KING EDWARD VI
HANDSWORTH GRAMMAR
SCHOOL FOR BOYS

KING EDWARD VI
ACADEMY TRUST
BIRMINGHAM

Year 8

2023 Mathematics 2024

Unit 9 Tasks – Part 1

DO NOT WRITE INSIDE

KING EDWARD VI
HANDSWORTH GRAMMAR
SCHOOL FOR BOYS

KING EDWARD VI
ACADEMY TRUST
BIRMINGHAM

Year 8

2023 Mathematics 2024

Unit 9 Tasks – Part 2

DO NOT WRITE INSIDE

KING EDWARD VI
HANDSWORTH GRAMMAR
SCHOOL FOR BOYS

KING EDWARD VI
ACADEMY TRUST
BIRMINGHAM

Year 8

2023 Mathematics 2024

Unit 9 Tasks – Part 3

DO NOT WRITE INSIDE

Contents

1 Proportion

Fluency Practice

1) At a steady speed, a car uses 70 litres of petrol to travel 210 km. At the same speed, what distance could be travelled on 10 litres?

2) It takes some bricklayers 90 hours to build a 360 m wall. How long will it take them to build a 36 m wall?

3) At a petrol station, 66 litres of petrol cost £72.60. Find the cost of 11 litres of petrol.

4) At a steady speed, a car uses 14 litres of petrol to travel 28 km. At the same speed, what distance could be travelled on 140 litres?

5) At a petrol station, 252 litres of petrol cost £320.04 . Find the cost of 28 litres of petrol.

6) It takes some bricklayers 6 hours to build a 36 m wall. How long will it take them to build a 180 m wall?

7) At a steady speed, a car uses 24 litres of petrol to travel 120 km. At the same speed, what distance could be travelled on 12 litres?

8) At a steady speed, a car uses 24 litres of petrol to travel 24 km. At the same speed, what distance could be travelled on 4 litres?

9) At a steady speed, a car uses 11 litres of petrol to travel 11 km. At the same speed, what distance could be travelled on 99 litres?

10) At a petrol station, 104 litres of petrol cost £128.96 . Find the cost of 13 litres of petrol.

Fluency Practice

Question 1: Keith buys 6 pencils for 90p

(a) How much does one pencil cost?
(b) How much would five pencils cost?
(c) How much would eleven pencils cost?

Question 2: Jack and Harry are waiters in a restaurant.
They are both paid the same amount of money for each hour that they work.
Jack worked 6 hours and is paid £48
Harry worked 8 hours.
How much money is Harry paid?

Question 3: A car travels 120 miles in 3 hours at a steady speed.

(a) How far does the car travel in 1 hour?
(b) How far does the car travel in 8 hours?

Question 4: A plumber charges £140 for a 4 hour job.

How much does the plumber charge for a 3 hour job?

Question 5: Seven candles cost £45.29

How much would 25 candles cost?

Question 6: £50 is worth €56

(a) How many euros is £1 worth?
(b) How many euros is £220 worth?

Question 7: If 24 marbles have a mass of 60g, what would the mass of 60 marbles be?

Question 8: Rebecca is making Chilli Con Carne.
Here is a list of ingredients to serve 6 people.

Rebecca wants to make enough Chilli Con Carne for 4 people.

How much of each ingredient does Rebecca need?

serves 6
1.2kg mince
420g tomatoes
3 chillies
600g kidney beans

Question 9: Oscar is making fish pie.
Here is a list of ingredients for 5 people.

Oscar wants to make enough fish pie for 6 people.

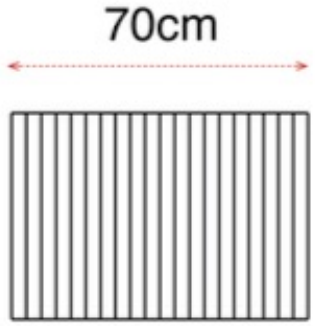
How much of each ingredient should Oscar use?

serves 5
500g cod
400g haddock
600ml milk
120g butter
40g flour
1kg potatoes

Question 1: On a map, 4cm represents 60 miles.
The distance between two towns is 37.5 miles.
On the map, what is the distance between the two towns?

Question 2: Nathan has 20 identical books on a shelf.
The books take up 70cm of space on the shelf.
Nathan removes seven books.

How much space do the remaining books take up?



Question 3: A car uses 8.4 litres of petrol for a 112 mile journey.
When the tank is full, the car holds 54 litres of petrol.

How far should the car be able to travel on a full tank of petrol?

Question 4: A 345ml tin of paint costs £4.80
A 250ml tin of paint costs £3.35
Which tin is better value for money?

Fluency Practice

learn by heart

Two values are in direct proportion if there is a constant multiplier between them.

Unlike ratios, values in proportion do not have to be the same type of quantity.

examples

1. A 50g carton of yoghurt contains 40 calories.
   How many calories are there in each of the following amounts of the same yoghurt?

   a) 100 grams

   50g has 40 calories
   ×2 ↓ ↓ ×2
   100g has **80** calories

   $40 \times 2 = 80$ **calories**

   b) 250 grams

   50g has 40 calories
   ×5 ↓ ↓ ×5
   250g has **200** calories

   $40 \times 5 = 200$ **calories**

2. Jenny buys 6 apples.
   The total cost is £1.50

   First divide to find the cost of a smaller number of apples.
   Use a common factor of the numbers of apples involved.

   a) Work out the cost for 9 apples

   6 apples cost £1.50
   ÷2 ↓ ↓ ÷2
   3 apples cost £ 0.75
   ×3 ↓ ↓ ×3
   9 apples cost £ 2.25

   b) Work out the cost for 5 apples

   6 apples cost £1.50
   ÷6 ↓ ↓ ÷6
   1 apple costs £ 0.25
   ×5 ↓ ↓ ×5
   5 apples cost £ 1.25

exercise

1. Complete the total costs for the stationery items.

   a) 4 pens cost £1.40
   8 pens cost £ ____

   b) 2 rulers cost £1.20
   6 rulers cost £ ____

   c) 10 erasers cost £2.50
   5 erasers cost £ ____

   d) 3 calculators cost £12.60
   1 calculator costs £ ____

   e) 2 protractors cost 90p
   12 protractors cost £ ____

   f) 5 compasses cost £6
   1 compass costs £ ____

   g) 1 pencil costs 30p
   8 pencils cost £ ____

   h) 4 pencil sharpeners cost £1.60
   40 pencil sharpeners cost £ ____

Fluency Practice

2. Jason can fill 3 glasses with 600ml of squash.
   Work out how many litres of squash Jason will need to fill 12 glasses.

3. Rianna pays £20 for 16 litres of petrol.

   a) How many litres of petrol would Rianna get for £10 ?

   b) How many litres of petrol would Rianna get for £30 ?

   c) How much would it cost to buy 1 litre of petrol?

4. Sarah pays £1.80 for 2.5kg of potatoes.

   a) Work out the cost of 5kg of potatoes.

   b) Work out the cost of 7.5kg of potatoes.

   c) Work out the cost of 500g of potatoes

5. Complete the total costs for buying multiple items from a shop.

   a) 2 drinks cost £3
      1 drink costs £ _____
      5 drinks cost £ _____

   b) 3 chocolate bars cost £1.80
      1 chocolate bar costs £ ____
      2 chocolate bars cost £ ____

   c) 6 sandwiches cost £9.60
      2 sandwiches cost £ _____
      8 sandwiches cost £ _____

   d) 12 buns cost £2.80
      6 buns costs £ _____
      18 buns cost £ _____

   e) 4 tins of beans cost £3
      __ tins of beans cost £ _____
      10 tins of beans cost £ _____

   f) 8 oranges cost £2.40
      __ oranges cost £1.20
      __ oranges cost £3.60

6. Jim uses 5 litres of soil to fill 8 flower pots.
   Work out how many litres of soil he will need to fill 12 flower pots.

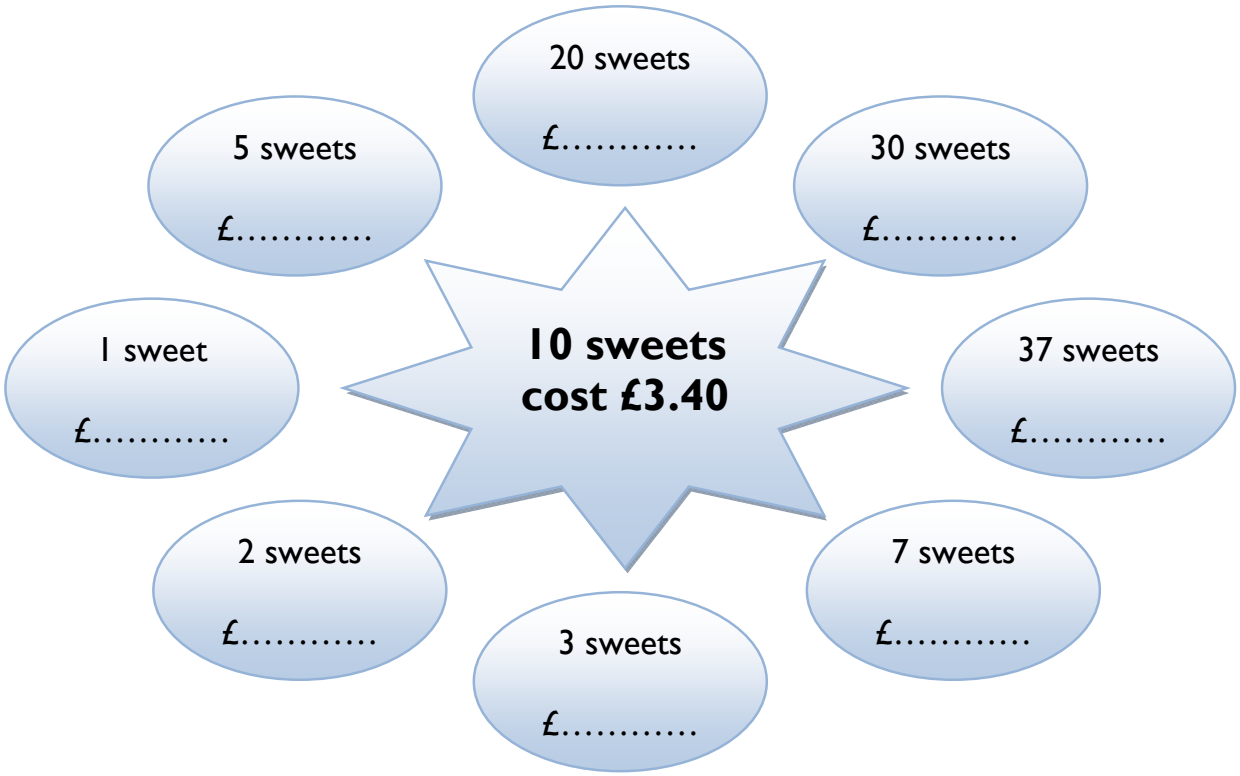
7. 1.5kg of meat costs £3.60. Work out the cost of 2.5kg of meat.

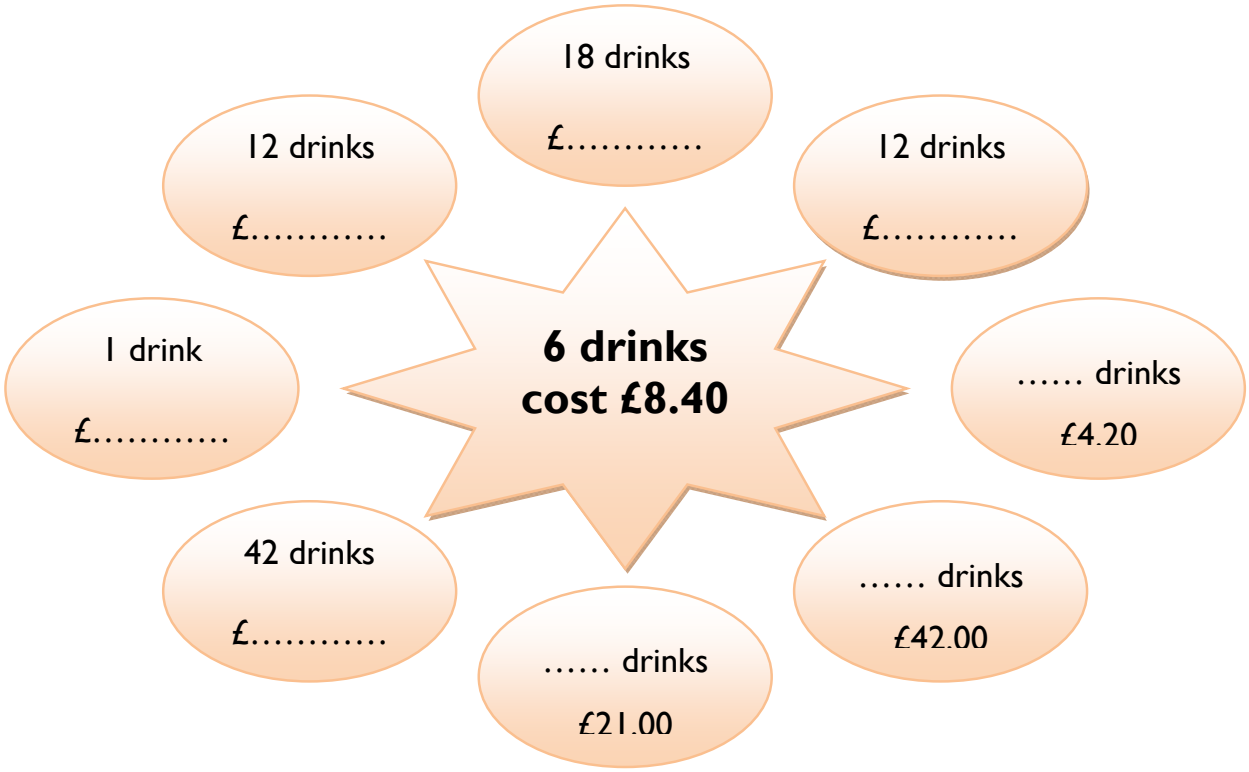
8. Lily can clean 6 hotel rooms in 2 hours.
   How long will it take for Lily to clean 8 hotel rooms?

9. 100g of apple contains 52 calories.
   100g of grapes contains 65 calories.
   A fruit pot contains 150g of apple pieces and 60g of grapes.
   Work out how many calories there are in the fruit pot.

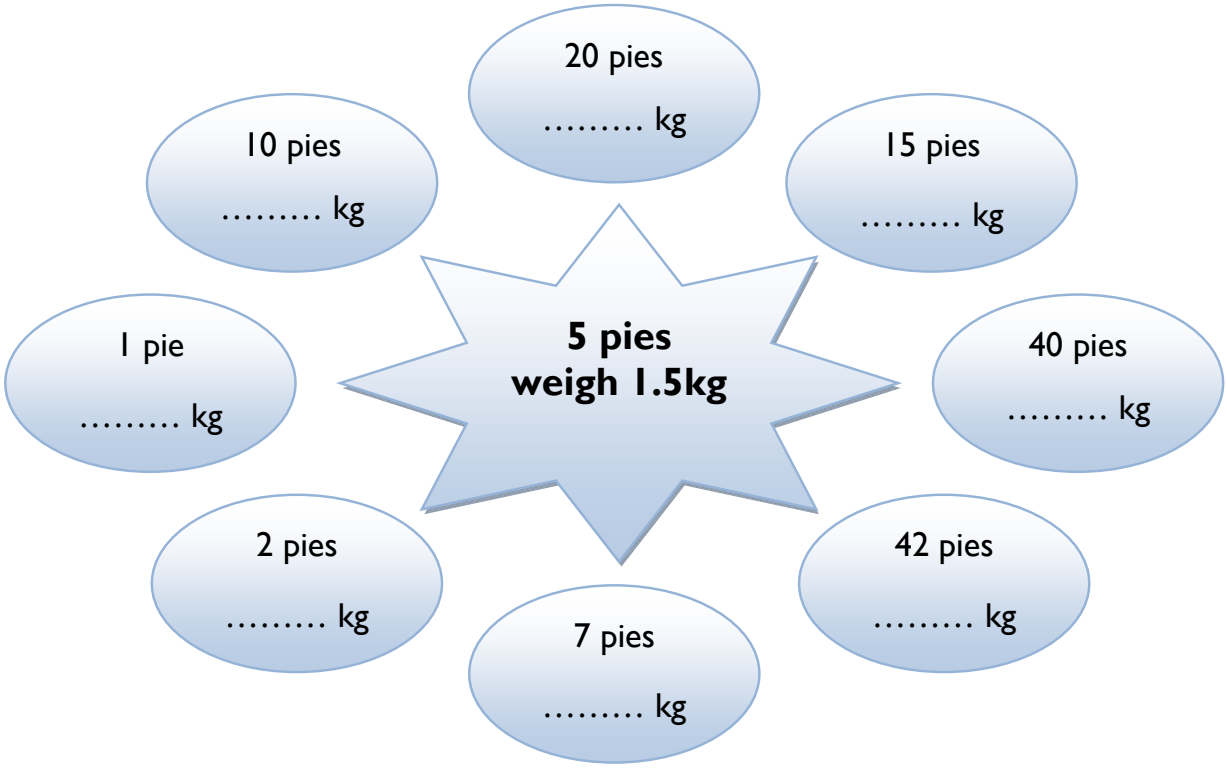
10. Josie mixes 6 litres of red paint with 15 litres of white paint to make a shade of pink.
    She has another 4 litres of red paint. Work out how many litres of white paint Josie should mix with this to make more of the same shade of pink.

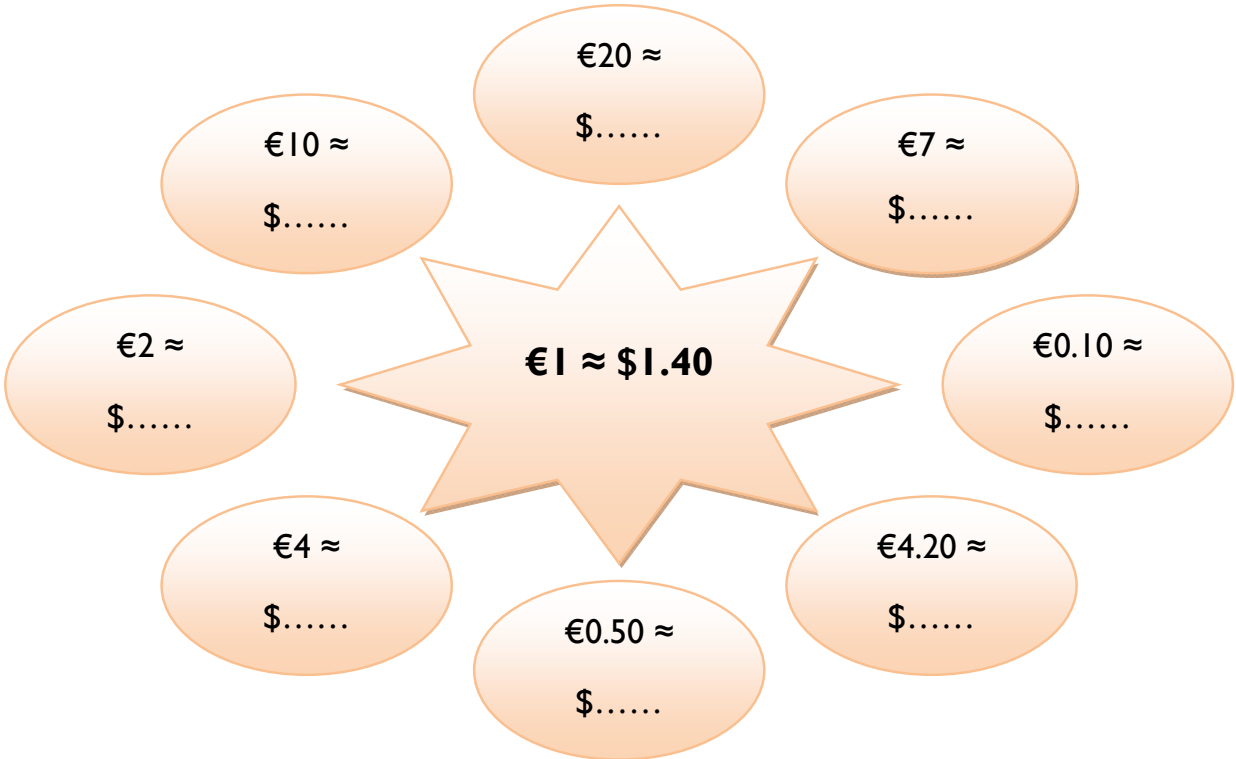
Fluency Practice





Fluency Practice





More-Same-Less

Instructions: Calculate the cost per pen in the middle box. Complete the remaining boxes changing as little as possible. Try and ensure your answer is a whole number of pence.

	Cost per pen		
	Less	Same	More
More			
Same		**7 pens cost £4.20**	
Less			

Number of pens

Fluency Practice

Question 1: Jake is making scones.
Here is a list of ingredients to make 8 scones.

8 Scones

200g flour
30g caster sugar
50g butter
140ml milk
1 egg

How much of each ingredient would be needed to make:

(a) 16 scones? (b) 4 scones? (c) 24 scones?

(d) 40 scones? (e) 80 scones? (f) 2 scones?

Question 2: Chloe is making ice cream.
She is using the recipe below.

serves 4

300ml double cream
320ml milk
120g caster sugar
1 vanilla pod
4 egg yolks

How much of each ingredient would Chloe need to make enough for:

(a) 8 people? (b) 2 people? (c) 1 person?

(d) 3 people? (e) 6 people? (f) 10 people?

Question 3: Rupert is making a fish pie.
He is using the recipe below.

serves 5

500g cod
400g haddock
600ml milk
120g butter
40g flour
1kg potatoes

How much of each ingredient would Rupert need to make enough for:

(a) 15 people? (b) 1 person? (c) 2 people?

(d) 4 people? (e) 8 people? (f) 11 people?

Extension

Question 1: Tia uses this recipes to make hot cross buns.
Tia is going to use this recipe to make 9 hot cross buns.

(a) How much of each ingredient does Tia need?

Grace uses the same recipe.
She uses 500ml of milk.

(b) How many hot cross buns is Grace making?

makes 12
480g flour
60g caster sugar
200ml milk
1 egg
50g butter
100g currant

Question 2: Timothy is making a Rice Krispie cakes.
A recipe uses 240g of chocolate and 160g of Rice Krispies to make 24 cakes.

(a) Write down the ratio of chocolate to Rice Krispies in its simplest form.

(b) How much Rice Krispies should Timothy use to make 30 cakes?

Question 3: Sarah is making shortbread biscuits.
She has:

600g of butter
300g of caster sugar
1kg of plain flour
500g of cornflour

She has found this list of ingredients for making 8 shortbread biscuits

makes 8

Butter	150g
Caster Sugar	60g
Plain Flour	200g
Cornflour	50g

Sarah wants to make as many shortbread biscuits as possible.
Work out how many shortbread biscuits Sarah can make.

Question 4: Rebecca has a recipe for Chilli Con Carne

She only has 400g of kidney beans

How much of the other ingredients should she use?

serves 6
1.2kg mince
420g tomatoes
3 chillies
600g kidney beans

Extension

Question 5: Heather is making chocolate biscuits.
She has:

2kg of flour
1kg of butter
340g of icing sugar
200g of chocolate

Here is the list of ingredients for making 20 biscuits.

makes 20

100g flour
120g butter
80g icing sugar
25g chocolate

Heather wants to make as many biscuits as she can.
Work out how many biscuits Heather can make.

Question 6: David has a full 800ml bottle of car shampoo.
He is going to mix some of the car shampoo with water.

The bottle has this guidance

Car Shampoo - 800ml

Mix $\frac{1}{4}$ of the car shampoo
with 1.8 litres of water

David is going to use 360ml of water.
How much car shampoo should David use?

Question 7: James is making concrete using cement, sand and gravel in the ratio 1 : 2 : 3
James has:

63kg cement
112kg sand
210kg gravel

What is the maximum amount of concrete that James can make?

Fluency Practice

example

The ingredients for making 10 pancakes are shown.

Ingredients to make 10 pancakes

2 eggs
150g flour
250ml milk

a) Work out the amount of each ingredient needed to make 15 pancakes.

	Eggs	Flour	Milk
10 pancakes	2	150g	250ml
5 pancakes	1	75g	125ml
15 pancakes	3	225g	375ml

(÷2, ×3 between 10 and 5 pancakes; ÷2, ×3 between 5 and 15 pancakes)

b) Jude has 6 eggs, 1.5kg of flour and 500ml of milk.
He makes as many pancakes as possible.
Which ingredient does Jude run out of first? How many pancakes has he made?

×3: 2 eggs for 10 pancakes → 6 eggs for 30 pancakes ×3

×10: 150g flour for 10 pancakes → 1500g flour for 100 pancakes ×10

×2: 250ml milk for 10 pancakes → 500ml milk for 20 pancakes ×2

Jude runs out of **milk** first, after he has made **20 pancakes**.

exercise

1. The row of each table shows the amount of ingredients needed for a recipe for the given number of servings. Complete each table.

a)

	Oats	Butter	Sugar	Syrup
12 flapjacks	240g	120g	90g	3 tablespoons
4 flapjacks	80g			
16 flapjacks	320g			

b)

	Flour	Butter	Sugar	Choc chips
25 cookies	275g	225g	110g	75g
5 cookies				
15 cookies				

Fluency Practice

2. Abby is going to make 50 shortbread biscuits.
The box shows the amount of ingredients required to make 20 shortbread biscuits.

a) Work out the amount of each ingredient Abby needs.

b) Abby already has 250g of butter.
How much more butter does she need?

Ingredients to make 20 shortbread biscuits

130g butter
60g sugar
180g flour

3. The box shows the amount of ingredients required to make enough mushroom soup to serve 4 people.
Brendan wants to make enough soup to serve 10 people.

a) Work out the amount of each ingredient Brendan needs.

b) A packet of mushrooms weighs 350g and costs 95p.
How much will it cost Brendan to buy all the mushrooms he needs for his soup?

Ingredients to make mushroom soup to serve 4 people

90g butter
2 onions
500g mushrooms
4 tablespoons cream

4. A recipe for biscuits says:

"Use three times as much flour as sugar,
and two times as much butter as sugar."

Jane uses 25g of sugar to make 8 biscuits.
How much sugar, flour and butter will she need to make 24 biscuits?

5. A recipe for making five servings of porridge is shown.

a) Alex uses the recipe with 900ml of milk.
How many servings of the porridge does Alex make?

b) Chris has 320g of oats and 3 litres of milk.

(i) Work out the greatest number of servings of the porridge Chris can make.

(ii) Which ingredient will Chris have left over, and how much will he have?

To make porridge to serve 5 people

Mix 200g of oats
with 1.5 litres of milk.

6. The box shows the amount of ingredients required to make 24 muffins.

a) Marie uses the recipe with 600g of flour.
How much sugar does Marie use?

b) Lisa has 500g of sugar, half a litre of milk, 300g of flour, 6 eggs and 100ml of vegetable oil.

Work out the greatest number of muffins Lisa can make.

Ingredients to make 24 muffins

240g sugar
300ml milk
400g flour
2 eggs
120ml vegetable oil

onion soup

onion soup recipe for **8** people:

10 onions
2 pints of water
4 vegetable stock cubes
2 dessertspoons butter
½ pint cream

(1) for **4** people
(a) how much water is needed?
(b) how many stock cubes are needed?
(c) how many onions?

(2) for **12** people
(a) how much water is needed?
(b) how many stock cubes are needed?
(c) how many onions?

(3) for **20** people
(a) how many onions are needed?
(b) how many stock cubes are needed?
(c) how much water is needed?

(4) how much cream is needed for
(a) 4 people?
(b) 12 people?
(c) 20 people?

pancakes

250 ml milk
1 egg
140 g flour
5g butter/fat

this recipe is enough for **8** pancakes

(i) how much milk is needed for **32** pancakes?
(ii) how much flour is needed for **20** pancakes?

apple crumble

90 g sugar
60 g butter/fat
80 g flour
6 apples

this recipe is enough for **4** people

how much of each ingredient is needed for **10** people?

trifle

120 g jelly
8 sponge fingers
420 ml custard
180 g tinned fruit

this recipe is enough for **4** people

(i) how much custard is needed for **6** people?
(ii) how much tinned fruit is needed for **7** people?

scones

225 g self raising flour
55 g butter
25 g caster sugar
150 ml milk

this recipe is enough for **10** scones

(i) how much flour is needed for **8** scones?
(ii) how much of each ingredient is needed for **6** scones?

Extension

Fluency Practice

Question 1: For each pair, decide which is better value for money.

(a) 1 ticket for £8 or 3 tickets for £20

(b) 1 sandwich for £2.50 or 2 sandwiches for £5.20

(c) 2 pizzas for £12 or 4 pizzas for £28

(d) 3 doughnuts for 60p or 6 doughnuts for £1

(e) 6 eggs for 96p or 12 eggs for £1.80

(f) 1 litre of milk for 67p or 2 litres of milk for £1.35

(g) 100g of ham for £1.20 or 300g of ham for £3.50

(h) 5kg of potatoes for £2.50 or 20kg of potatoes for £10.50

(i) 500ml of lemonade for 89p or 1 litre of lemonade for £1.70

Question 2: For each pair, decide which is better value for money.

(a) 2 croissants for 48p or 3 croissants for 75p

(b) 3 cupcakes for £1.05 or 5 cupcakes for £1.70

(c) 4 pens for £3.50 or 6 pens for £5

(d) 10 chocolate bars for £4.80 or 15 chocolate bars for £6.90

(e) 6 chicken wings for £3.50 or 9 chicken wings for £5.30

(f) 400g of porridge for £1.52 or 500g of porridge for £1.86

(g) 500ml of lemonade for 94p or 750ml of lemonade for £1.44

(h) 200 minutes of calls for £7 or 350 minutes of calls for £12.50

(i) 600g of honey for £4.25 or 1kg of honey for £6.99

Question 3: For each pair, decide which is better value for money.
You may use a calculator.

(a) 250 sheets of paper for £1.25 or 400 sheets of paper for £2.08

(b) 350g of coffee for £2.45 or 540g of coffee for £3.60

(c) 0.8kg of carrots for £1 or 1.3kg of carrots for £1.70

(d) 345ml of paint for £4.80 or 250ml of paint for £3.35

(e) 0.9 grammes of gold for $38.20 or 6.5 grammes for gold for $270

(f) A taxi journey of 8.7 miles for £17 or A taxi journey of 3.3 miles for £7

Extension

Question 1: Mr McClean wants to hire a taxi.
He rings three different taxi companies and asks them for their prices.

A1 Taxis: A 5 mile journey costs £15
Crazy Cabs: A 4 mile journey costs £13
Value Cars: A 10 mile journey costs £28

Order the taxi companies from best to least value for money.

Question 2: Bethany wants to buy 9 chairs.
Which shop is best value for money?

Question 3: Baked beans are sold in different sizes:
415g tin for 75p.
3 x 200g pack for £1.69.
1kg fridge pack for £2.39.
Which is best value for money?

Question 4: Flower pots normally cost £4 each.

Two shops have special offers.

Gardenbase
20% off

Lawn Factory
Buy 5 get 2 free

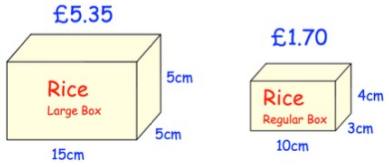
Laura wants to buy 30 flower pots.
Which shop should Laura buy them from?

Question 5: A cereal bar is sold in packs of 4, 6 or 8.

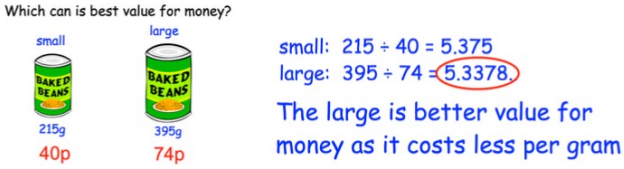
The 4 pack of cereal bars costs £1.80 and it is the least value for money.
The 8 pack of cereal bars cost £3.52 and it is the best value for money.

Work out (a) the lowest price of the 6 pack of cereal bar
(b) the highest price of the 6 pack of cereal bar

Question 6: A shop sells two different boxes of rice.
Work out which box is best value for money.



Question 7: Phil has completed his maths homework.
Can you spot any mistakes?



Fluency Practice

(a) 1000ml of lemonade costs 60p. 440ml of lemonade costs 35p. Which is better value for money?

(b) 95m of rope costs £7.40. 80m of rope costs £6.90. Which is better value for money?

(c) 5 litres of paint costs £3.40. 2 litres costs £1.60. Which is better value for money?

(d) Which is better value? 200 ml juice at 19p or 1.1 litre juice at 97p.

(e) Which is better value? 9m foil for 89p, 85cm foil for 8p, or 4m foil for 50p?

(f) The supermarket sells three sizes of shampoo. Which is the best value shampoo?

400ml	300ml	200ml
£3.59	£2.99	£2.19

(g) Plants are sold in three different sizes of tray.

A small tray of 30 plants costs £6.50.
A medium tray of 40 plants costs £8.95.
A large tray of 50 plants costs £10.99.

Kaz wants to buy the tray of plants that is the best value for money. Which size of tray of plants should she buy?
You must show all your working out.

(h) Ketchup is sold in three different sizes of bottle. A **small** bottle contains 342g of ketchup and costs 88p. A **medium** bottle contains 570g of ketchup and costs £1.95. A **large** bottle contains 1.5 kg of ketchup and costs £3.99. Which bottle is the best value for money?

Fluency Practice

learn by heart

If an item is for sale in two or more different sizes, you can work out which is better value for money using direct proportion.

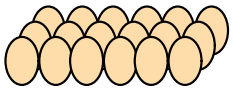
examples

If one size is a multiple of the other, find the cost of buying the larger quantity using smaller packs.

1. A pack of 6 eggs costs £1.30
   A pack of 18 eggs costs £3.75

   Which size pack gives better value for money?

Pack of 6 eggs
£1.30



Pack of 18 eggs
£3.75

18 ÷ 6 = 3

3 small packs give 18 eggs.

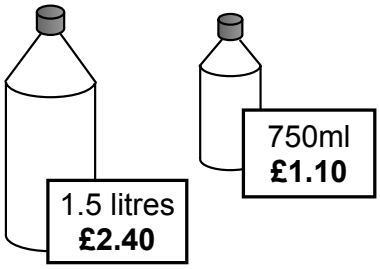
With **small packs**:

×3 (6 eggs cost £1.30 → 18 eggs cost **£3.90**) ×3

The **large** pack gives better value for money, **as the cost for 18 eggs is less** with a large pack (£3.75) than with small packs (£3.90).

2. A large bottle of lemonade (1.5 litres) costs £2.40
   A small bottle of lemonade (750ml) costs £1.10

   Which size bottle gives better value for money?



1.5 litres = 1500ml

1500 ÷ 750 = 2

2 small bottles contain 1.5 litres.

With **small bottles**,

×2 (750ml costs £1.10 → 1.5 litres cost **£2.20**) ×2

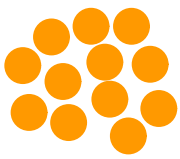
The **small** bottle gives better value for money, **as the cost for 1.5 litres is less** with small bottles (£2.20) than with a large bottle (£2.40).

exercise

1. Work out which quantity of each item is better value for money.

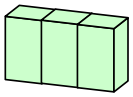
a) Oranges

Pack of 4
£1.20

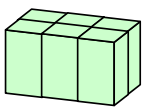


Pack of 12
£3.80

b) Apple juice



3 cartons
£1.65

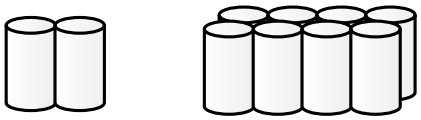


6 cartons
£2.95

Fluency Practice

2. Work out which quantity of each item is better value for money.

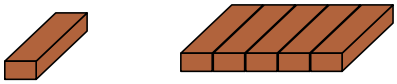
a) Kitchen roll



2 rolls
75p

8 rolls
£2.80

b) Chocolate



Single
60p

5 bars
£2.60

c) Shampoo

200ml
£2.20

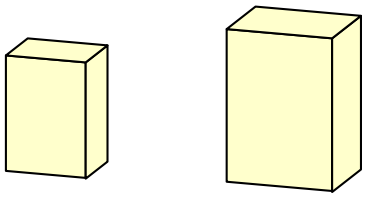
400ml
£4.50

d) Baked beans

450g
£2.50

150g
80p

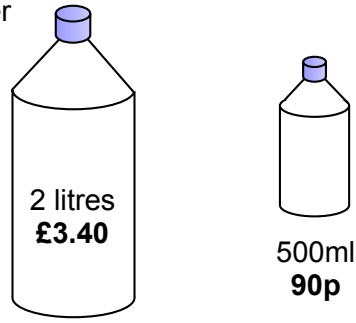
e) Cereal



750g
£1.90

1.5kg
£3.60

f) Water



500ml
90p

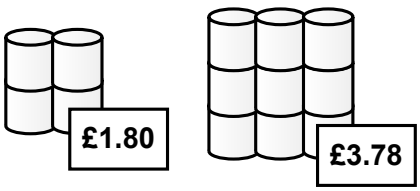
D Value for money 2

examples

Use direct proportion to find the cost of an equivalent amount for each size.

1. A pack of 4 toilet rolls costs £1.80
   A pack of 9 toilet rolls costs £3.78

   Which size pack gives better value for money?



Small pack

÷4 (4 rolls cost £1.80) ÷4
(1 roll costs £0.45)

Large pack

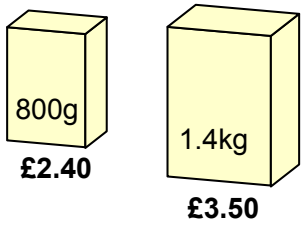
÷9 (9 rolls cost £3.78) ÷9
(1 roll costs £0.42)

*The **large** pack gives better value for money, **as the cost per roll is less** with a large pack (42p) than with a small pack (45p).*

Fluency Practice

2. A box containing 800g of cereal costs £2.40
   A box containing 1.4kg of cereal costs £3.50

   Which size box gives better value for money?



1.4kg = 1400g

A common factor of 800 and 1400 is **200**.

Small box

÷4 (800g costs £2.20) ÷4
(200g costs **£0.55**)

Large box

÷7 (1.4kg costs £3.50) ÷7
(200g costs **£0.50**)

The **large** box gives better value for money, **as the cost per 200g is less** with a large pack (50p) than with a small pack (55p).

exercise

1. Work out which quantity of each item is better value for money.

a) Plums

Pack of 4 **£1.20**

Pack of 6 **£1.65**

b) Juice

3 cartons **£1.35**

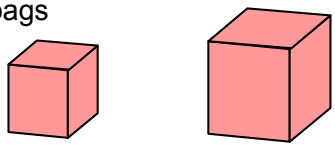
4 cartons **£1.92**

c) Fish fingers

Pack of 15 **£2.85**

Pack of 10 **£1.80**

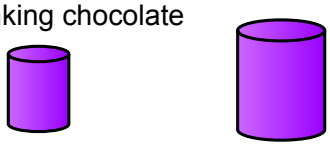
d) Tea bags



120 bags **£1.56**

200 bags **£2.60**

e) Drinking chocolate



150g **£2.10**

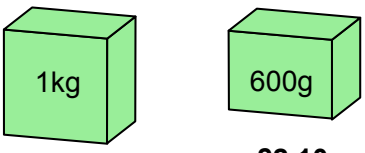
250g **£3.60**

f) Cola

330ml **66p**

250ml **40p**

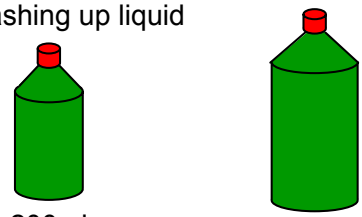
g) Washing powder



£3.80

£2.10

h) Washing up liquid



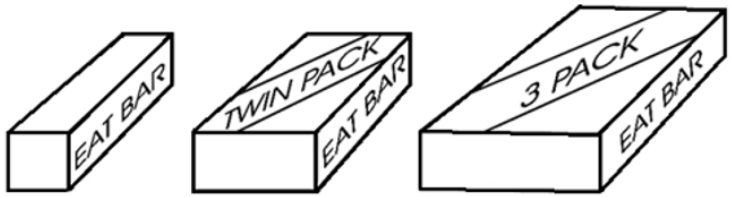
200ml **96p**

500ml **£2.30**

ratio

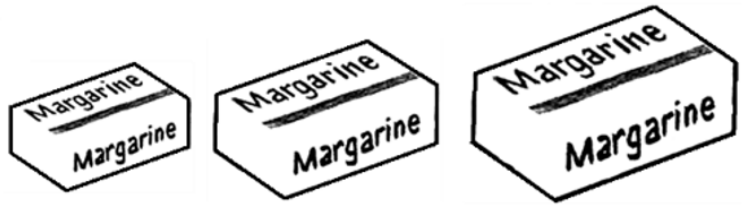
which is the best buy?

(1)



28p 52p 81p

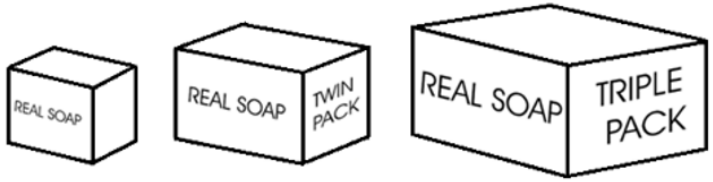
(2)



500g 1kg 2kg

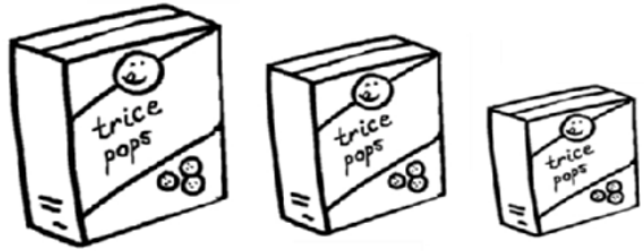
£1.25 £2.48 £4.98

(3)



83p £1.68 £2.50

(4)



500g 300g 200g

£2.21 £1.32 87p

Extension

£2.00
80 tea bags

£3.55
150 tea bags

£5.30
220 tea bags

what do each of these calculations tell you?

200 ÷ 80

355 ÷ 150

150 ÷ 3.55

530 ÷ 220

2 ÷ 8

5.30 ÷ 22

220 ÷ 5.30

80 ÷ 2.00

3.55 ÷ 15

Extension

Fluency Practice

Question 1: Given £1 = 5 złoty convert each of the following into Polish złoty

(a) £4 (b) £9 (c) £20 (d) £35 (e) £70 (f) £410 (g) £88

Question 2: Given £1 = 5 złoty convert each of the following into UK pounds

(a) 15 zł (b) 35 zł (c) 250 zł (d) 180 zł (e) 715 zł (f) 900 zł (g) 95 zł

Question 3: Given £1 = 25 Mexican Peso convert each of the following into Pesos

(a) £4 (b) £20 (c) £25 (d) £40 (e) £37 (f) £66 (g) £360

Question 4: Given £1 = 25 Mexican Peso convert each of the following into UK pounds

(a) $75 (b) $250 (c) $825 (d) $4000 (e) $9200 (f) $38000 (g) $1275

Question 5: Given £1 = $1.50 convert each of the following into US dollars.

(a) £3 (b) £5 (c) £7 (d) £20 (e) £40 (f) £50 (g) £100

Question 6: Given £1 = $1.50 convert each of the following into UK pounds

(a) $3 (b) $6 (c) $15 (d) $45 (e) $300 (f) $12 (g) $33

Question 7: Given £1 = ₺4.25 convert each of the following into Turkish lira.

(a) £9 (b) £15 (c) £9.60 (d) £73 (e) £853 (f) £9500 (g) 80p

Question 8: Given £1 = ₺4.25 convert each of the following into UK pounds.

(a) ₺29.75 (b) ₺76.50 (c) ₺110.50 (d) ₺2550 (e) ₺5100 (f) ₺0.85 (g) ₺4.59

Question 9: Given £1 = €1.28 convert each of the following into euros.

(a) £6 (b) £4.50 (c) £13 (d) £58 (e) £190 (f) £5730 (g) £809

Question 10: Given £1 = €1.28 convert each of the following into pounds.

(a) €64 (b) €153.60 (c) €1152 (d) €0.32 (e) €44.80 (f) €140.80 (g) €2.24

Extension

Question 1: Nicola went to Italy. She changed £800 into euros (€).
The exchange rate was £1 = €1.40
Change £800 into euros.

Question 2: A new TV in Tokyo costs ¥53380
The exchange rate is £1 = ¥157
How much is the TV in pounds?

Question 3: In Lisbon, a watch costs €80.
In Liverpool, the same watch costs £65.
The exchange rate is £1 = €1.25

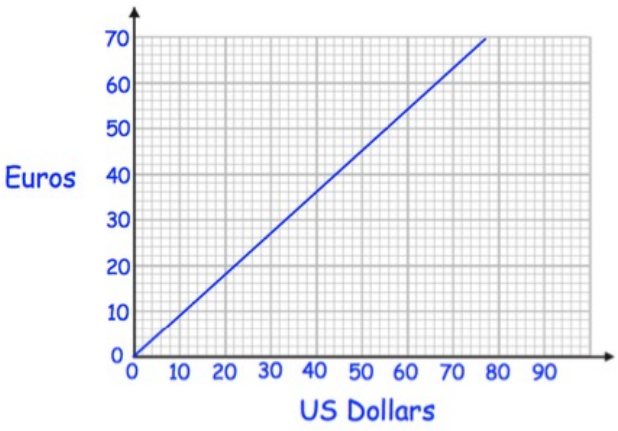
Work out the difference in cost.

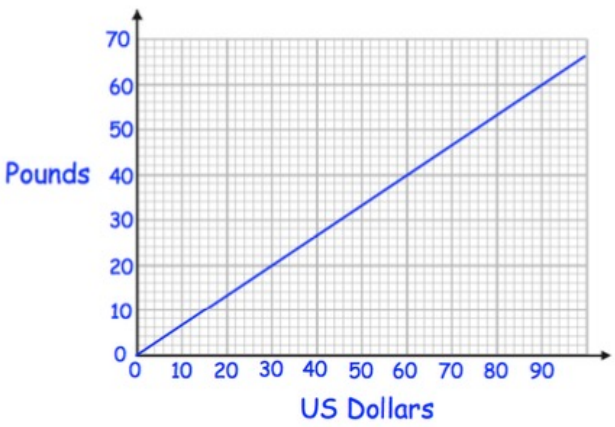
Question 4: Below are the prices of the same car in different countries.
£1 = €1.18 £1 = ¥140 £1 = $1.25

USA	Ireland	England	Japan
$20000	€17500	£15000	¥3000000

In which country is the car the best value?

Question 8: Convert £160 into Euros





Extension

Question 5: Martina wants to convert £300 into Euros.
The Post Office only has €20 notes.
The exchange rate is £1 = €1.17

(a) How many €20 notes will Martina receive?
(b) How much will it cost Martina?

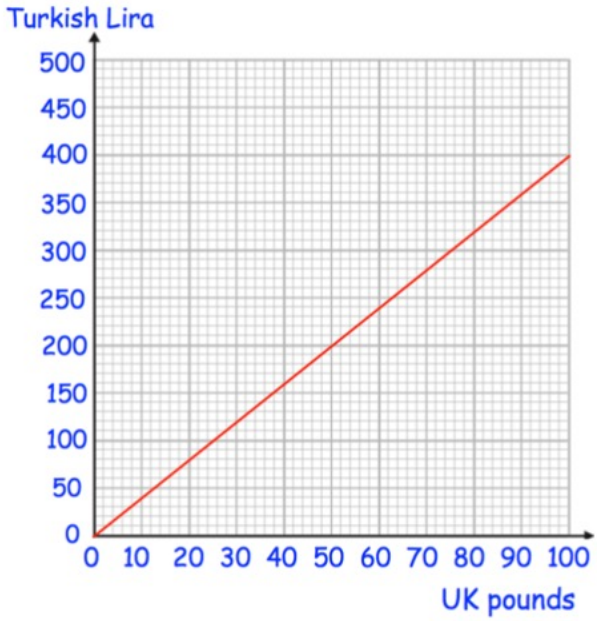
Question 6: Shown is a conversion graph to convert between GB pounds and Turkish lira.

(a) Convert £90 into Turkish lira.

(b) Convert 100 lira into pounds.

(c) Convert £250 into Turkish lira.

(d) Convert 800 lira into pounds.

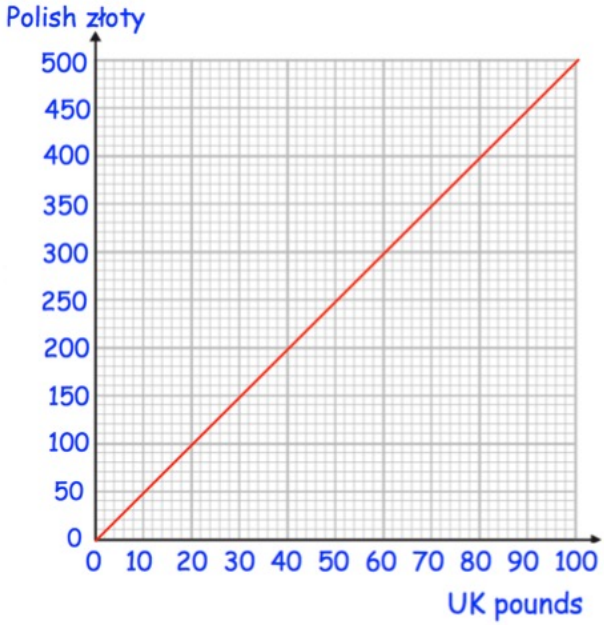


Question 7: Below is a conversion graph to convert between GB pounds and Polish złoty.

Jack has £400 and 1200 złoty
His hotel bill is 2000 złoty

He pays the bill with 1200 złoty and some of the pounds.

Work out how many pounds he has left.



Fluency Practice

1 UK pound = 1.17 Euros.
Complete the table.

UK Pounds	Euros
1	1.17
10	
	117
25	
	58.5
80	

1 US dollar = 74.3 Indian rupees
Complete the table.

US Dollars	Indian Rupees
1	74.3
15	
	600
65	
	1350

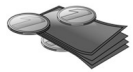
1 Euro = 109.74 Japanese yen
(a) A flight costs 225 euros. How much is this in Japanese yen?
(b) What is 175 Japanese yen in Euros?
(c) The same TV costs 265 euros in France and 30000 Yen in Japan. Which is cheapest?

1 US dollar = 31.85 Taiwan dollars
1 Taiwan dollar = 1.46 Indian rupees
(a) Convert 27.85 US dollars to Taiwan dollars.
(b) A mobile phone costs 10000 Indian rupees. How much is this in Taiwan dollars?
(c) What is 75 Indian rupees in US dollars?

FOREX

You are at Heathrow Airport, looking at the **FOR**eign **EX**change board.

We sell				We Buy	
£1	$ 1.27	USD	USA	$ 1 USD	£0.75
	€ 1.12	EUR	Europe	€ 1 EUR	£0.80
	$ 1.82	AUD	Australia	$ 1 AUD	50p
	¥ 136	JPY	Japan	¥ 1 JPY	0.6p
	¥ 9	CNY	China	¥ 1 CNY	£0.10
	K 120	KES	Kenya	K 1 KES	£0.08
	0.49	OMR	Oman	1 OMR	£1.73



Unlike many shops, every transaction is rounded to the cent (2 dp).

A) Tim is travelling to China.
He wants to exchange £200 into CNY. How many Yuan does he get?

B) Helen is travelling to Kenya.
She wants to exchange £50 into KES. How many Shillings does she get?

C) How many USD does £45 buy?

D) How many Japanese Yen does £122 buy?

E) How many KES does 40p buy?

F) Rashid wants to get rid of his British money before returning to Oman.
How many Rial does he get for £6.28?

G) Sophie has returned from Australia with $270 AUD.
How much GBP will she get?

H) Haurto has arrived from Japan and found ¥1200 in his pocket.
How much GBP can he exchange this for?

I) Sam is visiting a friend in France and only wants €300 spending money.
To the nearest £, how much should she exchange?

J) On arrival in Nairobi, Max will need 5500 KES for the visa.
How much GBP does he need to exchange to pay for this?

K) Jenny returns from the USA with $54.24
How many GBP can she exchange this for?

L) Bill returns from Oman with 5.27 OMR.
How many GBP can she exchange this for?

M) Lucy is travelling to America. She exchanges £260 but misses her flight!
If she exchanges her Dollars back to Pounds, how much will she get?
How much profit does the shop make?

N) If a customer exchanged £64.20 to Euros, then immediately exchanged these Euros for Pounds, how much money would they lose?

O) Richard is on a transfer, travelling from Kenya to Australia.
He has 4250 Kenyan Shillings but the shop won't change them directly to AUD, he has to buy GBP first. How many Dollars does he get?

P) Exchange 515 CNY to USD (you must convert to GBP first).

Q) Exchange €12.47 to JPY (you must convert to GBP first).

R) After exchanging her Euros, Kelly got £56
How many Euros did she exchange?

S) After exchanging his JPY, Doug got £150
How many Yen did he exchange?

T) A week ago Michael exchanged £450 and went on holiday to Italy.
He has returned and exchanged his remaining EUR for £30.
How many Euros did he spend on holiday?

U) Ash exchanged her Pounds to Dollars (Australian). She actually wanted US Dollars! She exchanged the money back to Pounds and then to USD. In all the fuss she missed her flight and had to change the USD into GBP! The exchange gave her £90.
How much money did she lose (not including the flight)?

Fluency Practice

1) In a school, 10 classrooms are required if each class has 30 pupils. How many classrooms would be required if the class size has reduced to 20 ?

2) 2 taps fill a tank in 44 hours. How long would it take to fill the tank if only 11 taps are working?

3) It takes 5 men 15 hours to dig some holes. How long would it take 3 men to dig the same holes?

4) 5 bricklayers can build a certain wall in 15 days. How long would it take 3 bricklayers to build it?

5) It takes 6 men 20 hours to dig some holes. How long would it take 5 men to dig the same holes?

6) In a school, 8 classrooms are required if each class has 30 pupils. How many classrooms would be required if the class size has reduced to 20 ?

7) It takes 3 men 20 hours to dig some holes. How long would it take 5 men to dig the same holes?

8) It takes 8 men 25 hours to dig some holes. How long would it take 5 men to dig the same holes?

9) In a school, 15 classrooms are required if each class has 32 pupils. How many classrooms would be required if the class size has reduced to 20 ?

10) 2 taps fill a tank in 18 hours. How long would it take to fill the tank if only 6 taps are working?

Fluency Practice

learn by heart

If two quantities are inversely proportional, when one of the quantities is multiplied by a value, the other is divided by the same value.

When the two quantities are multiplied, the result is always the same constant.

examples

1. Machines in a factory are being used to make an order of scarves.
   With 5 identical machines working, the order will be completed in 30 minutes.

   a) How long would it take to complete the order if 10 machines were used?

   ×2 ↘ 5 machines would take 30 minutes ↘ ÷2
   10 machines would take 15 minutes

   b) How long would it take to complete the order if 2 machines were used?

   ÷5 ↘ 5 machines would take 30 minutes ↘ ×5
   ×2 ↘ 1 machine would take 150 minutes ↘ ÷2
   2 machines would take 75 minutes

   75 minutes $\left(1\frac{1}{4} \text{ hours}\right)$

2. y is inversely proportional to x.
   Work out the missing values in the table.

x	5	2	
y	6		10

↓

x	5	2	3
y	6	15	10

Two inversely proportional quantities always multiply to the same constant.

Here you can work out that the constant is **30** from the first pair of values.

$5 \times 6 = 30$

$2 \times \_\_ = 30$

$\_\_ \times 10 = 30$

exercise

1. Using 6 pumps, it takes 4 hours to drain a pond of water. Complete the following:

a) 6 pumps would take 4 hours
12 pumps would take ___ hours

b) 6 pumps would take 4 hours
3 pumps would take ___ hours

c) 6 pumps would take 4 hours
1 pump would take ___ hours

d) 6 pumps would take 4 hours
2 pumps would take ___ hours

Fluency Practice

2. With 8 construction workers, a road can be built in 12 days. Complete the following:

a) 8 workers would take 12 days
4 workers would take ___ days

b) 8 workers would take 12 days
16 workers would take ___ days

c) 8 workers would take 12 days
2 workers would take ___ days
6 workers would take ___ days

d) 8 workers would take 12 days
1 worker would take ___ days
3 workers would take ___ days

3. A farmer has a store of food, that can feed 12 sheep for 15 days.

   a) For how many days would he be able to feed 6 sheep with the store of food?

   b) For how many days would he be able to feed 18 sheep with the store of food?

4. At a speed of 600mph, it takes a plane 3 hours to travel between London and Berlin.

   a) How long would the journey take at a speed of 200mph?

   b) To complete the journey in $1\frac{1}{2}$ hours, at what speed would a plane need to travel?

5. It takes 1 hour and 20 minutes to fill a pool using 4 taps.
   Work out how long it would take with 5 taps.

6. With a team of 3 workers, a wall can be built in $7\frac{1}{2}$ hours.
   Work out how long it would take with 5 workers.

7. Complete each table, in which x and y are inversely proportional.

a)

x	4	3		24
y	6		12	

b)

x	12		3	
y	5	10		2

c)

x	8	10		1.6
y	5		8	

d)

x	6	4		10
y	8		15	

8. A company director has an amount of money to give to his staff as bonuses.
   The company has 5 office workers and 15 warehouse workers.
   If the money is shared equally between the warehouse workers, each receives £120.

   a) If the money is instead shared equally between the office workers, how much will each office worker receive?

   b) If the money is instead shared equally between the office workers and the warehouse workers, how much will each worker receive?

Proportional or Not?

Direct Proportion: When one variable increases so does the other.
Inverse Proportion: When one variable increases the other *decreases*.

1) Decide if these real-life situations describe **directly proportional** or **inversely proportional** relationships.
How might they **not** be proportional?

Peter rides 20 km in an hour.
How far will he travel in 3 hours?

Jan gets paid £30 for 2 hours' work.
How much will she get paid for 3 hours' work?

It takes Jack and Joe 3 hours to build a wall.
How long would it take 3 people to build the wall?

A 4-person band can play the song 'Wonderwall' in 3 minutes.
How long would it take a 3-person band to play the song?

Ash invests £200 and gets 3% interest per year.
How much will she have after 5 years?

A PC with 2GB of RAM can load a game in 1 minute.
How long would it take a PC with 6GB of RAM to load the game?

3 kg of dog food costs £9.
How much does 30 kg of dog food cost?

Heidi can eat 3 mini-pizzas in 30 minutes.
How long would it take Heidi to eat 50 mini-pizzas?

A construction crew can build a single floor of a building in 1 month.
How long will it take to build a 20-floor building?

A taxi charges £3 pick-up fee and £2 per mile.
How much will it cost to travel 10 miles?

3 machines can make 120 widgets in 2 hours.
How long does it take 5 machines to make 200 widgets?

2) For the proportional relationships, calculate an answer.

Fluency Practice

Machines	Proportion	Time
15	100%	8 hours
15	?	4 hours

Machines	Proportion	Time
15	100%	8 hours
?	100%	4 hours

Machines	Proportion	Time
15	100%	8 hours
15	?	6 hours

Machines	Proportion	Time
15	100%	8 hours
?	100%	16 hours

Machines	Proportion	Time
15	100%	8 hours
15	?	1 hours

Machines	Proportion	Time
15	100%	8 hours
?	100%	40 hours

Machines	Proportion	Time
15	100%	8 hours
15	25%	?

Machines	Proportion	Time
15	100%	8 hours
5	100%	?

Machines	Proportion	Time
15	100%	8 hours
15	10%	?

Machines	Proportion	Time
15	100%	8 hours
3	100%	?

Machines	Proportion	Time
15	100%	8 hours
15	10%	?

Machines	Proportion	Time
15	100%	8 hours
150	10%	?

Machines	Proportion	Time
15	100%	8 hours
15	50%	
5	50%	?

Machines	Proportion	Time
15	100%	8 hours
	50%	
9	50%	?

Machines	Proportion	Time
15	100%	8 hours
15	50%	?
30	50%	

Machines	Proportion	Time
15	100%	8 hours
	25%	
10	25%	?

Machines	Proportion	Time
15	100%	8 hours
15	25%	
3	25%	?

Machines	Proportion	Time
15	100%	8 hours
20	75%	?

Machines	Proportion	Time
15	100%	8 hours
15	25%	
12	25%	?

Machines	Proportion	Time
15	100%	8 hours
12	20%	?

20 machines work at the same rate.
Together, the 20 machines can complete an order in 12 hours.
18 of the machines break down after 3 hours.
The other machines carry on working until the order is complete.

Machines	Proportion	Time
20	100%	12 hours
20	25%	3 hours
20	75%	
2		

20 machines work at the same rate.
Together, the 20 machines can complete an order in 12 hours.
16 of the machines break down after 3 hours.
The other machines carry on working until the order is complete.

Machines	Proportion	Time
20	100%	12 hours
20	25%	3 hours
4		

20 machines work at the same rate.
Together, the 20 machines can complete an order in 12 hours.
5 of the machines break down after 3 hours.
The other machines carry on working until the order is complete.

Machines	Proportion	Time
20	100%	12 hours
15		

20 machines work at the same rate.
Together, the 20 machines can complete an order in 12 hours.
5 of the machines break down after 9 hours.
The other machines carry on working until the order is complete.

Machines	Proportion	Time

20 machines work at the same rate.
Together, the 20 machines can complete an order in 12 hours.
8 of the machines break down after 9 hours.
The other machines carry on working until the order is complete.

Machines	Proportion	Time

20 machines work at the same rate.
Together, the 20 machines can complete an order in 12 hours.
8 of the machines break down after 4 hours.
The other machines carry on working until the order is complete.

Machines	Proportion	Time

(a)	(b)	(c)	(d)
Four highlighter pens cost £3.16. What is the cost of 7 highlighter pens?	A cake recipe for 5 people uses 45g of sugar and 120g of flour. How much sugar and flour is needed to make a cake for 8 people?	Three volunteers take 8 days to build a wall. If four volunteers were to build the same wall, how long would it take?	Which is better value for money – 4 packs of tissues for £1.15 or 9 packs of tissues for £2.50?
(e)	**(f)**	**(g)**	**(h)**
If a van travels at 60 km/h, it completes the journey in 25 minutes. How long will the journey take if the van travels at 20 km/h?	1kg of carrots costs 65p. How much would it cost for 600g of carrots?	Six bars of chocolate costs £1.15. Five bars of chocolate costs 95p. Which is the better value for money?	It takes 40 minutes for 4 hosepipes to fill a pool. How long would it take to fill the pool if five hosepipes were used?
(i)	**(j)**	**(k)**	**(l)**
It takes four hours to re-turf a lawn with an area of 20 m^2. How long would it take to re-turf a lawn with an area of 35 m^2?	Hari buys enough food to feed his two hamsters for 9 days. He then adopts another hamster. How many days will his hamster food last now?	It takes a team of 4 builders 15 days to build a garage. If the garage needs to be completed in six days, how many more builders are required?	A recipe for 8 pancakes requires 2 eggs and 120g flour. Marcia has 6 eggs and 300g flour. How many pancakes can she make?

(a)	(b)	(c)	(d)
There are 40 pens and 15 pencils in a pot. Write down the ratio of pens to pencils in its simplest form.	There are 60 adults and 12 children on a bus. Write the ratio of adults to children in the form $n:1$	1 Euro is equivalent to £1.20. Convert 220 Euros into Pounds.	A table has width $80\ cm$ and length $1.96\ m$. Write the ratio of the width to length in the form $1:n$.
(e)	**(f)**	**(g)**	**(h)**
A soup recipe which serves 5 people requires $175g$ of carrots. Work out the amount of carrots required to make soup which serves 12 people.	The ratio of red sweets to green sweets in a jar is $7:2$. If there are 18 green sweets, how many red sweets are there?	Work out the largest share when £425 is divided in the ratio $9:8$.	Amjit, Bella and Chris share $\$1250$ in the ratio $6:8:11$. Work out how much Chris receives.
(i)	**(j)**	**(k)**	**(l)**
Which is better value for money – 4 cakes for £1.25, 5 cakes for £1.49 or 6 cakes for £1.89?	In a jumble sale, Del, Eric and Fajar earned some money in the ratio $6:9:5$. Eric earned £36 more than Del. How much did Fajar earn?	The ratio of black squares to grey squares is $7:3$. The ratio of white squares to grey squares is $9:5$. Find the ratio of black squares to white squares in its simplest form.	The ratio of counters in bag A to bag B is $7:2$. Five counters are taken from bag A and added to bag B. The ratio of counters in bag A to bag B is now $8:3$. Find the number of counters now in bag A and in bag B.

Fluency Practice

(a) Three pens cost 15p. How much do 7 pens cost?

(b) Four ice creams cost 80p. How much do nine ice creams cost?

(c) Typing four pages takes 24 minutes. How long does it take to type 13 pages?

(d) Jim walks three miles in 45 minutes. How long does it take for him to walk 5 miles?

(a) 5 boxes of cereal weigh 800g. How much do 11 boxes of cereal weigh?

(b) A car travels 175 miles in 5 hours. How far does it travel in 7 hours?

(c) Julie runs 5 km in 25 minutes. How long does it take her to run 8.5 km?

(d) Larry earns £29.60 for four hours work. How much would he earn for 7.5 hours work?

(a) A call centre job pays £55.38 for working a 6 hour day. A receptionist job pays £76.80 for working an 8 hour day. Which job pays the better hourly rate?

(b) At Aldi, 8 tomatoes cost £1.44, whereas at Lidl 6 tomatoes cost 96p. Which shop is better value for money?

(c) A corner shop charges £1.85 for 4 pints of milk. A petrol station charges 49p for 1 pint of milk. A supermarket charges £1.05 for 2.5 pints of milk. Which is better value for money?

(a) Fred takes 40 minutes to walk two dogs. How long does it take Fred to walk three dogs?

(b) A choir with 8 members sings Ave Maria in 5 minutes. How long does it take a choir with 10 members to sing the same song?

Fluency Practice

(a) 4 bottles of cola cost £3.60. How much do 9 bottles of cola cost?

(b) 5 jars of coffee cost £9. How much do 4 jars cost?

(c) 8 bottles of washing up liquid cost £12. How much will 5 bottles cost?

(d) 3 rolls of Sellotape cost £2.40. How much will 5 rolls of Sellotape cost?

(e) It takes 4 people 2 days to paint a wall. How long would it take if 8 people painted the wall?

(f) It takes 14 hours for a tap with a flow of 18 litres per minute to fill a reservoir with water. How long will it take if its flow is reduced to 7 litres per minutes?

(g) If 6 builders take 80 days to build a house. How many builders must be employed to build the house in just 16 days?

(h) One kilogram of cheese costs £9.68 Chris buys 650 g of this cheese. How much does he pay?

(i) On 1st May 2012, the cost of 5.7 grams of gold was 15 960 rupees. Work out the cost, in rupees, of 4.6 grams of gold on the same day.

(j) 4 people take 3 hours to paint a fence. How long would it take 5 people to paint the same fence? Give your answer in hours and minutes.

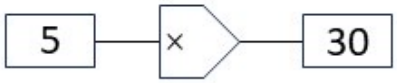
(k) Sam and two friends put letters in envelopes on Monday. The three of them take two hours to put 600 letters in envelopes. Working at the same rate, how much longer would it take four people to put 1000 letters in envelopes than it would take five people?

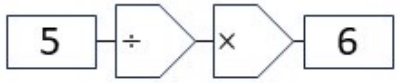
Direct Proportion

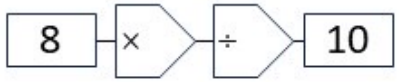
Direct Proportion

1. Factual recall

Complete the function machines







2. Carry out a routine procedure

The following tables follow a direct proportion, fill in the missing values

x	0	2	4		12
y		8		24	

x	1	2	5		11
y			15	21	

x	2	3		9	
y			21	27	42

3. Classify some mathematical object

Tick the scenarios that follow a direct proportion

The number of sweets bought at a shop and the price.	
The ages of a brother and a sister.	
The number of builders and the time to complete a building	
The speed of a runner and the distance the runner travels.	

4. Interpret a situation or answer

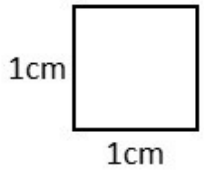
8 pens at a shop cost £2.40.
Calculate the cost of...

a) 16 pens
b) 36 pens
c) 111 pens

5. Prove, show, justify

The following table represents the length and perimeter of a square. By filling in the table show that the length of a square is directly proportional to the perimeter of the square.

l	1	2	5	10	20
P					



6. Extend a concept

Now fill in this table for the area of the squares.

l	1	2	5	10	20
A					

Is the area of the square directly proportional to its length?

7. Construct an instance

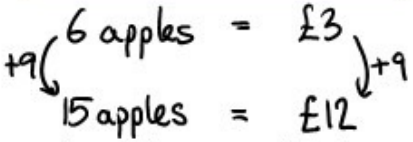
Construct 3 different ways of solving the following problem.

6 cans of soda cost £3.60, find the price of 20.

8. Criticise a fallacy

A student answers the following question.

6 apples cost £3.
Find the price of 15 apples.



Is the student correct? Explain.

① **Prices**

A) At the supermarket, 3 apples cost £1.20
How much do 7 apples cost?

Apples	1	2	3	6	**7**
Price			120		

B) Jeff buys 8 doughnuts for his friends and pays £2
If Jeff bought 11 doughnuts, how much will he pay?

Dough.	1	2	4	8	10	**11**
Price						

Best Buys

C)

At BestCo **8 pies** cost £3.20

At Mega Mart **20 pies** cost £7

At Supa-Save Mart **30 pies** cost £9.60

Which shop is cheaper?

BestCo

Pies	1	2	4	**8**
Price				320

Mega Mart

Pies	1	5	10	**20**
Price				

Supa-Save

Pies	1	2	3	**30**
Price				960

Recipes

D)

To make **20 mini-onion pizzas**, we need these ingredients:

600 grams of onions
700 grams of flour
300 grams of tomatoes
460 grams of cheese

Find how much of **each ingredient** we need to make **24 mini-pizzas.**

Mini-Pizzas	1	2	4	20	24
Onions (g)				600	
Flour (g)				700	
Tomatoes (g)				300	
Cheese (g)				460	

Exchange Rates

E) For **£1** you can buy **6.1 Malaysian Ringgit** (the currency in Malaysia).

£1 = 6.1 Malaysian Ringgit

Complete the ratio table to show how many Ringgit you can get for £80

British £	1	10	20	40	80
Ringgit	6.1				

F)

£1 = 11.6 Swedish Krona

Complete the ratio table to show how many Krona you can get for £25

British £	1	5	10	20	25
Krona	11.6				

② **Prices**

A) 16 tins of beans cost £6.88
How much do 10 tins cost?

Tins	1	2	4	8	10	16
Price						688

B) 30 pencils cost £3.90
How much do 25 pencils cost?

Pencils	1	2	3	10	20	25	30
Price							390

Best Buys

At SuperMart **60 protractors** cost £16.20

At Big Box **25** cost £5.75

At BestCo **36** cost £8.64

C

Which shop is cheaper?

SuperMart

Prot.	1	2	3	6	**60**
Price					1620

Big Box

Prot.	1	2	5	10	**25**	50
Price						

BestCo

Prot.	1	3	9	18	**36**
Price					

D **Recipes**

To make **40 'to-go' Pasta Pots**, we need these ingredients:

2.2 kg of pasta
1.04 kg of sauce
480 grams of chopped veg.
300 grams of spice

Find how much of **each ingredient** we need to make **45 pots.**

Mini-Pizzas	1	2	4	40	45
Pasta (g)					
Sauce (g)					
Veg (g)					
Spice (g)					

E **Exchange Rates**

For **£1** you can buy **48 Taiwanese Dollars** (the currency in Taiwan).

£1 = 48 Taiwan Dollar

Complete the ratio table to show how many Dollars you can get for £6.50

British £	0.5	1	2	4	6.50
Dollars		48			

F

£1 = 24.2 South African Rand

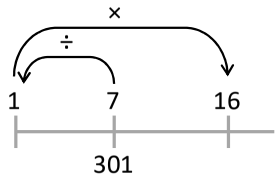
Complete the ratio table to show how many Rand you can get for £60.50

British £	0.5	1	3	30	60	60.50
Rand						

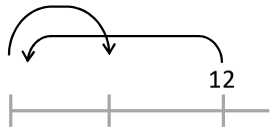
①

Prices

A) 7 pens cost £3.01
How much do 16 pens cost?



B) 12 mini-pizzas cost £22.32
How much do 5 pizzas cost?



C) 6 pasties cost £8.70
How much do 10 pasties cost?

D) 12 pork pies cost £10.68
How much do 9 pies cost?

Best Buys

E) A packet of 10 protractors costs £3.40
A packet of 25 protractors costs £7.25

Which packet size is cheaper **per protractor**?

	1	
340	10	
	25	725

F) At **Mega-Mart** Mark buys
12 cookies for £6.96

At **Go Save** Abe buys
20 cookies for £12.60

Tif wants to buy 30 cookies (for friends).

How much will that cost
at the cheaper store?

	1	
	12	
	20	
	30	

Recipes

G) A recipe for 5 rolls says we need 227 g of flour.

If we want to make 30 rolls,
how much flour do we need?

×	
5	30
227	

H) A recipe for 9 cupcakes says we need 324 g of sugar.

If we want to make 15 cupcakes,
how much sugar do we need?

× ÷		
	9	15

I) If we need 420 ml of milk for 15 pancakes, how much milk do we need for 25 pancakes?

J) If 189 g of sugar is in 18 cans of soda, how much sugar is in 7 cans?

Exchange Rates

£1 = ฿43 — 1 British Pound is worth 43 Thai Baht

K) Complete these currency conversions.

£25 = ฿
£3.50 = ฿
55p = ฿
฿400 = £
฿230 = £
฿35 = £

£1 = $1.4 — US Dollar

£1 = ¥146 — Japanese Yen

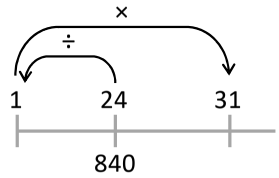
L) Jess is travelling from Wales to Japan. She exchanges £350 into Yen. She comes home with 17520 Yen.

How many British pounds did she spend in Japan?

She converts the Yen into Pounds and then into Dollars.
How many dollars does she have for her trip to the USA?

② **Prices**

A) 24 protractors cost £8.40
How much do 31 protractors cost?



B) 5 pencils cost 85p
How much do 32 pencils cost?

C) 40 rulers cost £19.20
How much do 12 rulers cost?

D) 32 calculators cost £207.04
How much do 10 calculators cost?

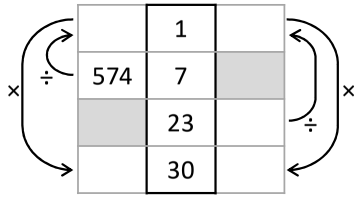
Best Buys

E) At **Mega-Mart** Ahmed buys 7 candy bars for £5.74

At **Go Save** Jay buys 23 candy bars for £17.25

Si wants to buy 30 candy bars.

How much will that cost at the cheaper store?



F) At **Mega-Mart** Rahul buys 15 cupcakes for £14.40

At **Go Save** Emma buys 26 cupcakes for £26.78

Trey wants to buy 18 cupcakes.

How much cheaper is it to buy these at the cheaper store?

Recipes

G)

28 Mini-cakes
728 g of butter
490 g of sugar
2.7 kg of flour

Find the ingredients needed to make 35 cakes.

1	28	35

H)

40 Flapjacks
328 g of toffee
560 g of sugar
2.25 kg of oats

Find the ingredients needed to make 15 flapjacks.

Exchange Rates

£1 = $1.43 — 1 British Pound is worth 1.43 USA dollars.

I) Complete these currency conversions.

£52 = $ $200 = £
£13.50 = $ $25.50 = £
87p = $ 58 cents = £

£1 = KD 0.42 Kuwaiti Dinar

£1 = R19.56 South African Rand

J) Ken buys a laptop in Kuwait. He spends KD 165.

Ben buys the same model laptop IN South Africa for 7432 Rand.

As a percentage,
how much more did one person pay for the laptop?

2 Averages and Range

Intelligent Practice

Find the range of:

1) $1, 1, 3, 5, 10$

2) $2, 2, 4, 6, 11$

3) $4, 4, 8, 12, 22$

4) $4, 4, 8, 12, 20$

5) $4, 4, 8, 10, 20$

6) $1, 4, 8, 10, 17$

7) $0.1, 0.4, 0.8, 1.7$

8) $-1, -4, -8, -10, -17$

Fluency Practice

Question 1: Find the range for each of the following

(a) 5, 9, 1, 5, 7, 4, 3 (b) 6, 7, 10, 8, 9, 9 (c) 21, 15, 19, 24, 30, 26

(d) 210, 250, 260, 180, 240 (e) 6.2, 7.3, 8.8, 1.5, 4.1 (f) 3, 1, 2, 1, 3, 4, 5, 0, 1

(g) −5, 1, 3, 6, −8, 1 (h) −6, −10, −2, −9 (i) 0, 7, 9, −21, 10, −4

(j) 7, 9, −2, 13, 9, 8, 20, −8, 1 (k) −10, −6, −15, −9, −8, −7, 8, −3

Question 2: The range for a list of numbers is 7. The smallest value is 4.
What is the largest value in the list?

Question 3: The range for a list of numbers is 8. The largest value is 13.
What is the smallest value in the list?

Question 4: The range for a list of numbers is 1. The largest value is 4.
What is the smallest value in the list?

Question 5: The range for a list of numbers is 27. The smallest value is 87.
What is the largest value in the list?

Question 6: The number of points that Randalstown Rugby Club scored in eight matches are 24, 17, 19, 35, 9, 43, 15, 30.

(a) Work out the range of the number of points scored.

(b) Work out the median of the number of points scored.

Question 7: The table shows the midday temperature over five days.
Each temperature is in degrees celsius.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature	-4	1	-6	1	-2

(a) Work out the range of the temperatures.

(b) Work out the mean temperature.

Intelligent Practice

Find the mode of:

1) $10, 5, 3, 1, 1$

2) $1, 1, 3, 5, 10$

3) $2, 2, 6, 10, 20$

4) $2, 2, 6, 10, 6$

5) $2, 2, 6, 10, 6, 10$

6) $2, 2, 6, 10, 6, 2$

7) $2, 3, 6, 10, 5, 1$

8) $2, 2, 2, 2, 2, 2$

Fluency Practice

Question 1: Work out the mode for the each of the following

(a) 5, 6, 6, 7, 8, 10

(b) 1, 1, 1, 4, 6, 8, 12

(c) 5, 5, 7, 7, 7, 8, 8, 9

(d) 5, 7, 3, 5, 8, 9, 10, 2

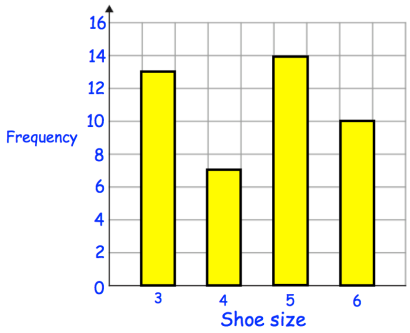
(e) 8, 3, 3, 4, 6, 8, 13, 3, 18

(f) 12, 14, 15, 17, 15

(g) 2.3, 2.6, 2.8, 2.7, 2.8, 2.7, 2.4, 2.3, 2.1, 2.3

(h) −2, −1, 5, 8, −2, 2, −1, 9, −1, 1, 2, −1

Question 2: The bar chart shows the shoe sizes of a group of students.



(a) How many students in total are there?

(b) What is the modal shoe size?

Question 3: Work out the mode for the each of the following

(a) 8, 1, 1, 7, 2, 1, 5, 9, 4, 1, 5, 5, 9, 6, 4, 3, 2, 3, 1, 1, 9, 8, 7, 3, 2, 4, 5, 1, 1, 9, 1

(b) 8, 9, 7, 3, 4, 7, 9, 3, 4, 5, 1, 2, 2, 1, 3, 0, 0, 8, 1, 4, 7, 8, 6, 6, 3, 3, 3, 1, 3, 3, 5

Question 4: The tally chart shows the favourite sport of the students in a class.

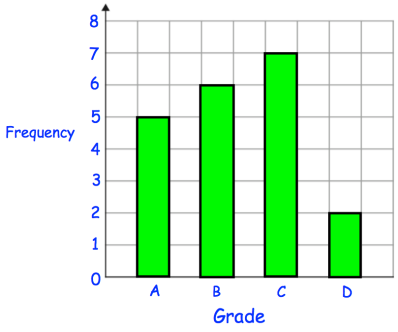
(a) What is the modal sport?

(b) How many students are in the class?

(c) How many more students liked football than rugby?

Sport	Tally
Rugby	𝍸
Football	𝍸 𝍸 |
Hockey	𝍸 𝍸 ||
Cricket	|||

Question 5: Mrs Green gives her class a test. The results are shown in the bar chart below.



(a) What is the modal grade?

(b) How many students sat the test?

A grade C or above is a "pass."

(c) What fraction of the students passed the test?

Intelligent Practice

Find the median of:

1) $10, 5, 3, 1, 1$
2) $1, 1, 3, 5, 10$
3) $2, 2, 6, 10, 20$
4) $3, 3, 7, 11, 21$
5) $3, 3, 7, 11, 210$
6) $-33, 3, 7, 11, 210$
7) $33, 3, 7, 11, 210$
8) $33, 3, -7, 11, 210$
9) $3, 4, 5, 6, 7$
10) $3, 4, 5, 6, 7, 8$
11) $2, 3, 4, 5, 6, 7, 8$
12) $1, 2, 3, 4, 5, 6, 7, 8$
13) $2, 4, 5, 6, 7, 8$
14) $2, 3, 4, 6, 7, 8$
15) $2, 3, 4, 6, 7, -8$
16) $2, -3, 4, -6, 7, -8$

Fluency Practice

Question 1: Work out the median for the each of the following

(a) 5, 1, 4, 6, 8

(b) 9, 1, 3, 6, 7, 8, 9

(c) 6, 4, 7, 1, 3, 8, 1, 10

(d) 7, 3, 8, 9, 6, 5

(e) 9, 8, 6, 6, 6, 7, 1, 2, 6, 8

(f) −4, 5, −7, −1, 2, 0, 9

(g) 20, 30, 10, 20, 40, 50, 60, 10, 80, 30

(h) 49, 34, 12, 10, 53, 20, 65, 34, 90, 100, 33

(i) 6.2, 6.8, 6.6, 7.2, 6.4, 7.4, 5.8

(j) 124, 53, 39, 230, 155, 180

Question 2: Shown are the ages and weights of 5 dogs.





	Fido	Lucky	Toto	Barney	Tess
Age	4	12	7	9	1
Weight	14kg	9kg	30kg	16kg	8kg

(a) Which dog has the median age?

(b) Which dog has the median weight?

Question 3: The height of some footballers are listed below:

1.81m, 1.78m, 1.88m, 1.79m, 1.86m, 1.85m, 1.78m, 1.93m

(a) Work out the median height

(b) What is the modal height?

Question 4: Write down five numbers with a median of 7

Question 5: Write down eight numbers with a median of 10

Question 6: Write down four different numbers with a median of 4.5

Question 7: Write down six different numbers with a median of 0

Find the median from the following lists of data:

1) 1, 2, 3, 4, 5

2) 1, 2, 3

3) 1.5, 2.5, 3.5, 4.5, 5.5

4) x, 2x, 3x, 4x, 5x

5) -1, -2, -3, -4, -5

6) 382, 383, 384, 385, 386

7) 196, 195, 194, 193, 192

8) 11, 12, 13, 14, 15, 16, 17

9) 1, 1, 1, 1, 1, 1, 1

10) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$

11) 10, 6, 1, 5, 13

12) 10, 6, 5, 1, 13

Extension

Intelligent Practice

Find the mean of:

1) $1, 4, 7, 9, 9$

2) $2, 5, 8, 10, 10$

3) $0, 3, 6, 8, 8$

4) $0, 3, 6, 8, 3$

5) $10, 3, 6, 8, 3$

6) $0, 13, 6, 8, 3$

7) $13, 6, 8, 3$

8) $26, 12, 16, 6$

9) $26, 12, 16, 6, 15$

10) $26, 12, 16, 6, 15, 21$

11) $12, 16, 15, 21$

12) $12, 12, 16, 16, 15, 15, 21, 21$

13) $3.6, 4.8, 4.5, 6.3$

14) $-6, -8, -7.5, -10.5$

15) $12^2, 16^2, 15^2, 21^2$

Fluency Practice

Question 1: Find the mean for each of the sets of data below

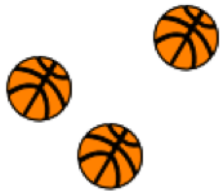
(a) 4, 9, 7, 10, 5 (b) 2, 8, 6, 3, 12, 7, 4 (c) 3, 2, 1, 3, 2, 2, 1, 3, 1, 2, 3, 2, 1

(d) 1, 8, 7, 5, 6, 4, 7, 6 (e) 20, 30, 24, 32 (f) 12, 8, 14, 5, 1, 3, 0, 8, 10, 11

(g) 9, −3, −6, 5, 0 (h) 1.4, 2.8, 2.4, 2.5, 2.8, 3.1, 1.1

Question 2: A basketball team plays 8 matches.
The number of points they score in each match are:

62, 68, 67, 79, 82, 50, 74, 62



(a) Work out the mean number of points scored

(b) Write down the modal number of points scored

(c) Write down the median number of points scored

Question 3: Mr Holland gives his class a test. The results are:
34%, 44%, 75%, 21%, 98%, 86%, 71%, 76%, 63%, 55%

(a) Work out the mean mark

(b) Work out the median mark

(c) How many students scored above the mean mark?

Question 4: Five houses on a street are sold in 2016. They sell for
£175,000 £184,000 £150,000 £201,000 £191,000

Calculate the mean price.

Question 5: The mean of four numbers is 10. Three of the numbers are 9, 11 and 7.
Work out the fourth number.

Question 6: The mean of six numbers is 5. Five of the numbers are 6, 6, 5, 3 and 1.
Work out the sixth number.

Question 7: The mean of five numbers is 8.2. Four of the numbers are 8, 10, 12 and 10.
Work out the fifth number.

Intelligent Practice

Find the missing number:

1) $4, 2, 8, ?$ $\quad \text{Mean} = 4$

2) $4, 2, 8, ?$ $\quad \text{Mean} = 5$

3) $5, 3, 9, ?$ $\quad \text{Mean} = 5$

4) $10, 6, 18, ?$ $\quad \text{Mean} = 10$

5) $10, 6, 18, ?$ $\quad \text{Mean} = 20$

6) $10, 6, 18, ?, 20$ $\quad \text{Mean} = 20$

7) $10, 6, 18, ?, 0$ $\quad \text{Mean} = 20$

Intelligent Practice

1) Four exams, mean mark is 22. First three scores are $20, 28$ and 25. What is the fourth score?

2) Four numbers have a mean of 2.2. The first three are $2.0, 2.8$ and 2.5. What is the fourth number?

3) Five exams, mean mark is 22. First four scores are $20, 28, 25$ and 17. What is the fifth score?

4) Five exams, mean mark is 44. First four scores are $40, 56, 50$ and 34. What is the fifth score?

5) Five numbers have a mean of 11. The first four are $10, 14, 12$ and 9. What is the fifth number?

6) Four numbers have a mean of 15. The first three are $15, 15$ and 15. What is the fourth number?

7) Four numbers have a mean of 15. The first three are $20, 20$ and 20. What is the fourth number?

8) Four numbers have a mean of 15. The first three are $30, 30$ and 30. What is the fourth number?

Intelligent Practice

1) The mean of 15 numbers is 31.
   One of these numbers is 72.
   Determine the mean of the other 14 numbers.
   Give your answer correct to 1 decimal place.

2) The mean height of 18 pupils is 140 cm.
   One of these pupils is 178 cm and leaves the group.
   Determine the new mean height of the group.
   Give your answer correct to 1 decimal place.

3) The mean age of 24 people in a theatre is 23 year-old.
   One person who is 35 year-old leaves the theatre.
   Determine the new mean age of the remaining people.
   Give your answer correct to 1 decimal place.

Intelligent Practice

1) The mean of 27 numbers is 36.
   A number is added and the mean becomes 38.
   Determine the value of the new number.

2) The mean height of 16 pupils is 120 cm.
   Another pupil joins the group and the mean height becomes 122 cm.
   Determine the height of the new pupil.

3) The mean age of 26 people in a theatre is 19 year-old.
   Another person arrives at the theatre and the mean age becomes 20 year-old.
   Determine the age of the new person.

4) A team scores a mean of 11 points after playing 15 matches.
   They play another match and the mean becomes 12 points.
   Determine how many points they scored in their last match.

Intelligent Practice

1) There are 24 boys and 15 girls in a class.
   The boys and the girls have some counters.
   The mean number of counters that the boys have is 25.
   The mean number of counters that the girls have is 27.
   Work out the mean number of counters the 39 children have.

2) There are 19 pears in a box.
   The mean weight of these 19 pears is 92 grams.
   There are 26 pears in a bag.
   The mean weight of these 26 pears is 118 grams.
   Work out the mean weight of the 45 pears.

3) A group of pupils take a test. The group consists of 29 boys and 16 girls.
   The mean mark for the boys is 19. The mean mark for the girls is 25.
   Calculate the mean mark for the whole group.
   Give your answer correct to 1 decimal place.

4) Some pupils in two different classes take a test. There are 30 pupils in 8X1 and 26 pupils in 8Y1.
   The mean mark for the pupils in 8X1 is 24. The mean mark for the pupils in 8Y1 is 20.
   Calculate the mean mark for the two classes combined.
   Give your answer correct to 1 decimal place.

Fill in the Gaps

Question	Table	Answer
There are 30 students in 8A and 20 students in 8B. On their Chemistry homework, 8A scored a mean of 8.6 and 8B scored a mean of 9.1. Find the combined mean across both classes.	Group / Frequency / Mean / Total 8A / 30 / 8.6 / 258 8B / 20 / 9.1 / 182 Combined / 50 / / 440	
In a bag there are 8 apples, with a mean weight of 120 g. In a box there are 12 apples, with a mean weight of 132 g. Find the mean weight of all the apples combined.	Group / Frequency / Mean / Total Bag / 8 / 120 / 960 Box / 12 / 132 / Combined / / /	
In a class there are 16 boys and 14 girls. In a test the mean score for boys is 17 and the mean score for girls is 17.6. Find the combined mean score for the whole class.	Group / Frequency / Mean / Total Boys / 16 / 17 / Girls / 14 / / Combined / / /	
Rovers A team play 15 games and score a mean of 2.1 goals per game. Rovers B team play 20 games and score a mean of 1.8 goals per game. Find the mean goals per game across both teams, giving your answer to 1 decimal place.	Group / Frequency / Mean / Total A team / / / B team / / / Combined / / /	
Class 7X contains 20 children and their mean height is 156 cm. Class 7Y contains 22 children and their mean height is 148 cm. Find the mean height across both classes, giving your answer to 1 decimal place.	Group / Frequency / Mean / Total / / / / / / / / /	

Intelligent Practice

1) There are 16 boys and 28 girls in a class.
   The boys and the girls have some counters.
   The mean number of counters that the boys have is 24.
   The mean number of counters that the whole group have is 19.
   Work out the mean number of counters the 28 girls have.

2) There are 16 pears in a box.
   The mean weight of these 16 pears is 101 grams.
   There are 27 pears in a bag.
   The mean weight of the pears in the box and in the bag combined is 109 grams.
   Work out the mean weight of the 27 pears in the bag.

3) A group of pupils take a test. The group consists of 29 boys and 21 girls.
   The mean mark for the boys is 26.
   The mean mark for the whole group is 19.
   Calculate the mean mark for the girls.
   Give your answer correct to 1 decimal place.

4) Some pupils in two different classes take a test. There are 30 pupils in 7X1 and 15 pupils in 7Y1.
   The mean mark for the pupils in 7X1 is 16.
   The mean mark for the pupils in the two classes combined is 26.
   Calculate the mean mark for the pupils in 7Y1.
   Give your answer correct to 1 decimal place.

Fill in the Gaps

Question	Table	Answer
Eleven members of a scout group have a mean height of 162 cm. A new member with a height of 168 cm joins the group. What is the new mean height of the scout group?		
Class 8Y has 22 students and class 8Z has 28 students. In an essay, 8Y obtained a mean score of 68%. The mean score across both classes was 70.8%. Find the mean score for 8Z.		
There are two ponds containing a total of 25 ducks. In the first pond there are ten ducks with a mean weight of 1.6 kg. The mean weight of all 25 ducks is 1.48 kg. Find the mean weight of the ducks in the second pond.		
A bakery makes 64 sausage rolls and 56 cheese pasties. The mean weight of all the baked goods is 246 grams. If the mean weight of the sausage rolls is 190 grams, what is the mean weight of the cheese pasties?		
Kris watches eight adverts, which have a mean playing time of 39 seconds. Two of the adverts have a mean playing time of 29 seconds. Find the mean playing time of the remaining six adverts, giving your answer to 1 decimal place.		

Group	Frequency	Mean	Total
Scout group	11	162	
New member	1	168	
Combined	12		

Group	Frequency	Mean	Total
8Y	22	68	
8Z	28		
Combined		70.8	

Group	Frequency	Mean	Total
1st Pond			
2nd Pond			
Combined			

Group	Frequency	Mean	Total
Sausage rolls			
Cheese pasties			
Combined			

Group	Frequency	Mean	Total

Fluency Practice

(a) In a class of 30 students, 12 are boys and 18 are girls. In a science test the mean score for girls was 72 and the mean score for boys was 65. Find the mean score for the whole class to 1 d.p.

	Number	Mean	Total
Girls	18	72	
Boys	12	65	
Overall	30		

(b) A farmer has 40 cows and 60 sheep. The mean weight of the cows is 950 kg and the mean weight of the sheep is 140 kg. Find the mean weight of all the animals the farmer has.

(c) A team of 14 athletes has a mean 100 m sprint time of 14.8 seconds. Another member joins the team with a 100 m time of 12.9 seconds. Find the new mean time of all 15 athletes to 1 decimal place.

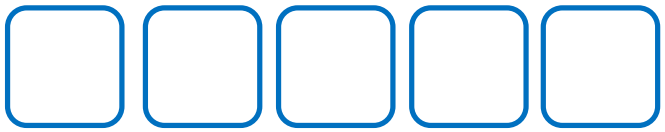
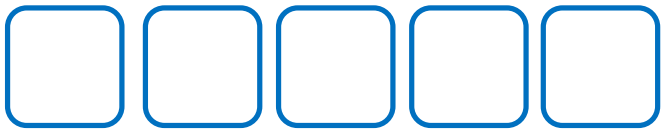
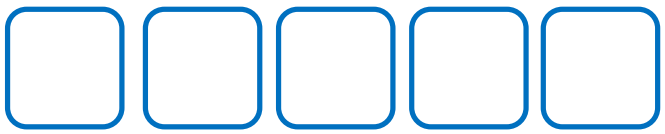
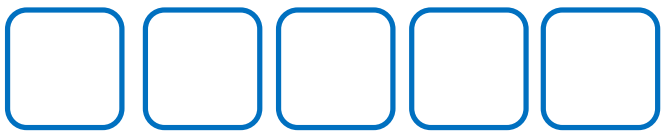
(d) Form 7A has 24 students and their mean age is 11.7 years. When the age of their form tutor is added, the mean goes up to 13.1 years. Find the age of the form tutor.

(e) Aleena records the number of people using a library per day over January and February. Across January a total of 1680 people visited the library and across both months the mean was 62.8 people. Given that it was a leap year, find the mean number of people who visited the library per day in February.

(f) The mean height of a sports team of 15 defenders or attackers is 183 cm. The mean height of the defenders is 187 cm and for the attackers it is 181 cm. How many attackers and defenders are there in the team?

Fluency Practice

Can you find...

4 numbers with a mean of 5	
5 numbers with a mode of 6 and a median of 8	
5 numbers with a mode of 3 and a mean of 6	
6 numbers with a range of 2 and a median of 4	
4 numbers with a range of 6, a mean of 4 and a median of 3	
4 numbers with a range of 1 and a median of 1	
5 numbers with a mean of 6, a median of 7 and a mode of 8	
5 numbers with a range of 5, a mean of 4 and a median of 3	
6 numbers with a range of 4, a mean of 9, a median of 9 and no mode	

Fluency Practice

1. (a) Calculate the mean and range of these two data sets:

A	5	10	0	1	9	5
B	5	6	4	3	7	5

(b) Make two valid comments about the two sets.

2. (a) Calculate the mean and range of these two data sets:

A	4	6	7	8	5	6.
B	5	7	7	8	9	6

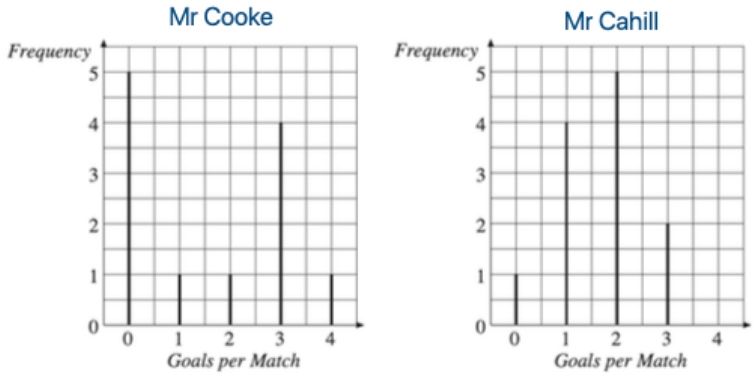
(b) Make two valid comparisons about the two sets.

3. (a) Calculate the mean and range of these two data sets:

A	4	6	10	3	5	2
B	6	7	9	9	5	3

(b) Make two valid comments about the two sets.

4. The two vertical line diagrams show the number of goals scored per match by two top footballers.



(a) Calculate the mean and range for each player.

(b) Make two valid comparisons about the two players.

(c) Which of these players would you like to have playing for your team? Explain why.

5. Miss McKeown's class decide to have a times table competition with Miss Hutton's class. Their scores for each class are listed below.

Miss McKeown						Miss Hutton					
10	1	5	8	5	7	5	5	7	6	7	8
2	6	8	7	5	9	5	4	3	3	2	5
2	4	8	0	5	3	4	5	6	5	4	6
5	10	2	5	7	1	7	7	6	4	3	5
5	5	3	3	0	9	3	5	5	6	4	5

(a) Calculate the mean and range for each class

(b) Make two valid comparisons about the two classes.

Comparing using Range & Mean

The tables show data from 2 weather stations over 10 days in February.
Calculate the **mean** & **range** for each of the 6 statistics in both countries.
What comparisons can you make between the weather in the two countries?

Moscow (Russia)

Day Temperature (°C)

4	8	5	2	8
10	12	9	7	5

Night Temperature (°C)

−2	2	3	−3	−1
0	4	2	−1	4

Wind speed (kmph)

7	6	2	0	0
3	5	0	2	4

Rainfall (mm)

15	7	0	0	0
4	0	5	0	2

Direct Sunlight (hours)

5.6	6	4.2	1.7	1.2
4.5	7.5	4	2	0.8

Snowfall (cm)

0	0	5.8	4.6	12.7
3.7	8.1	5.2	3.3	4.4

Berlin (Germany)

Day Temperature (°C)

8	9	8	7	6
14	14	11	8	8

Night Temperature (°C)

6	8	7	7	−5
3	5	2	8	4

Wind speed (kmph)

11	14	27	18	16
8	21	15	4	19

Rainfall (mm)

17	14	18	22	7
0	0	15	12	17

Direct Sunlight (hours)

4.6	7	7.1	6	6.5
5	6.2	4.8	5.4	7.2

Snowfall (cm)

0	0	0	0	14.2
1.3	0	0	0	0

Girls are Better at Maths?

Mr. John's Class			Miss Helen's Class		
Gender	Mark	Grade	Gender	Mark	Grade
M	85	A	F	76	B
F	91	A*	F	71	B
M	60	C	F	65	C
F	62	C	M	63	C
F	79	B	F	82	A
F	55	D	F	89	A
M	45	E	M	77	B
M	49	E	F	65	C
M	88	A	M	56	D
F	86	A	F	70	B
F	45	E	F	81	A
M	68	C	F	81	A
F	90	A*			
F	91	A*			

Questions

- Do you think the data suggests girls are better?
- Does the average help us decide?
- Which class did better? Which class would you rather be in? Why?
- What does the range tell us about the classes? Or the genders? Is it important?

More-Same-Less

Instructions: Complete the remaining boxes by making the minimum change possible to the centre box. If there are boxes that cannot be filled in, say why.

Person number with highest mean score

Person number with lowest range	Less	Same	More
More			
Same		Person 1: 20, 24, 32, 42, 45 Person 2: 33, 35, 37, 42, 50, 53 Person 3: 23, 27, 30, 49	
Less			

Fluency Practice

1 Find the *mean*, *median* and *mode* of each set of numbers:

(a) 4 4 6 8 5

(b) 6 7 7 7 7 5 6 2 9 8

(c) 8 4 3 3 5 7

(d) 6 6 7 7 4 9 1 7 10

2 The owner of a shoe shop recorded the sizes of the feet of all the customers who bought shoes in his shop in one morning. These sizes are listed below:

8	7	4	5	9	13	10	8	8	7
6	5	3	11	10	8	5	4	8	6

(a) What are the *mean*, *median* and *mode* shoe sizes?

(b) Which of these values would be most sensible for the shop owner to use when ordering shoes for his shop? Explain your choice.

3 One day the number of minutes that trains were late to arrive at a station was recorded. The times are listed below:

0	7	0	0	1	2	5	0	0	0
6	0	1	52	0	10	1	1	8	22

(a) Calculate the *mean*, *median* and *mode* of these data.

(b) Explain which value would be the best to use to argue that the trains arrive late too often.

(c) Explain who might use the mode and why it might be an advantage to them.

4 Calculate the indicated average for each set of data and explain if that sort of average is sensible or not.

(a) 2, 3, 5, 7, 8, 10 Mean

(b) 0, 1, 2, 2, 2, 4, 6 Mode

(c) 1, 4, 7, 8, 10, 11, 12 Median

(d) 2, 3, 6, 7, 10, 10, 10 Mode

(e) 2, 2, 2, 2, 4, 6, 8 Median

(f) 1, 2, 4, 6, 9, 30 Median

5 Calculate the range for each set of data below and decide whether it is a suitable measure of spread. Explain your answer.

(a) 1, 2, 4, 7, 9, 10

(b) 1, 10, 10, 10, 10, 10

(c) 1, 1, 1, 2, 10

(d) 1, 3, 5, 6, 7, 10

(e) 1, 1, 1 , 7, 10, 10, 10

(f) 5, 8, 9, 10, 14

6 Create three sets of data where, one for each of the following, where the given average would be the most appropriate one to describe your data:

(a) The mean

(a) The median

(a) The mode

Choosing an Average to Use: Mean, Median & Mode

For each data set, which average would represent the data best?

A restaurant records the meals each customer buys.

A zoo recorded the weight of each of its penguins.

At MegaCorp Industries:
50 people earn between £20,000 & £40,000,
20 people earn between £40,000 & £50,000,
1 person earns over £120,000

50 Year 9 students took a maths test,
but 5 of the students were 30 minutes late &
scored very low marks!

A group of friends compared their lunch purchases.

Hugh asked 50 students about their travel to school.

A clothes shop records how much each customer spends.

10 friends took a science test:
1 person got more than double the
score of the next best person!

In a 5 km race most of the runners finished in around
18 minutes. Dale finished with a time of 12:56

To see if a dice was fair,
Mae rolled it 200 times!

Jen records the eye-colour
of everyone in her class.

Over one month, nearly half of the
people who took a driving test failed!

Dr Greene recorded the daily
temperature in Ozburg for 6 months.

Intelligent Practice

Data	Mean	Median	Mode	Range
2, 2, 4, 5, 7				
2, 2, 4, 5, 12				
3, 3, 5, 6, 13				
6, 6, 10, 12, 26				
6, 6, 10, 18, 20				
6, 6, 13, 15, 20				
6, 6, 13, 15, 20, 24				
0, 6, 6, 13, 15, 20, 24				

Fluency Practice

Data	Mean	Median	Mode	Range
$1, 2, 3, 4, 5$				
$10, 20, 30, 40, 50$				
$0.1, 0.2, 0.3, 0.4, 0.5$				
$-1, -2, -3, -4, -5$				
$1a, 2a, 3a, 4a, 5a$				
$£1, £2, £3, £4, £5$				
$5, 2, 1, 4, 3$				
$2, 3, 4, 5, 6$				
$1, 2, 3, 4, 10$				
$0, 3, 3, 4, 5$				
$0, 0, 6, 4, 5$				
$-3, -2, -1, 0, 1, 2, 3$				
$1, 2, 3, 4, 500$				
$0, 1, 2, 3, 4, 5$				
$0, 0, 1, 2, 3, 4, 5$				
$1, 2, 3, 4, 5, 6$				
$0.4, 2.1, 0.9, 1.7, 2.9$				
$\frac{1}{2}, \frac{1}{5}, \frac{1}{10}$				
$4x, 2x, 7x, 3x, 9x$				
$3a + b, b, 6a$				

Fill in the Gaps

Data Set						Mode	Median	Range	Mean
2	3	3	3	4		3	3	2	3
2	2	3	4	5					3.1
4	4	6	8	10		4			
4	5	6	7	8					
6	6	6	6	6					
6	6	6	6	7					
−4	−2	−2	0	8					
0.6	0.6	0.8	0.8	1					
2	2	4	5	6	8				
−3	1	5	8	8	11				
8	2	5	9	5	10				
5.3	2.9	2.3	3.5	6.7	1.1				
5	7	7					7	6	
3	6	4							4
						8	8	10	7
						10	7	8	6.5
16	10	13				16	14		
						2	3	13	5.4
						7	4	10	3

Fluency Practice

Find the range of
(a) 9, 12, 6, 14, 11, 7
(b) 5, 3, 9, -4, 2, 1
(c) 1, 0, 1, 1, 0, 0, 1

Find the mode of
(a) 9, 5, 6, 1, 6, 3, 2
(b) 5, 2, 5, 3, 5, 4, 3, 3
(c) 3, 7, 5, 9, 12

Find the median of
(a) 8, 12, 11, 15, 9
(b) 6, 1, 9, 8, 11
(c) 19, 2, 14, 8, 11, 10, 4, 15

Find the mean of
(a) 13, 4, 7
(b) 4, 10, 15, 8, 5
(c) 5, -2, 0, 8, 3

(a) Five integers have a mean of 8. The integers are 7, 3, 10, 13, x. Find the value of x.
(b) Six integers have a range of 13. The integers are 5, 9, 7, 12, 3, x. Find the value of x.

(a) Four numbers have a mean of 9 and a median of 6. The four numbers are 2, 5, a, b. Find the value of a and b.
(b) Three integers have a mean of 5 and a range of 10. Find the three integers.

(a) Three different, positive integers have a mean of 8 and a median of 11. Find the three numbers.
(b) Four integers have a mode of 5, a mean of 7, and a median of 5.5. Find their values.

Fluency Practice

Find the mode, median and range of each of these sets of data:

(a) $6,\ 8,\ 6,\ 5,\ 10$

(b) $4,\ 7,\ 7,\ 2,\ 5,\ 6,\ 5$

(c) $6.2,\ 4.9,\ 5.3,\ 5.1,\ 6.7$

(d) $0, -3,\ 4, -2, -3,\ 2,\ 8$

(e) $7, 11, 10, 11$

(f) $12.5, 10.8, 11.7, 12.5$

The ages of two five-a-side teams are recorded as:

Rovers: $27, 23, 32, 21, 23$

United: $28, 27, 25, 29, 27$

Compare the mode, median and range of the ages for each team.

The test scores of class A and class B are recorded as:

Class A: $19, 18, 12, 19, 17$

$20, 14, 19, 15, 16$

Class B: $18, 15, 16, 11, 15$

$18, 14, 18, 17, 19$

Compare the mode, median and range of the scores for each class.

A set of four numbers has a range of 5 and a median of 6. Three of the numbers are $4, 5$ and 9. Find the fourth number.

A set of five numbers has a mode of 7, a range of 6 and a median of 9. Three of the numbers are $7, 12$ and 13. Find the remaining two numbers.

Fluency Practice

Find the mean of each of these sets of data:

(a) $8,\ 5,\ 10,\ 9$

(b) $6.3,\ 6.3,\ 6.3,\ 6.3$

(c) $18,\ 13,\ 11,\ 18,\ 14$

(d) $7, -3,\ 0,\ 5, -1$

(e) $7.8,\ 6,\ 7.2,\ 6.7,\ 4.8,\ 7.4,\ 7,\ 5.1$

(f) $11,\ 6,\ 14,\ 13,\ 8,\ 9$

Find the mean of each of these sets of data:

(a) Four numbers with a total of 20

(b) Five numbers with a total of 40

(c) Ten numbers with a total of 45

Find the total of each of these sets of numbers.

(a) Six numbers with a mean of 8

(b) Five numbers with a mean of 7.8

(c) Ten numbers with a mean of 2.2

The science test scores of class 7A and 7B are given below.

7A: $13, 8, 18, 19, 9, 12, 19, 17, 20, 17$

7B: $15, 16, 15, 12, 18, 17, 20, 18, 7, 10$

Compare the mean test scores of the two classes.

Find the missing numbers in these sets of data when given the mean.

(a) $Mean = 6$ $\quad 5,\ 8,\ 3,\ 6,\ ?$

(b) $Mean = 8.2$ $\quad 9,\ 7,\ 8,\ 5,\ ?$

(c) $Mean = 3$ $\quad -1,\ 7,\ 3,\ ?$

(d) $Mean = 4.5$ $\quad 7,\ 4,\ 5,\ 3,\ 3, ?$

Four numbers have a range of 7, a mean of 8, a mode of 6 and a median of 6.5. Find the four numbers.

Fluency Practice

learn by heart

Measures of the average of a data set:

Mean	**Median**	**Mode**
The result if all the values were shared evenly.	*The middle value when values are ordered*	*The most common value or values.*
Find the total and divide by the number of values.	If there are two middle numbers, add them and divide by 2.	There can be one or two modes, or otherwise no mode.

A measure of the spread of a data set:

Range *The difference between the largest and smallest values.*

exercise

1. Work out the mean of each data set:

   a) 8 9 2 7 1 3 b) 1.4 1.7 1.1 6.2 c) -7 2 16 -4 0

2. Four potatoes together weigh 760g. Work out the mean weight of the potatoes.

3. A data set contains the following values: 324, 412, 376, 380.
   Without calculating, decide which of the following is the mean of the data set.

   a) 1492 b) 318 c) 415.5 d) 373

4. Work out the median of each data set:

   a) 12 3 7 3 5 b) 8 -2 6 1 -5 -2 c) 4.3 2.3 7.3 9.3

5. Christopher has a twin brother aged 12 and two older brothers aged 18 and 14.
   Work out the median age of the four brothers.

6. Work out the mode of each data set:

   a) 4 7 6 7 7 6 b) 2.1 2.5 2.3 2.9 c) 8 2 7 2 6 8

7. Work out the range of each data set:

   a) 1 9 2 6 3 b) 9 12 58 5 8 6 c) 1.4 1.9 0.8 2.1

Fluency Practice

8. The ages of the members of two quiz teams are shown.

Team A:	32	29	24	32	28

Team B:	63	35	19	19

a) Work out the mean age for each team.

b) Work out the median age for each team.

c) Which team has the higher mean age?

d) Which team has the higher median age?

e) Work out the range of ages for each team.

f) Which team has the largest spread of ages?

9. Jake records the number of miles he ran each day for a week: 7 0 8 0 10 5 26
Which of the mean, median or mode is highest for this dataset?

10. Complete the following statements:

a) A data set has 5 values with a total of 35. The mean is ___.

b) A data set has 5 values with a total of ___. The mean is 9.

c) A data set has 10 values with a total of ___. The mean is 4.5.

d) A data set has ___ values with a total of 54. The mean is 9.

11. Each data set is ***in order from smallest to largest***.
Work out the missing values based on the given rule.

A	2	4	4	___	7	8	8	no mode
B	5	6	7	___	8	8		median = 7
C	3	6	___	17				mean = 8
D	2	4	7	8	___			range = 9
E	5	5	___	6	6	7		mode = 5
F	3	___	8	9				median = 6
G	2	3	3	4	___			mean = 4
H	___	7	7	8	12	13		range = 14

Problem Solving

Below are 12 sets of data and their means. Work out which numbers the letters stand for.

						Mean
1.	4	4	4	4	4	a
2.	8	3	2	7	5	b
3.	30	19	11	20	c	20
4.	9	10	10	11	d	15
5.	5	10	e	15	2e	12
6.	5	5	f	10	f + 6	8
7.	g	g	9	11	13	9
8.	h	2	h + 2	4	5	3
9.	i	2i	3i	12	14	10
10.	j-2	j-1	j	j+1	j+2	14
11.	4	6	6	k	12	k
12.	10	13	m-3	m	2m	m

Problem Solving

Mean box fill task

Write 5 numbers with a mean of 12

Change one of the numbers so the mean is 13

Change a different number so the mean is 10

Keep four numbers so the mean is as high as possible

Keep three numbers so the mean is as low as possible

Add one number so the mean stays the same

Add one number so the mean increases by 1

Change two numbers so the mean stays the same

Change one numbers so the mean increases by 0.4

Could you find a different way to complete it with your same starting numbers?
Could you complete it in a way such that there is never a decimal in any of the boxes?

Challenge

Question 1

The mean, median and mode of the numbers in the boxes below are the same. What is the missing number?

7	7	5	7	?

Question 2

The six-member squad for the Ladybirds five-a-side team consists of a 2-spot ladybird, a 10-spot, a 14-spot, an 18-spot, a 24-spot and a pine ladybird (on the bench). The average number of spots for members of the squad is 12. How many spots has the pine ladybird?

Question 3

Karen was given a mark of 72 for Mayhematics. Her average mark Mayhematics and Mathemagics was 78. What was her mark for Mathemagics?

Question 4

It is well known that the Pobble has no toes, and that the three-toed sloth has 12 toes (3 on each of its 4 feet). A synchronised swimming team is made up of 7 Pobbles and 5 three-toed sloths. What is the mean number of toes per team member?

Question 5

The range of a list of integers is 20, and the median is 17. What is the smallest possible number of integers in the list?

Question 6

On four tests, each marked out of 100, my average was 85. What is the lowest mark I could have scored on any one test?

Question 7

The mean score of the students who took a mathematics test was 6. Exactly 60% of the students passed the test. The mean score of the students who passed the test was 8. What was the mean score of the students who failed the test?

Question 8

What value of x makes the mean of the first three numbers in this list equal to the mean of the last four?

15 5 x 7 9 17

Question 9

Viola has been practising the long jump. At one point, the average distance she had jumped was 3.80 m. Her next jump was 3.99 m and that increased her average to 3.81 m. After the following jump, her average had become 3.82 m. How long was her final jump?

Question 10

When one number was removed from the set of positive integers from 1 to n, inclusive, the mean of the remaining numbers was 4.75. What number was eliminated?

Averages Snake

(1)

Fill the gap to make the mean equal to 9.

(2)

Fill the gap to make the mode equal to half the range.

(3)

Fill the gap in two different ways to make the range equal to the median.

(8)

Fill in the gap to make the range 10 times the size of the mean.

Averages

3 , 9 , 7 , $\square$

(4)

Fill the gap in two different ways to make the range equal to 9.

(7)

What values could fill the gap to make the range less than the median?

(6)

Fill the gap to make the mean and median add up to as close to 11 as possible.

(5)

Fill the gap to make the mean, median, mode and range four consecutive numbers.

wiped out

one of the numbers from
1 2 3 4 5 6 is wiped out
the mean of what is left is
3.6
which number was
crossed out?

one of the numbers from
1 2 3 4 5 6 7 is wiped out
the mean of what is left is
4.0
which number was
crossed out?

one of the numbers from
1 to 15 is wiped out
the mean of what is left is
7.714285714…
which number was
crossed out?

one of the numbers with
consecutive numbers 1 up
to a number is wiped out

the mean of what is left is
6.8333333333333333…

which number was
crossed out?
from how many?

one of the numbers with
consecutive numbers 1 up
to a number is wiped out

the mean of what is left is
25.76

which number was
crossed out?
from how many?

one of the numbers with
consecutive numbers 1 up
to an even number is wiped
out

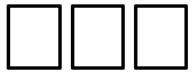
the mean of what is left is **a
whole number (integer)**

which numbers could have
been crossed out?
why?

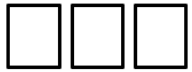
Extension

averages and range (positive integers)

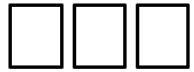
1) 3 numbers:
mean = 3
mode = 2



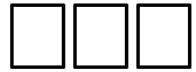
2) 3 numbers:
mean = 7
mode = 10



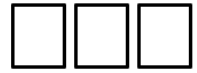
3) 3 numbers:
mean = 8
median = 10
range = 8



4) 3 numbers:
mean = 6
median = 7
range = 11



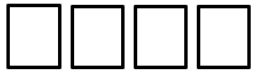
5) 3 numbers:
mode = 7
median = 7
mean = 6



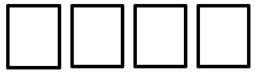
6) 3 numbers:
mean = 13
range = 8

find three sets

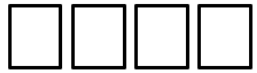
7) 4 numbers:
mean = 4
mode = 1
median = 2



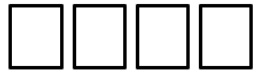
8) 4 numbers:
mean = 9
mode = 6
median = 7



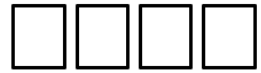
9) 4 numbers:
mean = 6
median = 6½
range = 11



10) 4 numbers:
mean = 7½
mode = 6
median = 7



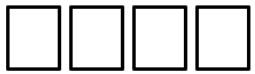
11) 4 numbers:
mean = 10
range = 12
mode = 13



12) 4 numbers:
mean = 8
range = 8
median = 7

find three sets

13) 4 numbers:
mean = 4
range = 6
median = 3



find two sets

14) 5 numbers:
range = 5
mean = 6
median = 7
mode = 8

15) 5 numbers:
range = 9
mean = 4
mode = 3

find two sets

16) 5 numbers:
range = 6
mean = 4
mode = 2

find two sets

17) 5 numbers:
range = 5
mean = 4
median = 3

find three sets

18) 5 numbers:
range = 10
mean = 7
mode = 7

find three sets

19) 5 numbers:
range = 5
mean = 5
mode = 5
median = 5

find two sets

20) 5 numbers:
range = 10
mean = 10
mode = 10
median = 10

find three sets

21) 5 numbers:
range = 10
mean = 4
mode = 1
median = 2

22) 6 numbers:
range = 10
mean = 4
mode = 1
median = 2

23) range = 10
mean = 4
median = 2
mode = 1

a) 4 numbers
b) 5 numbers
c) 6 numbers

24) 5 numbers:
2, 5, n, 2n, 5n
mean =
2 × median – 1

find n

Extension

Find numbers to complete this grid!

			range of 2
			mode of 8
			mean of 5
mean of 6	range of 4	median of 6	

For each set of numbers find: (i) the mean, (ii) the median, (iii) the range.

Leave your answers in their simplest form.

a)	$\frac{1}{2}$	$\frac{1}{4}$	1
b)	$\frac{1}{2}$	$\frac{1}{3}$	1
c)	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$
d)	$\frac{1}{5}$	$-\frac{1}{2}$	$\frac{1}{10}$
e)	$\frac{1}{3}$	$\frac{1}{4}$	$-\frac{1}{12}$
f)	$\frac{4}{15}$	$-\frac{2}{5}$	$-\frac{1}{6}$

g)	$\frac{5}{7}$	$\frac{2}{7}$	$\frac{2}{3}$
h)	$\frac{2}{3}$	$\frac{2}{5}$	$\frac{3}{5}$
i)	$1\frac{2}{3}$	$2\frac{1}{15}$	$1\frac{3}{5}$
j)	$3\frac{1}{3}$	$6\frac{1}{6}$	$2\frac{1}{2}$
k)	$2\frac{1}{2}$	$5\frac{2}{3}$	$-2\frac{1}{6}$
l)	$5\frac{1}{7}$	$9\frac{6}{7}$	$5\frac{1}{4}$

m)	$\frac{2}{5}$	$\frac{9}{10}$	$\frac{1}{5}$	$\frac{1}{10}$
n)	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$
o)	$1\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{2}$
p)	$-\frac{2}{3}$	$-\frac{3}{4}$	$\frac{1}{3}$	$\frac{3}{4}$
q)	$2\frac{2}{3}$	$-\frac{5}{7}$	$-1\frac{1}{7}$	$\frac{1}{3}$
r)	$-2\frac{1}{8}$	$-2\frac{5}{6}$	$4\frac{5}{6}$	$5\frac{5}{8}$

Instructions: Complete the remaining boxes by making the minimum change possible to the centre box. If there are boxes that cannot be filled in, say why.

Mean

Median	Less	Same	More
More			
Same		3, 3, 5, 6, 8, 11	
Less			

Maths Venns

Median = 5
If you think a region is impossible to fill, convince me why!
Range > Mean
Mode = 4
Think of a list of 5 numbers that could belong in each region
A
B
C
D
E
F
G
H

Maths Venns

Median = 5
If you think a region is impossible to fill, convince me why!
Only 4 pieces of data
Range > mode
Think of a ??? that could belong in each of the regions
A
B
C
D
E
F
G
H

Maths Venns

Median > Range
If you think a region is impossible to fill, convince me why!
Mode = Mean
Mean > Median
Think of a list of 5 numbers that could belong in each region
A
B
C
D
E
F
G
H

Maths Venns

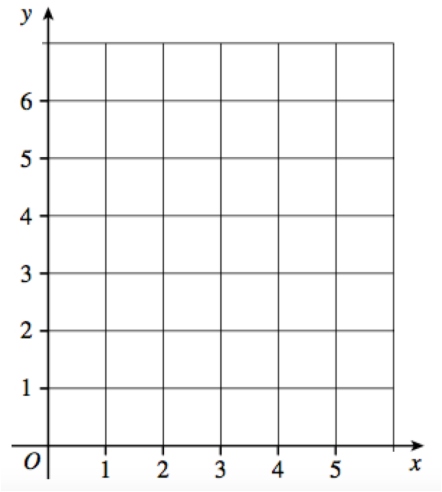
Range < Mean
If you think a region is impossible to fill, convince me why!
Median = Mean
No mode
Think of a list of 5 numbers that could belong in each region
A
B
C
D
E
F
G
H

3 Coordinates

Fluency Practice

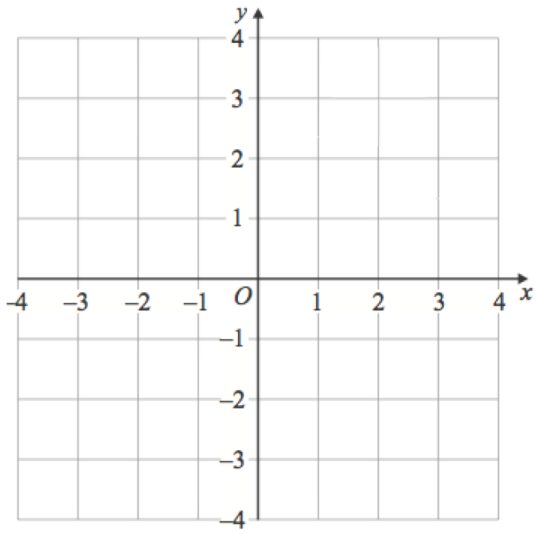
Question 2: Make a copy of the grid shown and then plot the points:

(a) A (3, 1)
(b) B (2, 5)
(c) C (5, 4)
(d) D (1, 1)
(e) E (4, 0)
(f) F (0, 1)
(g) G (3, 3)
(h) H (0, 0)



Question 4: Make a copy of the grid shown and then plot the points:

(a) A (1, 4)
(b) B (−1, 1)
(c) C (−3, −4)
(d) D (2, −1)
(e) E (−2, 0)
(f) F (−1, −2)
(g) G (3, −2)
(h) H (0, −4)
(i) I (−2, 2)
(j) J (−4, −1)
(k) K (0, 1)



Fluency Practice

Plotting Fractional Coordinates

Plot each point!

①

Ⓐ $\left(\frac{3}{4},\frac{1}{4}\right)$ Ⓑ $\left(\frac{1}{2},1\right)$ Ⓒ $\left(1\frac{1}{4},0\right)$

②

Ⓐ $\left(\frac{1}{6},\frac{5}{6}\right)$ Ⓑ $\left(1,\frac{1}{3}\right)$ Ⓒ $\left(\frac{1}{2},\frac{2}{3}\right)$

③

Ⓐ $\left(0,\frac{1}{4}\right)$ Ⓑ $\left(\frac{3}{8},\frac{1}{2}\right)$ Ⓒ $\left(\frac{3}{4},\frac{3}{4}\right)$

④

Ⓐ $\left(\frac{1}{4},1\right)$ Ⓑ $\left(\frac{1}{2},\frac{1}{3}\right)$ Ⓒ $\left(\frac{5}{6},\frac{3}{4}\right)$

⑤

Ⓐ $\left(\frac{1}{3},\frac{1}{15}\right)$ Ⓑ $\left(\frac{4}{5},\frac{2}{3}\right)$ Ⓒ $\left(1\frac{2}{5},\frac{2}{5}\right)$

⑥

Ⓐ $\left(1\frac{1}{3},\frac{2}{9}\right)$ Ⓑ $\left(1\frac{2}{3},\frac{2}{3}\right)$ Ⓒ $\left(\frac{1}{9},\frac{1}{18}\right)$

⑦

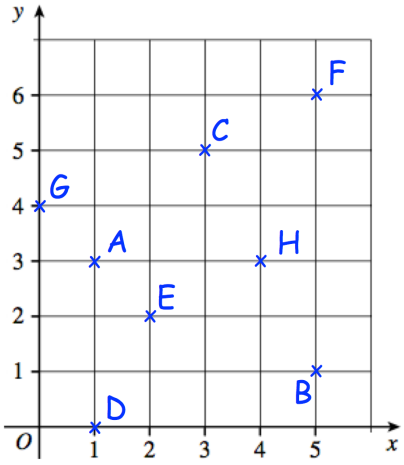
Ⓐ $\left(\frac{1}{8},\frac{1}{4}\right)$ Ⓑ $\left(\frac{5}{8},\frac{1}{8}\right)$ Ⓒ $\left(\frac{5}{6},\frac{3}{4}\right)$

⑧

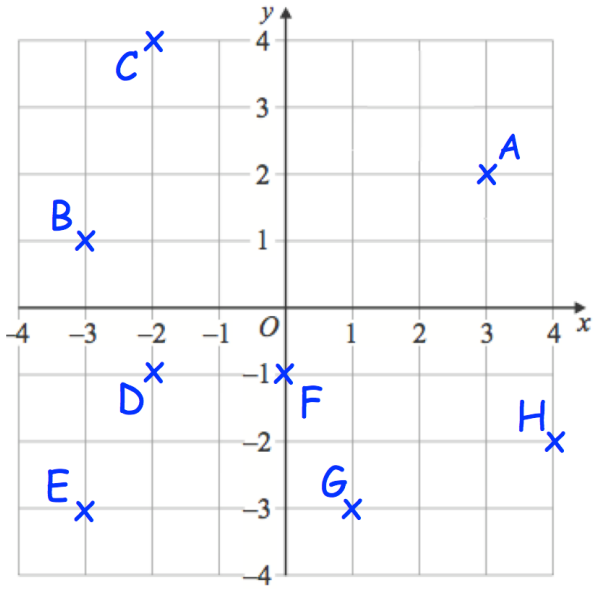
Ⓐ $\left(\frac{3}{4},\frac{1}{9}\right)$ Ⓑ $\left(\frac{2}{3},\frac{4}{9}\right)$ Ⓒ $\left(\frac{5}{18},\frac{2}{9}\right)$ Ⓓ $\left(\frac{5}{6},\frac{1}{36}\right)$

Fluency Practice

Question 1: Write down the coordinates of the points A, B, C, D, E, F, G and H.

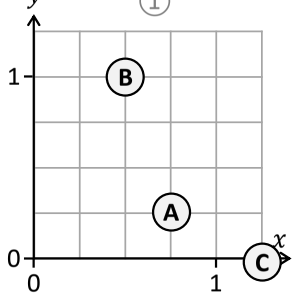


Question 3: Write down the coordinates of the points A, B, C, D, E, F, G and H.



Reading Fractional Coordinates

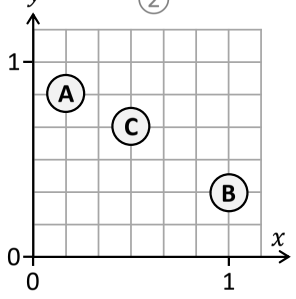
Express each point using simplified fractional coordinates.

① 

A ( )

B

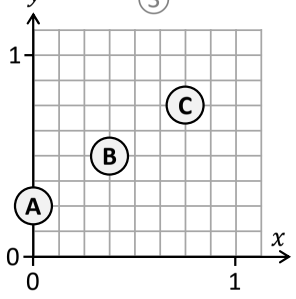
C

② 

A

B

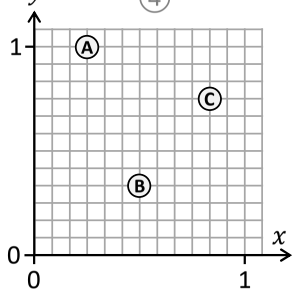
C

③ 

A

B

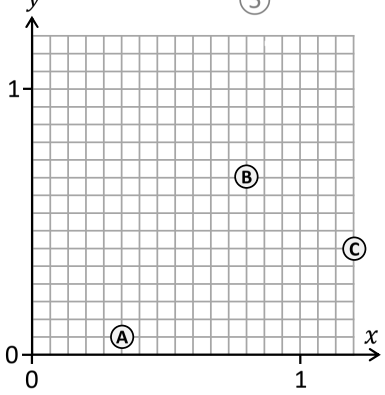
C

④ 

A

B

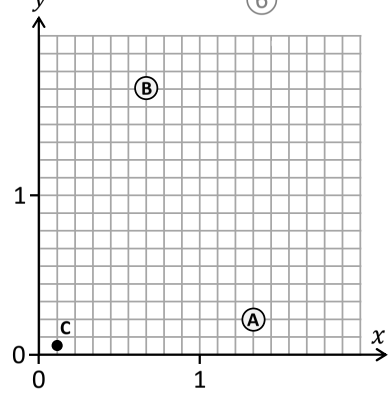
C

⑤ 

A

B

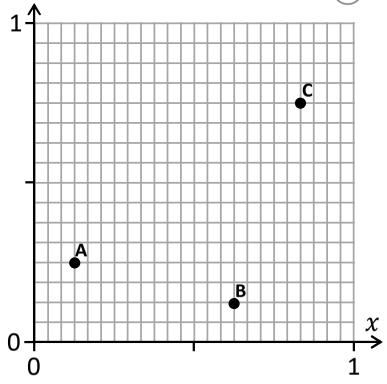
C

⑥ 

A

B

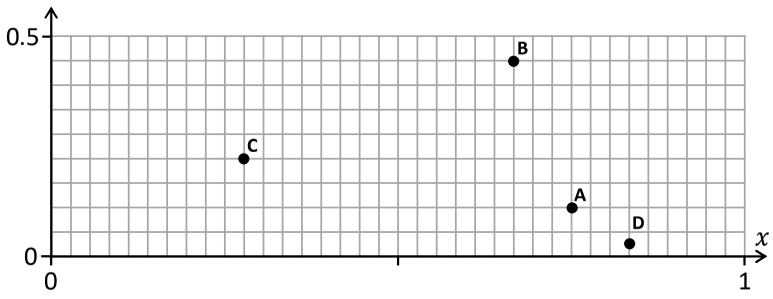
C

⑦ 

A

B

C

⑧ 

A

B

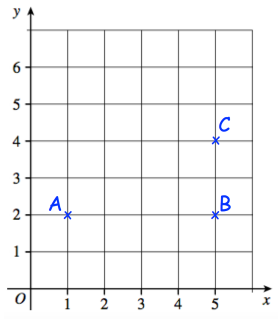
C

D

Extension

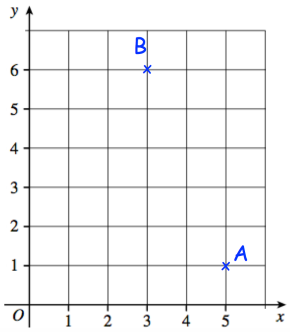
Question 1: Three points are shown on a grid.
ABCD is a rectangle.

(a) Plot D
(b) Write down the coordinates of the point D



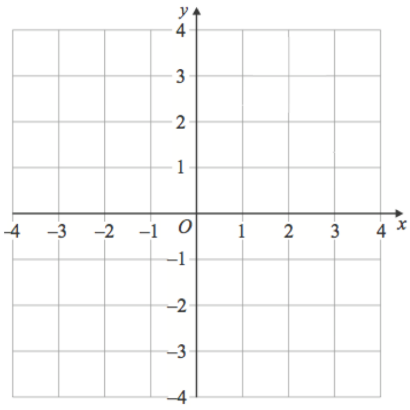
Question 2: Two points are shown on a grid
ABC is an isosceles triangle.

(a) Plot C
(b) Write down the coordinates of the point C



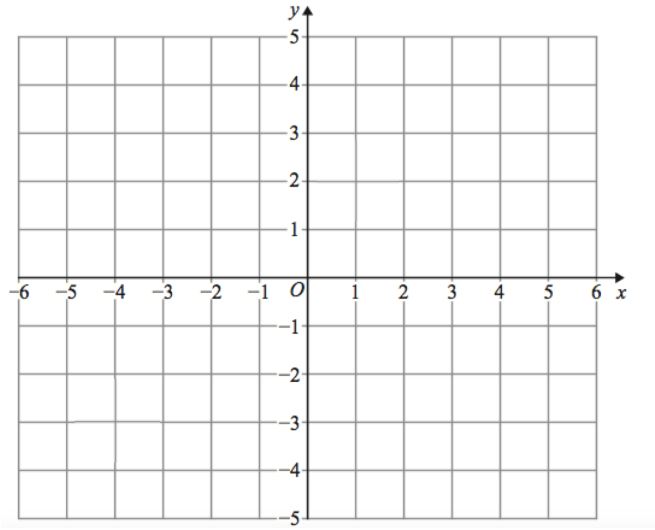
Question 3: Make a copy of the grid shown.

(a) Plot the point A (−3, −2)
(b) Plot the point B (1, −2)
(c) Plot the point C (3, 1)
(d) Plot the point D (−1 , 1)
(e) What type of quadrilateral is ABCD?



Extension

For each question 4-5 below, you will need copies of this grid.



Question 4: (a) Plot the following coordinates

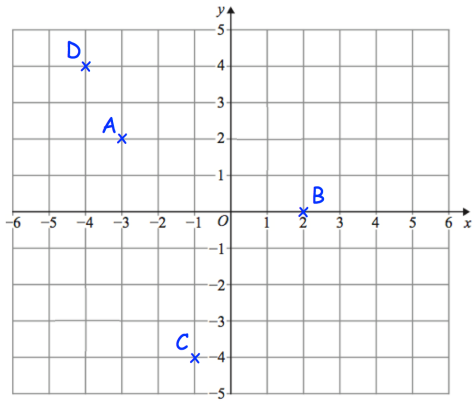
(3, 0) (−3, −2) (1, −4) (1, 2) (−3, 0) (−1, −4) (3, −2) (−1, 2)

(b) Join the shapes to make a polygon.
(c) Name the polygon that you have drawn.

Question 5: (a) Plot the coordinates A (−4, 1), B (1, −2) and C (2, 1)
(b) ABCD is a kite.
(c) Plot D
(d) Write down the coordinates of the point D.

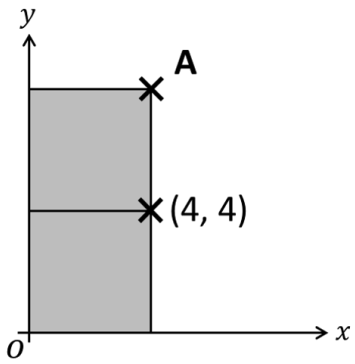
Question 6: James has been asked to plot the coordinates A (−3, 2), B (0, 2), C (−1, −4) and D (4, −4)

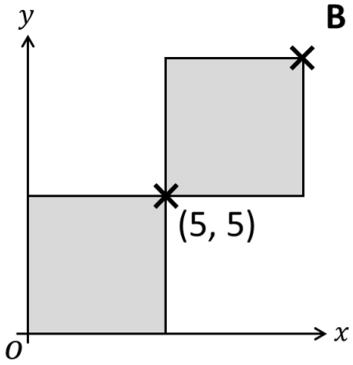
Can you spot any mistakes?

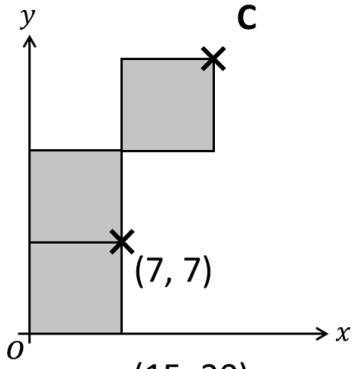


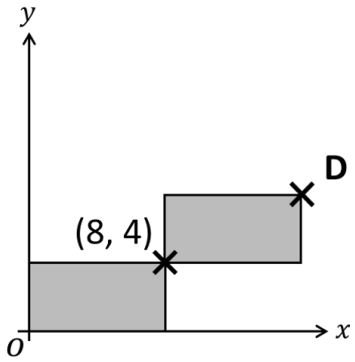
Fluency Practice

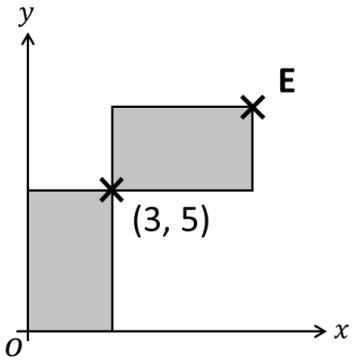
The shapes for each question are **congruent**. Calculate the coordinates of points **A** to **F**.

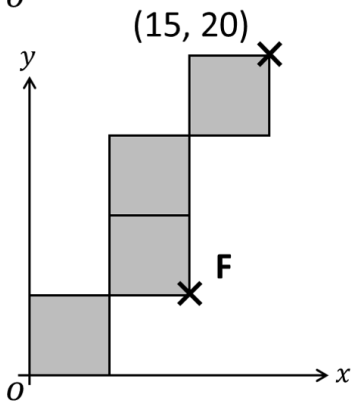




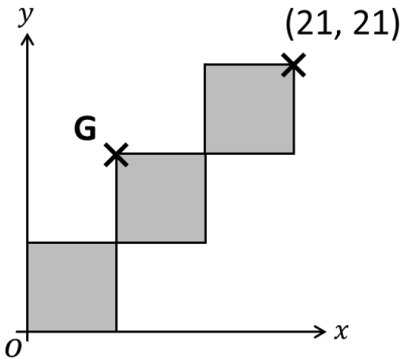


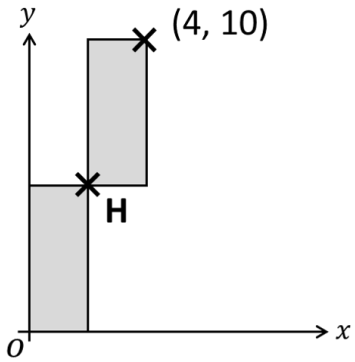


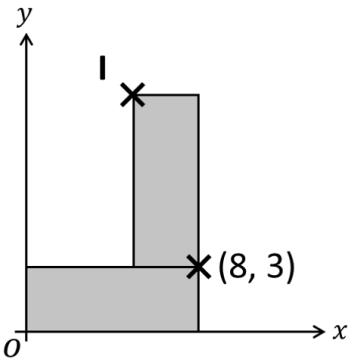


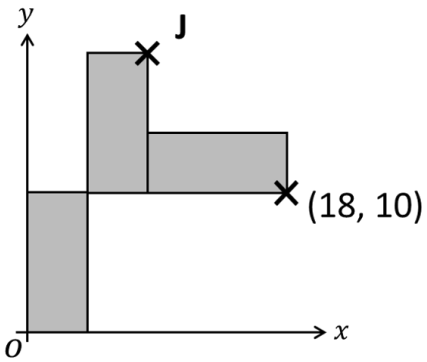


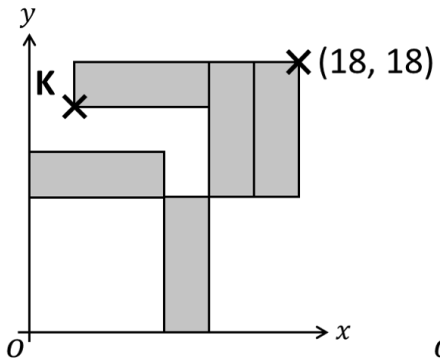
The shapes for each question are **congruent**. Calculate the coordinates of points **G** to **L**.

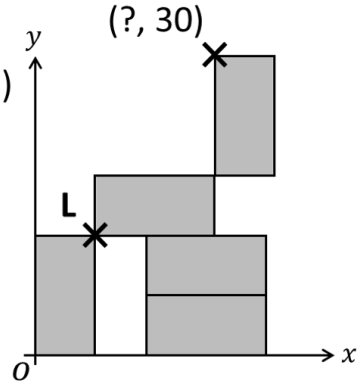






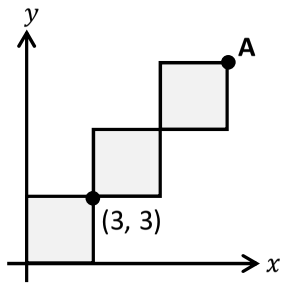




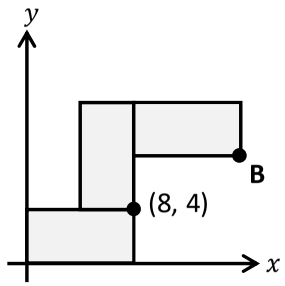


Coordinates & Shape

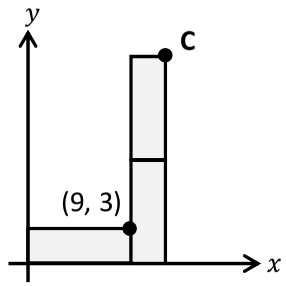
Find the **labelled coordinates, or coordinate**. For each diagram, the shapes are **congruent**.



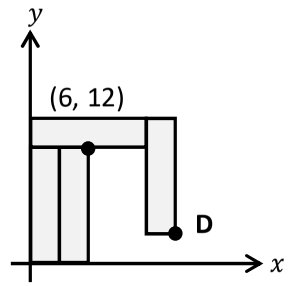
Point A =



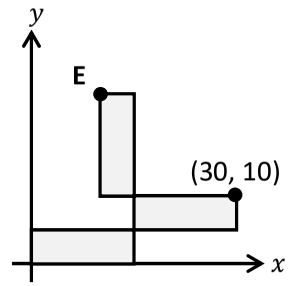
Point B =



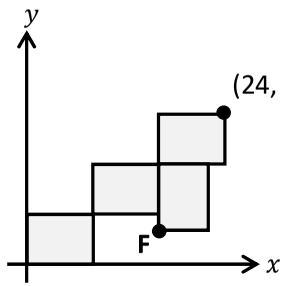
Point C =



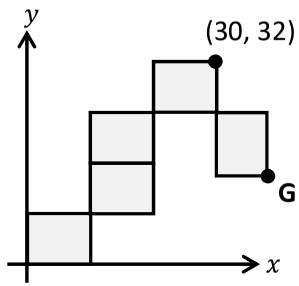
Point D =



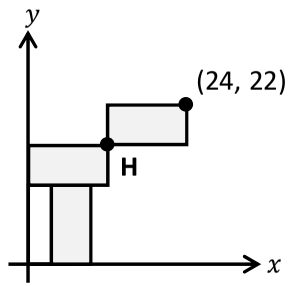
Point E =



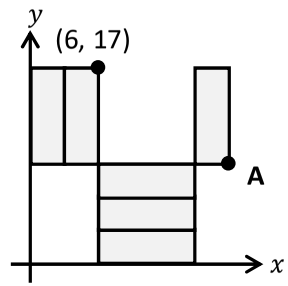
Point F =



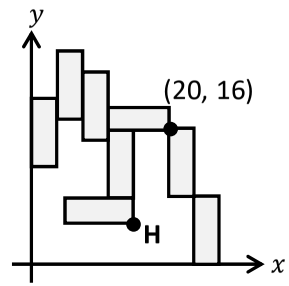
Point G =



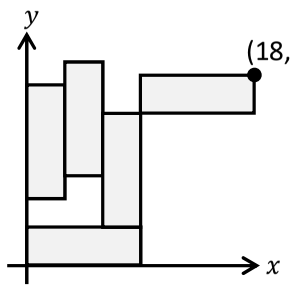
Point H =



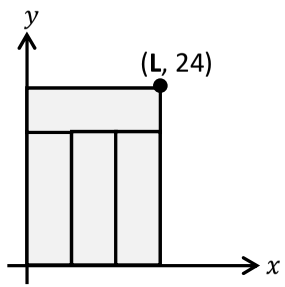
Point I =



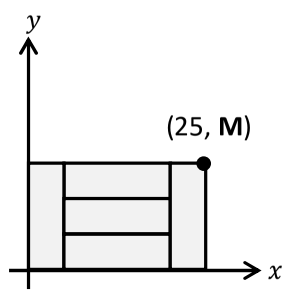
Point J =



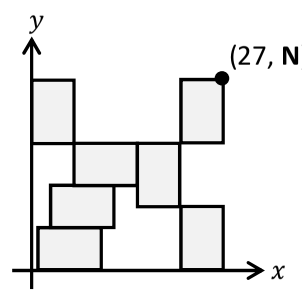
K =



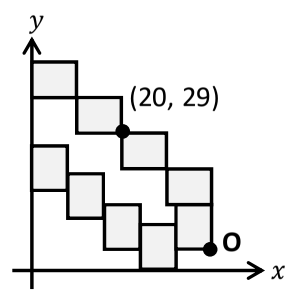
L =



M =

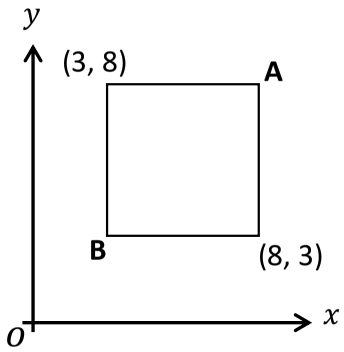


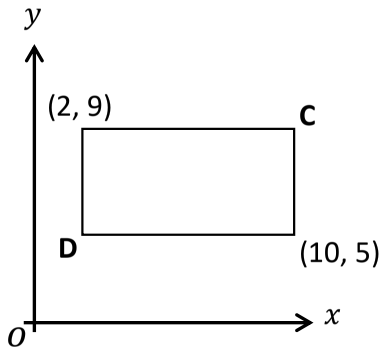
N =

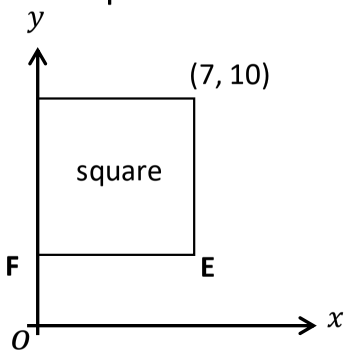


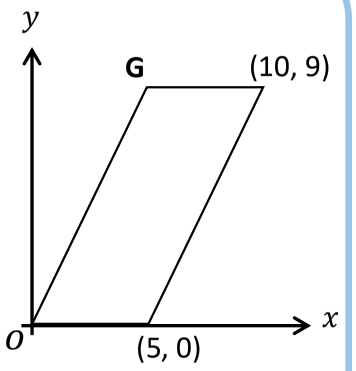
Point O =

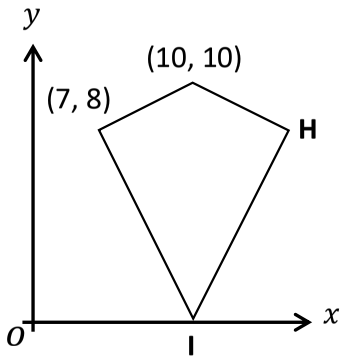
What are the coordinates of the points **A** to **F**?

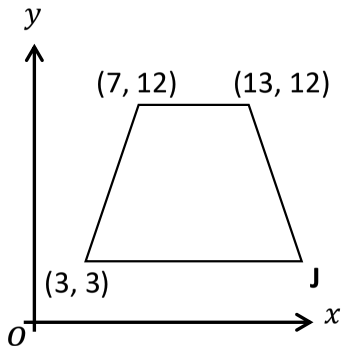


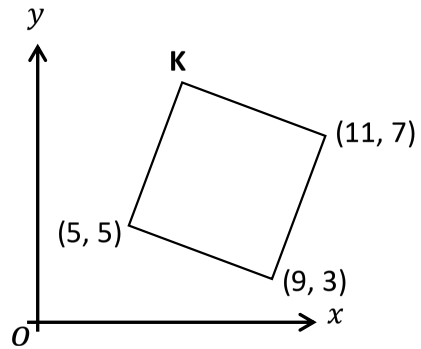


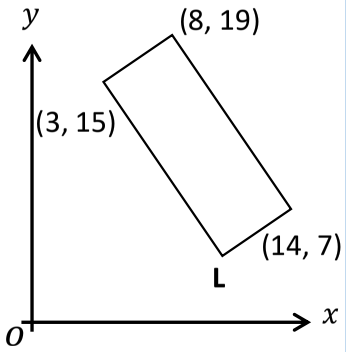


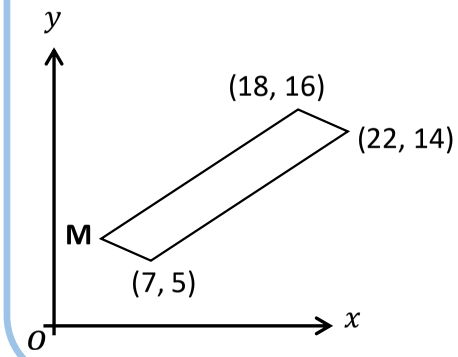


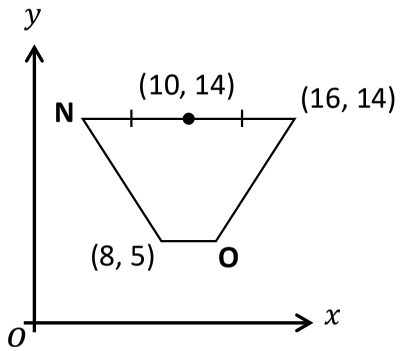


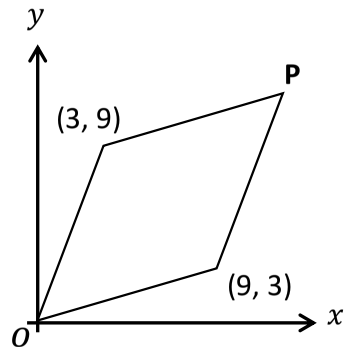


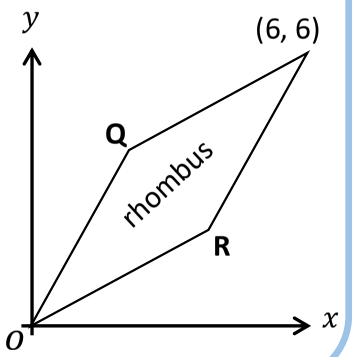






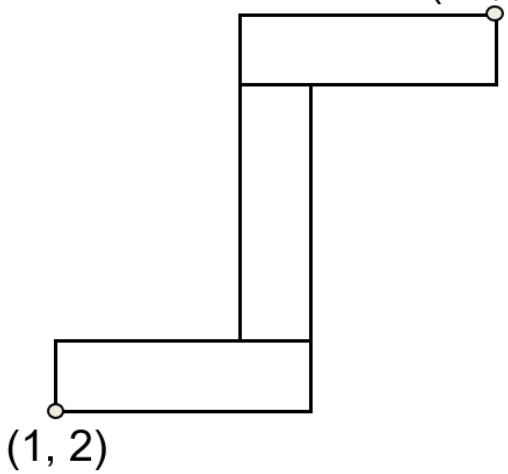






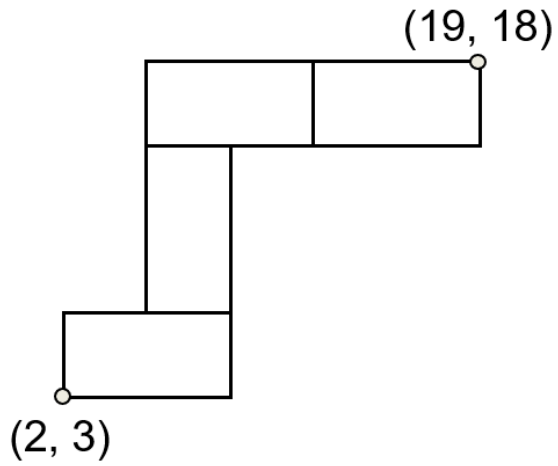
rectangles on a grid how long and wide are each of the rectangles?

(1)

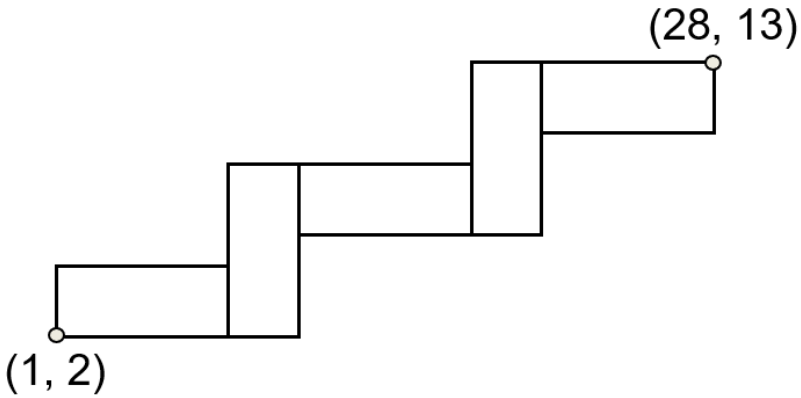


the rectangles in each question are all congruent

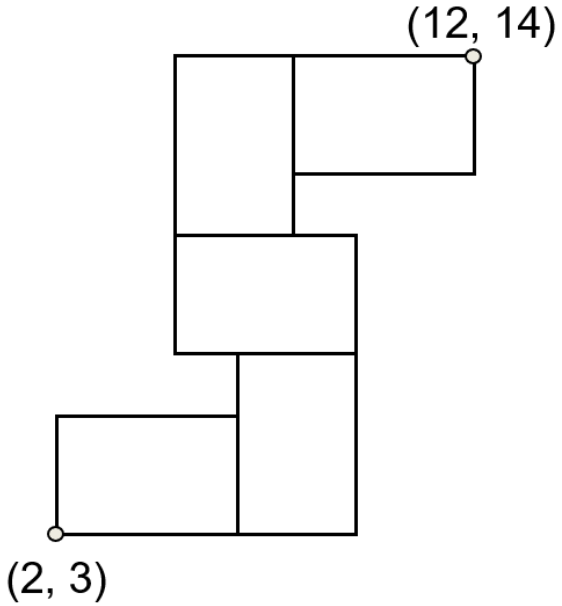
(2)



(3)

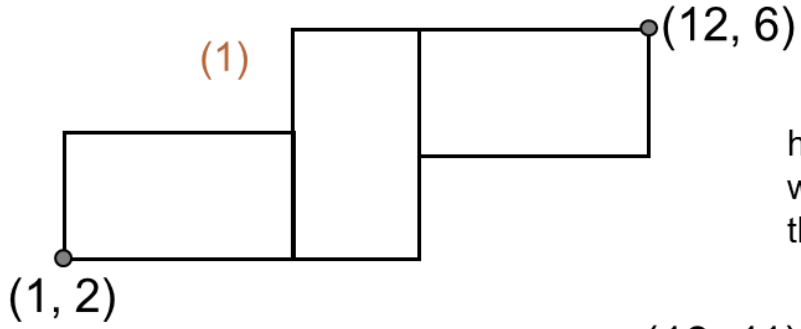


(4)

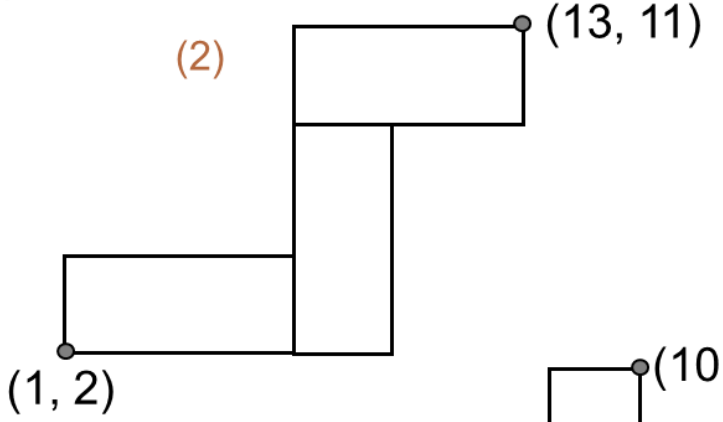


rectangles on a grid

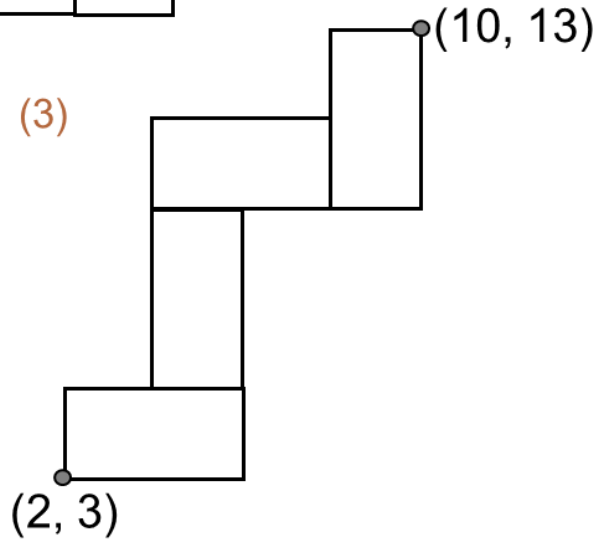
(1)



(2)



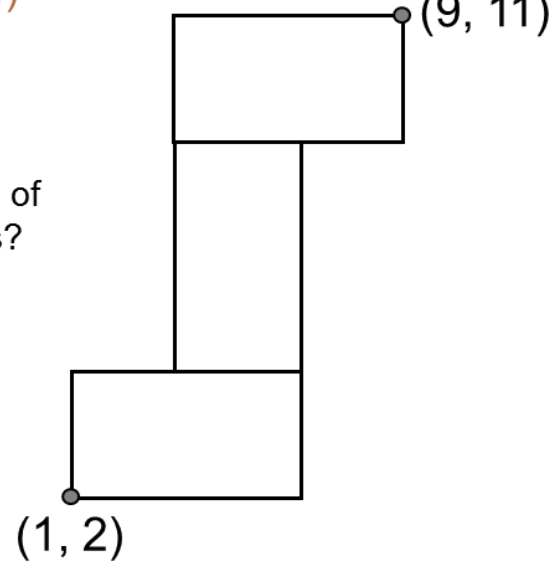
(3)



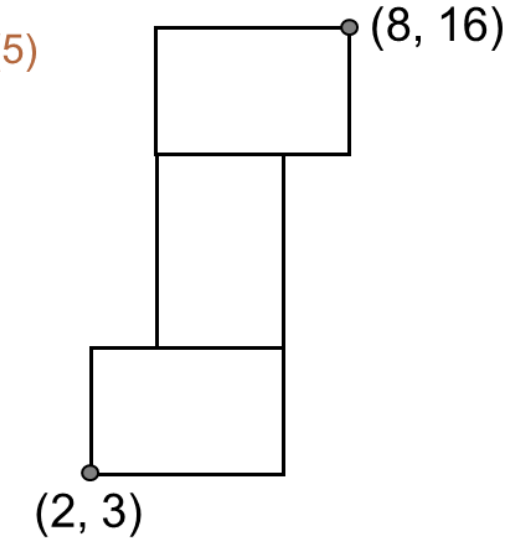
the rectangles in each question are all congruent

how long and wide are each of the rectangles?

(4)

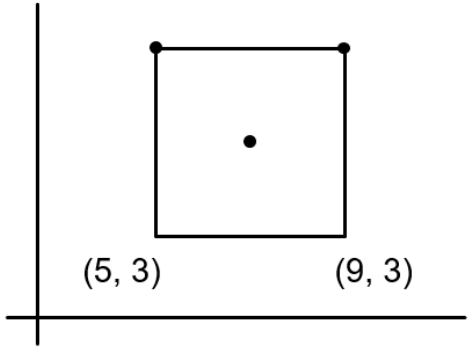


(5)

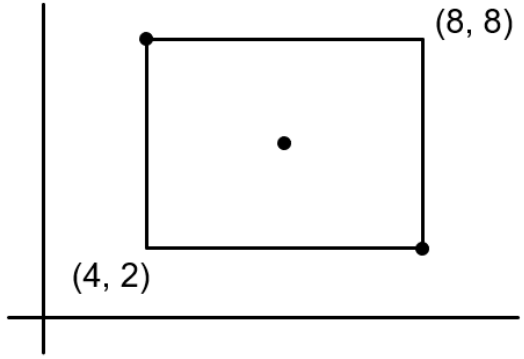


find the missing coordinates of the given shapes (i)

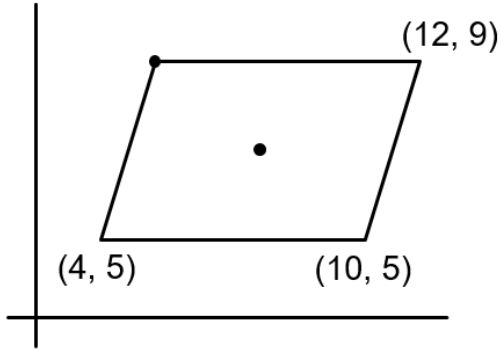
(1) a square



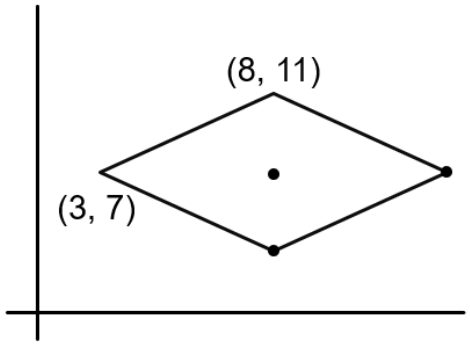
(2) a rectangle



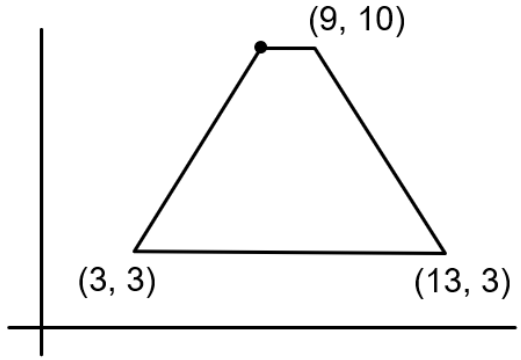
(3) a parallelogram



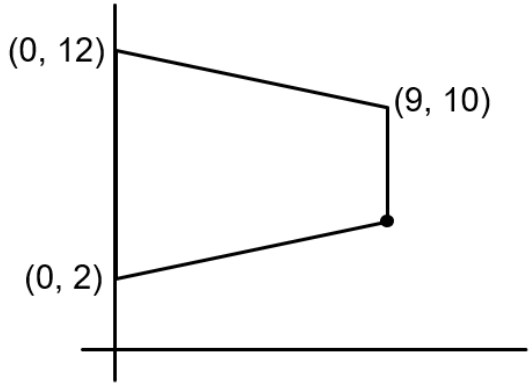
(4) a rhombus



(5) an isosceles trapezium

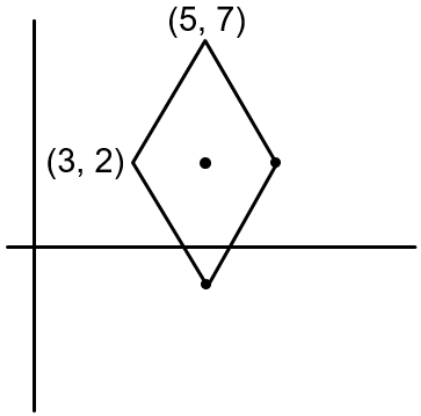


(6) an isosceles trapezium

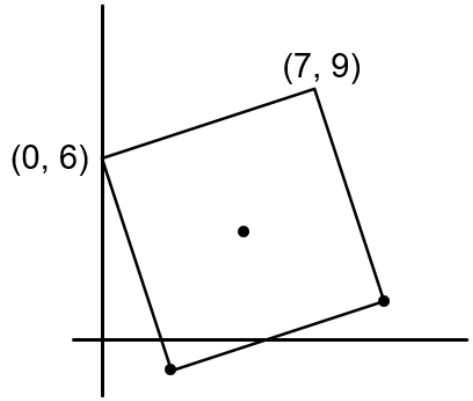


find the missing coordinates of the given shapes (ii)

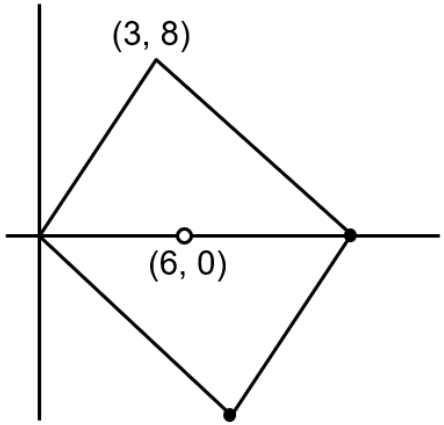
(7) a rhombus



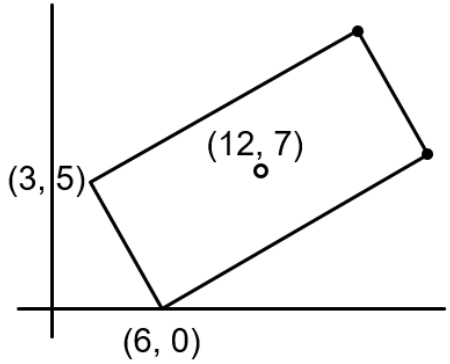
(8) a square



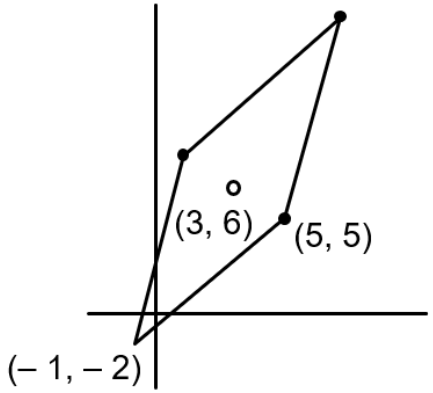
(9) a parallelogram



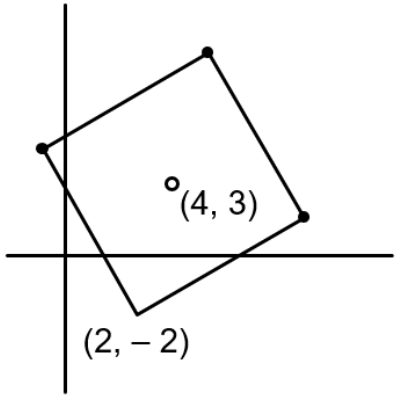
(10) a rectangle



(11) a rhombus



(12) a square



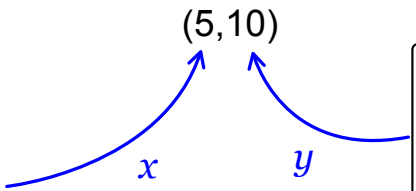
Fluency Practice

learn by heart

Co-ordinates are written (x, y)

The x value of a co-ordinate is the first number in the bracket and tells us how far along the x axis the point is.

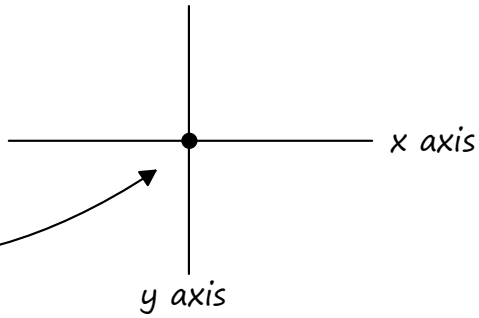
The y value of a co-ordinate is the 2nd number in the bracket and tells us how far up the y axis the point is.



The x axis is horizontal

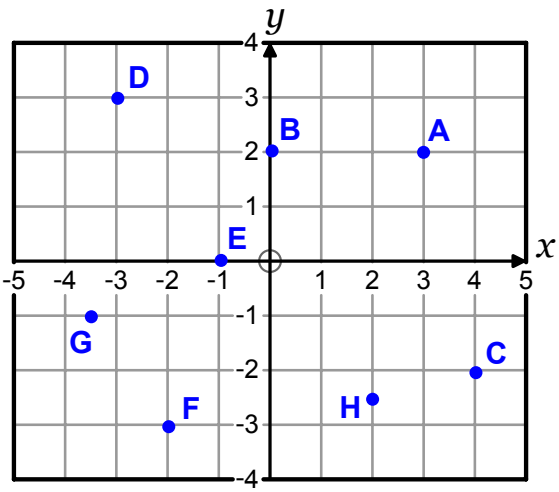
The y axis is vertical

The **origin** is the point (0, 0)



exercise 7b

1. State the coordinates of each point on the grid.



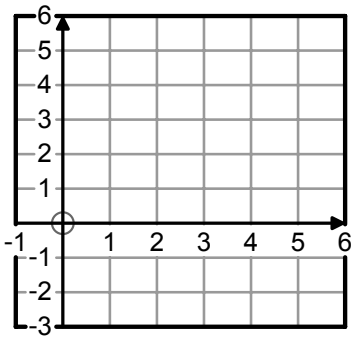
A (,) **B** (,)

C (,) **D** (,)

E (,) **F** (,)

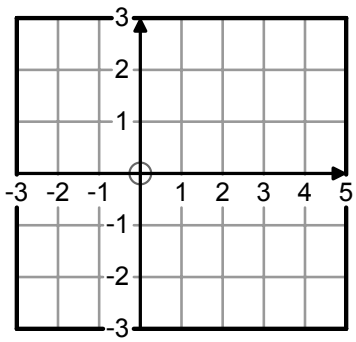
G (,) **H** (,)

2. a) On the grid, plot the points (0,3), (5,5) and (5,1).



b) Join up your points.
What type of triangle does it make?

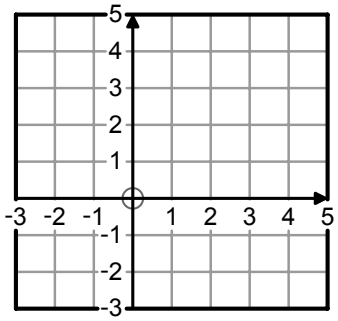
3. a) On the grid, plot the points (-2,2), (4,-1) and (-2,-1).



b) Join up your points.
What type of triangle does it make?

Fluency Practice

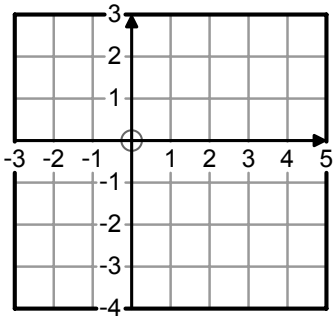
4. a) On the grid, plot the points (2,4), (4, -1), (2, -2) and (0,-1).



b) Join up your points.
What shape does it make?

kite | trapezium | square

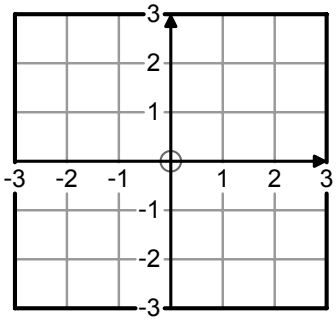
5. a) On the grid, plot the points (-2,0), (1, 2), (4,0) and (1, -2)



b) Join up your points.
What shape does it make?

rectangle | rhombus | square

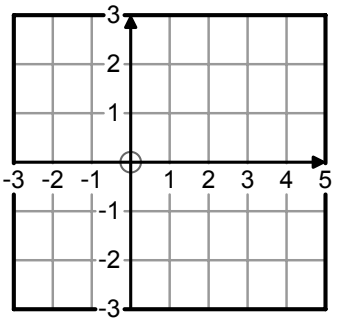
6. a) On the grid, plot the points (-2,-1), (-1,2), (1,2) and (2,-1).



b) Join up your points.
What shape does it make?

rectangle | trapezium | kite

7. a) On the grid, plot the points (-2,-1), (1,-1), (3,2) and (0,2)

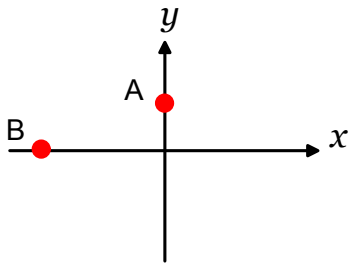


b) Join up your points.
What shape does it make?

parallelogram | rhombus | kite

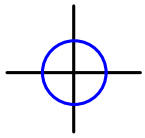
8. The grid shows two of the co-ordinates listed below.
Can you work out which two?

(-2, 3) | (0, 2) | (0,-2) | (2, 0) | (2, 3) | (-8,0)



Point A = _____ Point B = _____

9. A circle is drawn with its centre on the origin.
The circle has a diameter of 12 units.
Which of these points will lie on the circumference of the circle?



a) (12, 0) b) (0, 12) c) (6, 0) d) (6, 6)

Fluency Practice

learn by heart

Co-ordinates are written (x,y). The first numbers in the pair is the x-value, the second number is the y-value.

example

Which co-ordinate has an x value of -5?
A) (4,-5) B)(5,-5) C) (-5,5) D) (5,5)

The x value is the first number, so the answer is C.

exercise 7c

1. Fill in the table:

Co-ordinate	(5,2)	(-3,5)	(0,2)	(-2,0)	(0, 2.5)
x value					
y value					

2. Which of these co-ordinates has a y-value of -3? Select 2 answers.

   a) (0, 3) b) (3, 0) c) (-3, 0) d) (0, -3) e) (3, -3)

3. Which co-ordinate has an x-value of -2?

   a) (-2, 2) b) (2, -2) c) (0, 2) d) (0, -2)

4. Which of these co-ordinates have $\boldsymbol{x = 3}$? Circle all that apply.

   a) (-4,3) b) (3,1) c) (-3,1) d) (3,-3)

5. In which co-ordinates below is x a negative number? Choose 2 answers.

   a) (-5, 10) b) (5, -10) c) (5, 10) d) (-10, 5)

6. For which of the co-ordinates below does $x = y$? Choose 2 answers:

   a) (-3, -3) b) (-3, 3) c) (0, 0) d) (-3, 0) e) (0, 3)

7. Circle the co-ordinates below where $x + y = 10$.

   a) (4,5) b) (3,7) c) (-2,12) d) (-1,9)

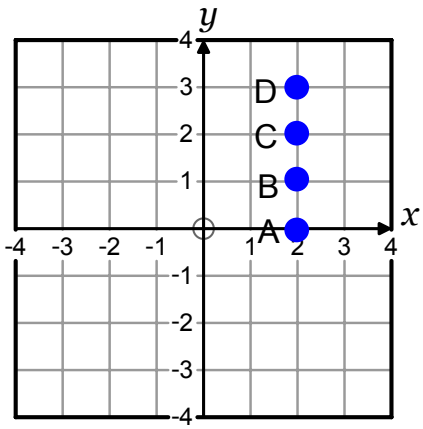
8. In which co-ordinates below is $x < 0$? Circle all that apply.

   a) (-5, 10) b) (5, -10) c) (5, 10) d) (-10, 5)

9. Write down the co-ordinate with an x value of 6 and a y value of -3.

Fluency Practice

10. Write down the co-ordinates of the points on this grid. What do they have in common?



A = (,)

B = (,)

C = (,)

D = (,)

11. True or false?

a) The co-ordinate (3,-4) has a positive x value.

b) The co-ordinate (0,-4) is below the x axis.

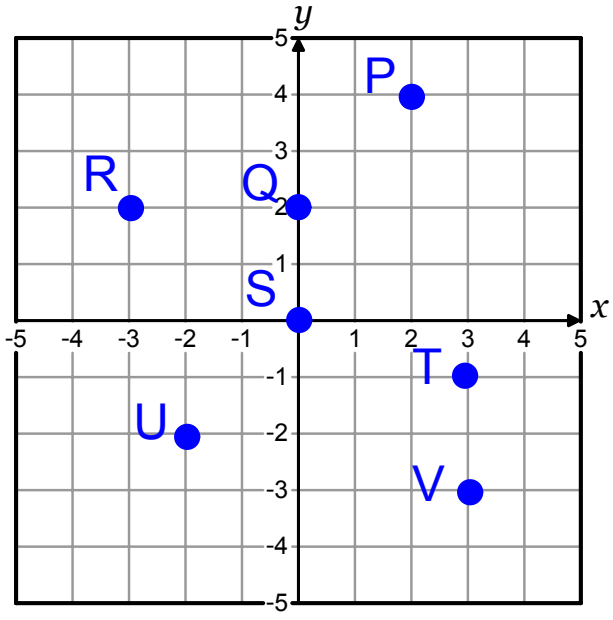
c) For the co-ordinate (-2,6), $x = 6$.

d) For the co-ordinate (-2,0), $y = 0$

e) A co-ordinate can not be a decimal

f) The co-ordinate (0,-2) has a negative y value

12. Seven points are shown on the coordinate grid.



Decide which points follow each rule:

a) $x = 3$

b) $y = x$

c) $y = 2$

d) $y = -x$

e) $y > 2$

f) $x \leq -1$

g) $x + y = 2$

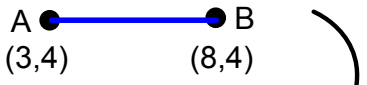
h) $x = 0$

Fluency Practice

learn by heart

We can find the horizontal distance between two points by looking at the difference in their x co-ordinates.

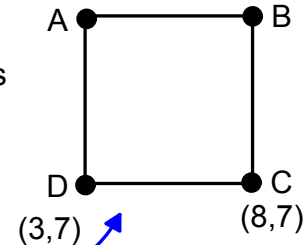
We can find the vertical distance between two points by looking at the difference in their y co-ordinates.



The horizontal distance between these points is 5 units (8 – 3 = 5)

examples

Work out the co-ordinates of A and B for the corners of this **square.**

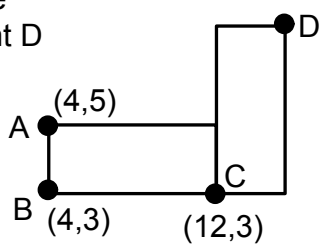


Side DC must be 5 units long because D is 3 along, but C is 8 along (8 – 3 = 5)

Therefore all sides are 5 units, so we need to go up 5 units from a height of 7.

So A = (3, 12) and B = (8, 12)

Two **identical** rectangles are shown. Work out the co-ordinates of point D



AB = 2 units
BC = 8 units
Each rectangle is 2 by 8

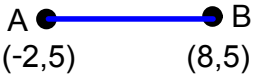
So we need to along 2 units from C and then up 8 units, so point D is (14,11)

exercise 7d

1. Work out the distance AB in each diagram:

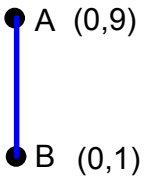
a)

b)

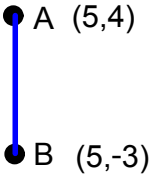


c)

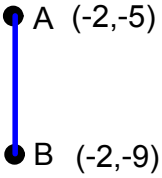
d)



e)



f)

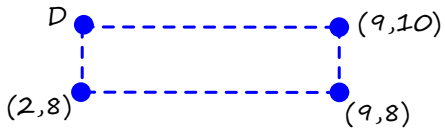


2. What is the distance between (-4,5) and (6,5)?

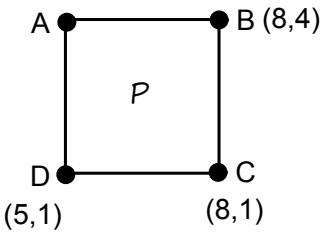
3. What is the distance between (-5,2) and (-5,-15)?

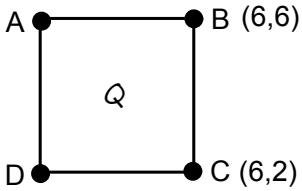
Fluency Practice

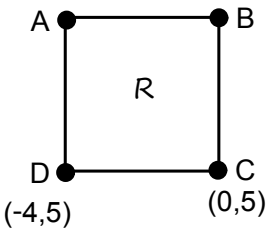
4. The diagram shows a rectangle.
Work out the co-ordinates of point D.

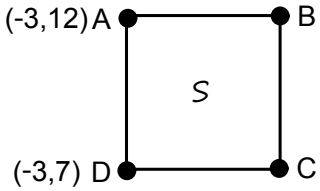


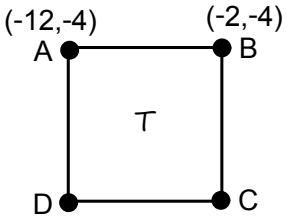
5. Work out the missing co-ordinates in each square:

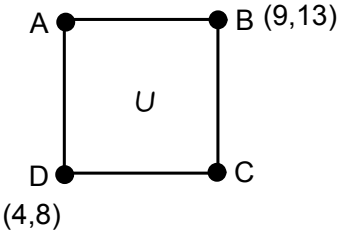




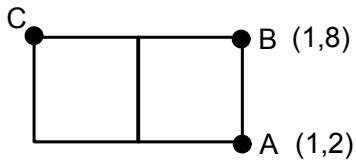




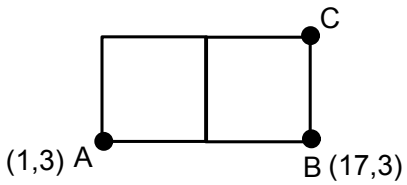




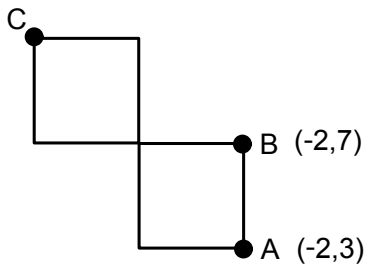
6. The diagram shows two identical squares. Work out the co-ordinates of point C.



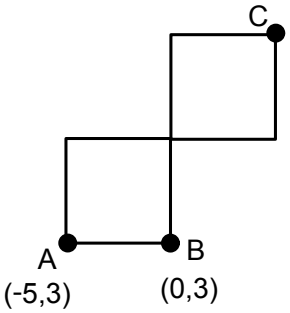
7. The diagram shows two identical squares. Work out the co-ordinates of point C.



8. The diagram shows two identical squares. Work out the co-ordinates of point C.

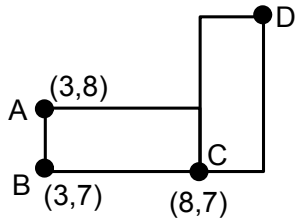


9. The diagram shows two identical squares. Work out the co-ordinates of point C.

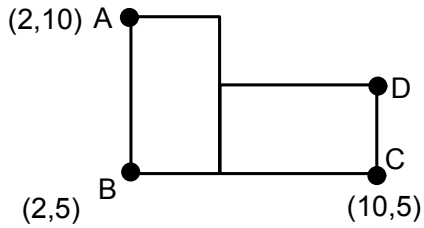


Fluency Practice

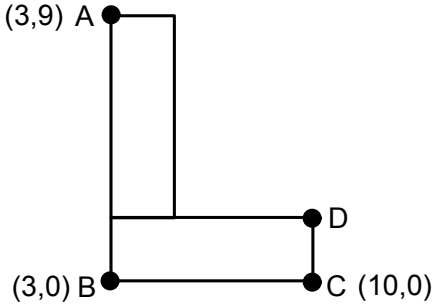
10. The diagram shows two **identical** rectangles. Work out the co-ordinates of point D.



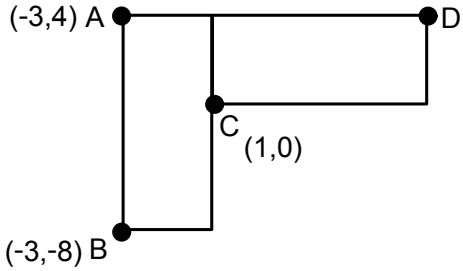
11. The diagram shows two **identical** rectangles. Work out the co-ordinates of point D.



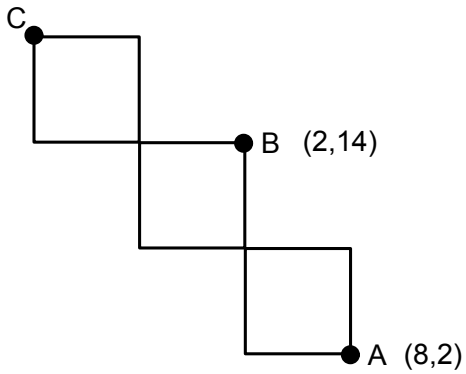
12. The diagram shows two **identical** rectangles. Work out the co-ordinates of point D.



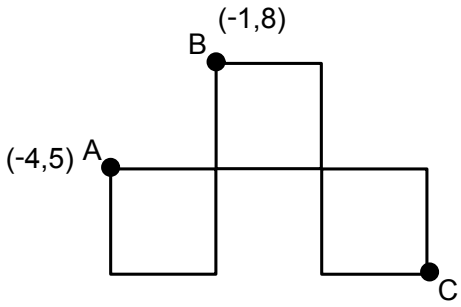
13. The diagram shows two **identical** rectangles. Work out the co-ordinates of point D.



14. The diagram shows **three identical squares.** Work out the co-ordinates of point C.



15. The diagram shows **three identical squares**. Work out the co-ordinates of point C.



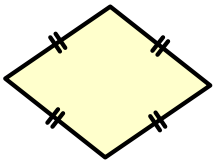
16. Three vertices of a square have co-ordinates (7,2), (10,2) and (10,5). What is the fourth co-ordinate?

17. Opposite vertices of a square have co-ordinates (8,3) and (3,-2). What are the other two co-ordinates?

Fluency Practice

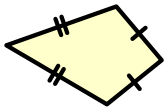
recall

Rhombus



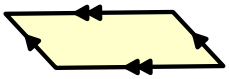
Four equal sides

Kite



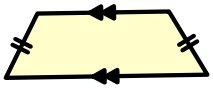
Two pairs of equal sides

Parallelogram



Opposite sides parallel

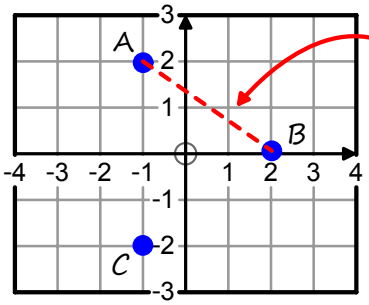
Isosceles Trapezium



One pair of parallel sides, other pair equal length

example

Plot point D so that ABCD is a rhombus.



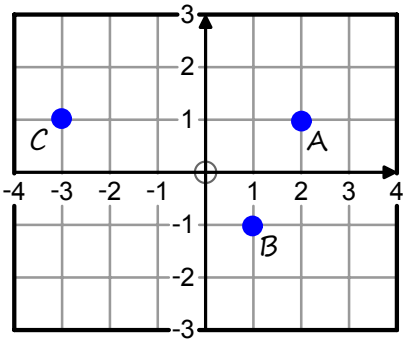
We can think of this distance as 3 across (horizontal) and 2 down (vertical).

To be a rhombus, all the sides must follow this same journey – 3 horizontally and 2 vertically. This will make the sides the same length.

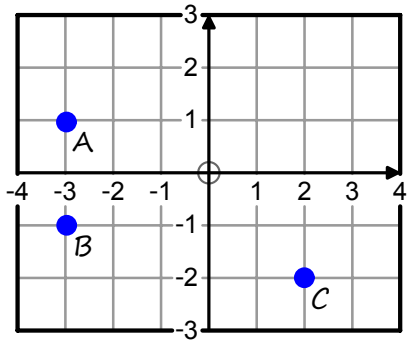
So point D must be at (-4,0).

exercise 7e

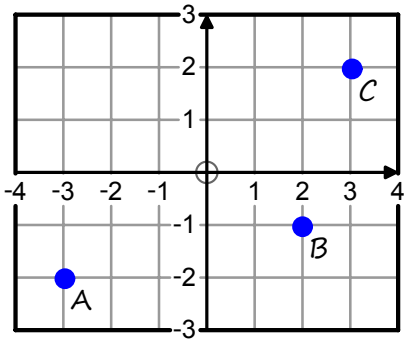
1. Plot point D so that ABCD is a kite. Join up your points.



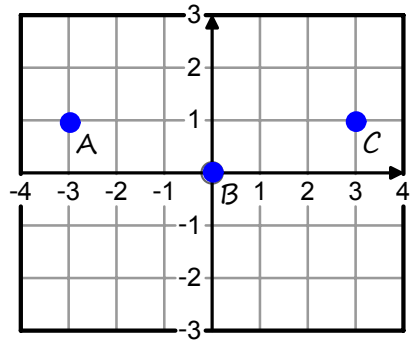
2. Plot point D so that ABCD is an isosceles trapezium. Join your points.



3. Plot point D so that ABCD is a parallelogram. Join up your points.

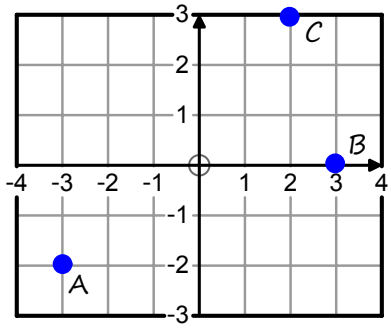


4. Plot point D so that ABCD is a rhombus. Join up your points.

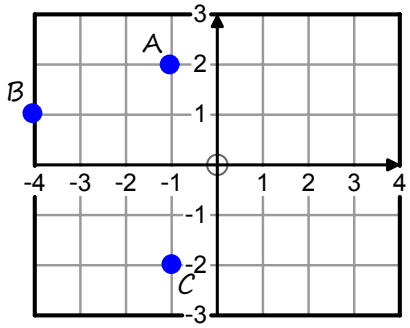


Fluency Practice

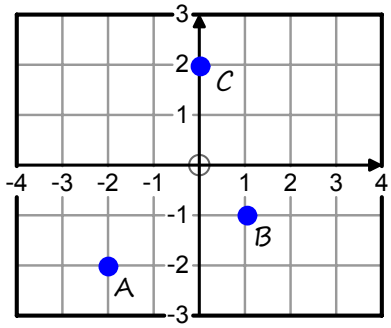
5. Plot point D so that ABCD is a rectangle. Join up your points.



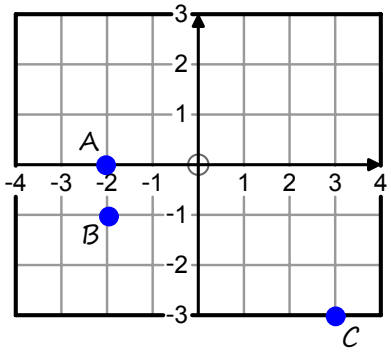
6. Plot point D so that ABCD is a kite. Join up your points.



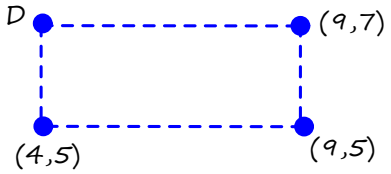
7. Plot point D so that ABCD is a square. Join up your points.



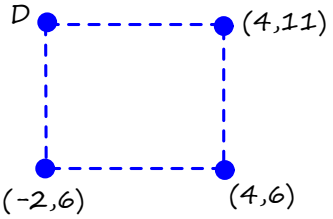
8. Plot point D so that ABCD is an isosceles trapezium. Join your points.



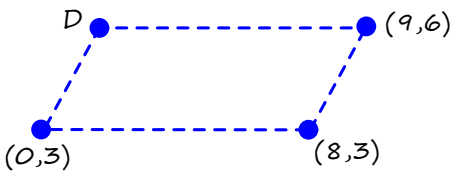
9. The diagram shows three corners of a rectangle. What would be the co-ordinate of point D, the 4th corner?



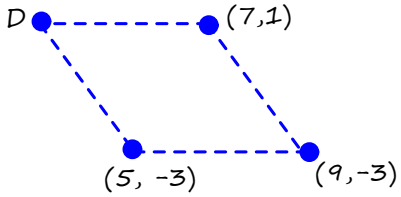
10. The diagram shows three corners of a rectangle. What would be the co-ordinate of point D, the 4th corner?



11. The diagram shows three corners of a parallelogram. What would be the co-ordinate of point D, the 4th corner?



12. The diagram shows three corners of a parallelogram. What would be the co-ordinate of point D, the 4th corner?



Fluency Practice

13. If the points (-6, 0), (-6, 2) and (4, 2) are 3 corners of a rectangle, what is the co-ordinate of the 4th corner?

a) (6, 2) b) (6, -2) c) (4, -2) d) (0, 4) e) (4, 0)

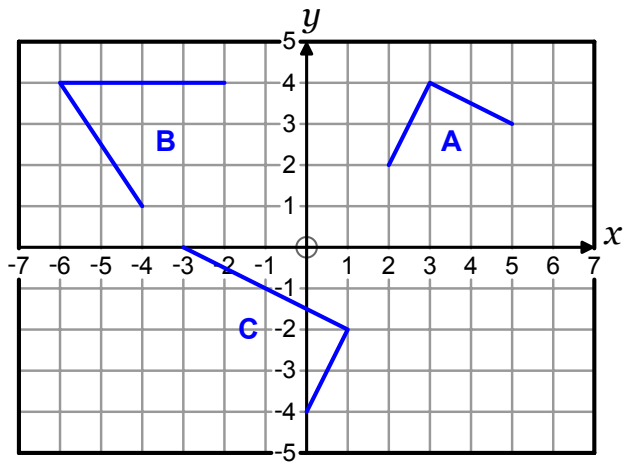
14. Each quadrilateral has two sides shown on the grid.

Complete the shapes and give the coordinates of the fourth vertex of each shape.

A Square (,)

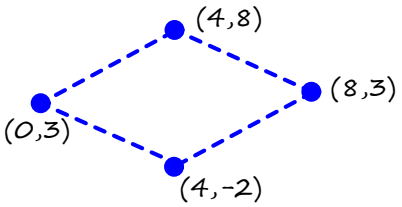
B Parallelogram (,)

C Rectangle (,)



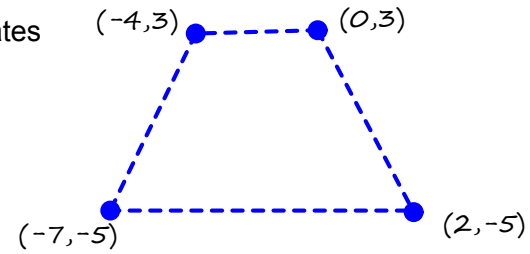
15. The diagram shows the co-ordinates of the corners of a quadrilateral (not drawn accurately).

Is this quadrilateral a **rhombus**? Explain your answer.



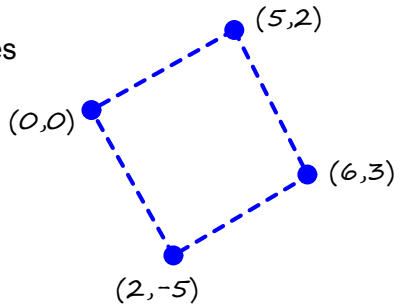
16. The diagram shows the co-ordinates of the corners of a quadrilateral (not drawn accurately).

Is this quadrilateral an **isosceles trapezium**? Explain your answer.



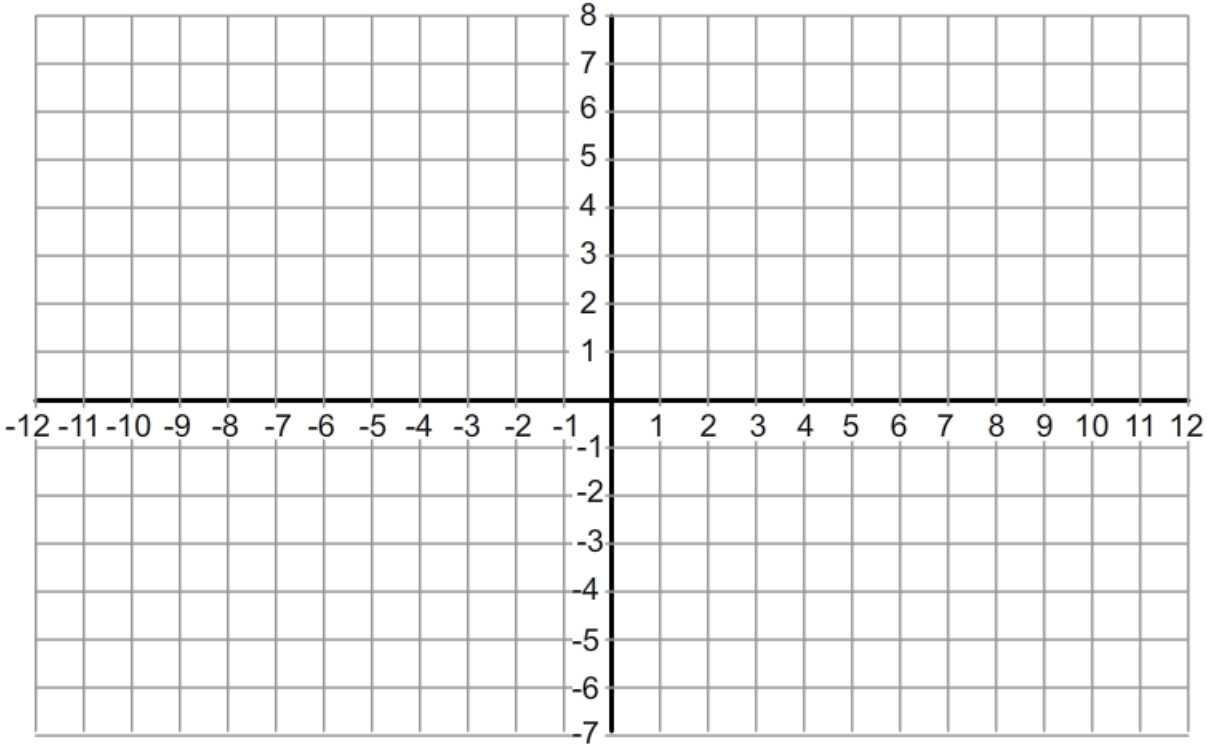
17. The diagram shows the co-ordinates of the corners of a quadrilateral (not drawn accurately).

Is this quadrilateral a **square**? Explain your answer.



Plot these co-ordinates:

A = (-10, 1)	G = (-9,5)	M = (9,5)	S = (-4, 1)	Y = (6, -2)
B = (-2, 4)	H = (9, 2)	N = (8,-6)	T = (4,0)	Z = (4, 6)
C = (-6,7)	I = (2, -3)	O = (10,-2)	U= (6,2)	$ = (-3,6)
D = (-4, -7)	J = (-8, -4)	P = (-4, -2)	V = (5,1)	
E = (2, -4)	K = (6,5)	Q = (2, -7)	W = (11,0)	
F = (-6, 1)	L = (8,8)	R = (8,0)	X = (12, 5)	



Which co-ordinates make a:

Square

Rectangle

Trapezium

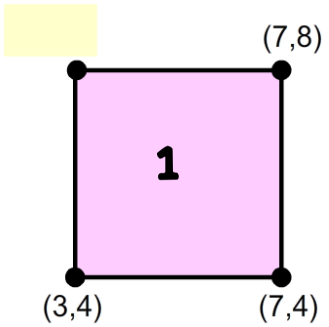
Kite

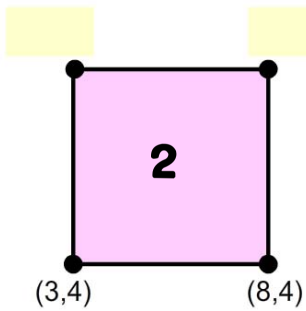
Pentagon

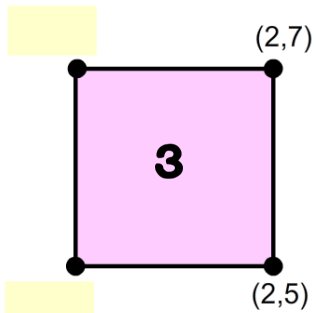
Isosceles Triangle

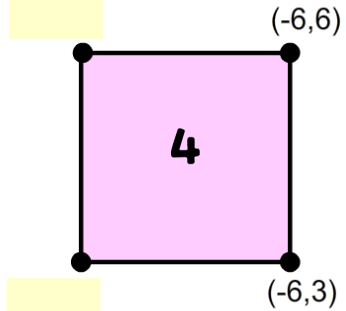
Scalene Triangle

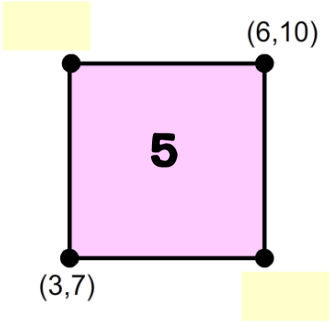
All of these shapes are squares. Label their missing corners.

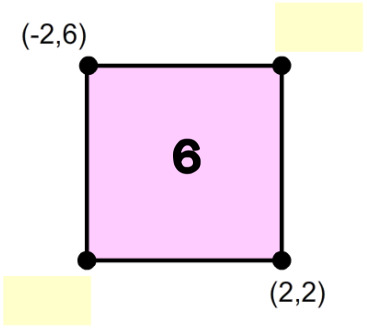


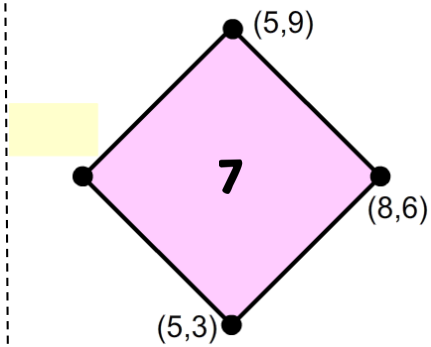


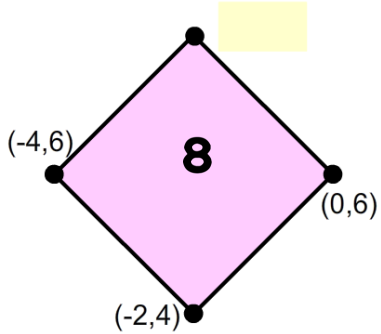




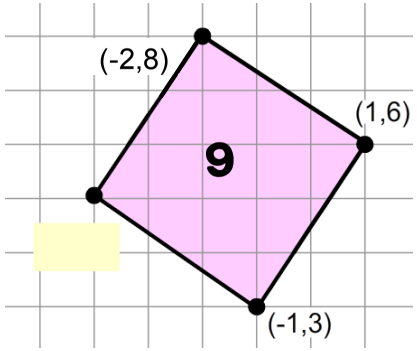


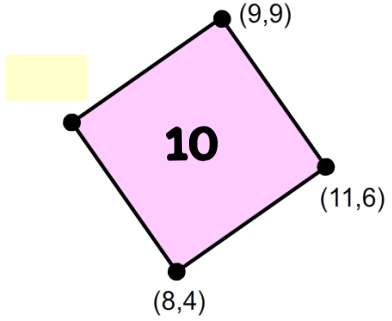


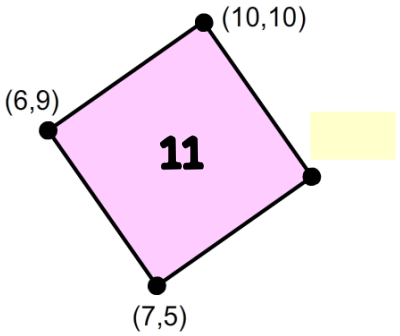




Hint: Try drawing right angled triangles around the squares.







4 Charts

Fluency Practice

Question 1: Draw a bar chart for each of these tables.

(a)

Sport	Frequency
Cricket	4
Football	3
Hockey	6
Rugby	1

(b)

Country	Frequency
China	12
Japan	18
South Korea	6
Thailand	6

(c)

Colour	Frequency
Blue	15
Green	8
Red	21
Yellow	3

Question 2: Draw a bar chart for each of these tables

(a)

Year	Students
7	36
8	35
9	25
10	24
11	16

(b)

Grade	Students
A	80
B	120
C	200
D	100
E	40
U	20

(c)

Animal	Frequency
Cat	12000
Dog	13000
Fish	1000
Horse	2000
Rabbit	7000

Question 3: Draw a dual bar chart for each table below

(a)

	Boys	Girls
Year 7	8	4
Year 8	6	6
Year 9	5	7

(b)

	Tea	Coffee
Monday	14	7
Tuesday	17	8
Wednesday	15	5
Thursday	11	10
Friday	9	15

Apply

Question 1: Matthew is a milkman.

The table below shows information about how many pints of milk he delivers in one village.

Day	Mon	Tues	Wed	Thurs	Fri	Sat
Pints Delivered	65	40	60	45	70	25

(a) Draw a bar chart to represent this information.

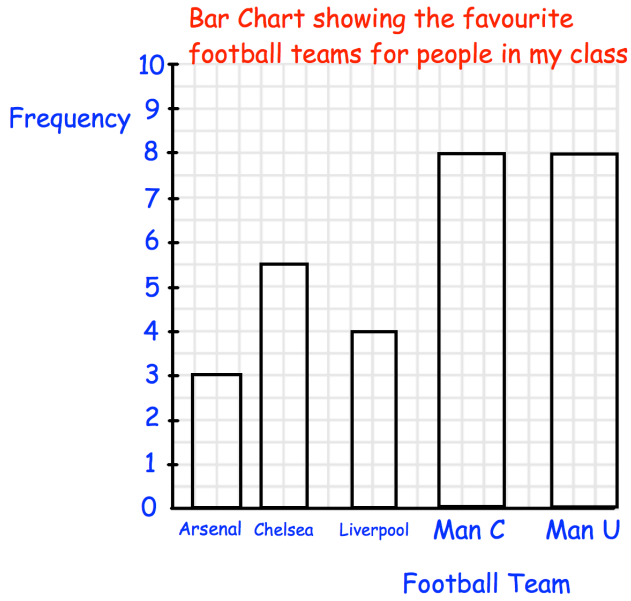
(b) How many pints of milk did he deliver in total?

Fluency Practice

Question 2: Shannon has drawn a bar chart to show the favourite football teams of the people in her class.

Shannon has made some mistakes.
(a) Explain what her mistakes are.
(b) Draw a correct bar chart for this information

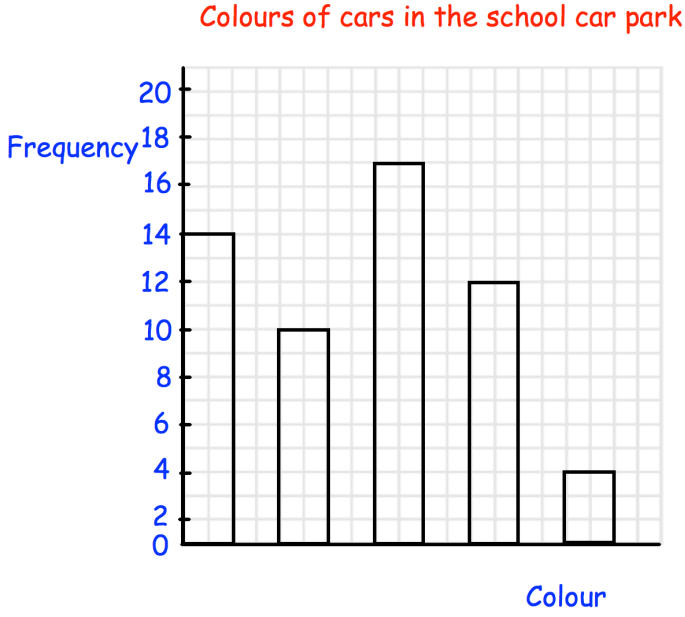
Football Team	Frequency
Arsenal	3
Chelsea	5
Liverpool	4
Man City	8
Man United	8



Question 3: Gareth has drawn a bar chart to show the colours of cars in a car park.

Gareth has made some mistakes.
(a) Explain what his mistakes are.
(b) Draw a correct bar chart for this information

Colour	Frequency
Blue	14
Red	9
Silver	17
White	12
Green	4

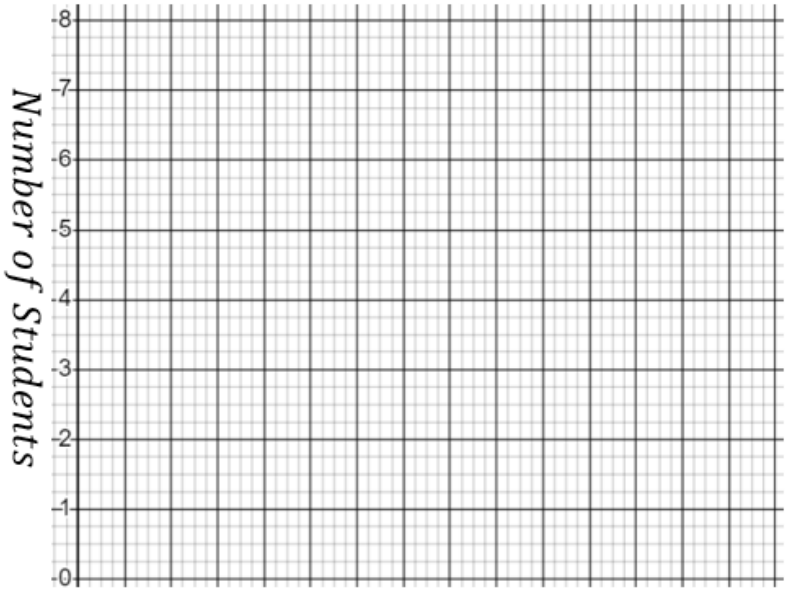


Drawing Comparative Bar Charts

(a)

The table shows the favourite sports of two Year 7 classes, 7A and 7B, when surveyed. Draw a comparative bar chart to represent this information. Include a key.

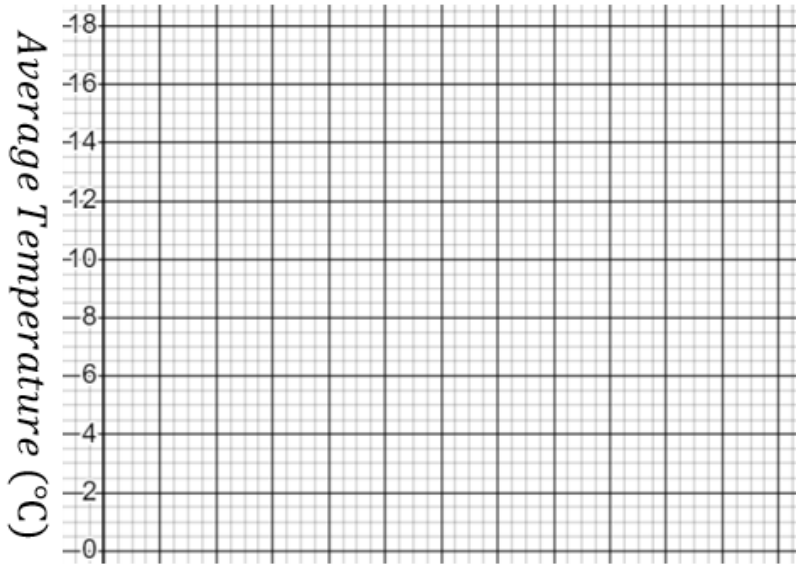
Class	Football	Tennis	Cricket	Netball	Other
7A	7	3	2	4	4
7B	5	4	4	5	2



(b)

The table shows the average temperature in °C in Manchester and London in each of the seasons. Draw a comparative bar chart to represent this information. Include a key.

City	Spring	Summer	Autumn	Winter
Manchester	7	16	8	4
London	11	18	9	6



Drawing Composite Bar Charts

(a)

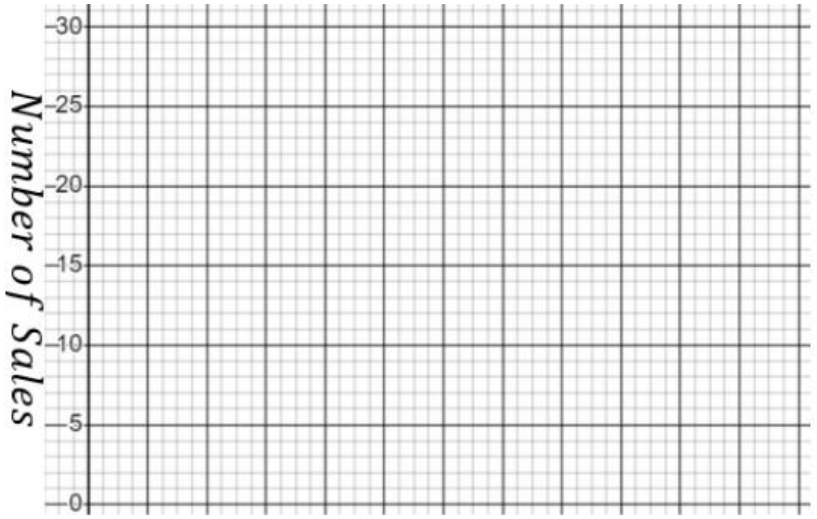
The table shows the number of ice creams and soft drinks sold over a week by an ice cream van. Draw a composite bar chart to represent this information. Include a key.

	Mon	Tue	Wed	Thu	Fri
Ice Cream	22	36	28	16	24
Soft Drink	12	8	10	16	10

(b)

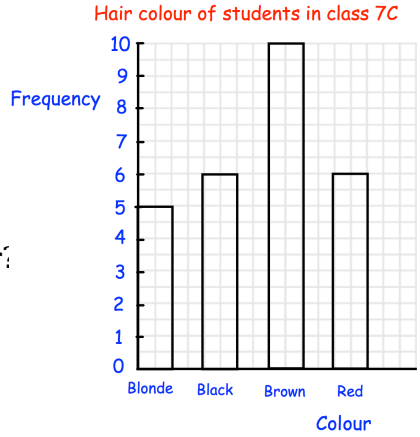
The table shows the recorded sales of TVs, laptops and mobile phones in a shop each month for 6 months. Draw a composite bar chart to represent this information. Include a key.

	Jan	Feb	Mar	Apr	May	Jun
TV	4	2	5	8	4	5
Laptop	10	5	6	5	9	12
Phone	16	6	8	11	8	12



Fluency Practice

Question 1: The bar chart shows information about the hair colour of students in 7C.



(a) What is the most common hair colour in 7C?

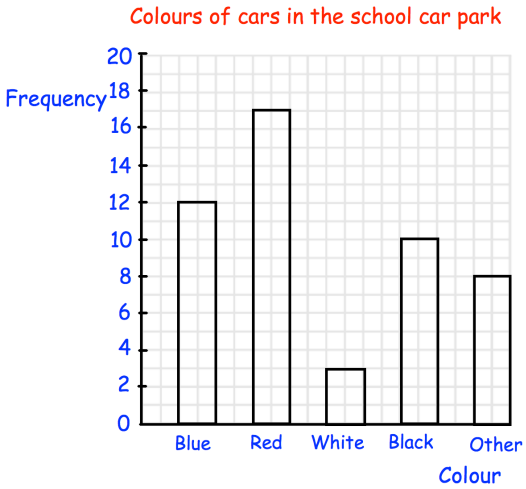
(b) How many students had black hair?

(c) What hair colour is the least popular in 7C?

(d) How many more students had brown than red hair?

(e) How many students are in 7C?

Question 2: Nicole recorded the colours of cars in a car park
She then drew a bar chart to show the results.



(a) What is the most common colour of car?

(b) How many cars were blue?

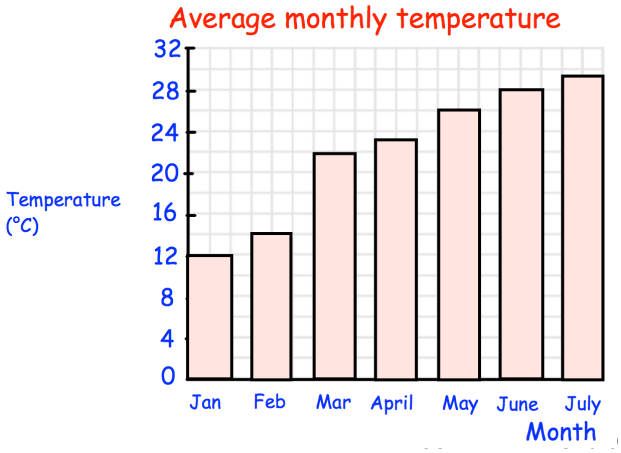
(c) How many cars were white?

(d) How many more cars were red than black?

(e) Why do you think there is a bar called "other?"

(f) How many cars were in the car park?

Question 3: The bar chart shows information about the average temperature on an island.



(a) What was the average temperature in March?

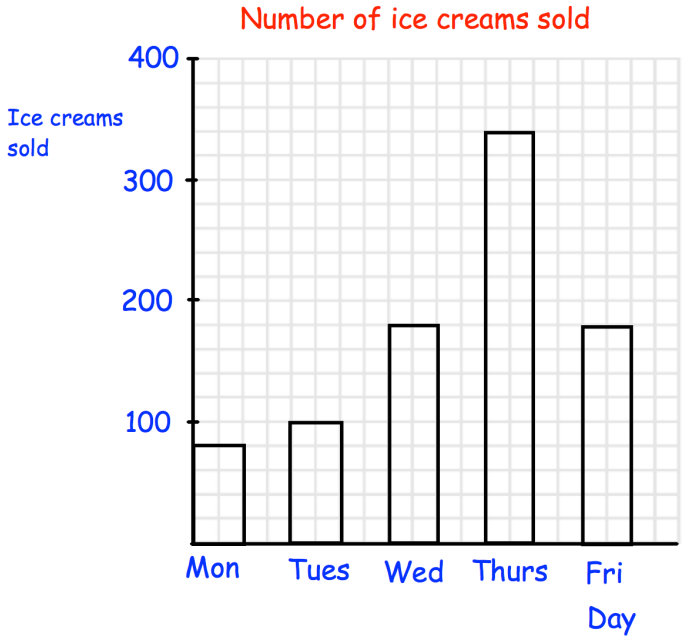
(b) Which month had an average temperature of 26°C?

(c) What is happening to the average temperatures between Jan and July?

(d) Between which two months was there the greatest rise in temperature?

Fluency Practice

Question 4: The bar chart shows information about the number of ice creams sold in a shop.



(a) How many ice creams were sold on Tuesday?

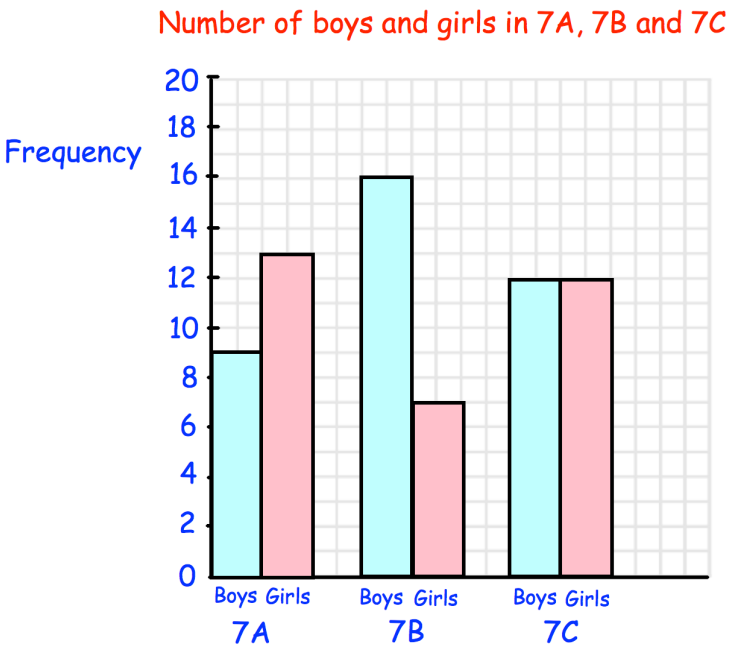
(b) On which day were the least number of ice creams sold?

(c) Why do you think so many ice creams were sold on Thursday?

(d) On which two days were the same number of ice creams sold?

(e) How many ice creams were sold in total?

Question 5: The dual bar chart shows information about the number of boys and girls in three tutor groups, 7A, 7B and 7C.



(a) How many boys are there in 7B?

(b) Which tutor group has 12 girls?

(c) Which tutor group has more girls than boys?

(d) Which tutor group has the same number of boys and girls?

(e) Which tutor group has the most students?

(f) How many more girls than boys are there in 7A?

(g) How many boys are there in Year 7?

(h) How many students are there in Year 7?

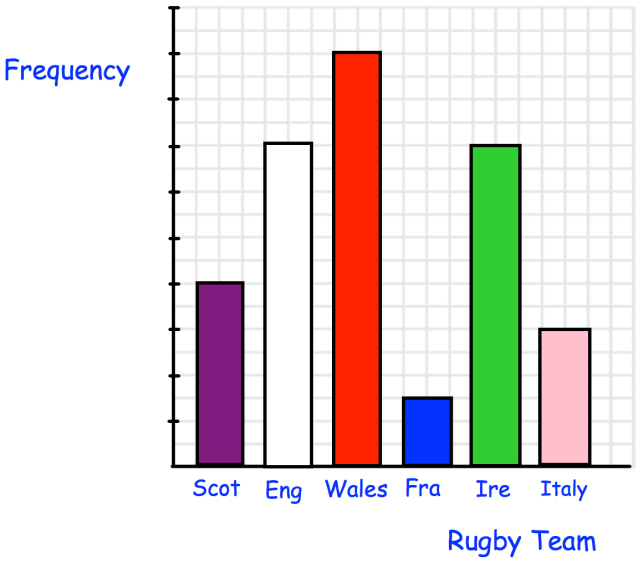
(i) Are there more boys or girls in Year 7?

Fluency Practice

Question 1: Nigel has asked his friends which country they support in the Six Nations. He has shown the results in a bar chart.

The bar chart is accurately drawn, but Nigel has forgotten to label the frequencies Nigel does remember that 9 people supported France.

Find the missing frequencies.



Rugby Team	Frequency
Scotland	
England	
Wales	
France	9
Ireland	
Italy	

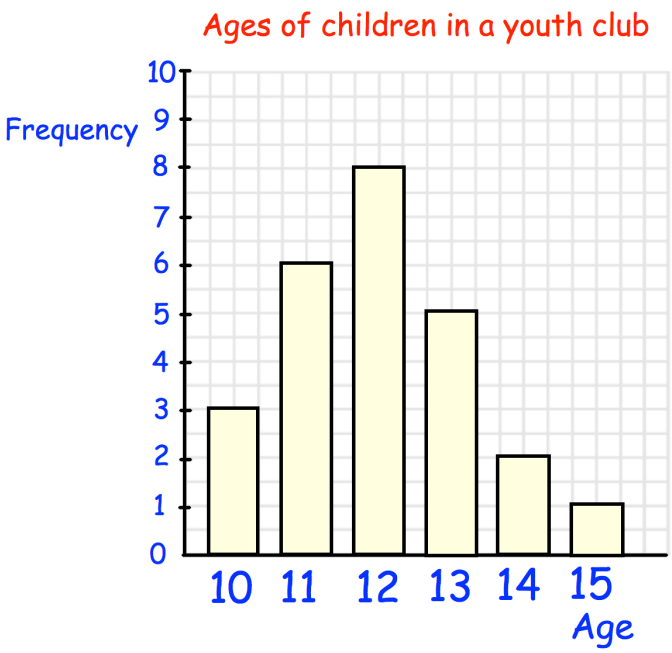
Question 2: The bar chart shows the ages of children in a youth club.

(a) What is the modal age?

(b) What is the range of the ages?

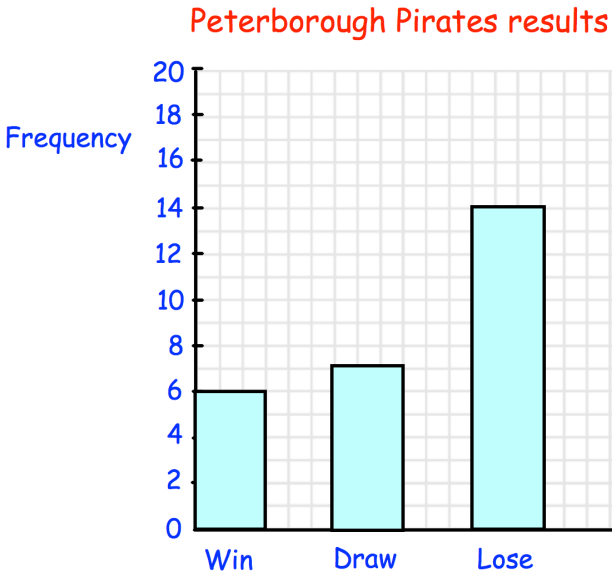
(c) What fraction of the children are 11?

(d) What percentage of the children are older than 13?



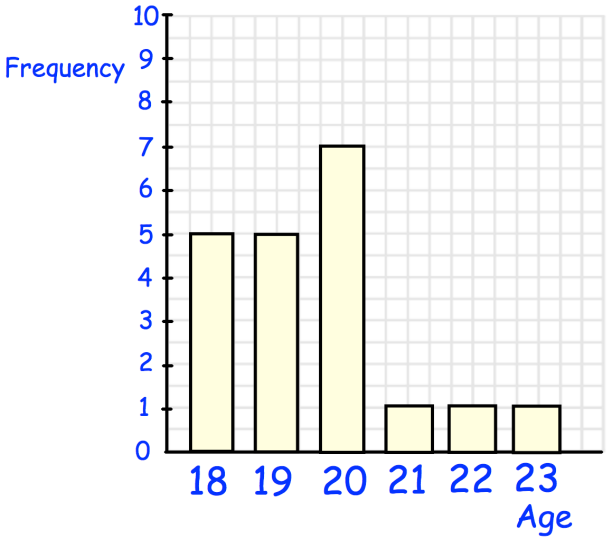
Fluency Practice

Question 3: Peterborough Pirates are an ice hockey team.
They play in a league where a win earns 5 points, a draw earns 2 point and a loss earns −1 points.
The bar chart shows information about their results in 2016.
The table shows the final points for the other 9 teams in the league.
In which position did Peterborough Pirates finish?



Belfast Giants:	50 points
Cardiff Devils:	23 points
Coventry Blaze:	49 points
Edinburgh Capitals:	51 points
Manchester Storm:	12 points
Nottingham Panthers:	28 points
Sheffield Steelers:	55 points
Swindon Wildcats:	33 points
Telford Tigers:	32 points

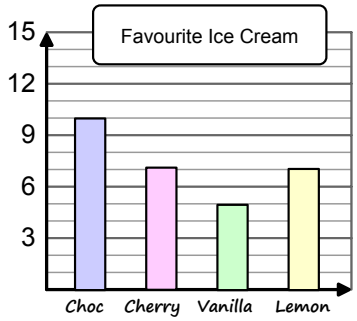
Question 4: Shown are the ages of 20 friends.
Work out the mean age.



Fluency Practice

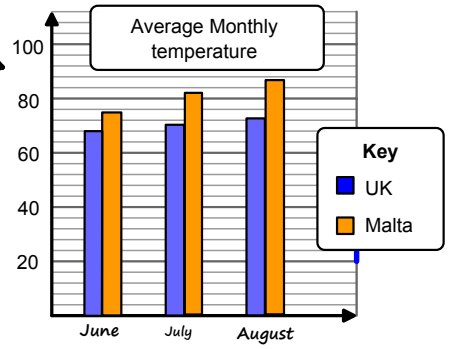
learn by heart

If we are drawing a bar chart and the x axis represents **discrete or qualitative data**, there can be gaps between the bars. This is because there can only be a limited number of values on the x axis, and the gaps in between the bars are meaningless.



Where the data is **continuous**, such as height, time or distance, a bar chart with touching bars would be drawn. A bar chart must have bars that are equal in width. Later on we will learn about histograms, which are charts we draw when we need bars of different widths.

If two or more data sets are being compared, a **comparison bar chart, or dual bar chart**, can be drawn, where each category has multiple bars.



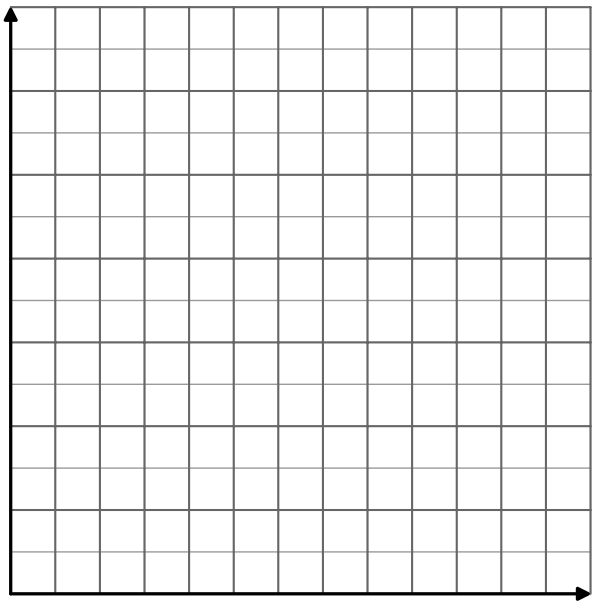
A **composite** bar chart is created when each bar is split into different categories.

exercise 8e

1. Jenny asked her classmates how many people lived in their household.

   Draw a bar chart to show the results.

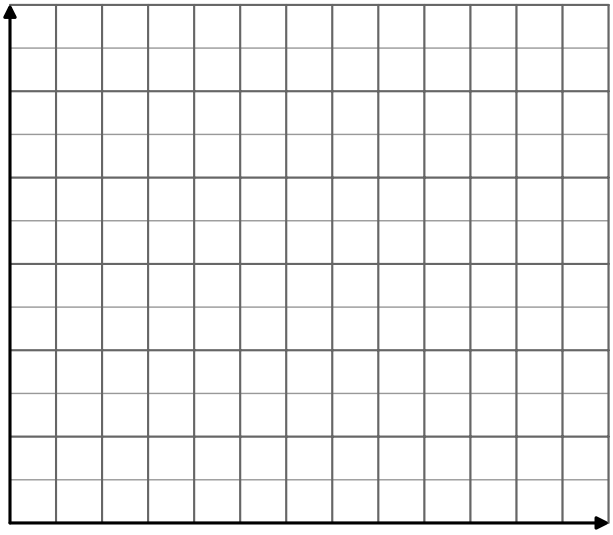
Number of People	Frequency
1	0
2	1
3	9
4	12
5	3
6+	3



Fluency Practice

2. Paul asked a group of students how many bars of chocolate they eat each month.

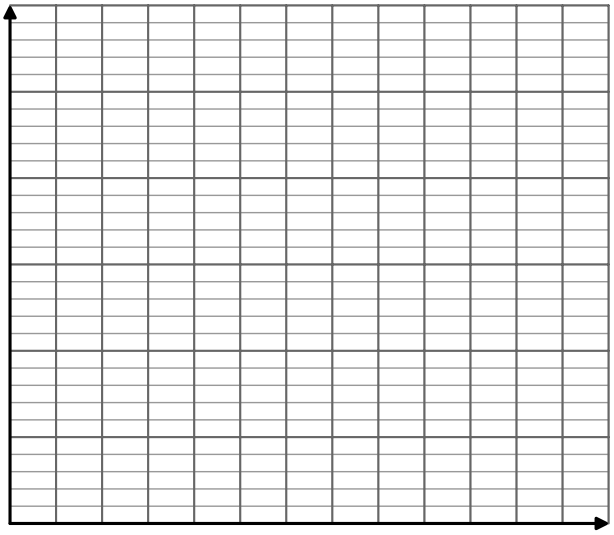
   Draw a bar chart of the results.



Number of Chocolate Bars	Frequency
0-4	1
5 - 9	5
10 - 14	5
15 -19	4
20-24	8
25+	10

3. Dana recorded the heights of a set of recently planted trees.

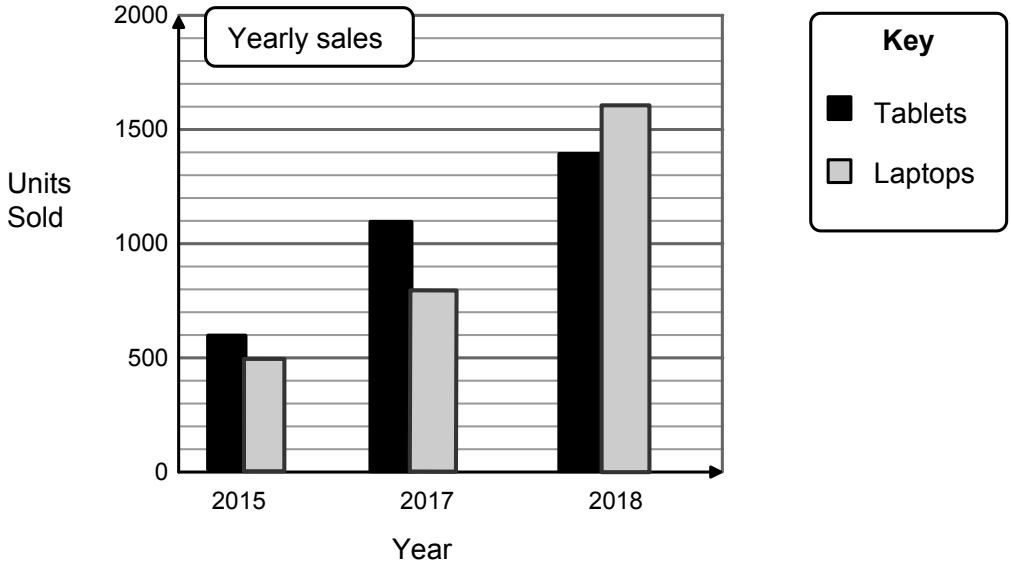
   Draw a bar chart of her results.



Tree Heights (cm)	Frequency
$0 \leq h < 30$	5
$30 \leq h < 60$	30
$60 \leq h < 90$	25
$90 \leq h < 120$	1

Fluency Practice

4. The chart shows the number of tablets and laptops sold by a technology company.



a) In which year did they sell the most tablets?

b) In which year did laptop sales exceed tablet sales?

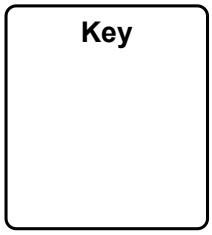
c) How many more tablets than laptops were sold in 2017?

d) The company also sells phones.
The table shows how many phones they sold each year.
Add this information to the bar chart.

2015	2017	2018
300	500	100

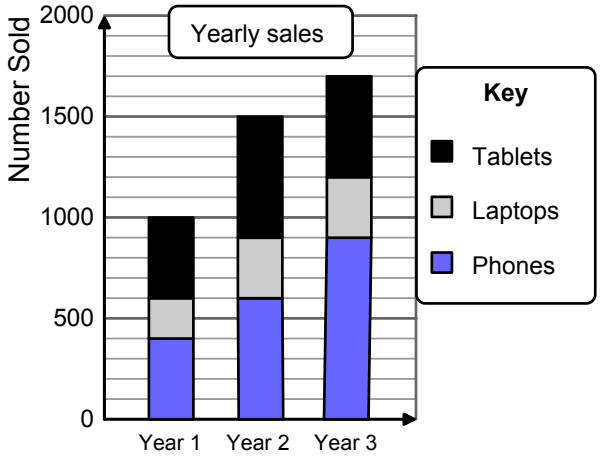
5. The table shows the quantity of wheat, barley and oats a firm produced over a number of years (in 1000kg). Draw a comparison bar chart to show the data.

	Wheat	Barley	Oats
2006	8	10	9
2007	11	7	11
2008	13	7	10
2009	14	4	9



Fluency Practice

6. The composite bar chart shows the number of sales of items by a new company in its first three years.

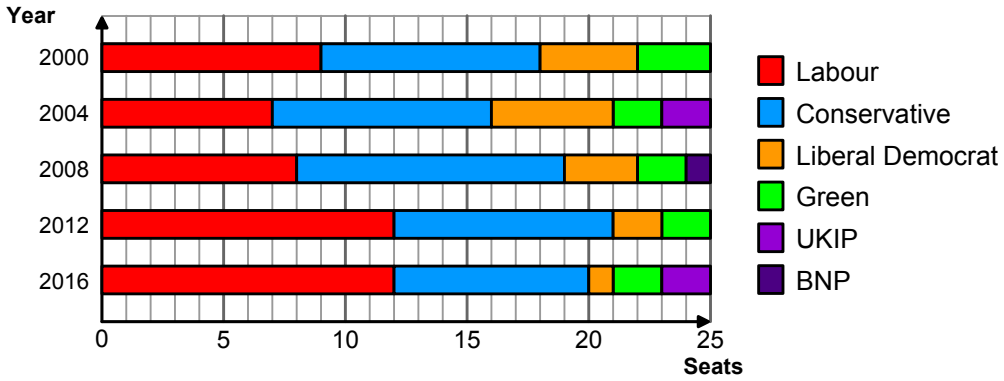


a) Work out the total number of laptops sold in the three years.

b) True or false? The number of sales of each item increased every year.

c) "The chart shows the company made the greatest profit from sales of phones." Do you agree?

7. The chart shows the number of seats in the London Assembly allocated to different political parties in 5 elections.

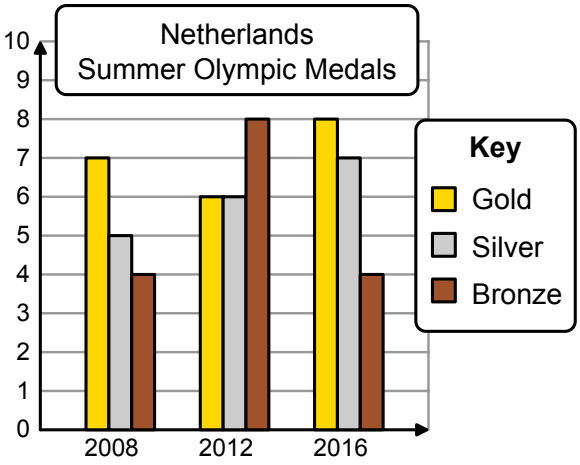


a) Which party had the most seats in 2004?

b) Did Labour achieve more than 50% of the seats in any election?

c) In which year did the Liberal Democrats have 4% of all the seats?

8. The chart shows the number of medals won by the Netherlands at three summer Olympic games.



a) More gold medals were won overall than bronze medals. How many more?

b) Work out the percentage of the medals won in 2012 that were gold.

c) Did the team ever achieve more than 50% gold medals?

Record & Represent

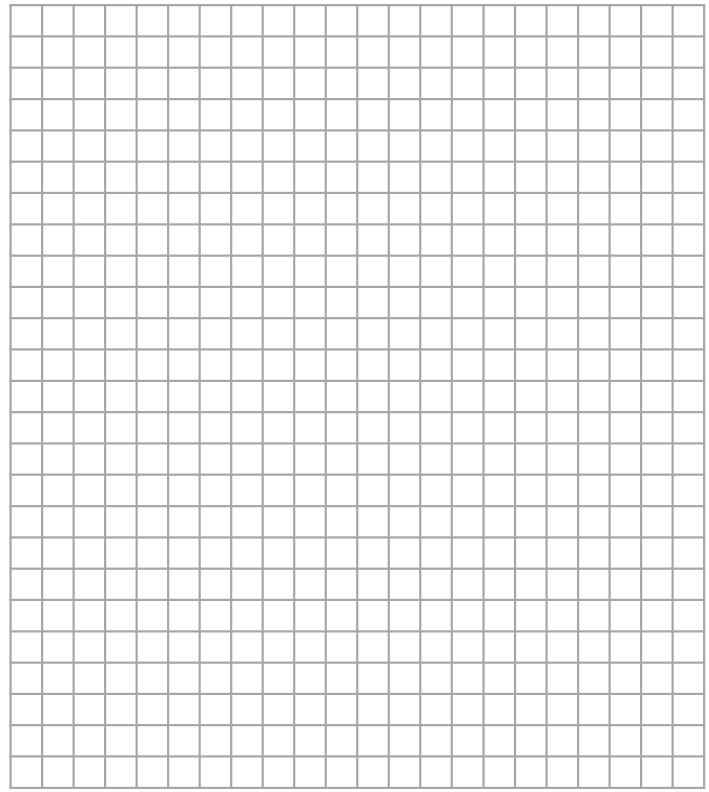
What would you like to investigate?

a) Create a tally chart.

What categories will you use?

	Tally	Total

b) Create a bar chart to represent the data.



c) Analyse & comment on the data.

Which category was the most popular?
Which was the least popular?
What was the difference between the most and least popular?
Were the results surprising to you?
How popular was your favourite compared to the total?

Problem Solving

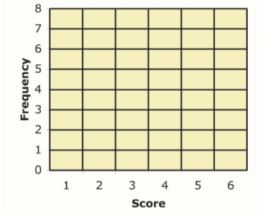
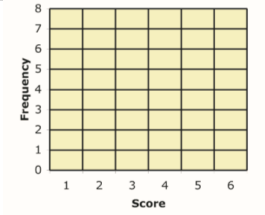
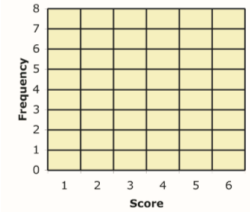
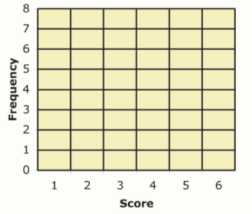
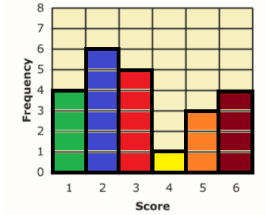
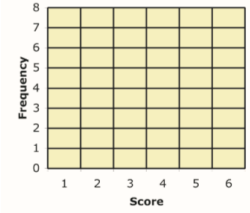
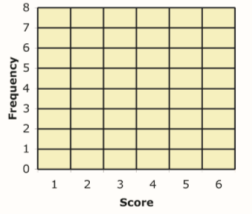
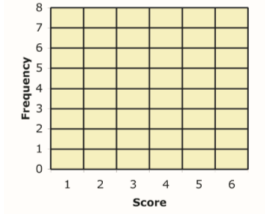
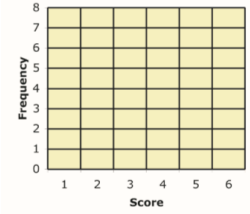
Draw a bar graph using the following information and squared paper.

- 24 children were asked to choose their favourite colour.
- A quarter of the children chose red.
- Two children chose green.
- The number of children who like pink is double the number of children who like green.
- Orange is as popular as green.
- The number of children who like blue is half the number of children who like red.
- No children like brown.
- An eighth of the children like purple.
- The rest of the children like yellow.

Instructions: Complete the remaining boxes by making the minimum change possible to the centre box. If there are boxes that cannot be filled in, say why.

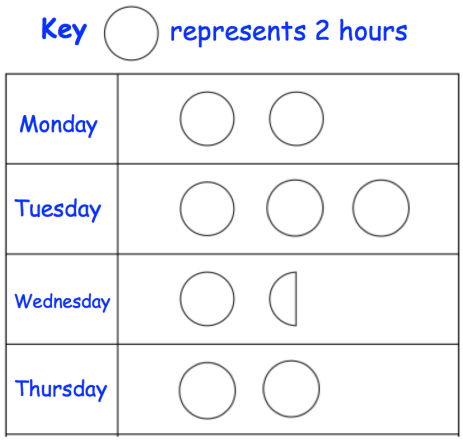
Total Frequency

Modal score

	Less	Same	More
More			
Same			
Less			

Fluency Practice

Question 1: James is revising for an exam.
The pictogram shows how many hours he spent revising over four days.



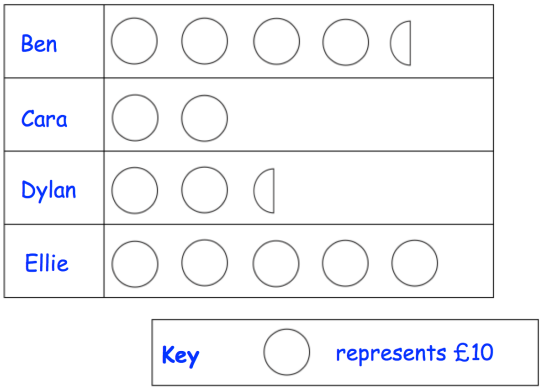
(a) How many hours did James spend revising on Monday?

(b) How many hours did James spend revising on Wednesday?

(c) On which day did James spend 6 hours revising?

(d) How many hours did James spend revising in total?

Question 2: The pictogram shows how much money 4 friends raised for charity.



(a) Who raised the most money for charity?

(b) Who raised the least money for charity?

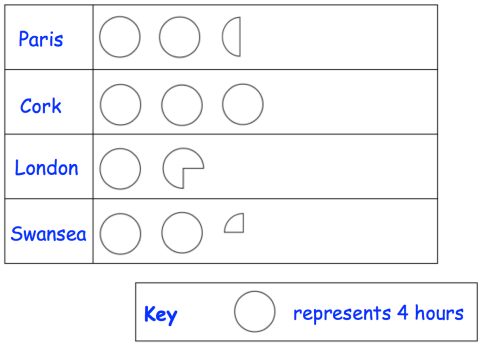
(c) How much money did Dylan raise?

(d) How much more did Ellie raise than Cara?

(e) How much more did Ellie raise than Dylan?

(f) How much money did the friends raise in total?

Question 3: The pictogram shows the number of hours of sunshine in four cities for a day in May.



(a) Which city had the most sunshine?

(b) How many hours of sunshine did Swansea have?

(c) How many more hours of sunshine did Paris have than London?

Fluency Practice

Question 4: Draw a pictogram for each of the following tables.
Use a suitable key.

(a)

Sport	Frequency
Badminton	20
Judo	15
Squash	25
Table Tennis	5

(b)

Day	Cars sold
Monday	6
Tuesday	8
Wednesday	3
Thursday	10
Friday	7

(c)

Position	Players
Goalkeepers	3
Defenders	18
Midfielders	16
Forwards	14

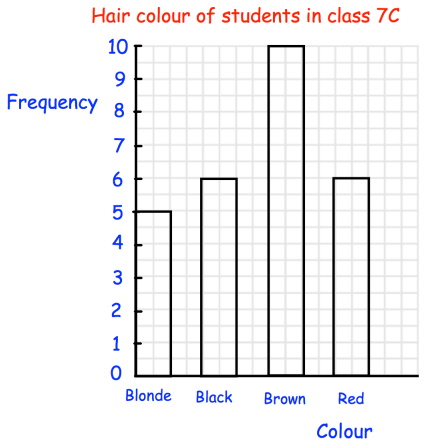
(d)

Shoe Size	Frequency
4	6
5	9
6	15
7	12
8	6

(e)

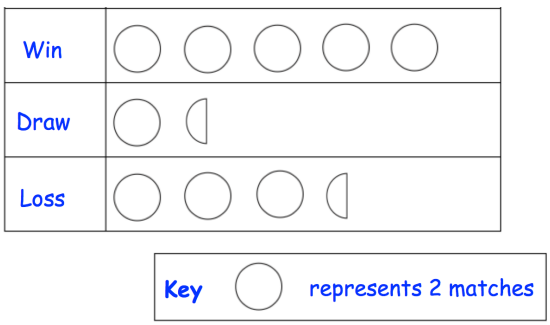
	Tweets
Hollie	50
Nick	120
Chris	70
Becky	80

Apply



Question 1: The bar chart above shows the hair colour of students in class 7C
Draw a pictogram to represent the information shown in the bar chart.

Question 2: The pictogram below shows the results of Bath City over a season.
Each win is worth 3 points.
Each draw is worth 1 point.
Each lose is worth 0 points.
How many points did Bath City earn over the season?



Fluency Practice

Question 3: Hannah has been asked to draw a pictogram for this information.

	Population
Milton	4,000
Leek	9,000
Redville	4,500
Newtown	5,000
Donhampton	2,000

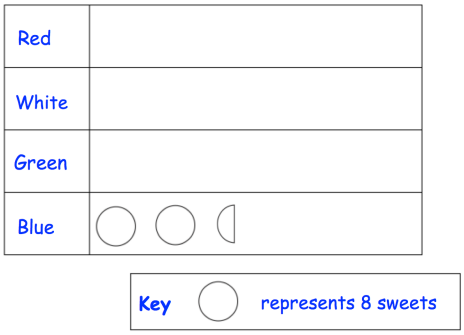
Hannah has decided to use the key

(a) Explain why her key is not suitable
(b) Suggest a more suitable key
(c) Draw a pictogram using your key from (b)

Question 4: The pictogram shows some information about the colour of sweets in a bag.

There are twice as many red sweets than green sweets.
There are 30% more white sweets than blue sweets.
There are 6 more red sweets than white sweets.

Complete the pictogram.

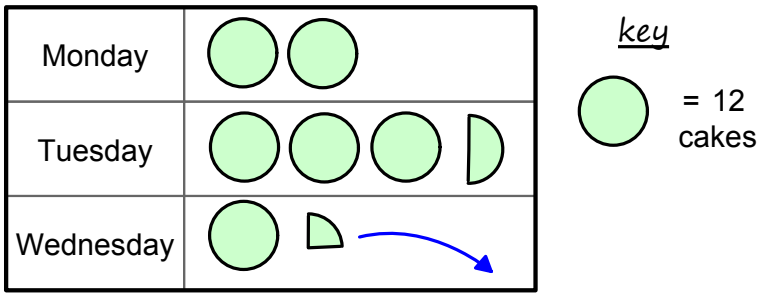


Fluency Practice

learn by heart

We can use diagrams and charts to help us see patterns or features of sets of data.

A pictogram can be used to highlight the frequency of different items. This pictogram shows the number of cakes sold each day at a bakery:



On Wednesday they sold
12 cakes + 3 cakes = 15 cakes

exercise 8d

1. The table shows how many students take part in after school clubs during the week.

Monday	Tuesday	Wednesday	Thursday
8	10	14	9

Complete the pictogram.

key

= 4

Monday	
Tuesday	
Wednesday	
Thursday	

2. The pictogram and the table both show how many phones were sold each day last week by a phone shop.

Monday	Tuesday	Weds	Thurs
20	45	25	

The pictogram and the frequency table are both incomplete.

Work out the missing information and fill them in, including the key

Mon	
Tues	★★★★½
Wed	
Thur	★★

key

★ = ____ phones

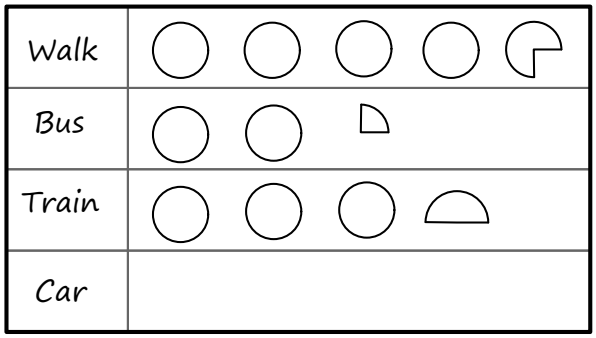
Fluency Practice

3. The pictogram shows how a group of 52 students travel to school.

The number travelling by car has not yet been included.

Complete the pictogram.

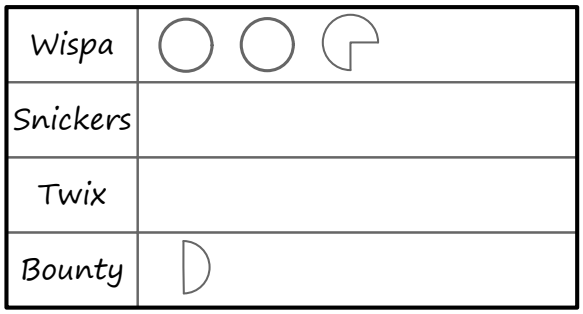
key ◯ = 4 people



4. The pictogram shows the favourite chocolate of a group of students.

The number who chose snickers & twix have not yet been included.

Use the clues below to complete the pictogram and the key.



key ◯ = ...

Clues

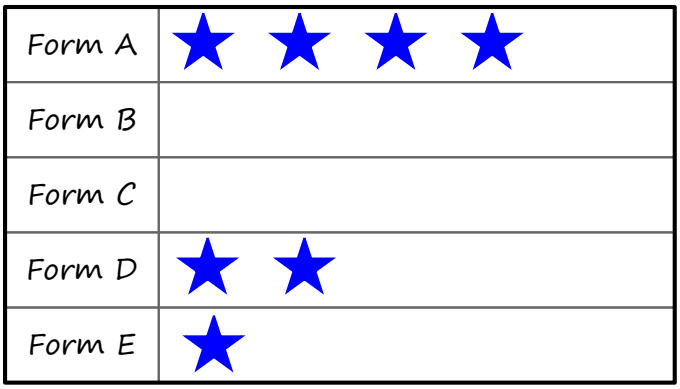
A) 26 students said either wispa or bounty

B) 36 students said snickers

C) 72 students took part in the survey.

5. The pictogram shows the number of merits each form group in year 7 received last week.

Use the clues below to complete the pictogram and the key.



Clues

A) Form A and B together received 50% of the total merits.

B) Form D received 10 merits more than Form E.

C) Form C received the most merits.

D) 160 merits were received in total.

key

★ = ...

Activity

Investigate!

Tally Chart

What information would you like to investigate?
What categories will you choose for data collection?

	Tally	Total

Pictogram

Will you use a shape or a picture to represent the data?
How many people will one shape/picture represent?

Key:

Fluency Practice

Question 1: Draw a pie chart for each set of data below

(a)

Method of Transport	Frequency
Car	8
Bus	11
Walk	12
Cycle	5

(b)

Rugby Team	Frequency
England	20
France	5
Ireland	15
Scotland	25
Wales	25

(c)

Colour	Frequency
Blue	25
Green	14
Red	21

(d)

Grade	Frequency
A	10
B	15
C	13
D	5
E	2

(e)

Make	Frequency
Ford	8
Mazda	14
Volkswagen	21
Fiat	20
Honda	9

(f)

Sport	Frequency
Cricket	7
Football	16
Gaelic Football	48
Hockey	33
Judo	4
Rugby	72

(g)

Language	Frequency
French	14
German	4
Polish	9
Spanish	3

(h)

Opinion	Frequency
Yes	3
No	11
Undecided	4

(i)

Drink	Frequency
Tea	410
Coffee	120
Fruit Juice	140
Water	50

Question 2: Draw a pie chart for each set of data below
You may use a calculator.

(a)

Holiday Destination	Frequency
France	102
Ireland	78
Portugal	24
Spain	36

(b)

Year Group	Frequency
7	5
8	17
9	20
10	8

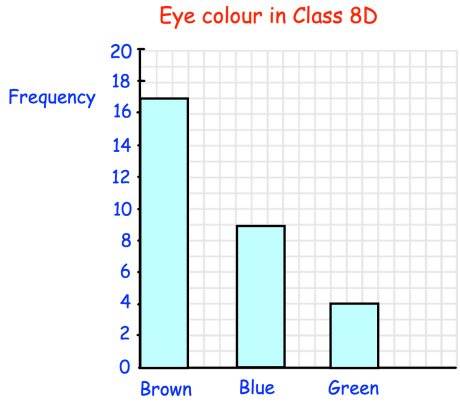
(c)

Meal	Frequency
Chinese	54
Indian	49
Italian	17
Thai	8

Fluency Practice

Apply

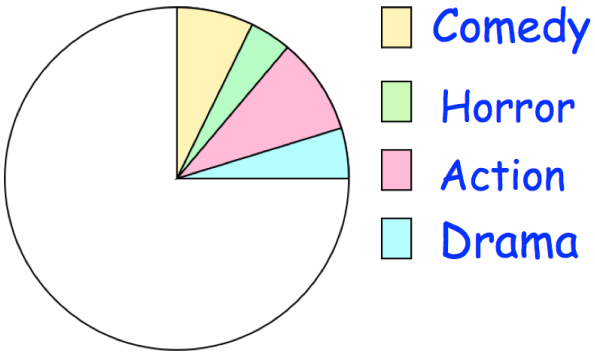
Question 1: Anne-Marie has drawn a bar chart to show the eye colours in class 8D.



(a) How many students are there in class 8D?
(b) Show this information in a pie chart.
(c) What fraction of the students have brown eyes?
(d) What fraction of the students have blue eyes?
(e) What fraction of the students have green eyes?

Question 2: Bill has drawn a pie chart to show his friends' favourite genre of film.

Genre	Frequency
Comedy	26
Horror	14
Action	33
Drama	17



(a) Can you explain to Bill what he has done wrong?
(b) Draw a correct pie chart for Bill.

Question 3: Erin is calculating the size of each angle for a pie chart.

(a) Can you spot what Erin has done wrong?
(b) Calculate the correct angles
(c) Draw a correct pie chart for Erin

Destination	Frequency	
Employment	15	$\times\ 0.2 = 3^\circ$
Apprenticeship	11	$\times\ 0.2 = 2.2^\circ$
Further Education	40	$\times\ 0.2 = 8^\circ$
Gap Year	6	$\times\ 0.2 = 1.2^\circ$

15 + 11+ 40 + 6 = 72

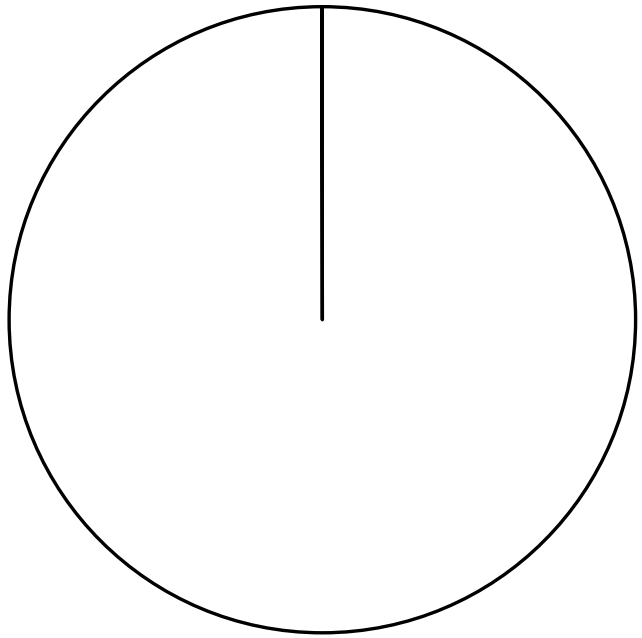
72 ÷ 360 = 0.2° per person

Drawing Pie Charts

(a)

In a survey, 90 students are asked to name their favourite fruit. The results are shown in the table below.
(a) Complete the table by calculating the angle for each fruit.
(b) Draw and label the pie chart.

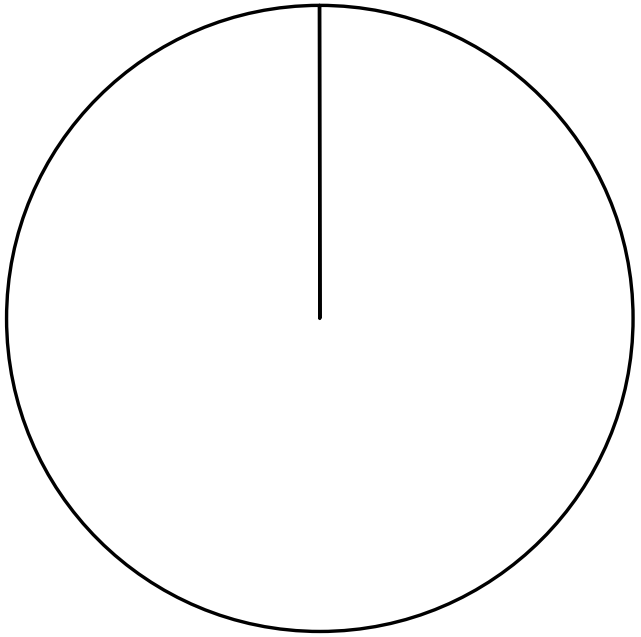
Fruit	Banana	Apple	Orange	Pineapple	Other
Number of Students	32	15	25	10	8
Angle					



(b)

The table shows the number of votes received by each candidate in a school election.
(a) Complete the table by calculating the angle for each candidate.
(b) Draw and label the pie chart.

Name	Tess	Kammy	David	Iqra	Mae
Number of Votes	26	32	14	48	24
Angle					

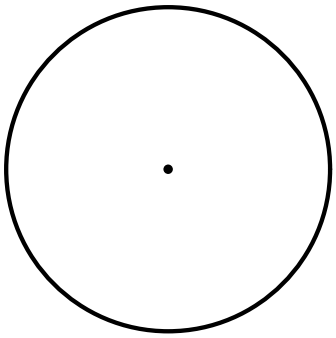


Fluency Practice

drawing pie charts Construct a pie chart for each table of data.

1 The table shows how a group of 60 pupils travel to school.

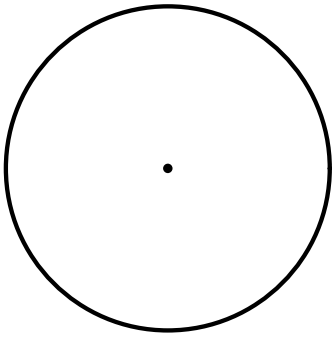
Transport	Frequency
Car	27
Bike	8
Bus	19
Other	6



---

2 The table shows some people's favourite fruits.

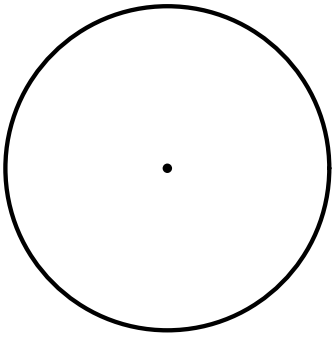
Fruit	Frequency
Apple	10
Banana	6
Orange	3
Other	5



---

3 The table shows some people's favourite film genres.

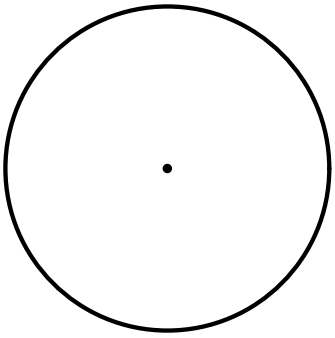
Genre	Frequency
Thriller	9
Comedy	18
Horror	7
Action	11



---

4 The table shows the languages studied by some pupils at a school.

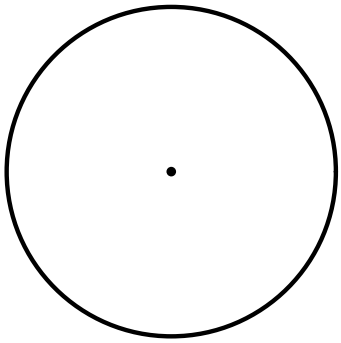
Language	Frequency
French	54
German	36
Spanish	30



Fluency Practice

5 The table shows some people's pets.

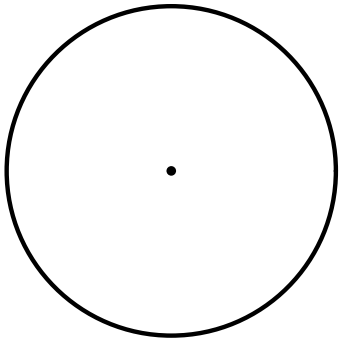
Pet	Frequency
Cat	18
Dog	21
Fish	9
Other	6



---

6 The table shows some diner's choices of dessert.

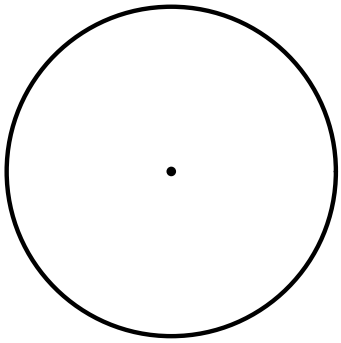
Dessert	Frequency
Ice Cream	80
Apple Pie	105
Cheesecake	125
Waffles	140



---

7 The table shows the types of medals won by a country at an Olympic Games.

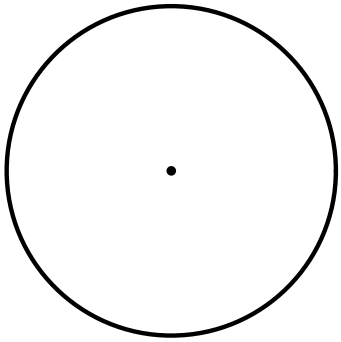
Medal	Frequency
Gold	6
Silver	13
Bronze	11



---

8 The table shows some people's choices of activity at an activity camp.

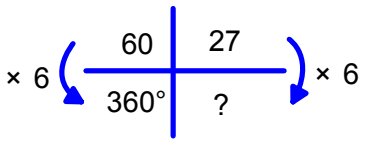
Activity	Frequency
Archery	34
Abseiling	22
Kayaking	14
Climbing	10



Fluency Practice

learn by heart

To draw a pie chart, we will need to work out the angle for each sector of the circle.

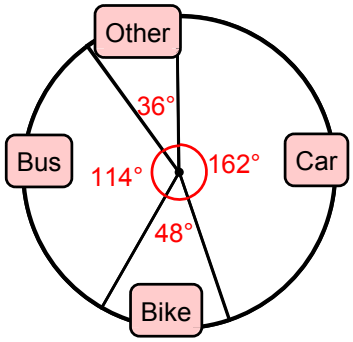


Since 60 people is 360°, each frequency is multiplied by 6 to find its angle

example

The table shows how a group of 60 pupils travel to school. Draw a pie chart to represent this data.

Transport	Frequency	
Car	27 × 6	162°
Bike	8	48°
Bus	19	114°
Other	6	36°

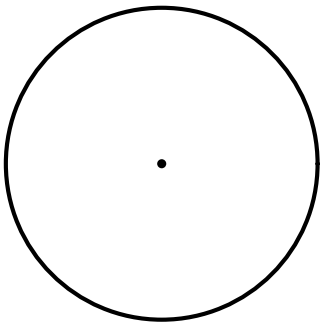


exercise 8h

1. The table shows the types of medals won by a country at an Olympic Games.

   Draw a pie chart of the data.

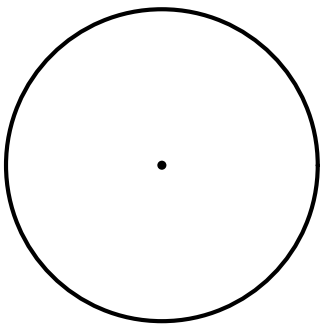
Medal	Frequency
Gold	6
Silver	13
Bronze	11



2. The table shows some people's choices of activity at an activity camp.

   Draw a pie chart of the data.

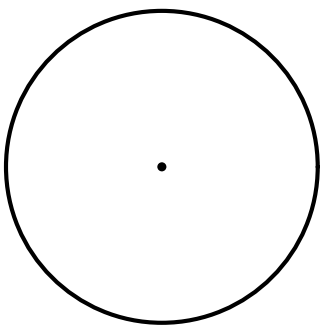
Activity	Frequency
Archery	34
Abseiling	22
Kayaking	14
Climbing	10



3. The table shows some people's pets. extra challenge

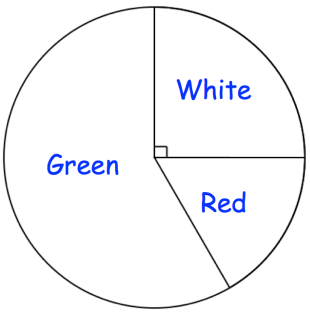
   Draw a pie chart of the data.

Pet	Frequency
Cat	18
Dog	21
Fish	9
Other	6



Fluency Practice

Question 1: This pie chart shows the colour of sweets in a bag.

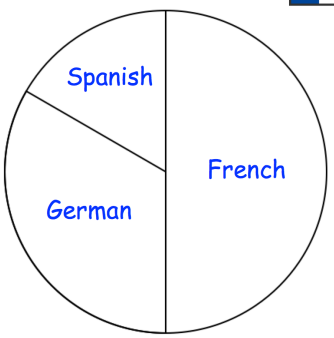


(a) What is the most common colour of sweet?

(b) What is the least common colour of sweet?

(c) What fraction of the sweets are white?

Question 2: The students in a school study one language.
The pie chart shows the languages studied.



(a) What is the most popular language?

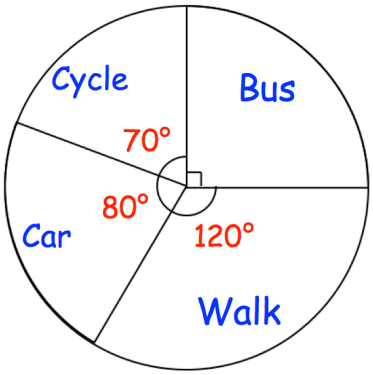
(b) What is the least popular language?

(c) What fraction of the students studied French?

There are 300 students that attend the school.

(d) How many students study French?

Question 3: The pie charts shows how a group of students travel to school.



(a) What is the most common method of travel?

(b) What is the least common method of travel?

(c) What fraction of the students caught the bus?

(d) What fraction of the students walked?

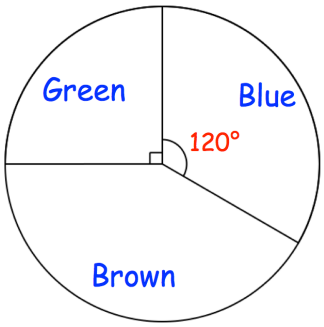
There are 36 students in the group.

(e) How many students caught the bus?

(f) How many students walked?

Fluency Practice

Question 4: There are 24 students in a class.
The pie chart shows information about their eye colour.

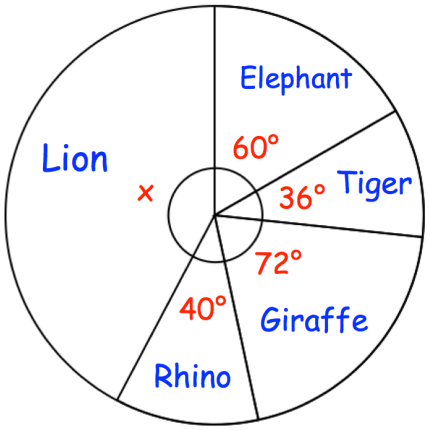


(a) How many students have green eyes?

(b) How many students have blue eyes?

(c) How many students have brown eyes?

Question 5: 90 students went on a school trip to Longleaf Safari Park.
They were asked their favourite animals.
The pie chart shows the results.



(a) What fraction of the students chose elephant?

(b) What fraction of the students chose tiger?

(c) What fraction of the students chose giraffe?

(d) What fraction of the students chose rhino?

(e) Find x

(f) How many students chose elephant?

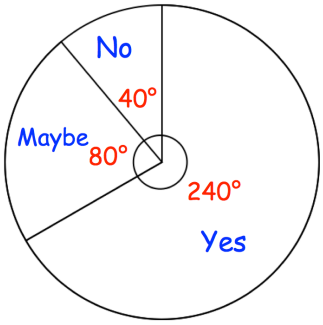
(g) How many students chose tiger?

(h) How many students chose giraffe?

(i) How many students chose rhino?

(j) How many students chose lion?

Question 6: 90 students were asked if they wanted to attend a history trip.
The results are shown in the pie chart.



(a) How many students said No?

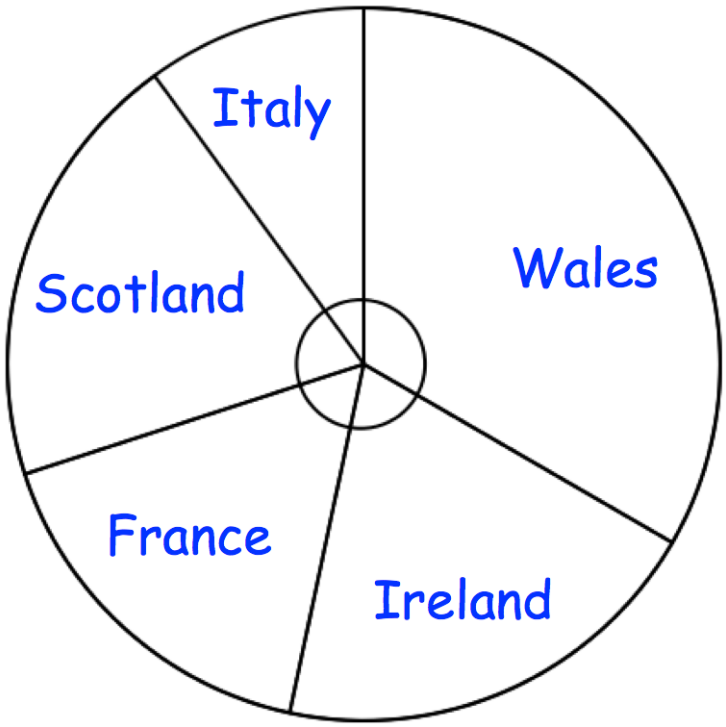
(b) What fraction of the students said Yes?

(c) How many students said Yes?

(d) How many students said Maybe?

Fluency Practice

Question 7: The pie chart below show the holiday destinations of 270 people.
The pie chart is **drawn accurately**.



(a) How many people are going to Wales?

(b) How many people are going to Ireland?

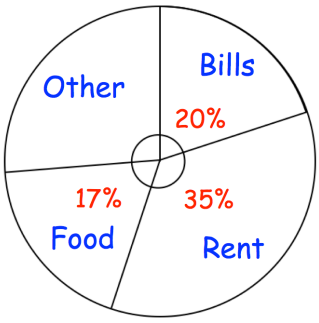
(c) How many people are going to France?

(d) How many people are going to Scotland?

(e) How many people are going to Italy?

Apply

Question 1: The pie chart shows how Rosie spent her pay last month.
She was paid £1200.



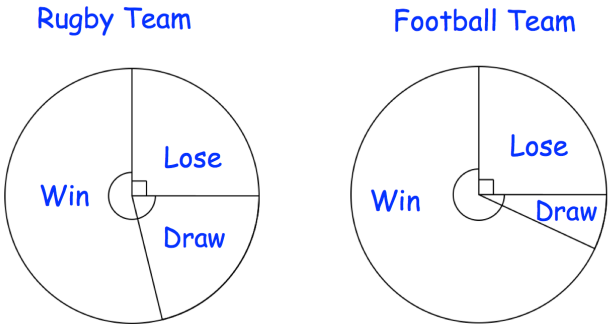
(a) What percentage of her pay did Rosie spend on Other?

(b) How much money did Rosie pay on Bills?

(c) How much money did Rosie pay on Rent?

Fluency Practice

Question 2: A school has a football team and a rugby team.
The pie charts show information about their results last season.



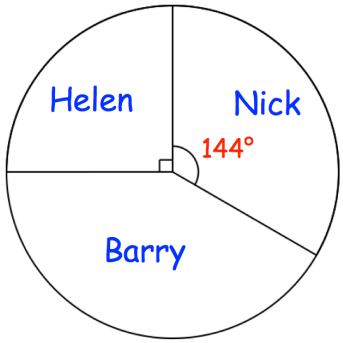
For each statement choose if they are **true, false** or **cannot tell.**

(a) The rugby team and football team both lost a quarter of their matches.
(b) The rugby team won more matches than they lost.
(c) The football team won more matches than the rugby team.
(d) The rugby team drew a larger proportion of their matches than the football team.
(e) The football team played 10 games last season.

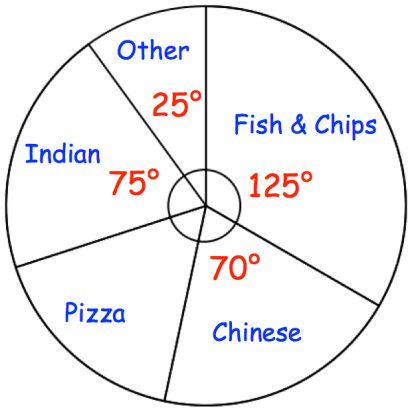
Question 3: Barry won £420 in a competition.

The pie chart shows how he shared the money with his brother, Nick, and sister, Helen.

With the money Barry kept for himself, he spent some and invested some, in the ratio 5:2.
How much money did Barry invest?



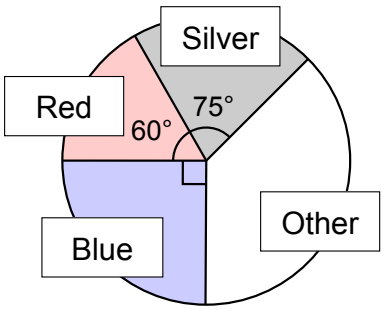
Question 4: The pie chart shows information about the visitors to restaurants in a town.
375 people had fish and chips.
How many people had pizza?



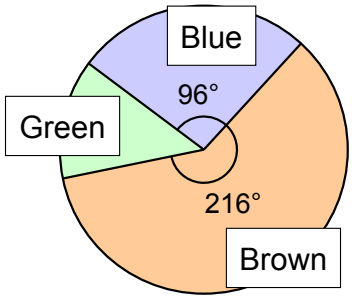
Fluency Practice

1. For each pie chart, work out the frequency for each category.

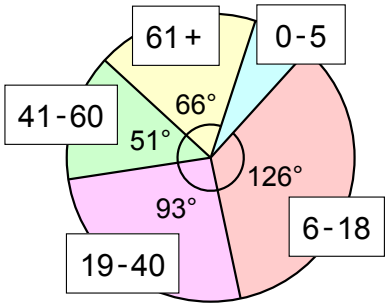
a) The colours of 48 cars sold.



b) The eye-colours of 15 children.



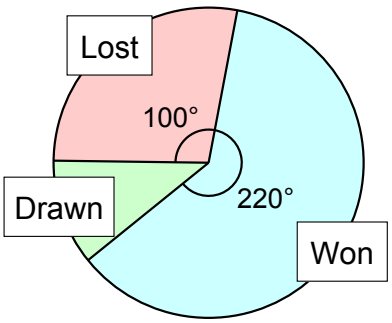
c) The ages of 240 visitors to a swimming pool.



2. The pie chart shows the proportion of matches won, drawn and lost by a football team in a season.
The team played a total of 18 matches.

The number of league points for a team is:
3 points for each win, plus 1 point for each draw

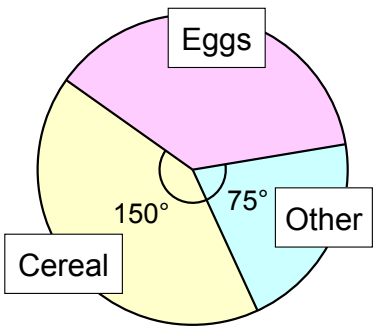
Work out the total league points for the team.



3. The pie chart shows the breakfasts eaten one morning by guests at a hotel.
30 of the guests chose cereal.

a) How many guests were there in total?

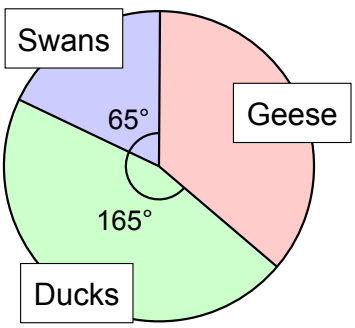
b) How many guests chose eggs?



4. The pie chart shows the types of birds at a lake.
There are 26 swans at the lake.

a) Work out how many ducks are at the lake.

b) Work out how many geese are at the lake.

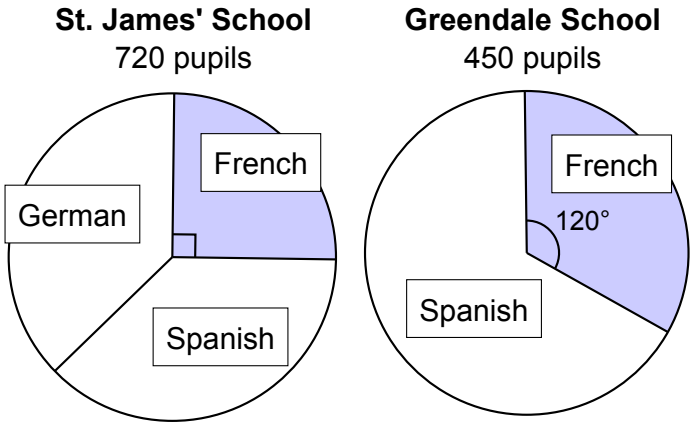


Fluency Practice

5. At both St James' School and Greendale School, all pupils study one foreign language.

   Hassan says the pie charts show that there are more pupils studying French at Greendale than at St. James'.

   Show that Hassan is wrong.



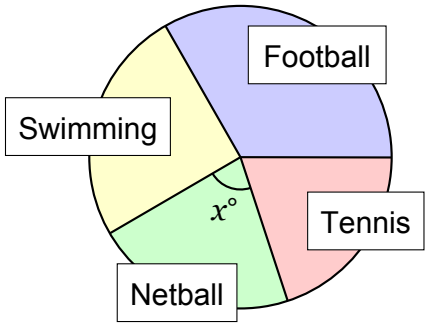
6. Some pupils were asked to choose a sport to take part in. The results are shown in the pie chart.

   $\frac{1}{3}$ of the pupils chose Football.

   $\frac{1}{4}$ of the pupils chose Swimming.

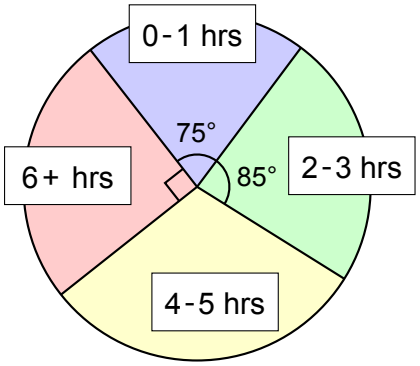
   $\frac{1}{5}$ of the pupils chose Tennis.

   Work out x, the angle for Netball in the pie chart.



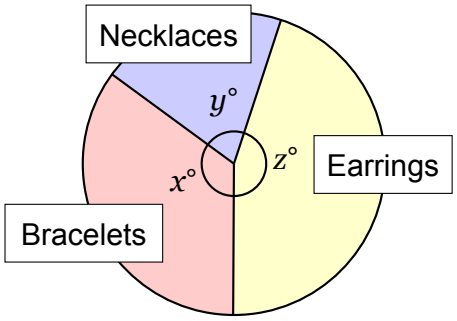
7. Lewis asked some people how much time they spent watching television one day. The pie chart shows the results.

   Given that 240 people said '0-1 hours', work out how many people said '4-5 hours'.



8. Maria sells bracelets, necklaces and earrings. One month, 35% of her sales were bracelets and the ratio of necklaces to earrings sold was 4 : 9.

   Work out the angles x, y and z in the pie chart for Maria's sales for the month.



Fluency Practice

learn by heart

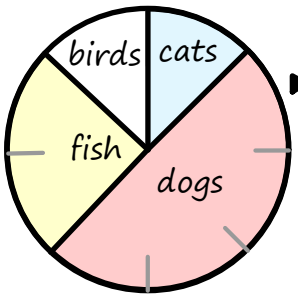
Pie charts are useful when we want to know the fraction of the whole each option takes up. For example, a pie chart might show us quickly that more than half of people voted for a particular group.

To interpret a pie chart it is important to remember that a full turn is 360°, half a turn is 180° and 90° is a quarter turn.

example

The pie chart shows the favourite animals of a group of children.
7 children liked cats.
How many children liked dogs?

cats = 1 section
dogs = 4 sections,
so 4 × 7 = 28 children

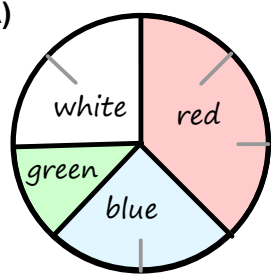


We can easily see here that approximately 50% of children liked dogs, and about $\frac{1}{4}$ liked fish.

exercise 8f

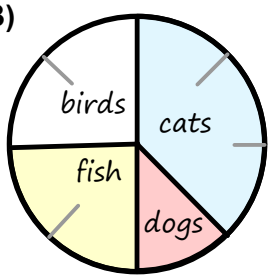
1. For each pie chart, complete the frequency table:

A)



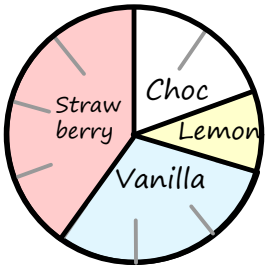
Colour	Frequency
Red	
Blue	
Green	
White	18

B)



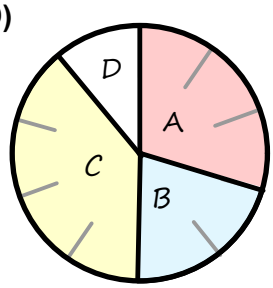
Animal	Frequency
Cat	15
Dog	
Fish	
Bird	

C)



Flavour	Frequency
Choc	
Lemon	9
Vanilla	
Strawberry	

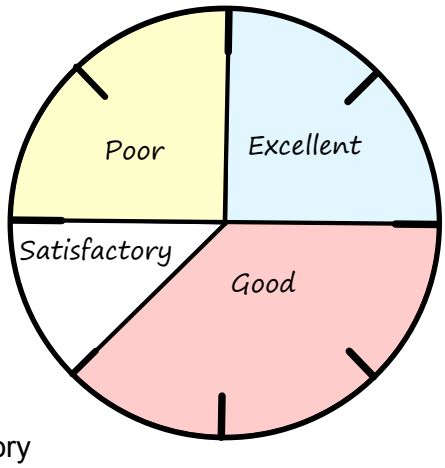
D)



Option	Frequency
A	
B	7
C	
D	

Fluency Practice

2. The pie chart shows how people rated a service.
120 people were asked.
Look at the pie chart and decide
whether each statement is true or false:

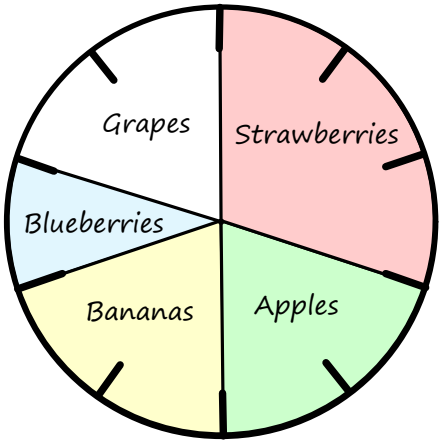


a) 90 people thought the service was excellent

b) $\frac{1}{4}$ of the people thought the service was poor

c) 50% believed the service was good

d) $\frac{1}{8}$ of the people believed the service was satisfactory



3. This pie chart shows the favourite
fruits of a group of children.
80 children were asked. Work out:

a) How many children said blueberries?

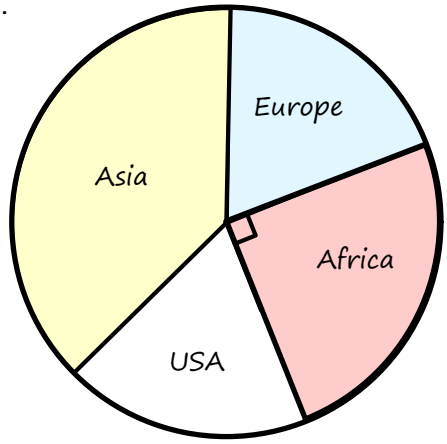
b) How many children said strawberries?

c) What fraction of the children said bananas?

d) What percentage of the children
said blueberries?

e) How many **more** children said strawberries
than blueberries?

4. The pie chart shows where some students were born.
60 students were asked.
Look at the pie chart and decide
whether each statement is true or false:



a) 30 people were from Asia

b) $\frac{1}{4}$ of the people were from Europe

c) 15 people were from Africa

d) More than 15 people were from the USA

Fluency Practice

learn by heart

In a pie chart, the total number of items covers 360° - the full turn. We can use this to work out how many degrees each item gets. For example, a pie chart for 80 people would mean that 80 people = 360°, so each person gets (360 ÷ 80 =) 4.5°. We would then multiply the frequency of each option by 4.5° to find the angle for each sector.

example

The pie chart shows the breakfasts eaten one morning by guests at a hotel.

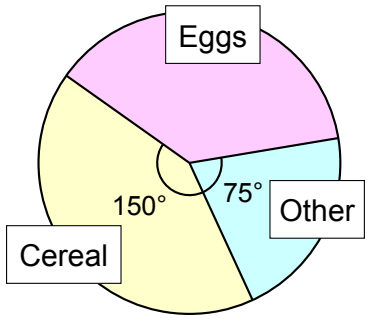
30 of the guests chose cereal.

a) How many guests were there in total?

× 5	30	?
	150°	360°

× 5

If 30 guests is 150° and 30 × 5 = 150 Then ? × 5 = 360, so 72 guests in total

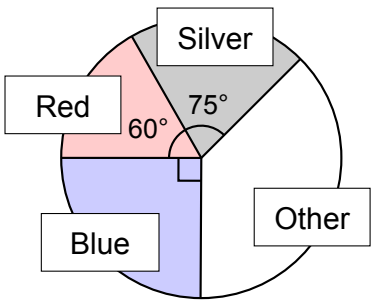


b) How many guests chose eggs?

The angle for eggs is 360 - 75 - 150 = 135° ? × 5 = 135, the answer is 27 people

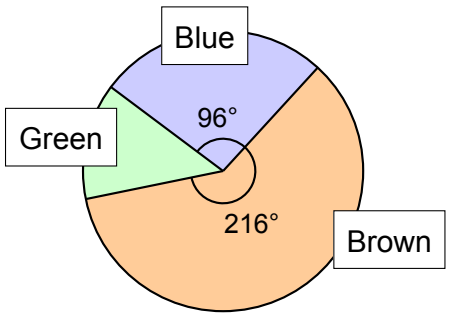
exercise 8g

1. The pie chart shows the colours of 48 cars sold.
Complete the frequency table.



Colour	Frequency
Blue	
Red	
Silver	
Other	

2. The pie chart shows the eye-colours of 15 children.
Complete the frequency table.



Colour	Frequency
Blue	
Green	
Brown	

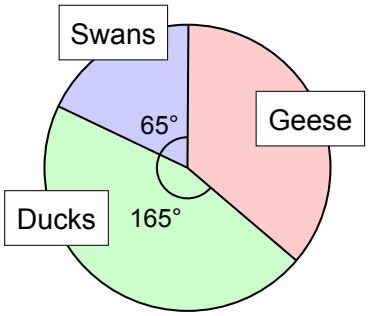
Fluency Practice

more challenging extra challenge

2. The pie chart shows the types of birds at a lake.
There are 26 swans at the lake.

a) Work out how many ducks are at the lake.

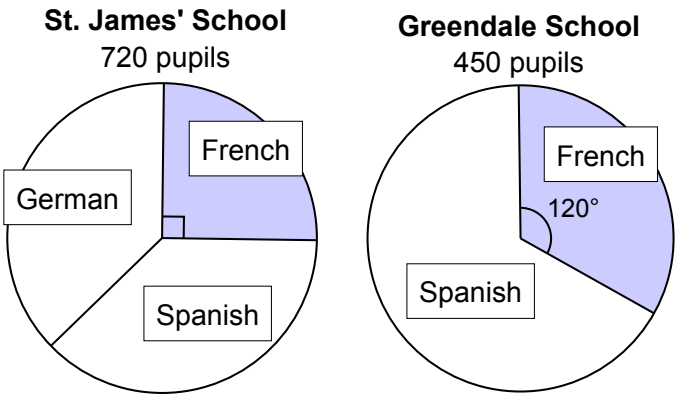
b) Work out how many geese are at the lake.



3. At both St James' School and Greendale School, all pupils study one foreign language.

Hassan says the pie charts show that there are more pupils studying French at Greendale than at St. James'.

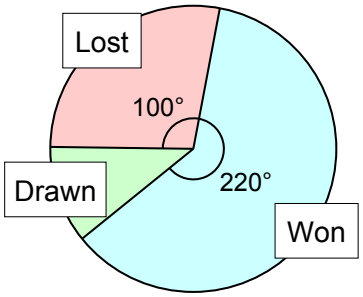
Show that Hassan is wrong.



4. The pie chart shows the proportion of matches won, drawn and lost by a football team in a season.
The team played a total of 18 matches.

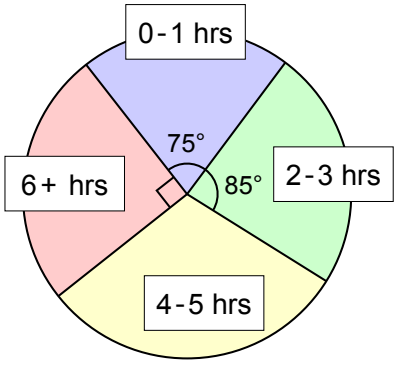
The number of league points for a team is:
3 points for each win, plus 1 point for each draw

Work out the total league points for the team.



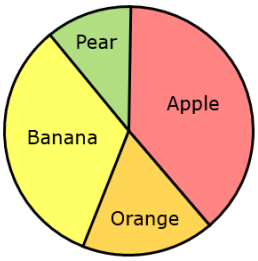
5. Lewis asked some people how much time they spent watching television one day.
The pie chart shows the results.

Given that 240 people said '0-1 hours', work out how many people said '4-5 hours'.



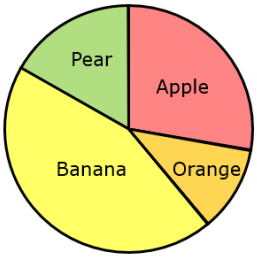
Fill in the Gaps

Each pie chart shows the favourite fruit of a group of students.

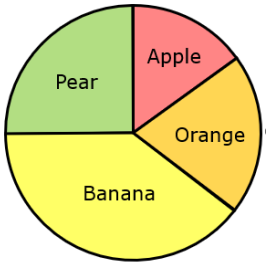


	Apple	Banana	Orange	Pear	Total
Frequency	7	3	6	2	18
Angle	140°			40°	360°
Proportion		$\frac{1}{6}$	$\frac{1}{3}$		1

	Apple	Banana	Orange	Pear	Total
Frequency	12				36
Angle	120°	80°	60°	100°	360°
Proportion	$\frac{1}{3}$				1



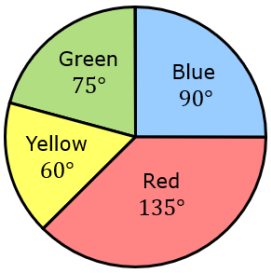
	Apple	Banana	Orange	Pear	Total
Frequency				15	90
Angle	100°		160°		360°
Proportion		$\frac{1}{9}$			1



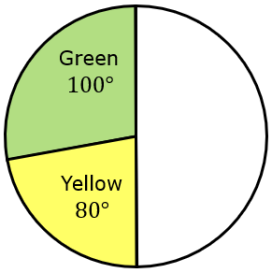
	Apple	Banana	Orange	Pear	Total
Frequency			24		
Angle	54°		144°		360°
Proportion		$\frac{1}{5}$			1

Fill in the Gaps

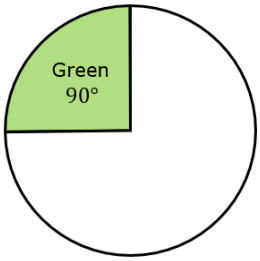
Each pie chart shows the favourite colour of a group of students.



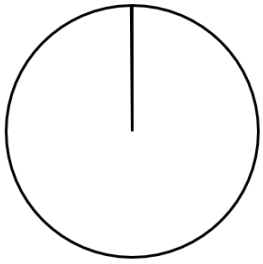
	Blue	Red	Yellow	Green	Total
Frequency					24
Angle					360°
Proportion					1



	Blue	Red	Yellow	Green	Total
Frequency	6			10	
Angle					360°
Proportion					1



	Blue	Red	Yellow	Green	Total
Frequency				18	
Angle					360°
Proportion	$\frac{1}{6}$	$\frac{3}{8}$			1



	Blue	Red	Yellow	Green	Total
Frequency				20	
Angle					360°
Proportion	$\frac{2}{5}$		$\frac{1}{4}$	$\frac{1}{5}$	1

Pie Equations

Form & solve equations to find the size of each sector.

a

football	x
rugby	$3x$

b

art	$x + 60$
drama	x

c

sci-fi	$x + 60$
crime	x
thriller	x

d

pass	$2x + 30$
fail	x

e

french	$x - 40$
german	x

f

adult	$x - 60$
child	$2x$

g

PC	$2x + 60$
mobile	$x + 20$
console	x

h

science	$2x + 30$
geography	$2x - 30$
history	$2x$

i

climbing	$2x + 40$
hiking	$3x + 10$
kayaking	$2x$
sailing	$x - 10$

j

cycle	$4x - 15$
bus	$x - 25$
walk	$2x - 20$

k

maths	$5x$
english	$160 - x$

l

petrol	$2x - 100$
electric	$360 - x$

m

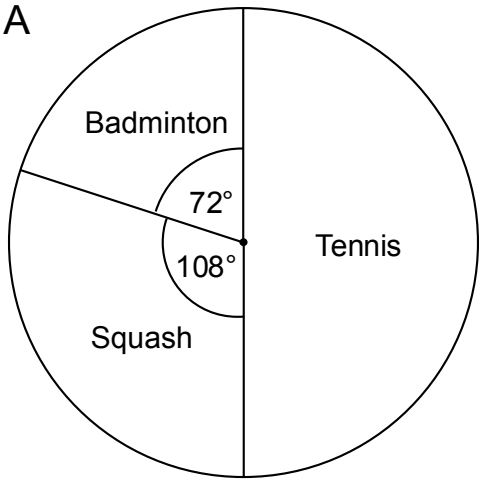
books	x
movies	$0.5x$

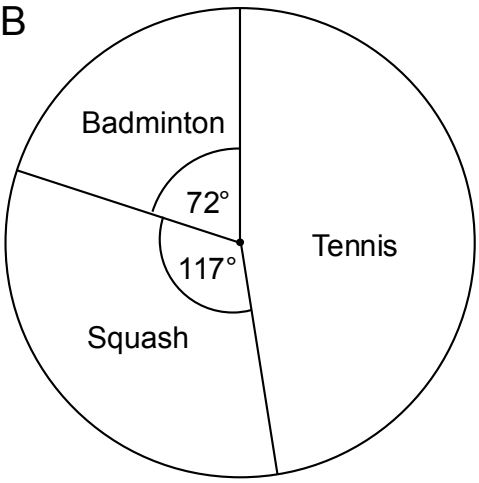
n

house	$\frac{x + 30}{2}$
flat	x

Problem Solving

1.



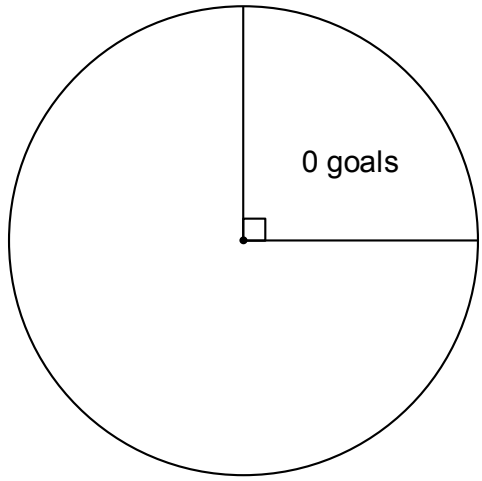


A group of children had to choose to play one of three sports – tennis, squash or badminton.
Pie chart A shows their choices.

One of the children changes sport. Pie chart B shows their choices after this change.

Use the pie charts to work out how many children chose to play badminton.

2.



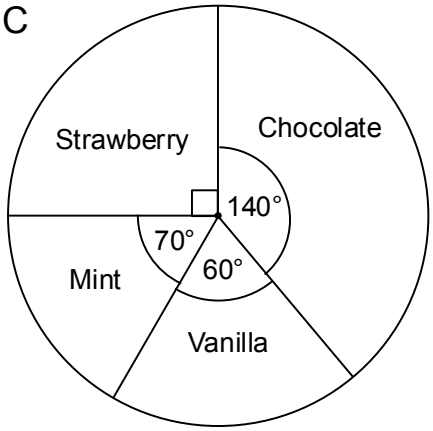
The diagram shows an incomplete pie chart for the number of goals a football team scored in matches during one season.
In these matches, the team scored 1 goal 50% more often than it scored 0 goals.
The team scored 2 goals in the same number of matches as it scored 0 goals.
The team scored 3 goals in three fewer matches than it scored 0 goals.
The team never scored more than 3 goals.

a) Copy and complete the pie chart.

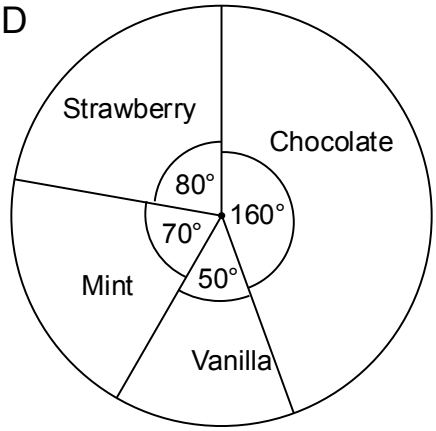
b) Work out the total number of matches the team played in the season.

3.

C



D

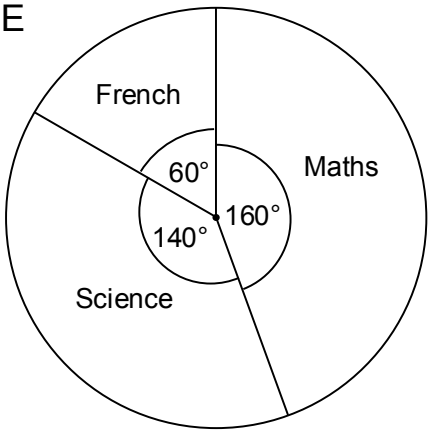


A group of children each had an ice cream. Pie chart C shows their choices.
The next day, the same group of children each had an ice cream. Pie chart D shows their choices.

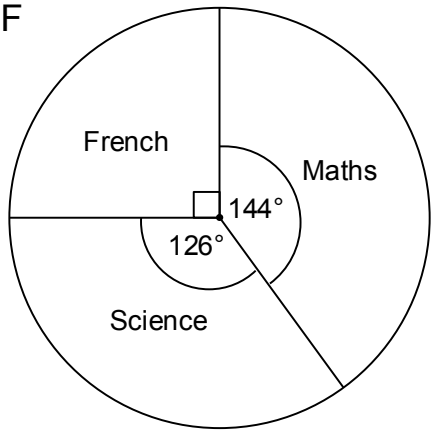
Work out the smallest number of children there could be in the group.

4.

E



F



Pie chart E shows the number of students at revision classes for Maths, Science and French.
The next week, all the same students attend. There are also two extra students who both attend the French revision class. Pie chart F represents the numbers in the second week.

Work out how many students attended the Maths revision class.

5. A focus group consists of people who are asked their views on current issues.
The group are asked what they think about proportional representation.

When most of the group have responded, a pie chart is drawn showing the results.
The angle of the sector representing "*Strongly For*" is 99º.

There are five more members of the group. Two of these five are "*Strongly For*".
When these five are added, the pie chart is revised and the angle of the sector representing "*Strongly For*" is now 104º.

Work out how many of the whole group are "*Strongly For*" proportional representation.

Record & Represent

What would you like to investigate?

a) Create a tally chart & collect the data.

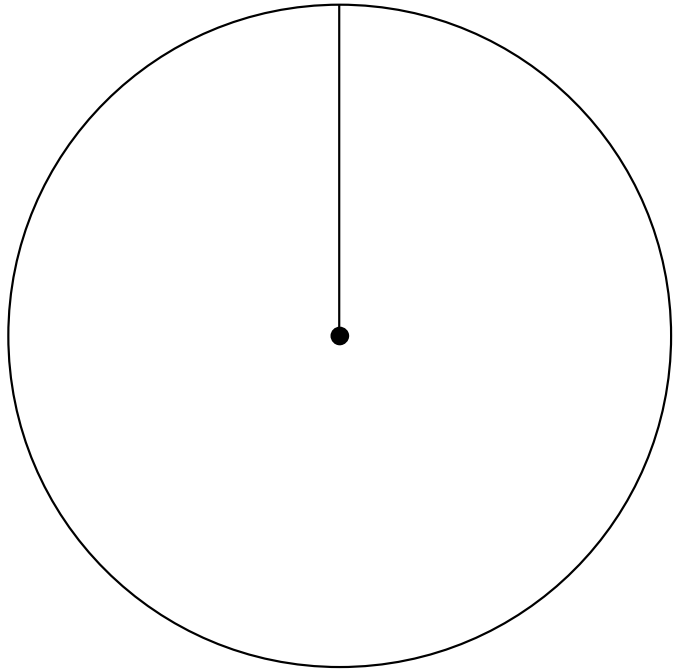
What categories will you use?

	Tally	Total

b) Complete the table with the angles for the pie chart.

Category	Frequency	Angle (°)

c) Create a pie chart to represent the data.



d) Analyse & comment on the data.

Which category was the most popular?
Which was the least popular?
What was the difference between the most and least popular?
Were the results surprising to you?

Fluency Practice

Question 1: Draw ordered stem and leaf diagrams for the following sets of data. Remember to include a suitable key.

(a) 35, 50, 38, 44, 53, 41, 39, 45, 48, 55

(b) 18, 42, 5, 28, 33, 9, 15, 38, 32, 9, 11, 24, 40, 29, 24

(c) 153, 144, 148, 140, 149, 145, 144, 142, 158, 135, 140, 139, 160

(d) 3.4kg, 1.9kg, 2.8kg, 3.1kg, 5.1kg, 3.9kg, 4.8kg, 4.5kg, 2.2kg, 3.7kg,

Question 2: The stem and leaf diagram below shows the ages of a group of people.

(a) How many people are there in the group?

(b) How old is the youngest member of the group?

(c) How old is the oldest member of the group?

(d) How many people are under 20?

(e) How many people are over 25?

Key: 1|4 means 14 years old

1	4 5 8
2	1 3 6 9 9
3	0 5 7
4	4

Question 3: The stem and leaf diagram below shows heights of Mrs Smith's flowers.

(a) How many flowers does Mrs Smith have?

(b) What is the height of the shortest flower?

(c) What is the height of the tallest flower?

(d) How many flowers have a height of 14cm?

(e) How many flowers have a height greater than 40cm?

(f) What fraction of the flowers have a height under 20cm?

Key: 0|9 means 9cm

0	9
1	2 4 4 4 8 9
2	0 4 5 8
3	2 4 9
4	1 6 8 8
5	3

Fluency Practice

Question 4: Fiona recorded the times it took 11 students to run 200 metres.
The times are measured in seconds and are:

27 38 42 35 43 49

50 37 38 41 48

(a) Draw an ordered stem and leaf diagram to show this information.

(b) Work out the median time.

(c) Work out the range of the times

(d) How many students finished the race in under 40 seconds?

Question 5: The following stem and leaf diagram shows times taken for 15 people to complete a jigsaw.

Key: 3|1 means 31 minutes

3	1 9
4	0 3 6
5	1 7 7 8 9
6	0 3 4 6
7	5

(a) Write down the modal time taken.

(b) Write down the median time taken.

(c) Write down the range of times taken.

(d) What fraction of the people took over one hour?

Apply

Question 1: The stem and leaf diagram shows the weights of 10 books that are placed on a book shelf.

Key: 0|3 means 0.3kg

0	3 4 4 4 7 8
1	2 8
2	5
3	1

(a) Write down the modal weight.

(b) Find the median weight.

(c) Find the range of the weights.

The bookshelf can hold 12kg.

(d) Will the bookshelf be able to support the 10 books?

Fluency Practice

Question 2: The stem and leaf diagram shows the heights of 14 students on a school trip to a theme park.

(a) Find the median height.

(b) Work out the range of the heights

A "fast pass" allows one of the students to go on a ride at the theme park without queueing.

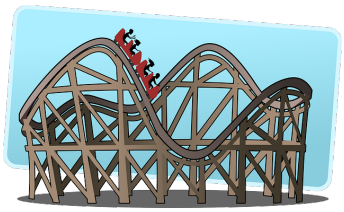
One of the students is picked at random to win a "fast pass" for a ride.

Key: 13|5 means 135cm

13	5 7 8
14	1 1 2 6 7 9
15	0 2 7
16	1 8

To go on the ride, the student must be at least 140cm tall.

(c) Write down the probability that the student who wins the "fast pass" cannot go on the ride.



Question 3: This dual stem and leaf diagram shows the results for the students in Mr Turner's class.

(a) How many boys are there in the class?

(b) How many girls are there in the class?

(c) What was the highest mark in the class?

(d) Find the range of the boys' results

(e) Find the median of the girls' results

(f) Find the modal mark for the whole class.

(g) Compare the boy's and girls' results.

Boys		Girls
	4	0 7
8 8 5 3 0	3	2 3 3
9 4 1	2	6
1	1	0 4
	0	5 6 9

Boys Key: 9|2 means 29 marks

Girls Key: 2|6 means 26 marks

Fluency Practice

Question 4: The stem and leaf diagram shows the time taken 10 students to answer a puzzle

Key: 0|4 means 4 seconds

0	4 7
1	0 4 6 6 7
2	5 8
3	3

(a) Work out the range

(b) Work out the median

Another student answers the puzzle in 38 seconds.

(c) Tick the box to show how this will effect the range

The range will decrease	The range will stay the same	The range will increase
☐	☐	☐

(d) Tick the box to show how this will effect the median

The median will decrease	The median will stay the same	The median will increase
☐	☐	☐

Question 5: Amelia has been asked to draw a stem and leaf diagram.
Can you spot any mistakes?

Draw an ordered stem and leaf for:

24 19 28 8 17 33 34 10 3 25

0	3 8
1	0 7 9
2	4 5
3	3 4

Back -2- Back Stem & Leaf Diagrams

①

Two classes took a Geography test.
Complete an ordered, back to back stem & leaf diagram for their results.

Class 9YX

12	31	24	31
35	24	32	1
29	35	12	43
9	43	36	23
38	18	30	

Class 9YX vs Class 9YZ

							0								
							1								
							2								
							3								
							4								

Class 9YZ

12	37	15	9
27	9	8	8
9	42	10	13
8	13	26	35
30	9	28	

a) Find the **median score** for each class.

b) What does the **shape** of the stem & leaf diagram tell us about the results?

Back -2- Back Stem & Leaf Diagrams

②

Two shoe shops are competitors.
Complete an ordered, back to back stem & leaf diagram for their sales on a Saturday.

Skoo Shoe Ltd

46	75	32	38
75	49	64	36
32	40	46	49
68	46	68	34
48	64	25	49
25	49	52	55
48	52	55	32
39	49	40	54

Skoo Shoe Ltd vs Kelly's Kicks

											2											
											3											
											4											
											5											
											6											
											7											

Kelly's Kicks

25	20	72	39
55	74	22	74
78	22	55	25
20	42	62	68
74	31	20	78
25	78	55	25
33	37	79	65
78	62	20	33
63	64		

a) Calculate the **median sale** for both shops.

b) Describe the **shape** of both sides of the diagram. Which shop do you think had a higher revenue?

Fluency Practice

Match each stem-and-leaf plot to the correct group

- An 18th birthday party
- A 3rd birthday party
- A family dinner
- A swimming class and their teacher

Stem	Leaf
0	8,
1	1, 4,
2	
3	
4	4, 5,

Stem	Leaf
0	1, 2, 3, 3, 4, 8,
1	
2	8,
3	3, 3, 4, 5,

Stem	Leaf
0	6, 8, 8, 8, 9,
1	
2	5,

Stem	Leaf
1	6, 7, 7, 7, 7, 7, 8, 8, 8, 8, 8, 8,
2	
3	
4	8,
5	1,

Further questions

How many friends has the 18-year-old invited to their party? Who else is there?

How many students are in the swim class and how old is their teacher?

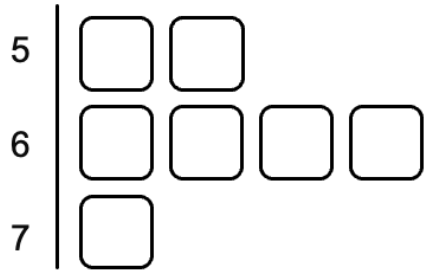
How many children are in the family and what are their ages?

How old could the 3-year-old's parents be?

the digits from 0 to 9 inclusive are used in an ordered stem and leaf diagram:

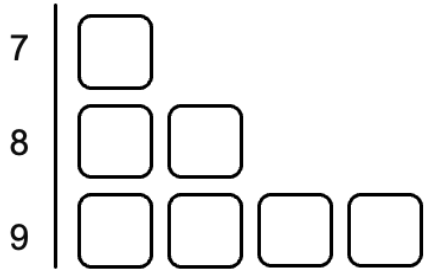
find where the other digits go

(1)



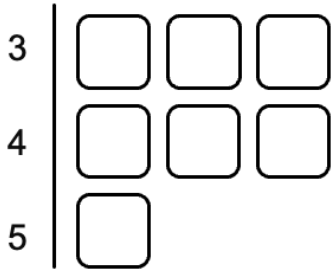
highest = 74
range = 16

(2)



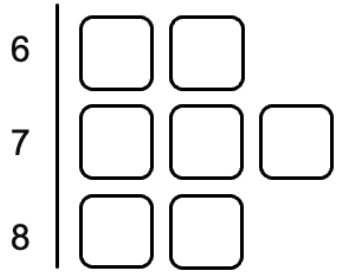
median = 92
lowest = 74

(3)



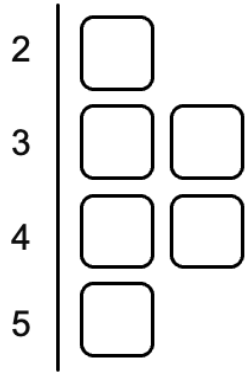
median = 47
range = 26

(4)



highest = 81
range = 16
median = 73

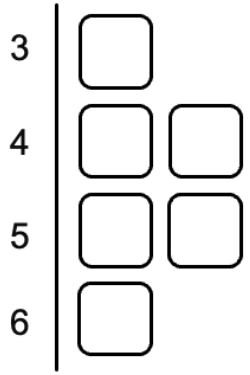
(5)



2 solutions

lowest = 27
range = 23
median = 42

(6)

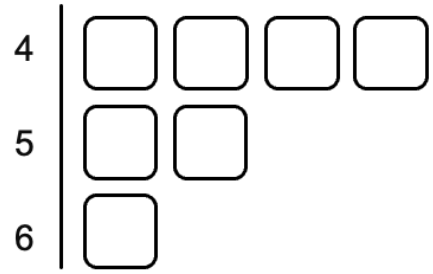


highest = 60
range = 28
median = 49½

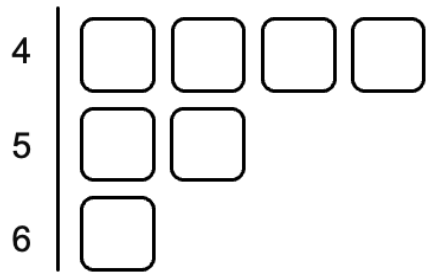
create your own examples

the digits from 0 to 9 inclusive are used in an ordered stem and leaf diagram:

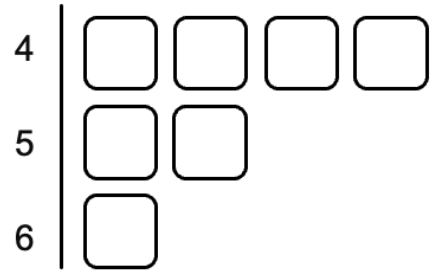
(a)



(b)

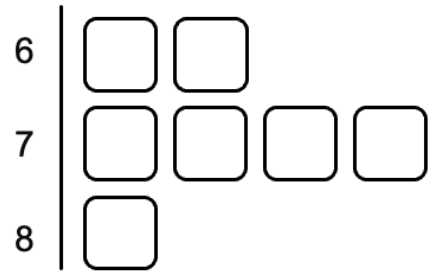


(c)

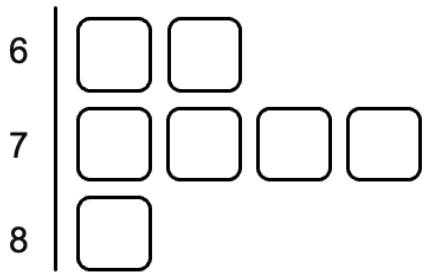


what are the means of your data sets for (a), (b) and (c)?

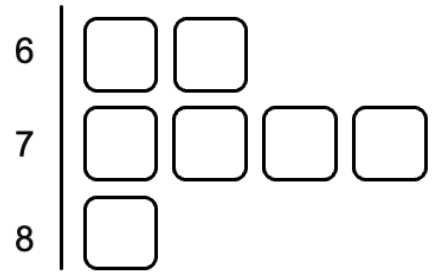
(d)



(e)



(f)

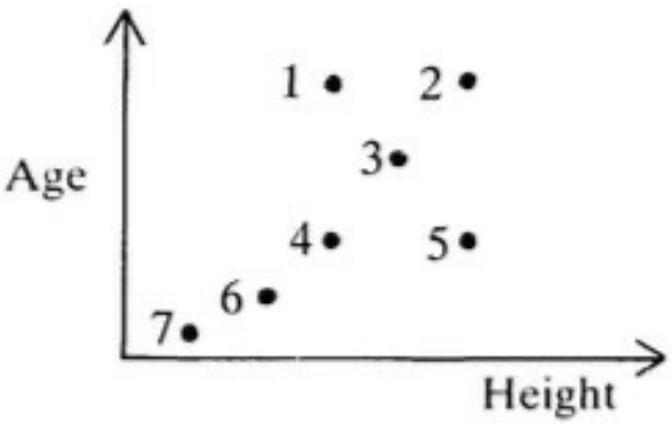


what are the means of your data sets for (d), (e) and (f)?

Fluency Practice

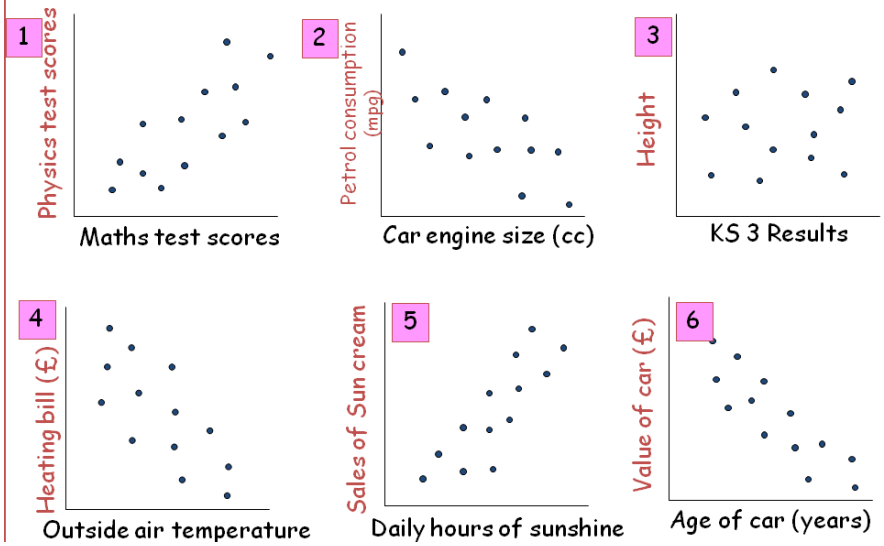
Who is represented by each point on the scattergraph, below?

Alice Brenda Cathy Dennis Errol Freda Gavin



Fluency Practice

State the type of correlation for the scatter graphs below and write a sentence describing the relationship in each case.



Compete the sentences using **positive/negative/no** and then **increase/decrease/not affected.**

1. There is a _____ correlation between Physics and Maths test scores. As the Maths test results increase the Physics test results _____

2. There is a _____ correlation between car engine size and petrol consumption.. As the car engine size increases the petrol consumption _____

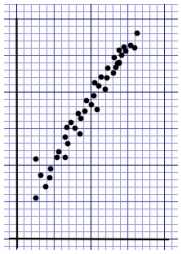
3. There is _____ correlation between KS3 results and height. As the KS3 results increase the height of the person is _____

4. There is a _____ correlation between outside air temperature and the heating bill. As the air temperature increases the heating bill _____

5. There is a _____ correlation between the daily hours of sunshine and sales of sun cream. As the hours of sunshine increase sales of sun cream _____

6. There is a _____ correlation between the age of a car and its value. As the car gets older its value _____

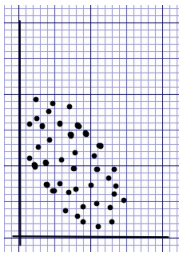
Fluency Practice



Strong

Moderate

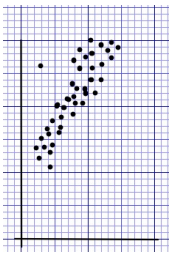
Weak



Strong

Moderate

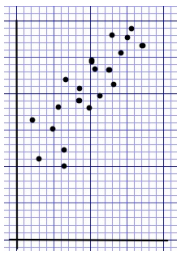
Weak



Strong

Moderate

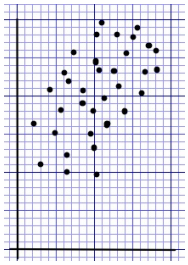
Weak



Strong

Moderate

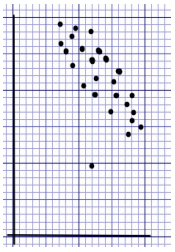
Weak



Strong

Moderate

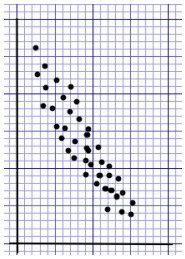
Weak



Strong

Moderate

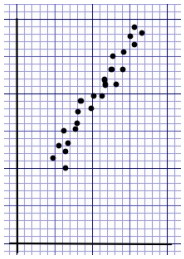
Weak



Strong

Moderate

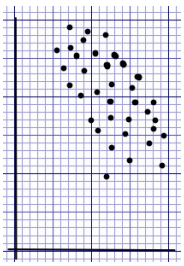
Weak



Strong

Moderate

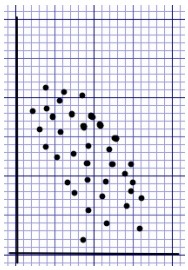
Weak



Strong

Moderate

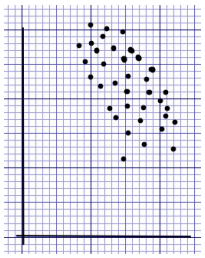
Weak



Strong

Moderate

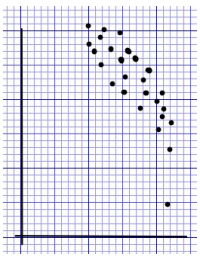
Weak



Strong

Moderate

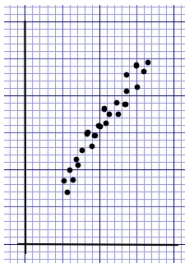
Weak



Strong

Moderate

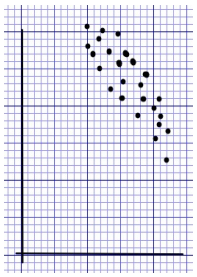
Weak



Strong

Moderate

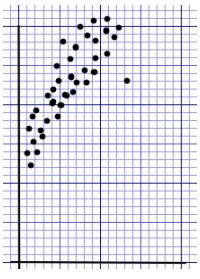
Weak



Strong

Moderate

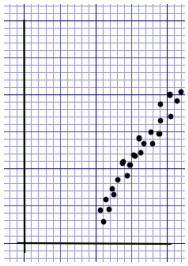
Weak



Strong

Moderate

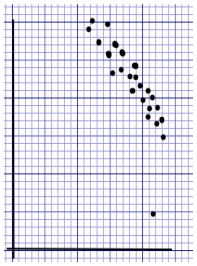
Weak



Strong

Moderate

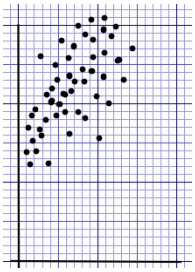
Weak



Strong

Moderate

Weak

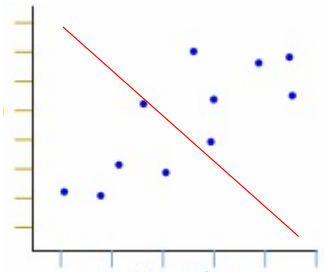


Strong

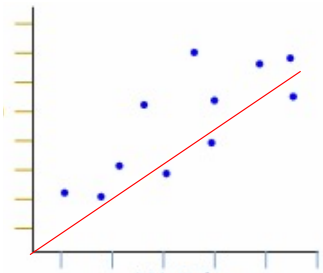
Moderate

Weak

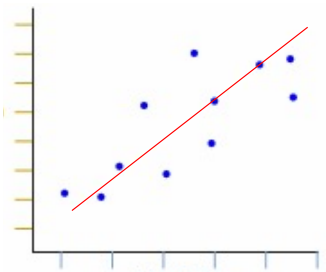
Fluency Practice



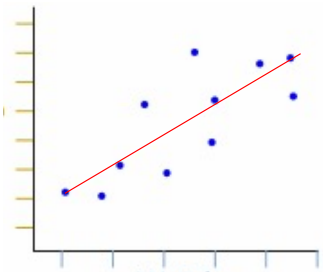
Yes / No



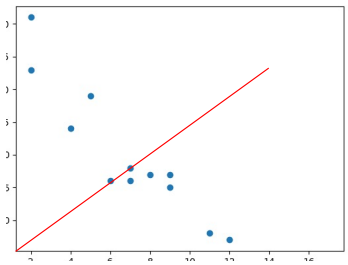
Yes / No



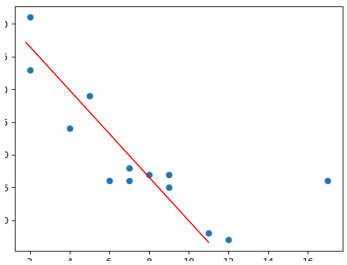
Yes / No



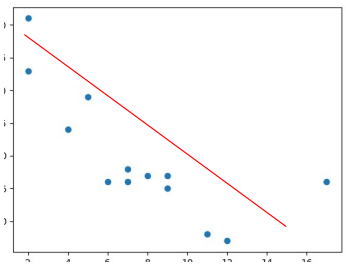
Yes / No



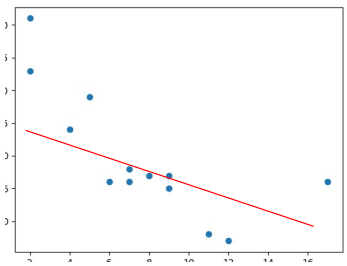
Yes / No



Yes / No



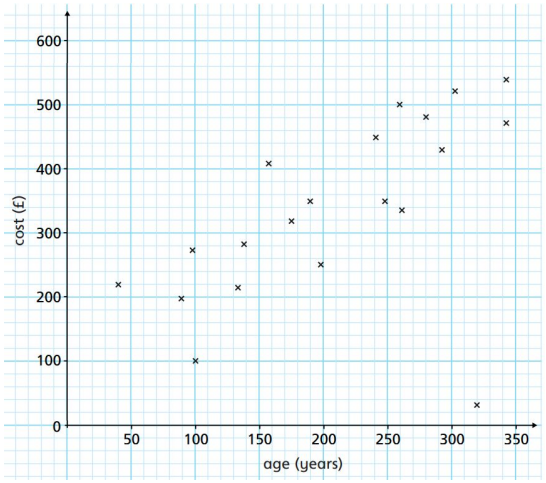
Yes / No



Yes / No

1. The scatter graph shows the cost and age of some rare books.

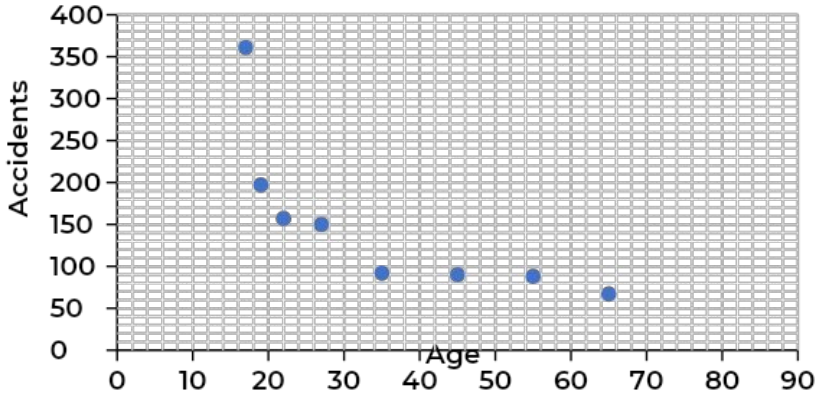
a)Circle the outlier.



b) Describe the correlation.

2. The scatter graph shows the number of accidents per million miles for drivers of different ages.

a)Circle the outlier.



b)Describe the correlation.

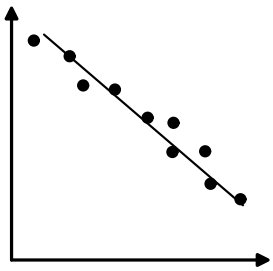
Fluency Practice

learn by heart

Positive correlation

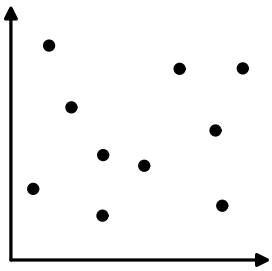
As one variable **increases**, the other **increases**.

Negative correlation



As one variable **increases**, the other **decreases**.

No correlation



There is **no relationship** between the variables

exercise 8i

1. Some children completed an obstacle course. The children's ages and the time it took them to complete the course are shown in the table,

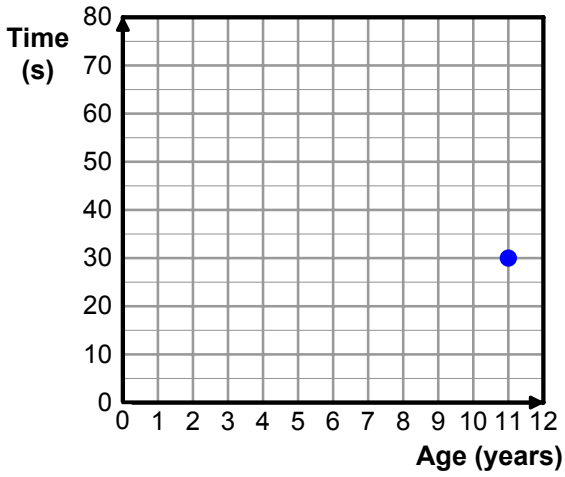
Age (years)	11	8	7	9	5	8	7	11	10	6	6	9
Time (secs)	30	55	60	50	75	50	65	40	35	70	65	40

a) Complete the scatter graph for this data.

b) Describe the type of correlation.

c) Draw a line of best fit.

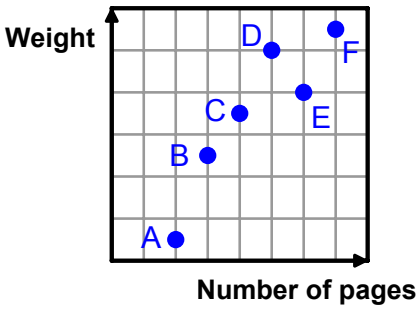
d) Another child took 50 seconds to complete the course. Use the graph to estimate this child's age.



2. The scatter graph shows the weights and number of pages of six books, labelled A to F.

a) Draw a line of best fit and describe the type of correlation.

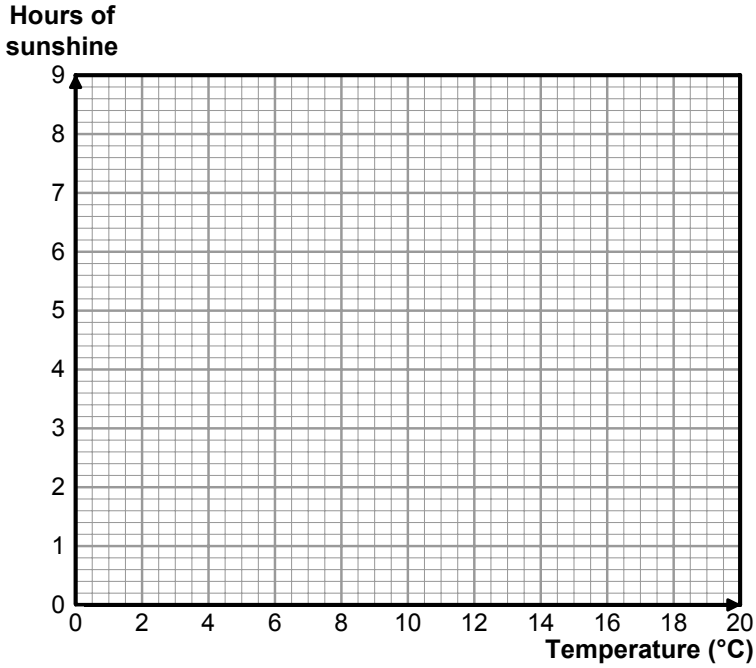
b) Jake says "If I pick two books at random, the book with the greater number of pages will be heavier." For which pair of books is this **not** true?



Fluency Practice

3. The table shows some weather data for the UK in 2018. Monthly averages for temperature and hours of sunshine per day are given.

Month	Temp (°C)	Hours of sunshine
Jan	5.3	1.9
Feb	3.1	3.7
Mar	4.9	2.8
Apr	9.5	4.3
May	12.9	7.8
Jun	15.9	8.3
Jul	18.7	8.8
Aug	16.7	5.5
Sep	13.8	5.3
Oct	10.7	4.4
Nov	8.2	2.5
Dec	6.8	1.4



a) Complete the scatter graph for this data. *Pay careful attention to the scales.*

b) Draw a line of best fit and describe the type of correlation.

c) A month in a different year had an average temperature of 12°C.
Use the graph to estimate the average hours of sunshine for this month.

d) Another month had an average number of hours of sunshine of 6.4.
Use the graph to estimate the average temperature for this month.

3. For each pair of variables, state whether you would expect positive, negative or no correlation.

a) the length of a taxi journey and its cost

b) a pupil's Maths test score and their long jump distance

c) the temperature and the number of umbrellas sold

d) the number of rooms in a house and its selling price

e) the weight of an adult dog and its age

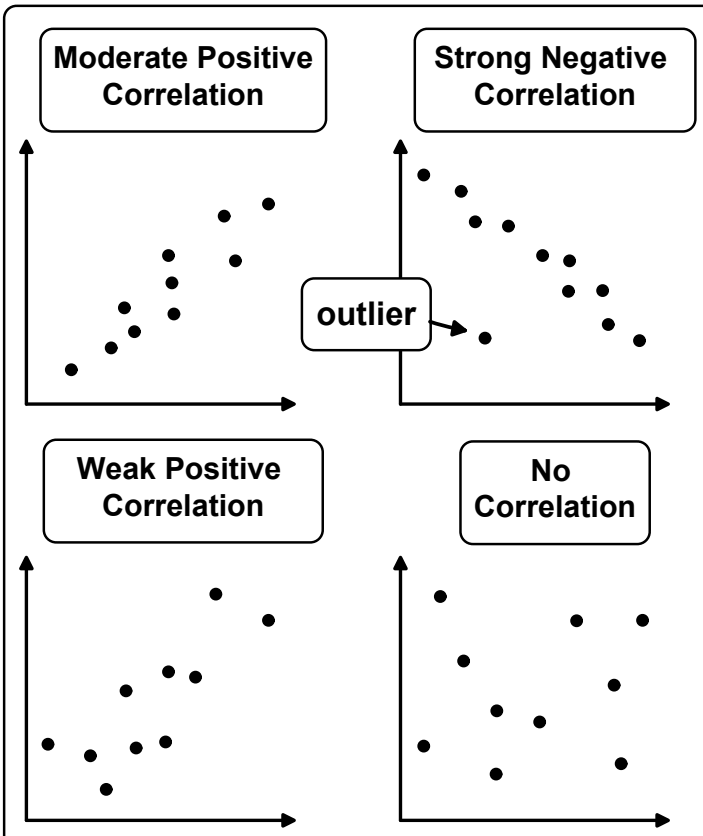
f) the length of time spent practising a piece of music and the number of mistakes made

4. A, B and C are variables.
A and B are negatively correlated. A and C are negatively correlated. Complete:

a) Generally, the higher the value of A, the _____ the value of B.

b) Generally, the higher the value of B, the _____ the value of C.

Fluency Practice



Interpreting correlation:

Positive correlation: The *greater* the ..., the *greater* the ... .

Negative correlation: The *greater* the ..., the *smaller* the ... .

Correlation is not causation, it does not mean that one variable is **causing** the other.

Do not extrapolate beyond the range of the data. It is unreliable to assume that a line of best fit continues beyond the range of your data.

exercise

1. The price and age of 12 used cars is shown in the table.

Age (years)	5	3	7	5	2	6	3	4	2	7	2	5
Value (£)	2500	3000	1500	3000	5000	3000	4000	3500	4500	2000	3000	2000

a) Complete the scatter graph for this data.

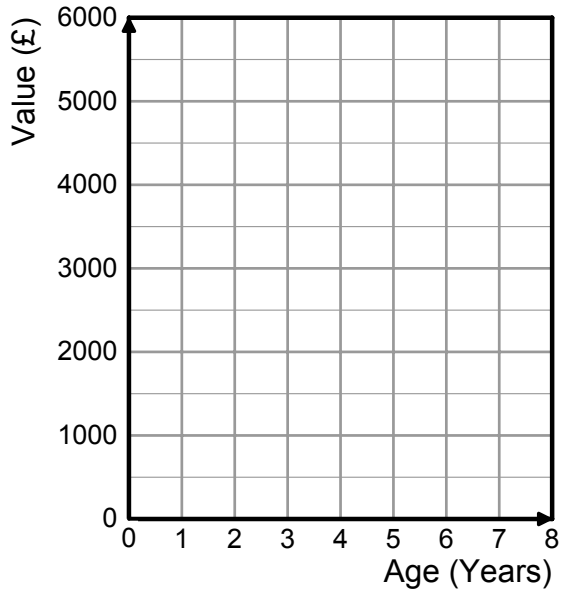
b) Describe the type of correlation.

c) Interpret the correlation in context.

d) Draw a line of best fit.

e) Another car is 4 years old. Estimate the price of this car.

f) Another car is less than a year old. Why is it unreliable to estimate its value from the graph?



Fluency Practice

2. In a dancing competition, two judges give competitors scores out of 10. The scores given to some competitors are shown in the table.

Judge 1	7.5	8.5	8	5	8	6.5	6	7	9	5.5	7.5	6.5	8.5
Judge 2	8	8	6.5	6	9.5	7.5	6.5	8	8.5	7.5	8.5	5.5	10

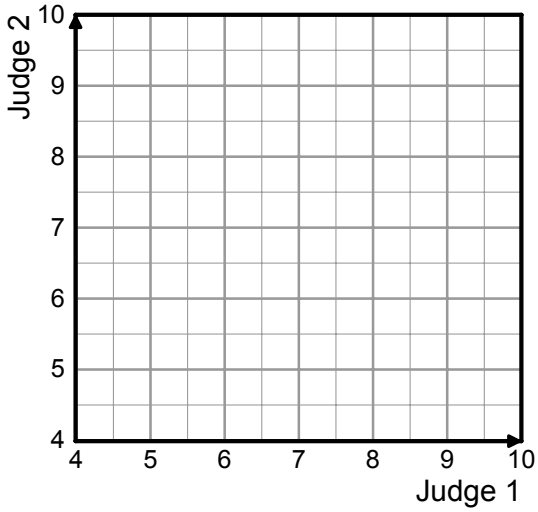
a) Complete the scatter graph for this data.

b) Describe the type of correlation.

c) Draw a line of best fit.

d) Another competitor was given a score of 7 by Judge 2. Estimate the score they will receive from Judge 1.

e) Which judge was more generous with their scores?



3. For each pair of variables, state whether you would expect there to be positive, negative or no correlation.

a) Journey distance and time taken.

b) Shoe size and French exam grade.

c) Weight of an item of jewellery and its value.

d) Maximum day temperature and number of hot chocolates sold.

e) A mobile phone's battery level and the time since it was last charged.

4. The scatter graph shows the number of ice creams sold at a food stall on different days, along with the maximum temperature on that day.

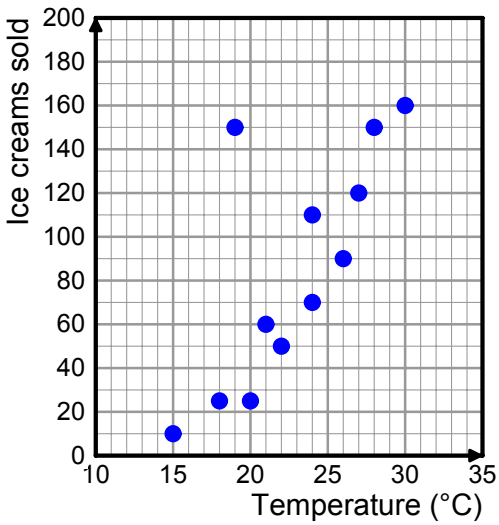
a) One of the days is an outlier. What was the temperature on this day?

b) For all the other points, identify the type of correlation.

c) Draw line of best fit.

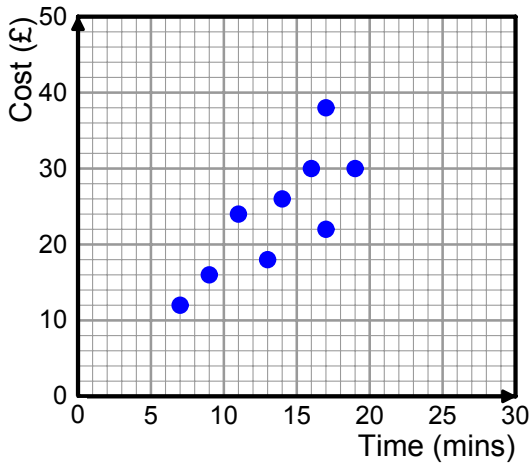
d) Work out an estimate for the gradient of the line.

e) Interpret the gradient.



Fluency Practice

5. The scatter graph shows the time taken and cost of a number of taxi journeys.

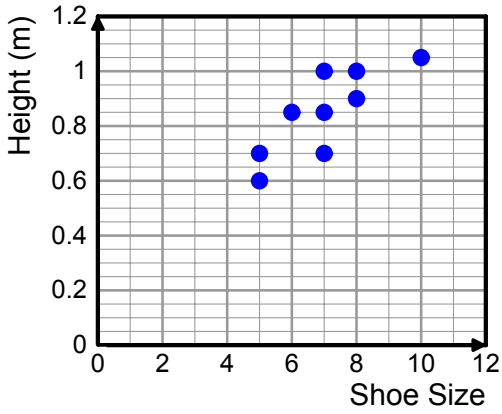


John is going to use the data to estimate the costs of other taxi journeys based on their duration. Which of the following journey times will result in **unreliable** estimates?

a) 10 mins b) 4 mins

c) 25 mins d) 45 mins

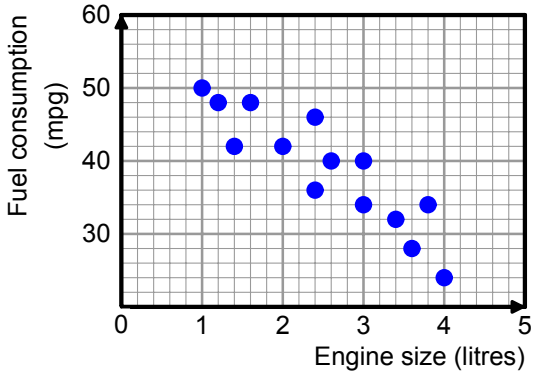
6. Julia draws a scatter graph showing the shoe sizes and heights of some children.



a) Describe one way in which Julia's scatter graph could be improved.

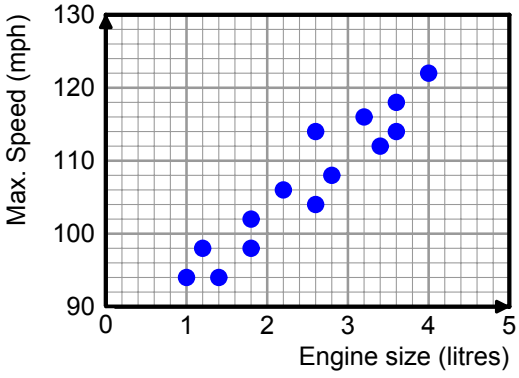
b) Julia says that the graph shows that a child's height is caused by their shoe size. What mistake has Julia made?

7. The two scatter graphs shows some data related to some cars.



a) Jenny's car has a fuel consumption rate of 40mpg (miles per gallon.) Use the scatter graphs to estimate the maximum speed of Jenny's car.

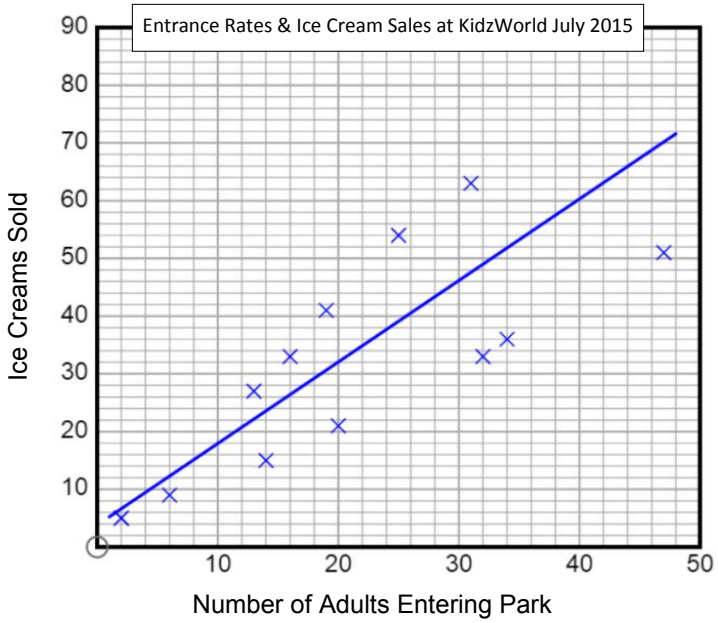
b) Bob's car has a maximum speed of 120mph. Use the scatter graphs to estimate the fuel consumption rate of Bob's car.



c) What does the data suggest is the correlation between a car's fuel consumption and its maximum speed?

Fluency Practice

scatter graphs: true or false?



A. From the graph we can use extrapolation to determine the number of ice creams that would be sold when 25 adults enter the park.

B. From these data we can use interpolation to predict that if 10 adults entered the park, 5 ice creams would be sold.

C. From the graph we can reliably extrapolate the number of ice creams sold when 100 adults enter the park.

D. We can extrapolate from this data that 50 adults entering the park would lead to 74 ice cream sales.

E. To sell 60 ice creams, we can use interpolation to estimate that 40 adults would need to enter the park.

F. The line of best fit is drawn incorrectly because there are more points below it than above it.

G. The graph shows strong positive correlation.

H. The line of best fit is drawn incorrectly because it should begin at (0,0).

A. We can predict from this data that if employees were paid £9.40 per hour, they would produce 11 units per hour.

B. We can conclude from this graph that increasing an employee's hourly rate of pay **causes** an increase in the number of units they produce per hour.

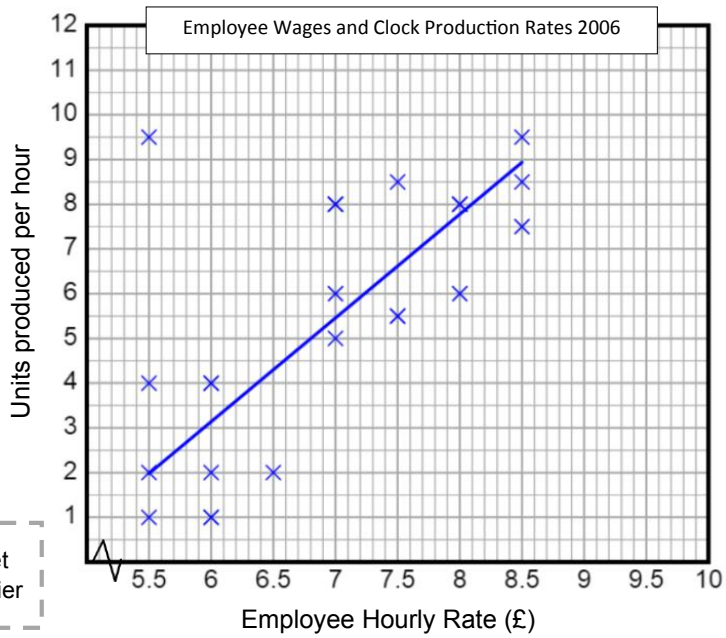
C. This graphs shows there is no relationship between employee earnings and productivity.

D. The graph represents data collected from 18 people.

E. From the line of best fit we can interpolate that an employee earning £6.50 per hour will produce 4.25 units per hour.

F. This data set contains an outlier

G. This graph is misleading because it does not start at 0 on the x axis.



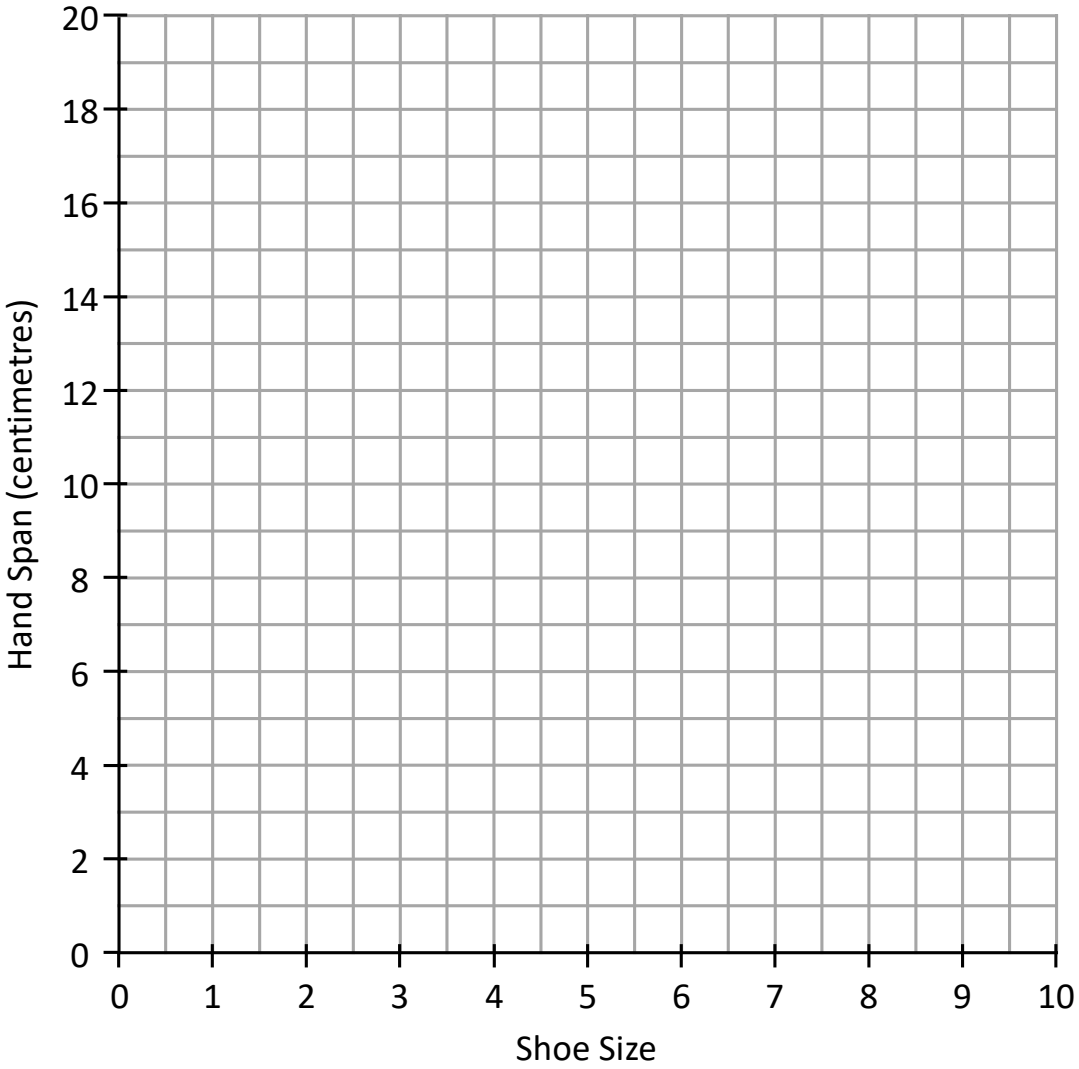
Activity

Hand & Foot Investigation

Record 10 students' shoe size & hand span in the table.
Then plot each student as a point on the grid.

Student	1	2	3	4	5	6	7	8	9	10
Shoe Size										
Hand Span (cm)										

A Comparison of Shoe Size & Hand Span



What comments can you make about the data & about the graph?