Year 8
Mathematics
Unit 10

Name: _____

Class: _____

Contents

1 Estimation

1.1 Significant Figures

In this section you will look at how to round numbers to significant figures.

1.2 Estimations

In this section you will look at estimations.

Calculating an approximate answer to a calculation by rounding the numbers used in the calculation prior to carrying out the calculation.

- Typically, number used in the calculation will be rounded to 1 significant figure.
- The result of the calculation will be close to the actual real answer.
- Do not forget to use the correct notation: $\approx$ ‘approximately equal to’

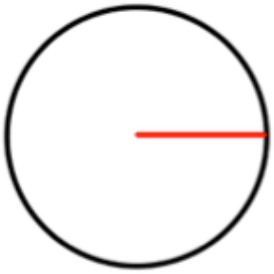
Worked Example	Your Turn
Estimate: (a) $409 + 571$ (b) $\frac{409+571}{0.53}$ (c) $\frac{409+571}{0.53-0.11}$	Estimate: (a) $593 + 401$ (b) $\frac{593+401}{0.47}$ (c) $\frac{593+401}{0.47-0.43}$

Worked Example	Your Turn
Estimate: a) $354 \div 6.9$ b) $\sqrt{17} \times 14$	Estimate: a) $357 \div 8.9$ b) $\frac{\sqrt{150}}{3}$

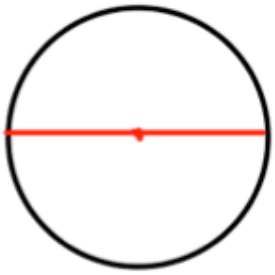
2 Circles

2.1 Parts of the Circle

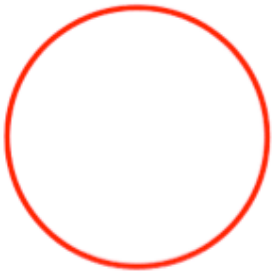
In this section you will look at the different parts of a circle.



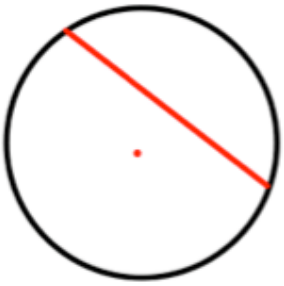
Radius



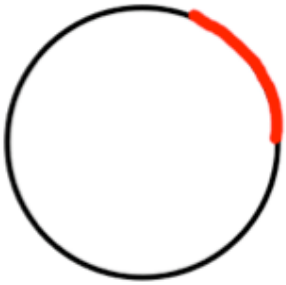
Diameter



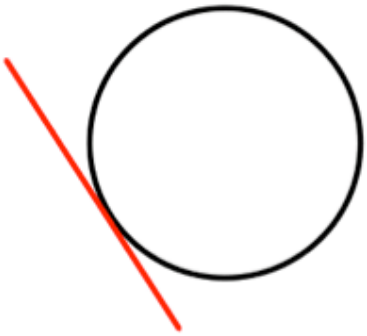
Circumference



Chord



Arc



Tangent

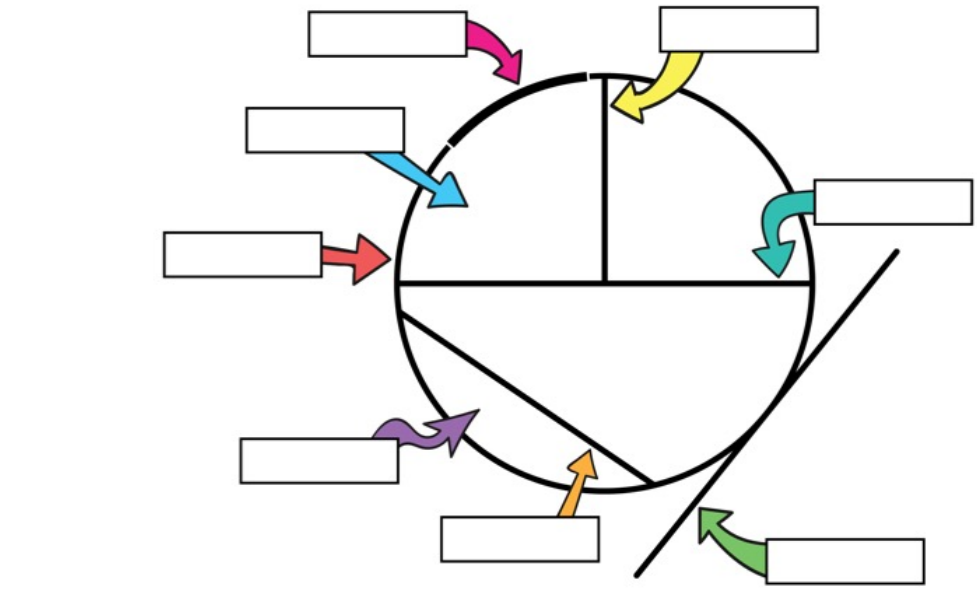
Segment

Sector

Fluency Practice

Labelling parts of a circle

Use the words below to label each part of the circle correctly



Arc | Chord | Circumference | Diameter | Radius | Sector | Segment | Tangent

Circle Vocabulary: Match each word with its definition.

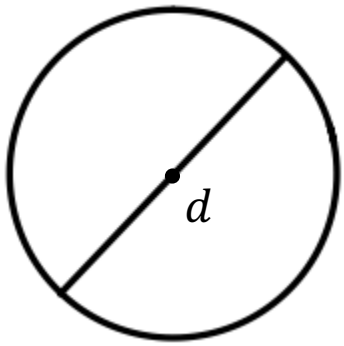
Arc	Line joining two points on a circumference.
Segment	Perimeter of a circle.
Chord	Part of a circle between a chord and an arc.
Radius	Line touching the circumference of a circle once.
Diameter	Distance from the centre of a circle to the edge.
Circumference	Part of the circumference of a circle.
Tangent	Part of a circle between two radii and an arc.
Sector	Width of a circle.

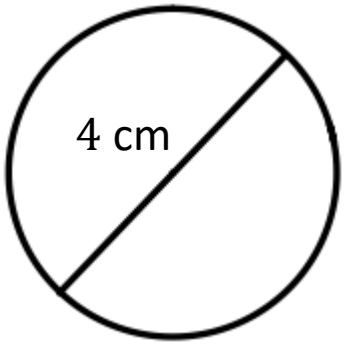
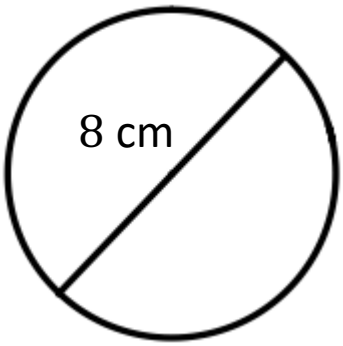
2.2 Circumference of Circles

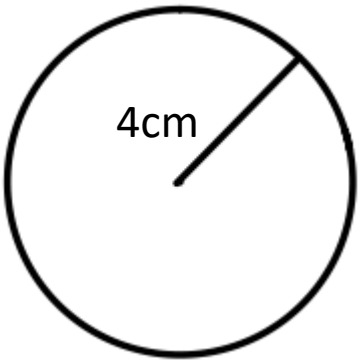
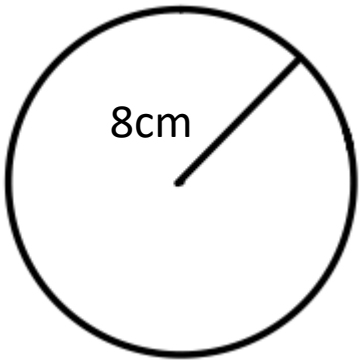
In this section you will look at calculating the circumference of circles.

The circumference is the perimeter of a circle.

$$\text{Circumference} = \pi \times \text{diameter}$$
$$C = \pi \times d$$

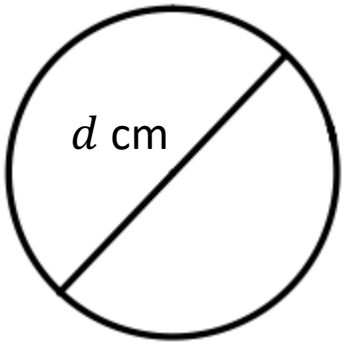


Worked Example	Your Turn
Calculate the circumference of the circle below. Give your answer in terms of π and to 1 decimal place.	Calculate the circumference of the circle below. Give your answer in terms of π and to 1 decimal place.
	

Worked Example	Your Turn
Calculate the circumference of the circle below. Give your answer in terms of π and to 1 decimal place.	Calculate the circumference of the circle below. Give your answer in terms of π and to 1 decimal place.
	

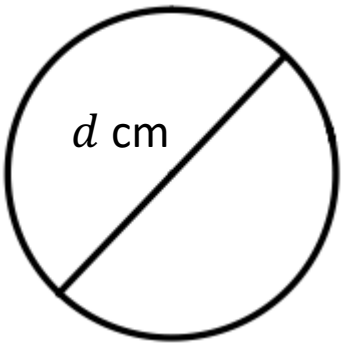
Worked Example

Calculate the diameter, d, of the semi-circle below given that the circumference is 12.6 cm. Give your answer to 2 decimal places.

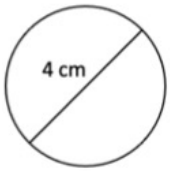
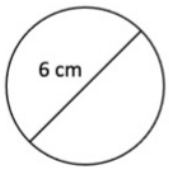
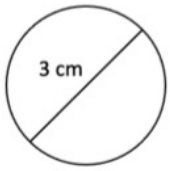
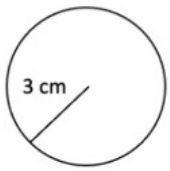
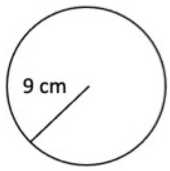


Your Turn

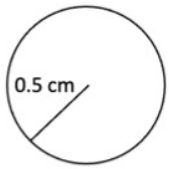
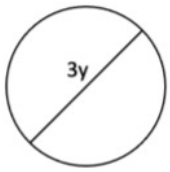
Calculate the diameter, d, of the semi-circle below given that the circumference is 25.1 cm. Give your answer to 2 decimal places.



Fill in the Gaps

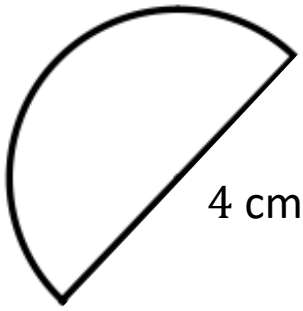
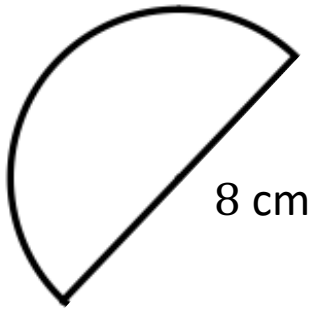
Diagram	Radius	Diameter	Calculation	Circumference (in terms of π)	Circumference (1 dp)
					
					
					
					
					
		12 mm			
	5 m				

Fill in the Gaps

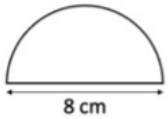
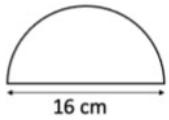
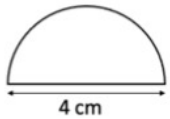
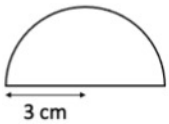
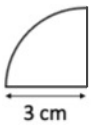
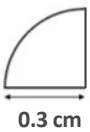
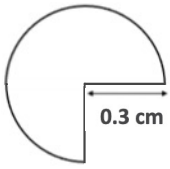
Diagram	Radius	Diameter	Calculation	Circumference (in terms of π)	Circumference (1 dp)
				16π km	
					
					
	$5a$				

2.3 Perimeter of Semicircles

In this section you will look at calculating the perimeter of semicircles.

Worked Example	Your Turn
Calculate the perimeter of the semi-circle below. Give your answer in terms of π and to 1 decimal place. 	Calculate the perimeter of the semi-circle below. Give your answer in terms of π and to 1 decimal place. 

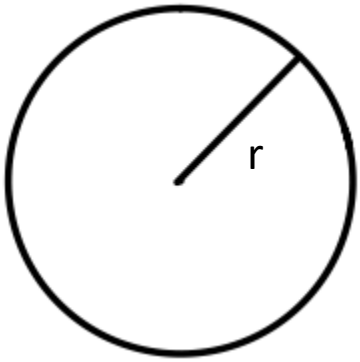
Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Perimeter (in terms of π)	Perimeter (1 dp)
					
					
					
					
					
					
					

2.4 Area of Circles

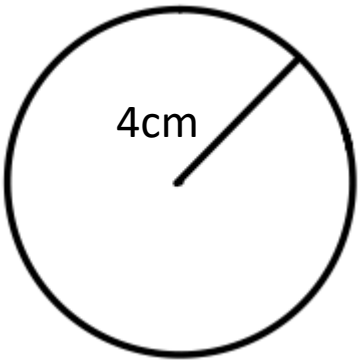
In this section you will look at calculating the area of circles.

$$\text{Area} = \pi \times \text{radius}^2$$
$$A = \pi \times r^2$$



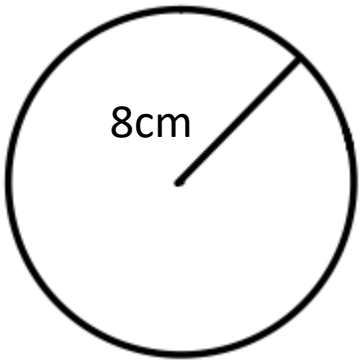
Worked Example

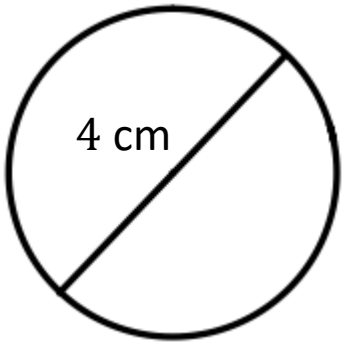
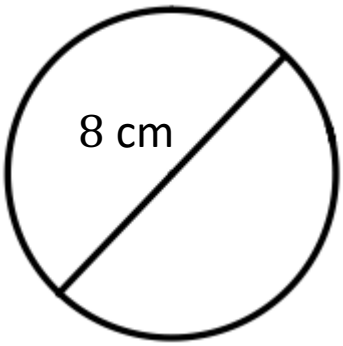
Calculate the area of the circle below. Give your answer in terms of π and to 1 decimal place.

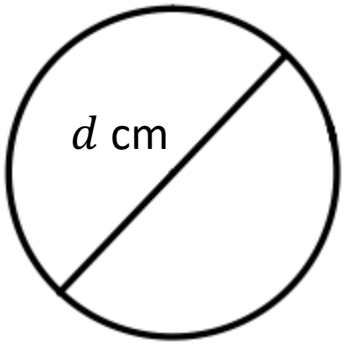
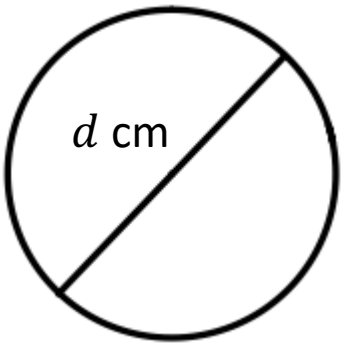


Your Turn

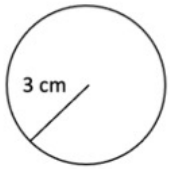
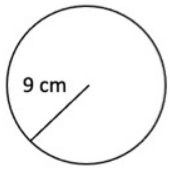
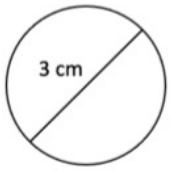
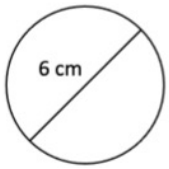
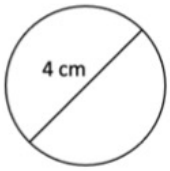
Calculate the area of the circle below. Give your answer in terms of π and to 1 decimal place.



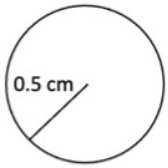
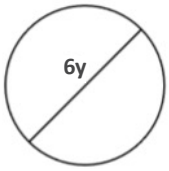
Worked Example	Your Turn
Calculate the area of the circle below. Give your answer in terms of π and to 1 decimal place.  	Calculate the area of the circle below. Give your answer in terms of π and to 1 decimal place. 

Worked Example	Your Turn
Calculate the diameter, d, of the semi-circle below given that the area is $12.6\ cm^2$. Give your answer to 2 decimal places.	Calculate the diameter, d, of the semi-circle below given that the area is $50.3\ cm^2$. Give your answer to 2 decimal places.
	

Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Area (in terms of π)	Area (1 dp)
					
					
					
					
					
	6 mm				
		10 m			

Fill in the Gaps

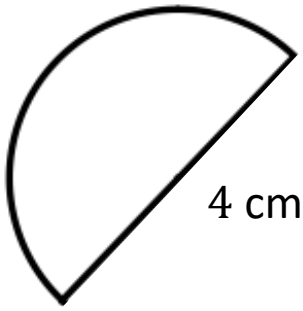
Diagram	Radius	Diameter	Calculation	Area (in terms of π)	Area (1 dp)
				16π km^2	
					
	$5a$				
					

2.5 Area of Semicircles

In this section you will look at calculating the area of semicircles.

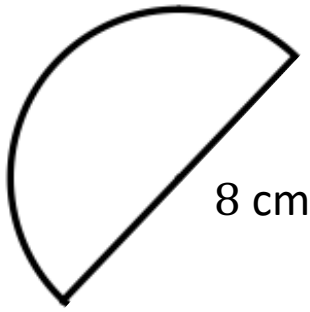
Worked Example

Calculate the area of the semi-circle below. Give your answer in terms of π and to 1 decimal place.

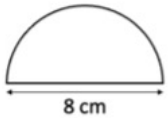
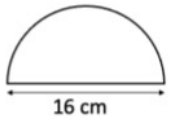
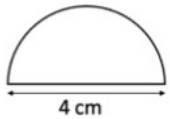
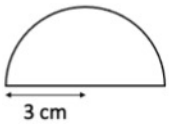
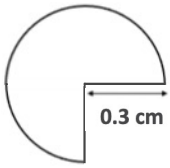


Your Turn

Calculate the area of the semi-circle below. Give your answer in terms of π and to 1 decimal place.



Fill in the Gaps

Diagram	Radius	Diameter	Calculation	Area (in terms of π)	Area (1 dp)
					
					
					
					
					
					
					

2.6 Area and Circumference of Circles

In this section you will look at calculating the area and circumference of circles.

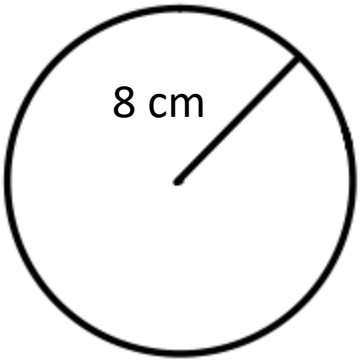
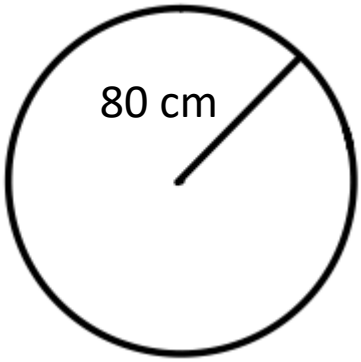
Fluency Practice

Which units should we use for the answer?

Question	Description	Units
1.	A circle has a radius of $10m$, what is the area?	
2.	A circle has a radius of $10cm$, what is the area?	
3.	A circle has a radius of $10cm$, what is the circumference?	
4.	A circle has a diameter of $10cm$, what is the circumference?	
5.	A circle has a circumference of $10cm$, what is the diameter?	
6.	A circle has an area of $10cm^2$, what is the diameter?	
7.	A circle has an area of $10cm^2$, what is the circumference?	
8.	A circle has an circumference of $10cm$, what is the area?	

9. Write a circles question where the units of the answer would be mm

10. Write a circles question where the units of the answer would be mm^2

Worked Example	Your Turn
	
Circumference =	Circumference =
Area =	Area =

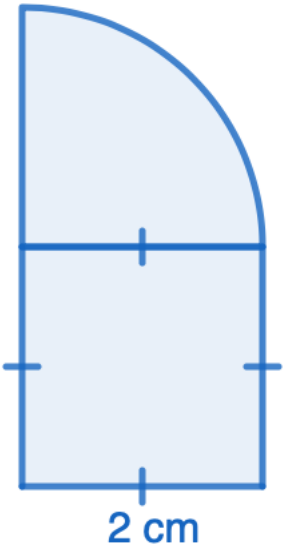
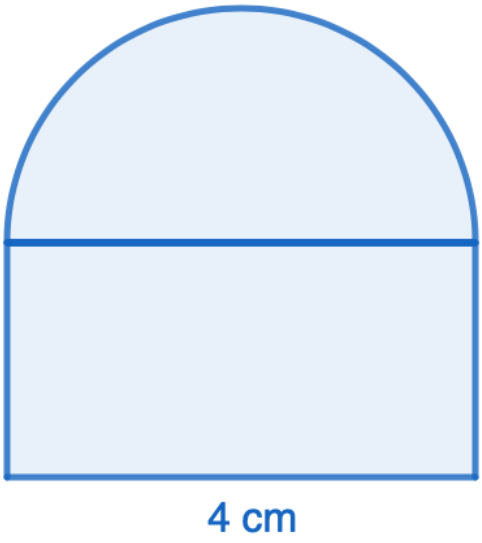
Fill in the Gaps

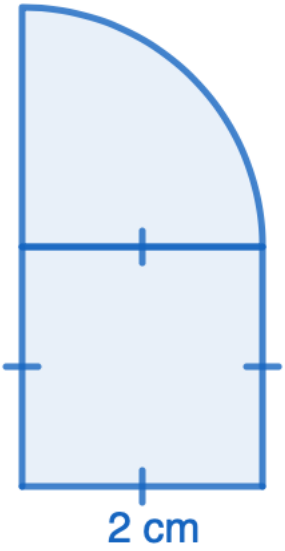
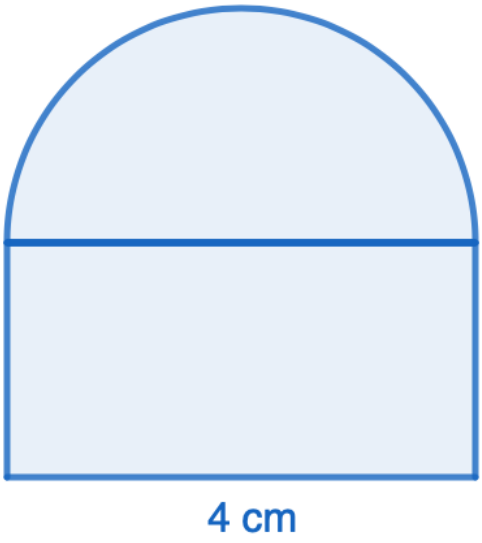
Round all answers to 1 decimal place. Remember to give units.

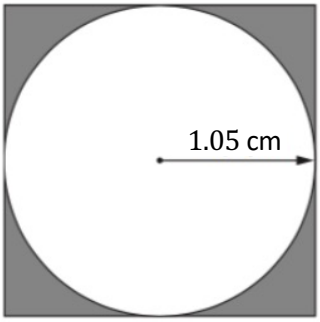
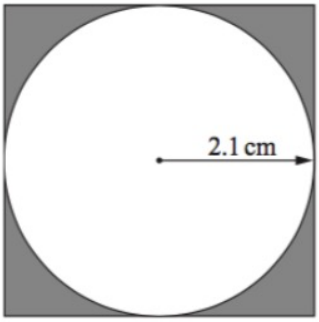
Radius	Diameter	Circumference	Area
$3\ cm$	$6\ cm$		$28.3\ cm^2$
$7\ cm$	$14\ cm$	$44.0\ cm$	
$5\ mm$			$78.5\ mm^2$
	$2.4\ m$	$7.5\ m$	
$4.5\ cm$	$9\ cm$		
$6\ cm$			
	$8\ cm$		
	$40\ mm$		
$0.7\ m$			
		$49.0\ cm$	$191.1\ cm^2$
		$100.5\ mm$	$804.2\ mm^2$
		$81.7\ m$	$530.9\ m^2$
		$11.3\ cm$	
		$147.0\ mm$	
			$38.5\ m^2$
			$498.8\ cm^2$

2.7 Area and Perimeter of Compound Shapes

In this section you will look at calculating the area and perimeter of compound shapes with circles.

Worked Example	Your Turn
Find the perimeter of this shape. Round your answer to 1 decimal place. 	Find the perimeter of this shape. Round your answer to 1 decimal place. 

Worked Example	Your Turn
Find the area of this shape. Round your answer to 1 decimal place.  	Find the area of this shape. Round your answer to 1 decimal place. 

Worked Example	Your Turn
The circle, of radius 1.05 cm, is inside a square. Work out the shaded area.  	The circle, of radius 2.1 cm, is inside a square. Work out the shaded area. 

3 Angles in Parallel Lines

3.1 Transversals

In this section you will look at what transversals are and how to identify them.

Frayer Model – Transversal

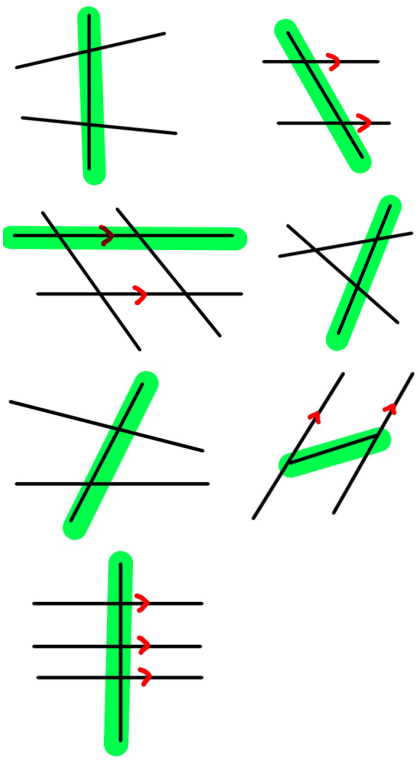
Definition

A transversal is a line that crosses or touches at least two other lines at different points.

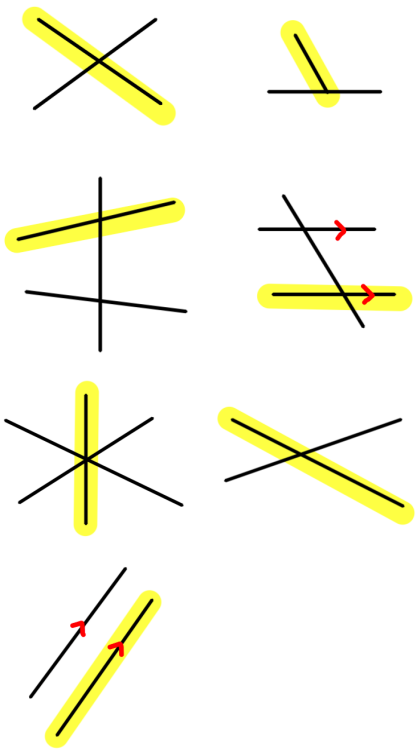
Characteristics

- The lines must be straight.
- The lines don't have to be parallel.
- From the Latin word ‘transversus’ meaning 'lying across’.

Examples



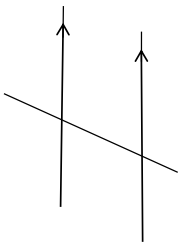
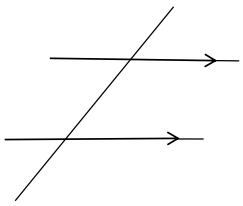
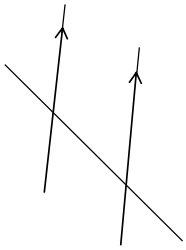
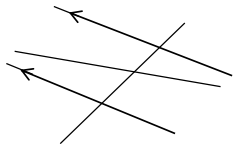
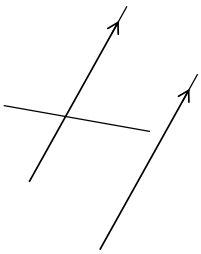
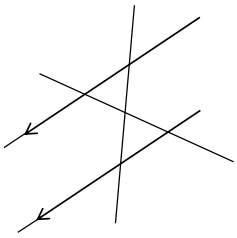
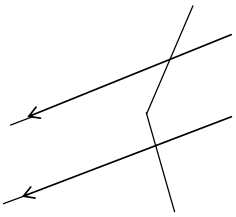
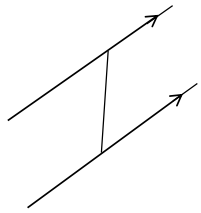
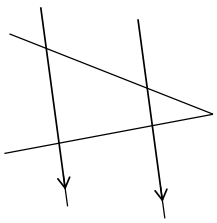
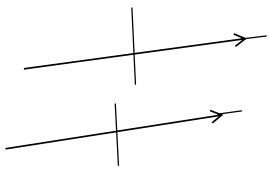
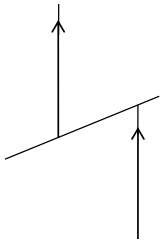
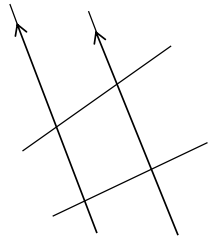
Non-Examples



Fluency Practice

The diagrams are not drawn accurately

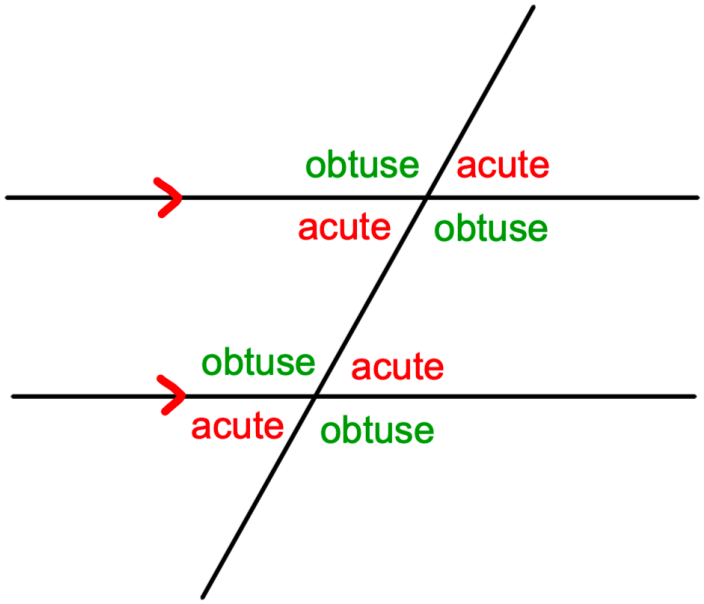
Highlight any transversals

Key Points

When you have two parallel lines cut by a transversal, you get four acute angles and four obtuse angles (except when you get 8 right angles).

- All the acute angles are equal.
- All the obtuse angles are equal.
- Each acute angle is supplementary (two angles add up to $180°$) to each obtuse angle.



3.2 Corresponding Angles

In this section you will look at what corresponding angles are and how to identify them.

Frayer Model – Corresponding Angles

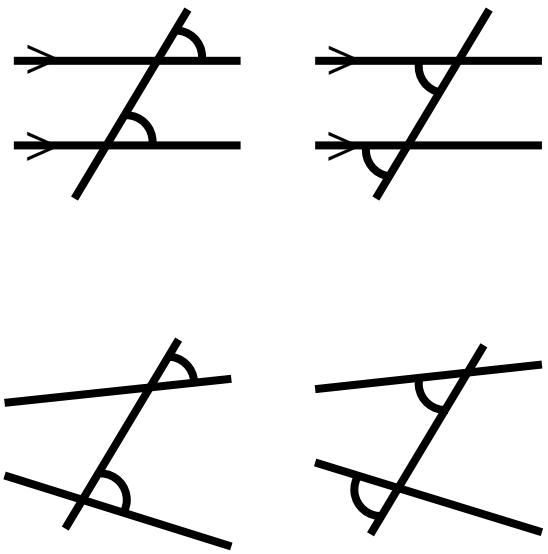
Definition

Corresponding angles are on the same side of the transversal and in corresponding positions in relation to the lines the transversal crosses or touches.

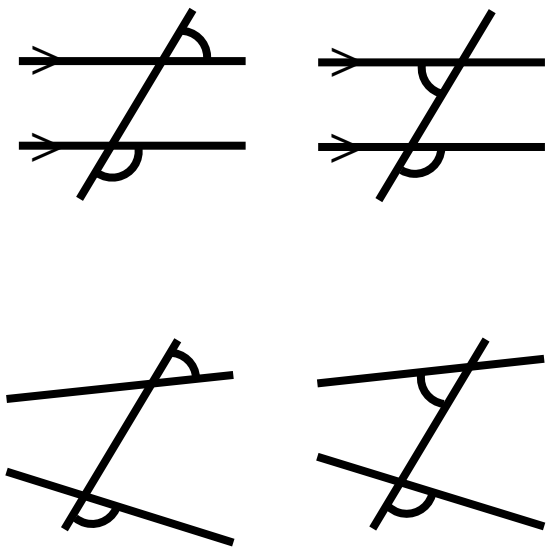
Characteristics

- The lines must be straight.
- The lines don't have to be parallel.
- Corresponding positions means matching positions – above/below or left/right.

Examples



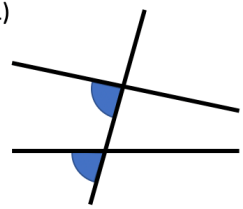
Non-Examples



Fluency Practice

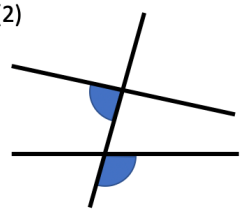
For each question, write either ***'corresponding'*** or ***'not corresponding'*** on the line.

(1)



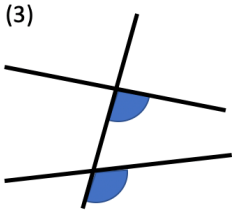
These angles are _____.

(2)



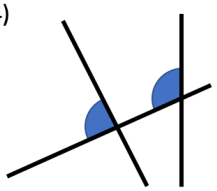
These angles are _____.

(3)



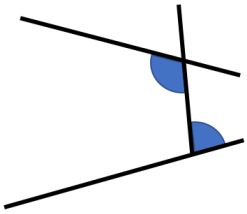
These angles are _____.

(4)



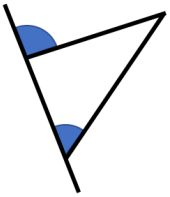
These angles are _____.

(5)



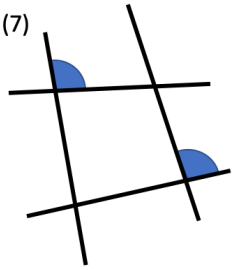
These angles are _____.

(6)



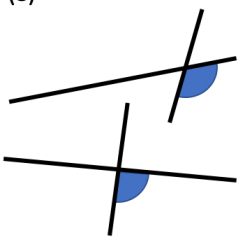
These angles are _____.

(7)



These angles are _____.

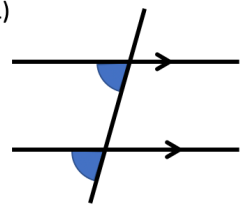
(8)



These angles are _____.

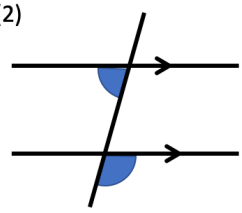
For each question, write either ***'corresponding'*** or ***'not corresponding'*** on the line.

(1)



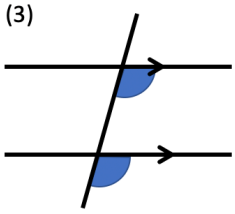
These angles are _____.

(2)



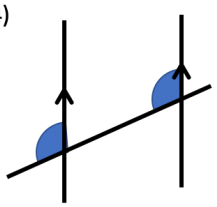
These angles are _____.

(3)



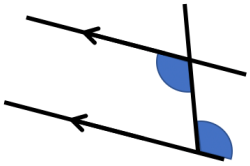
These angles are _____.

(4)



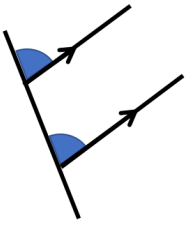
These angles are _____.

(5)



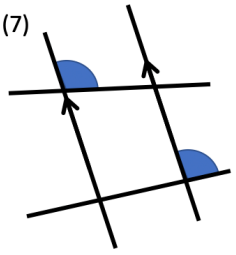
These angles are _____.

(6)



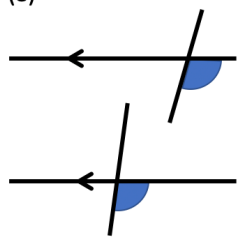
These angles are _____.

(7)



These angles are _____.

(8)

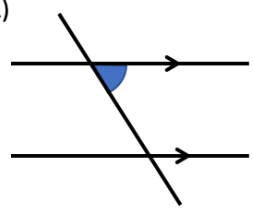


These angles are _____.

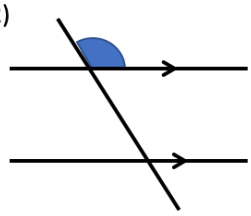
Fluency Practice

Each diagram has one angle shaded in.
Mark and shade in their corresponding angles.

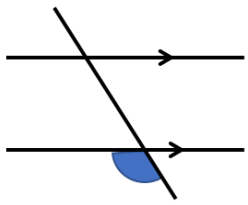
(1)



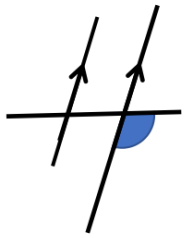
(2)



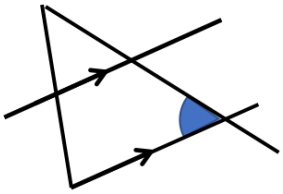
(3)



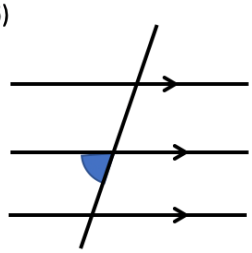
(4)



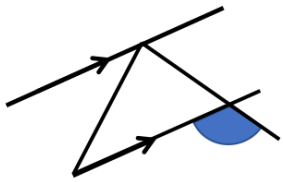
(5)



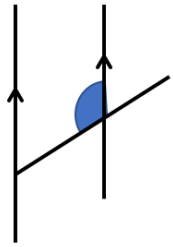
(6)



(7)

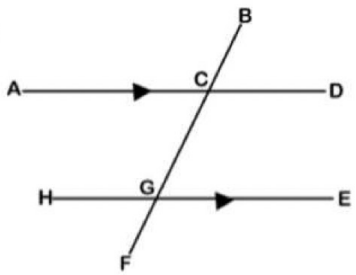


(8)

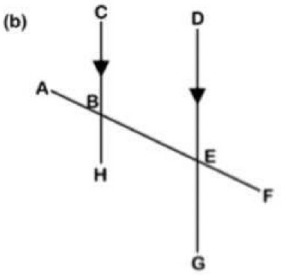


Find all the pairs of corresponding angles in each diagram.
Use three letter notation to identify the angles (e.g. "∠ACB and ∠HGC").

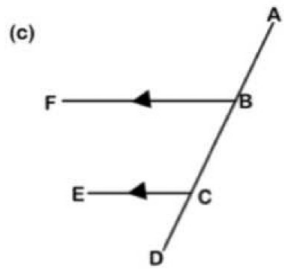
(a)



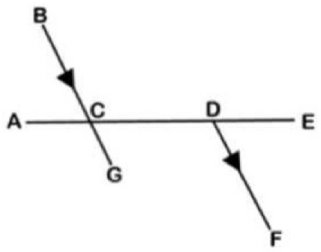
(b)



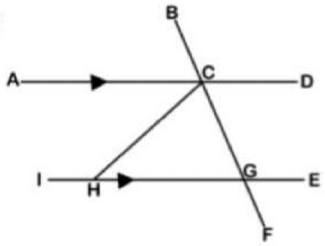
(c)



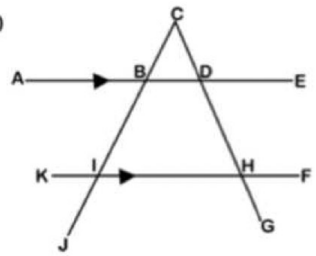
(d)



(e)



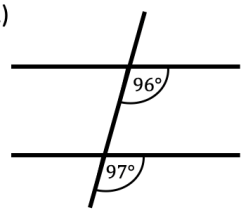
(f)



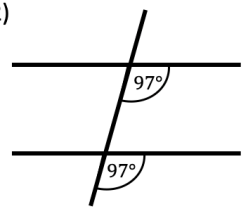
Fluency Practice

Use your knowledge of corresponding angles to decide which diagrams contain parallel lines. Explain how you made your decision for each question.

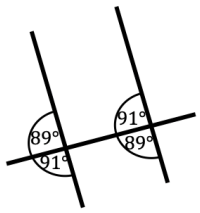
(1)



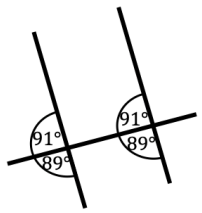
(2)



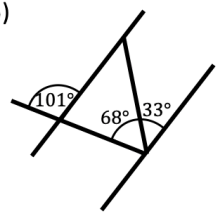
(3)



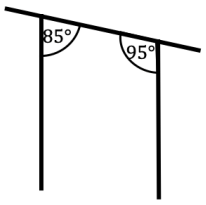
(4)



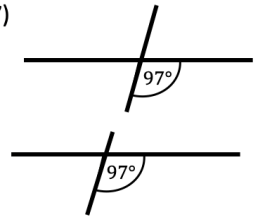
(5)



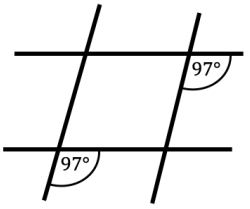
(6)



(7)



(8)



Fluency Practice

The diagrams are not drawn accurately

1. Do the diagrams show corresponding angles? Provide a reason for your answer.

a.

b.

c.

d.

e.

f.

g.

h.

2. Write down the three letter notation for any corresponding angles to the one that is marked on the diagram.

a.

b.

c.

d.

e.

f.

3. Write down the three letter notation for any pairs (or more) of corresponding angles.

a.

b.

c.

d.

e.

f.

4. Are the bold lines parallel? Provide a reason for your answer.

a.

b.

c.

d.

e.

f.

3.3 Alternate Angles

In this section you will look at what alternate angles are and how to identify them.

Frayer Model – Alternate Angles

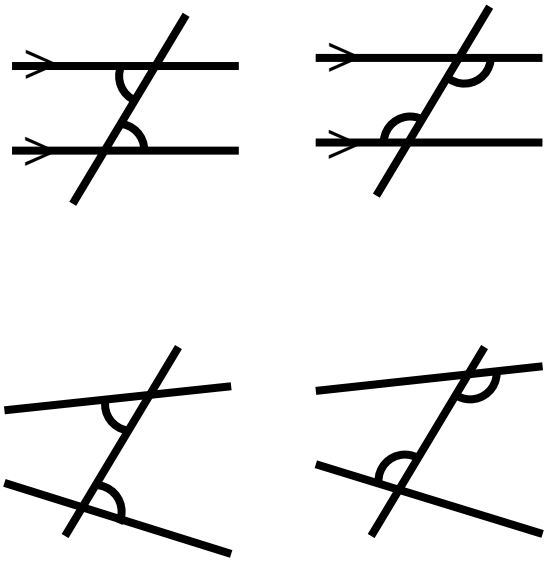
Definition

Alternate angles are on opposite sides of the transversal and between the two lines the transversal crosses or touches.

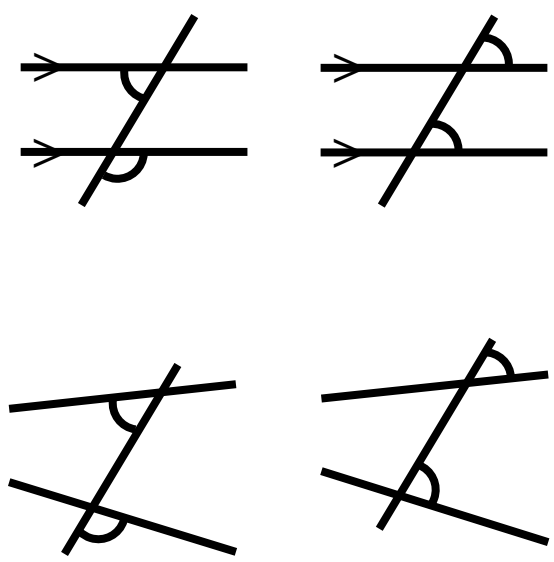
Characteristics

- The lines must be straight.
- The lines don't have to be parallel.

Examples



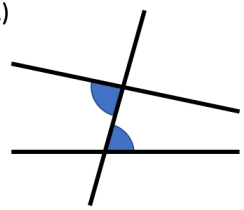
Non-Examples



Fluency Practice

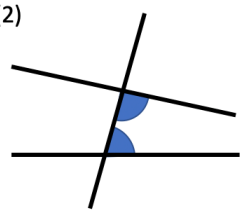
For each question, write either ***'alternate'*** or ***'not alternate'*** on the line.

(1)



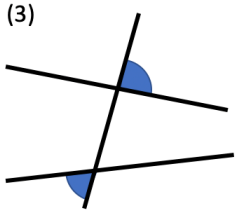
These angles are _____.

(2)



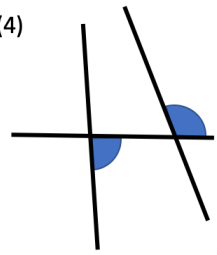
These angles are _____.

(3)



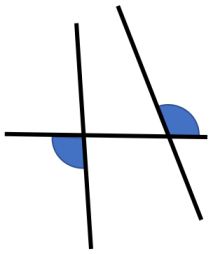
These angles are _____.

(4)



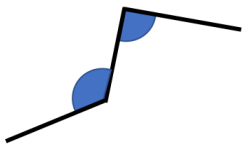
These angles are _____.

(5)



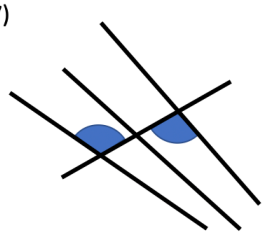
These angles are _____.

(6)



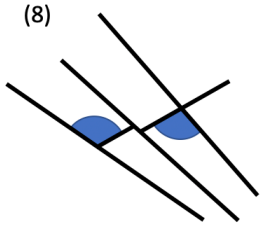
These angles are _____.

(7)



These angles are _____.

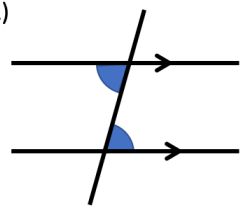
(8)



These angles are _____.

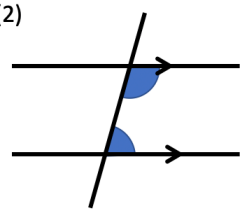
For each question, write either ***'alternate'*** or ***'not alternate'*** on the line.

(1)



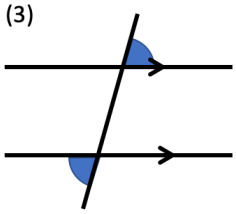
These angles are _____.

(2)



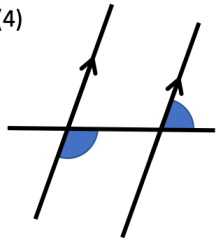
These angles are _____.

(3)



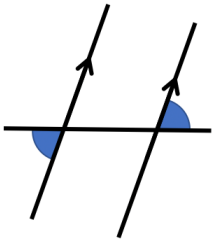
These angles are _____.

(4)



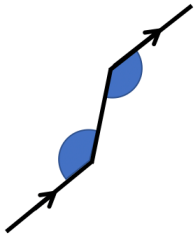
These angles are _____.

(5)



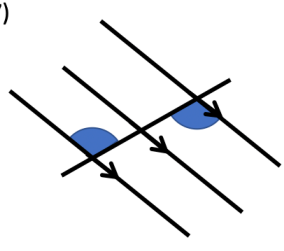
These angles are _____.

(6)



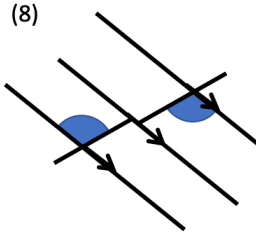
These angles are _____.

(7)



These angles are _____.

(8)

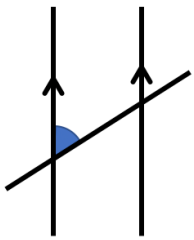


These angles are _____.

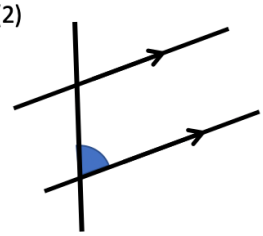
Fluency Practice

Each diagram has one angle shaded in.
Mark and shade in their alternate angles.

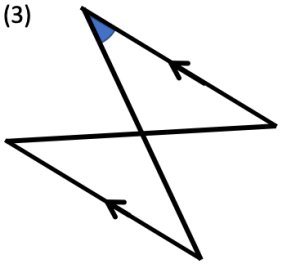
(1)



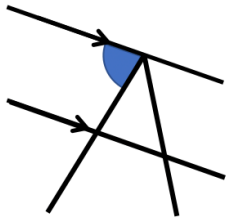
(2)



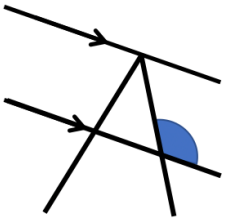
(3)



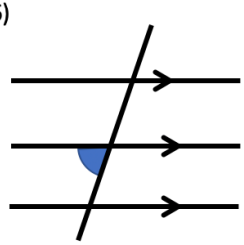
(4)



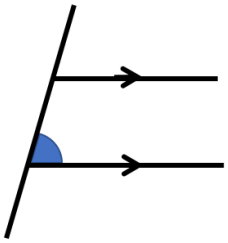
(5)



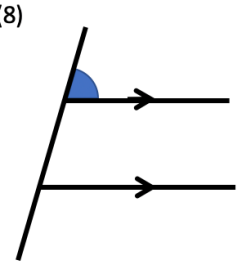
(6)



(7)

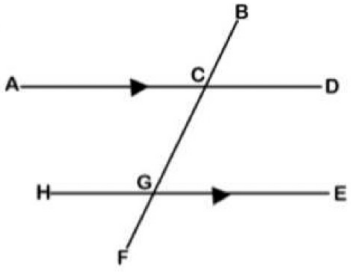


(8)

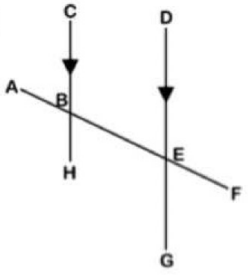


Find all the pairs of alternate angles in each diagram.
Use three letter notation to identify the angles (e.g. "∠DCG and ∠HGC").

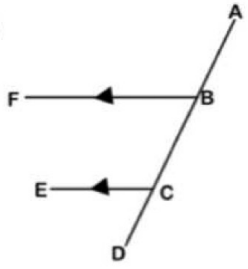
(a)



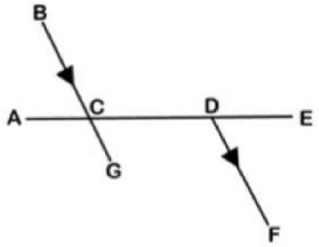
(b)



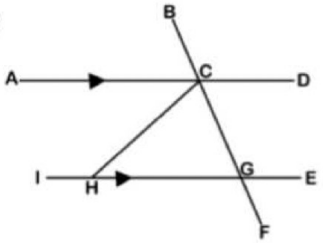
(c)



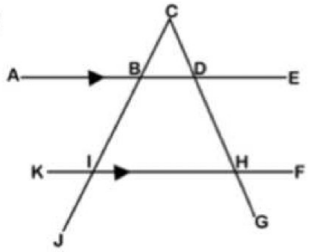
(d)



(e)



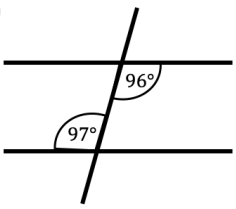
(f)



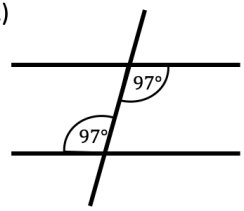
Fluency Practice

Use your knowledge of alternate angles to decide which diagrams contain parallel lines. Explain how you made your decision for each question.

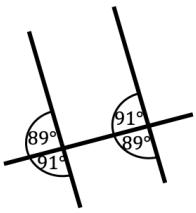
(1)



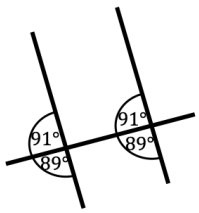
(2)



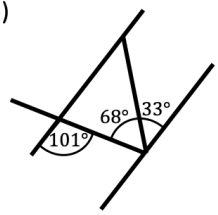
(3)



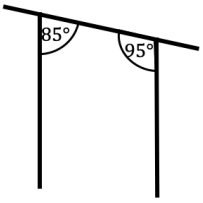
(4)



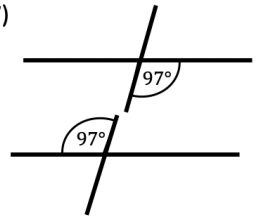
(5)



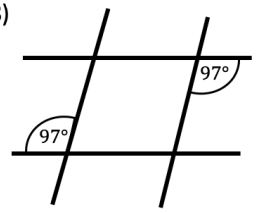
(6)



(7)

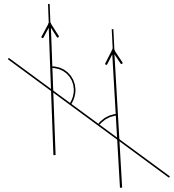


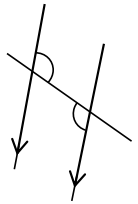
(8)

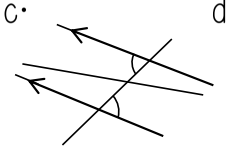


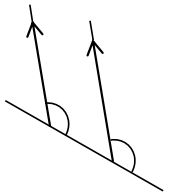
The diagrams are not drawn accurately

1. Do the diagrams show alternate angles? Provide a reason for your answer.

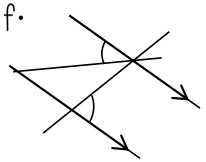
a. 

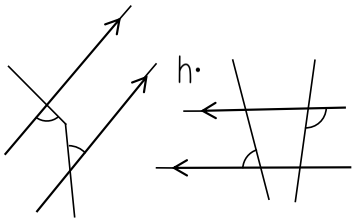
b. 

c. 

d. 

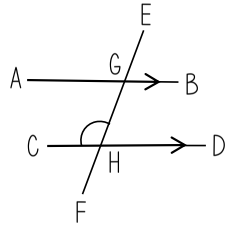
e. 

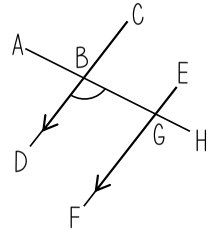
f. 

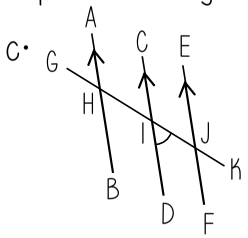
g. 

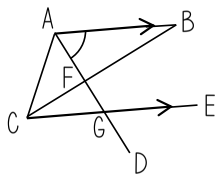
h.

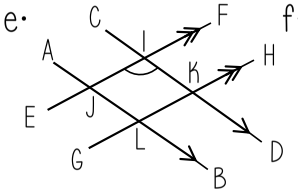
2. Write down the three letter notation for any alternate angles to the one that is marked on the diagram.

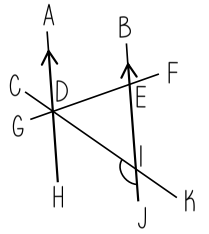
a. 

b. 

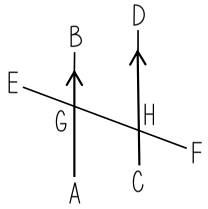
c. 

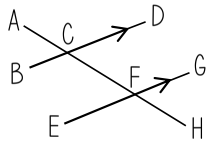
d. 

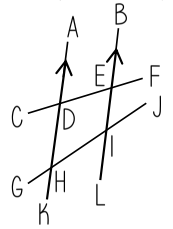
e. 

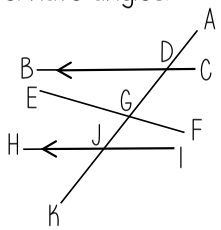
f. 

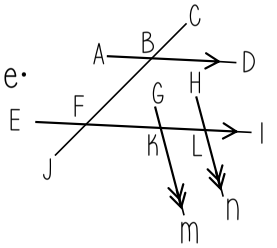
3. Write down the three letter notation for any pairs (or more) of alternate angles.

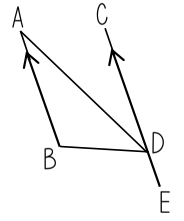
a. 

b. 

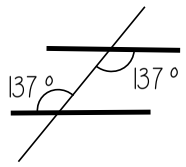
c. 

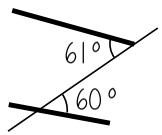
d. 

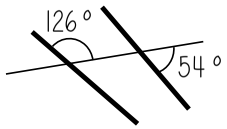
e. 

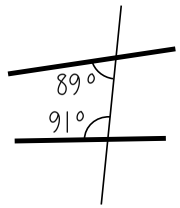
f. 

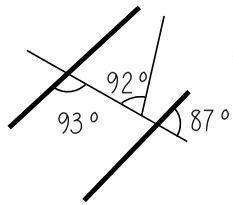
4. Are the bold lines parallel? Provide a reason for your answer.

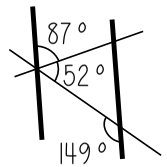
a. 

b. 

c. 

d. 

e. 

f. 

3.4 Co-Interior Angles

In this section you will look at what co-interior angles are and how to identify them.

Frayer Model – Co-Interior Angles

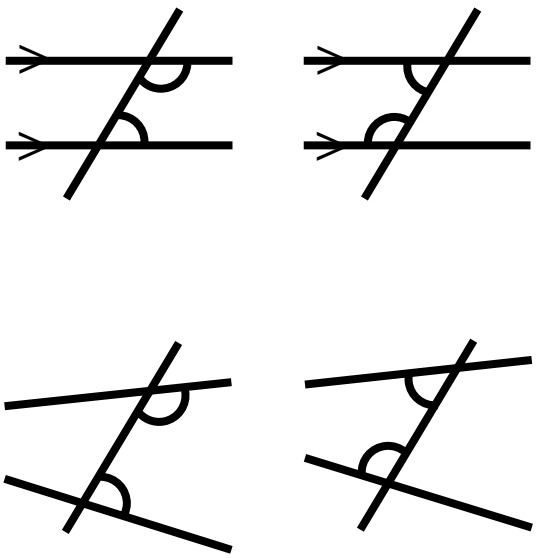
Definition

Co-interior angles are on the same side of the transversal and between the two lines the transversal crosses or touches.

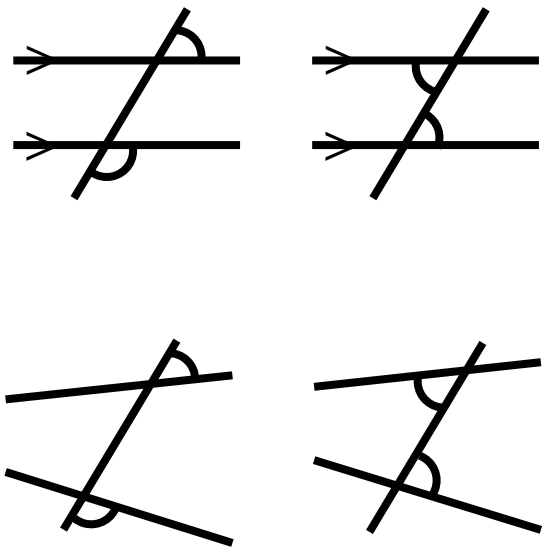
Characteristics

- The lines must be straight.
- The lines don't have to be parallel.
- Co-interior is short for consecutive interior.
- Also called allied angles.

Examples



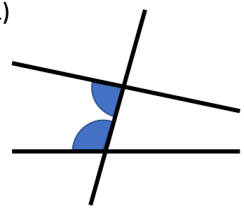
Non-Examples



Fluency Practice

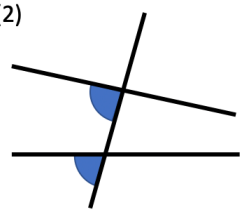
For each question, write either ***'co-interior'*** or ***'not co-interior'*** on the line.

(1)



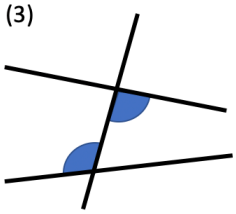
These angles are _____.

(2)



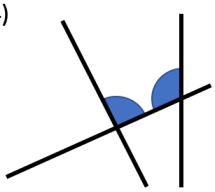
These angles are _____.

(3)



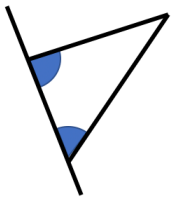
These angles are _____.

(4)



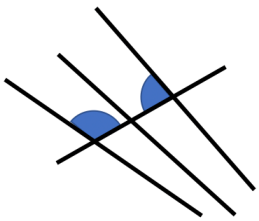
These angles are _____.

(5)



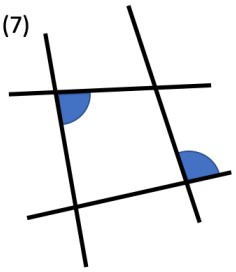
These angles are _____.

(6)



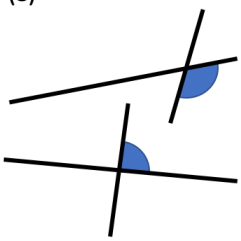
These angles are _____.

(7)



These angles are _____.

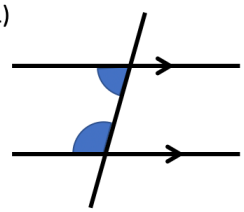
(8)



These angles are _____.

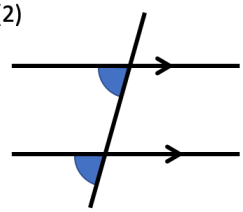
For each question, write either ***'co-interior'*** or ***'not co-interior'*** on the line.

(1)



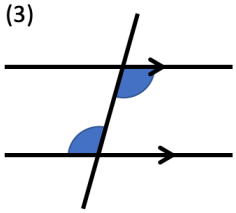
These angles are _____.

(2)



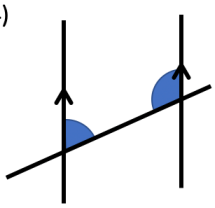
These angles are _____.

(3)



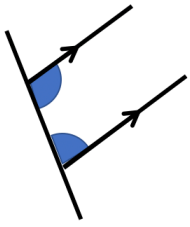
These angles are _____.

(4)



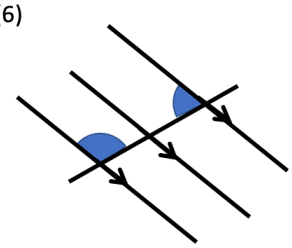
These angles are _____.

(5)



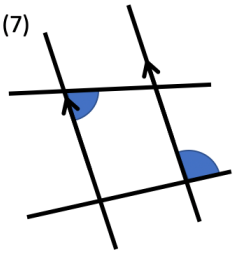
These angles are _____.

(6)



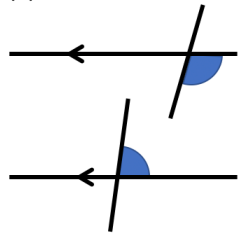
These angles are _____.

(7)



These angles are _____.

(8)

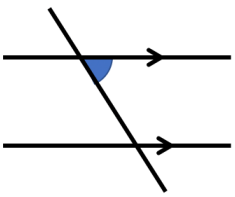


These angles are _____.

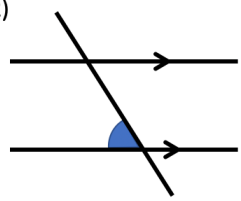
Fluency Practice

Each diagram has one angle shaded in.
Mark and shade in their co-interior angles.

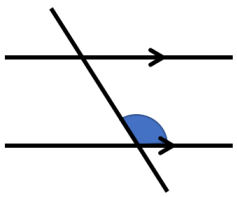
(1)



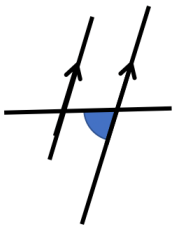
(2)



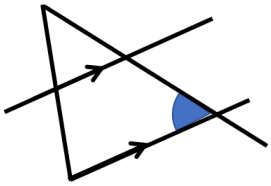
(3)



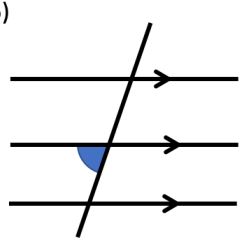
(4)



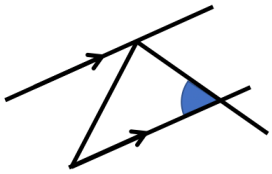
(5)



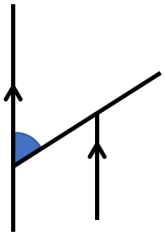
(6)



(7)

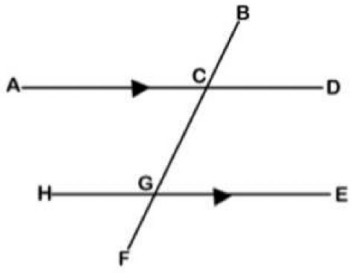


(8)

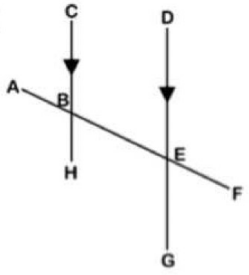


Find all the pairs of co-interior angles in each diagram.
Use three letter notation to identify the angles (e.g. "∠ACG and ∠HGC").

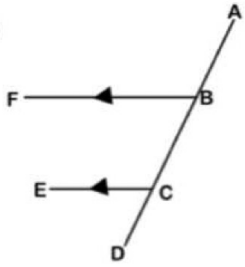
(a)



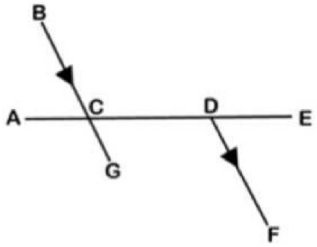
(b)



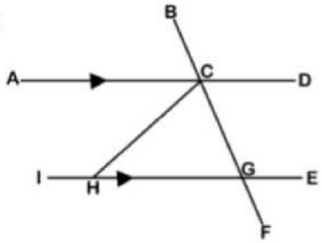
(c)



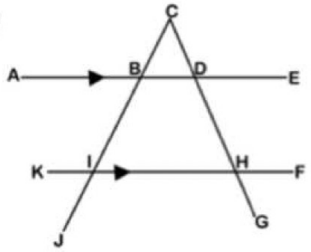
(d)



(e)



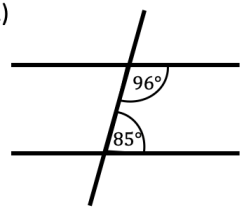
(f)



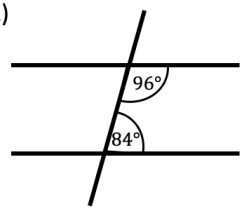
Fluency Practice

Use your knowledge of co-interior angles to decide which diagrams contain parallel lines. Explain how you made your decision for each question.

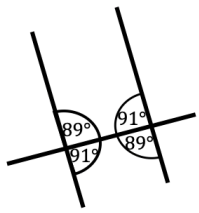
(1)



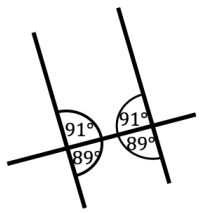
(2)



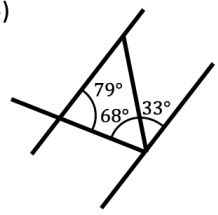
(3)



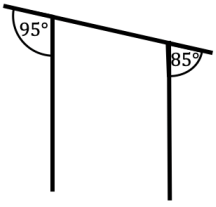
(4)



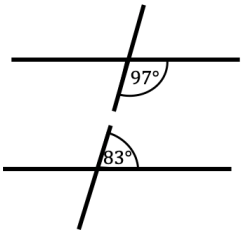
(5)



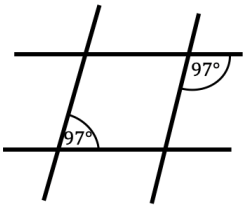
(6)



(7)

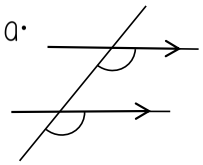


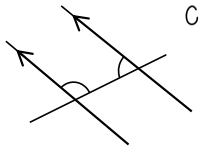
(8)

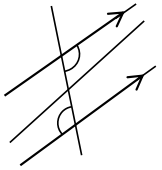


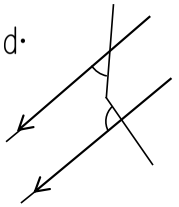
The diagrams are not drawn accurately

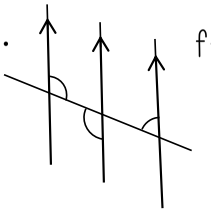
1. Do the diagrams show co-interior angles? Provide a reason for your answer.

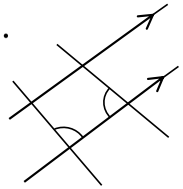
a. 

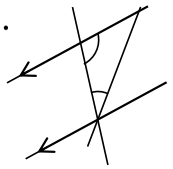
b. 

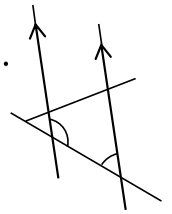
c. 

d. 

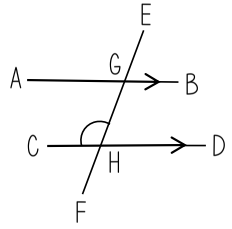
e. 

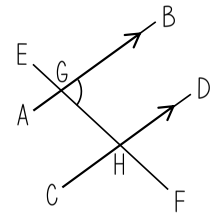
f. 

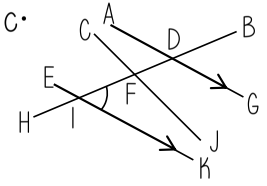
g. 

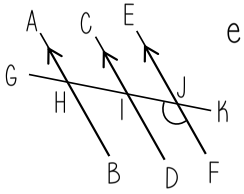
h. 

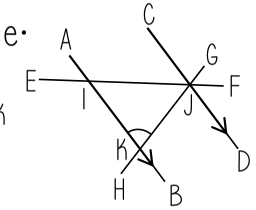
2. Write down the three letter notation for any co-interior angles to the one that is marked on the diagram.

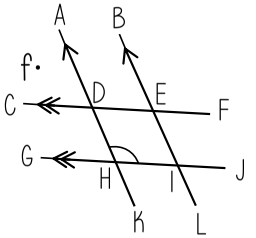
a. 

b. 

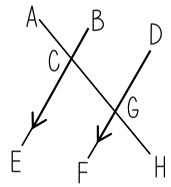
c. 

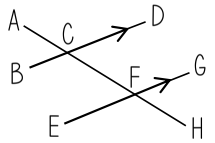
d. 

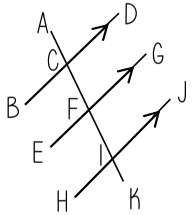
e. 

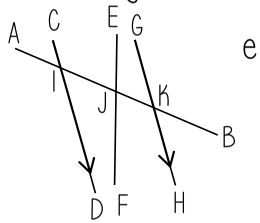
f. 

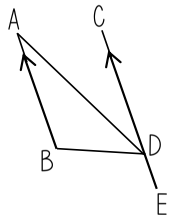
3. Write down the three letter notation for any pairs (or more) of co-interior angles.

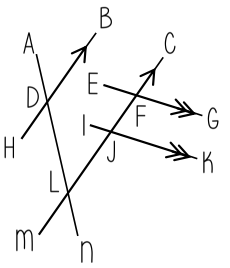
a. 

b. 

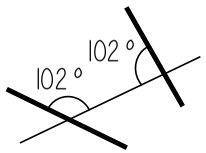
c. 

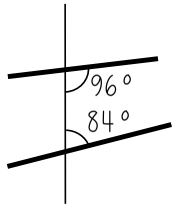
d. 

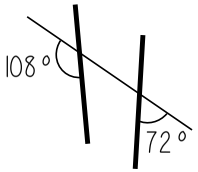
e. 

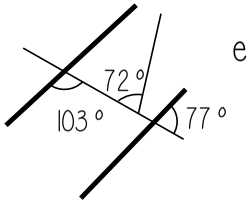
f. 

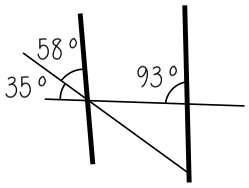
4. Are the bold lines parallel? Provide a reason for your answer.

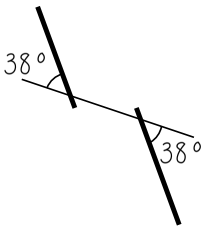
a. 

b. 

c. 

d. 

e. 

f. 

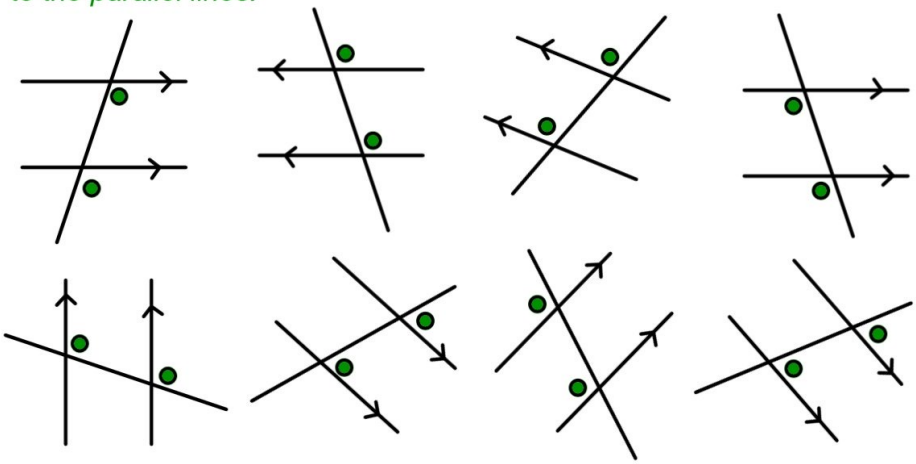
3.5 Mixed

In this section you will look at angles in parallel lines.

Rules

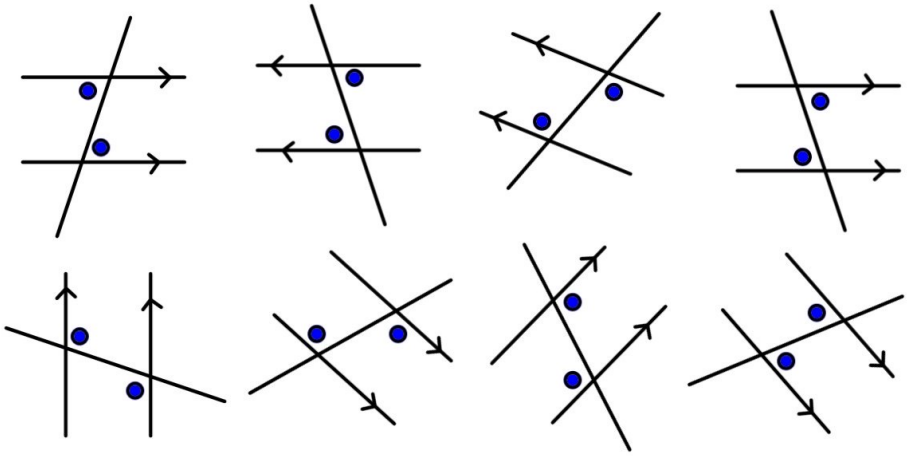
Angle Facts in Parallel Lines: *Corresponding angles are equal.*

On the same side of the transversal and in the same position in relation to the parallel lines.



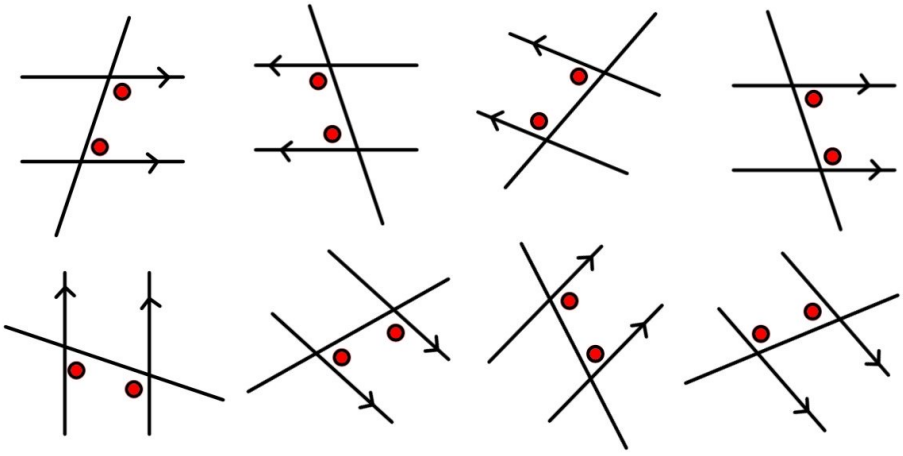
Angle Facts in Parallel Lines: *Alternate angles are equal.*

Between the parallel lines, on opposite sides of the transversal.



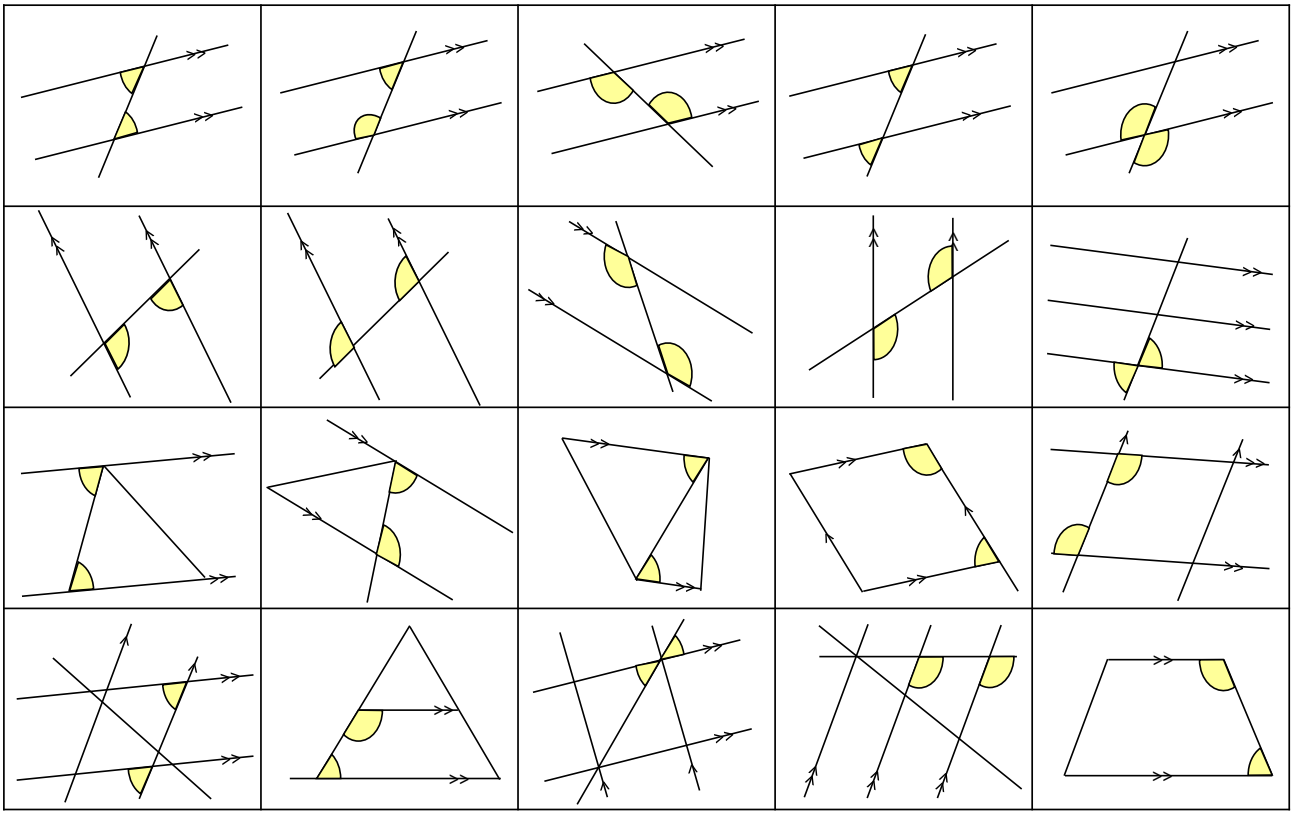
Angle Facts in Parallel Lines: *Co-interior angles add up to 180°.*

Between the parallel lines and on the same side of the transversal.



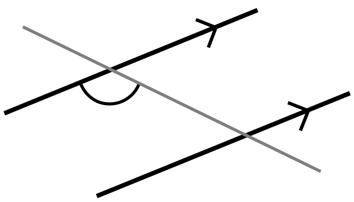
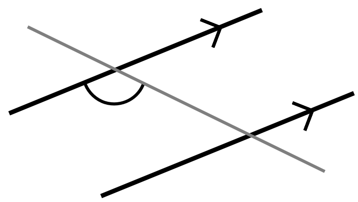
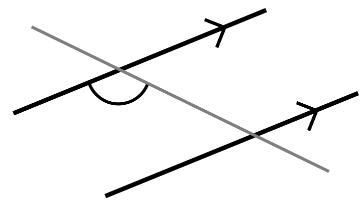
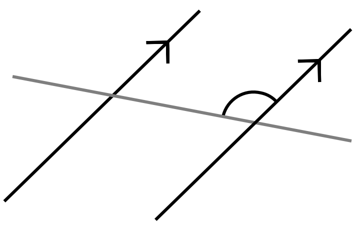
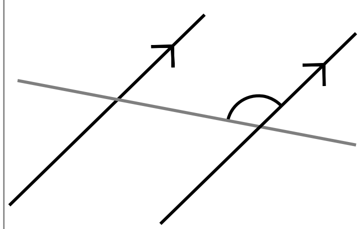
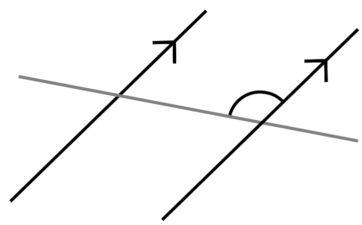
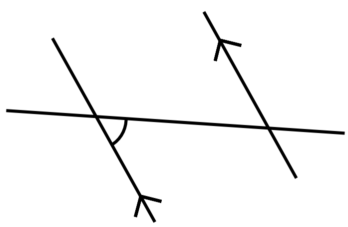
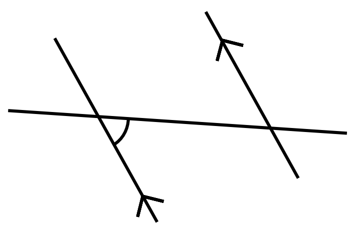
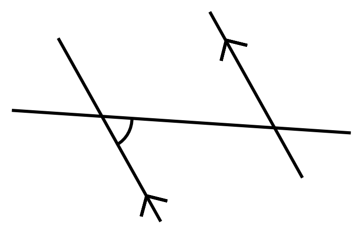
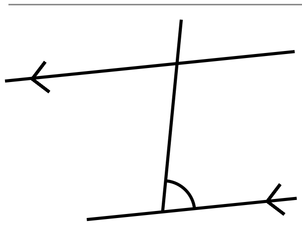
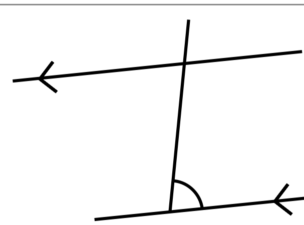
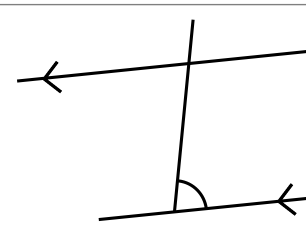
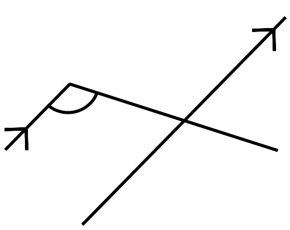
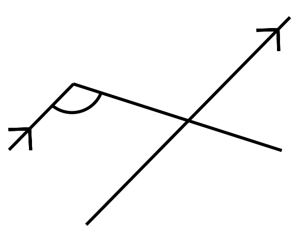
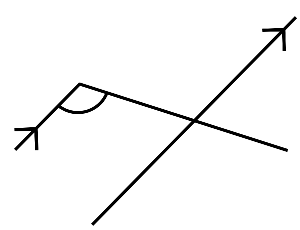
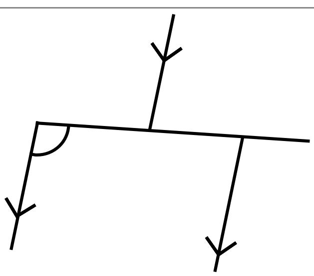
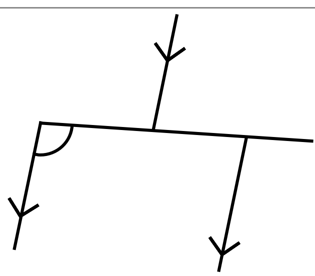
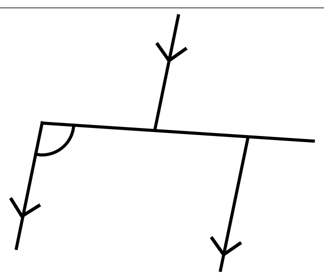
Fluency Practice

Vertically opposite angles	Alternate angles	Corresponding angles	Co-interior angles



Fluency Practice

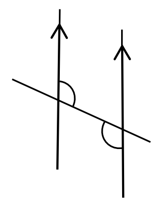
On each diagram, label an angle according to each rule.

Corresponding	Alternate	Co-Interior
		
		
		
		
		
		

Fluency Practice

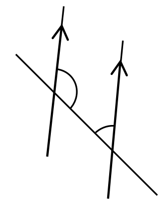
The diagrams are not drawn accurately

Decide whether the diagrams show corresponding, alternate or co-interior angles



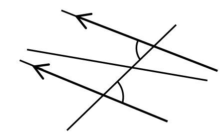
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



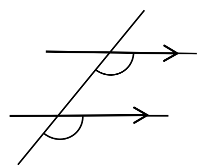
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



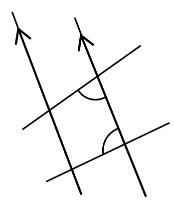
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



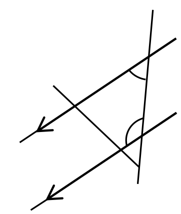
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



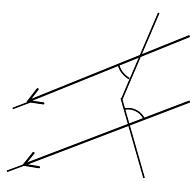
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



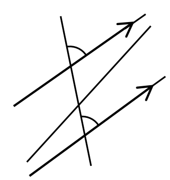
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



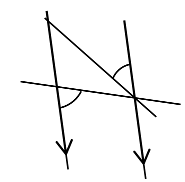
Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know



Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know

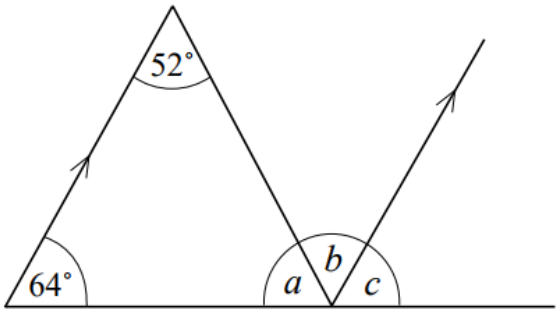


Corresponding	
Alternate	
Co-Interior	
None	

Explain how you know

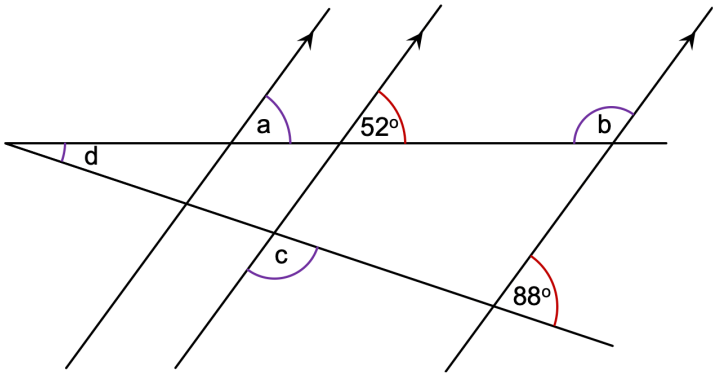
Worked Example

Work out the missing angles in the diagram below. Give reasons for your answer.



Your Turn

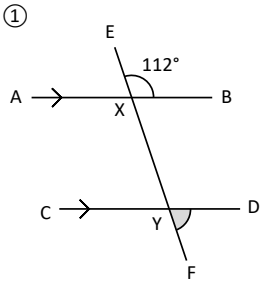
Work out the missing angles in the diagram below. Give reasons for your answer.



Fluency Practice

Angle Reasoning

①



Angle BXF =

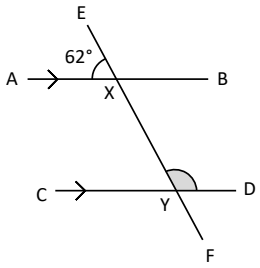
because…

Angle **DYF** =

because…

②

Here are two methods to find angle EYD:



Angle BXF =

because…

Angle **EYD** =

because…

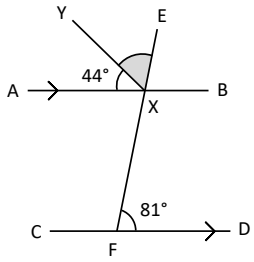
Angle AXF =

because…

Angle **EYD** =

because…

③



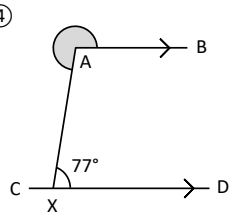
Angle EXB =

because…

Angle **EXY** =

because…

④



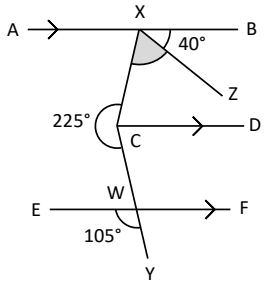
Obtuse Angle BAX =

because…

Reflex Angle **BAX** =

because…

⑤



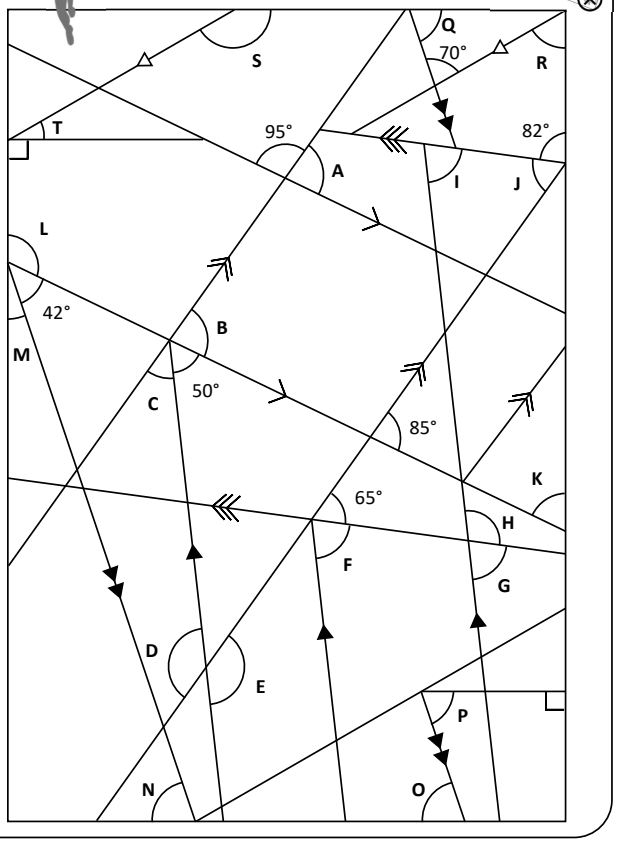
Angle **CXZ** =

because…

Fluency Practice

Parallel Parkour

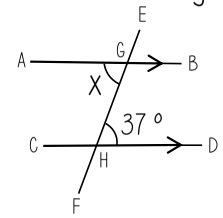
Using angle rules, find angles **A** to **T**.
The outside shape is a rectangle.

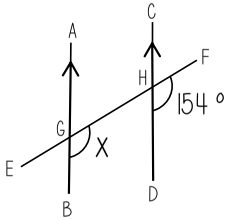


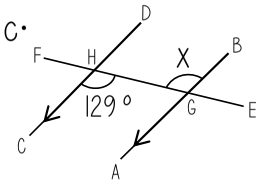
Angle Connection	Angle	Reason
→ **A**		
A → **B**		
B → **C**		
C → **D**		
D → **E**		
E → **F**		
F → **G**		
G → **H**		
H → **I**		
I → **J**		
J → **K**		
K → **L**		
L → **M**		
M → **N**		
N → **O**		
O → **P**		
P → **Q**		
Q → **R**		
R → **S**		
S → **T**		

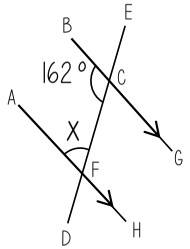
The diagrams are not drawn accurately

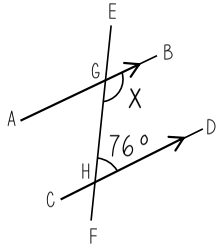
1. Find the missing angle and state what rule you used.

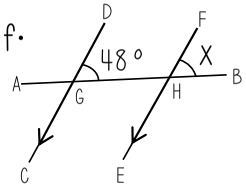
a. 

b. 

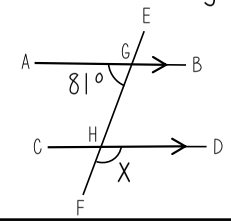
c. 

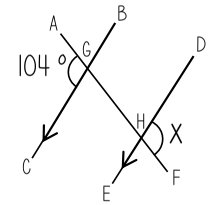
d. 

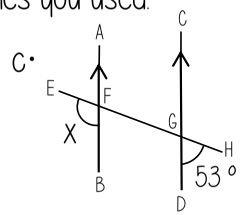
e. 

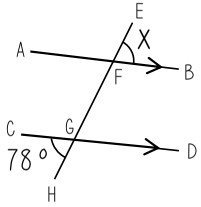
f. 

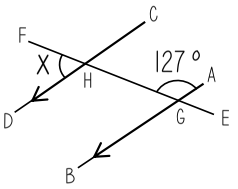
2. Find the missing angle and state what rules you used.

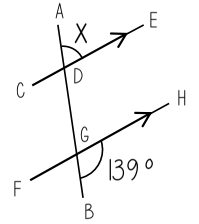
a. 

b. 

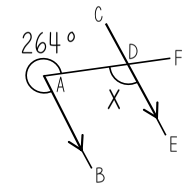
c. 

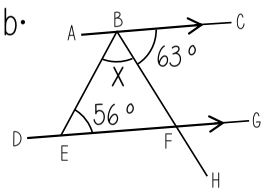
d. 

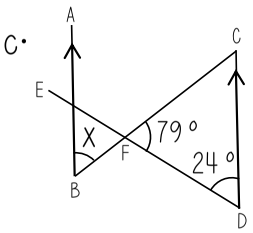
e. 

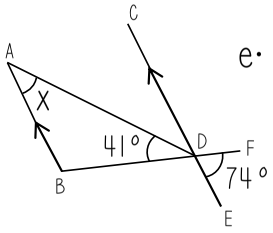
f. 

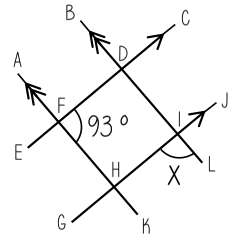
3. Find the missing angle and state what rules you used.

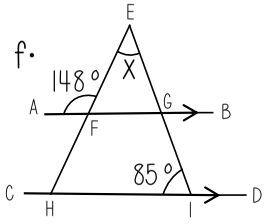
a. 

b. 

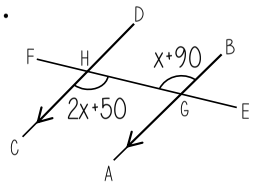
c. 

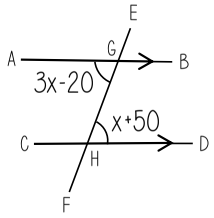
d. 

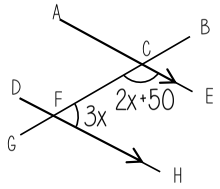
e. 

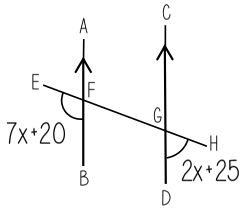
f. 

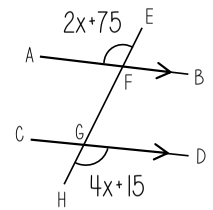
4. Find the value of x.

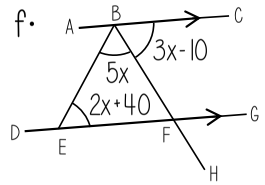
a. 

b. 

c. 

d. 

e. 

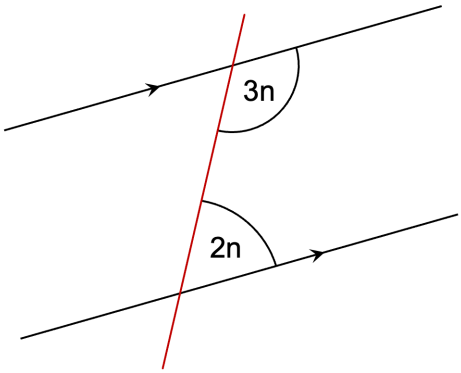
f. 

3.6 Angles in Parallel Lines with Equations

In this section you will look at angles in parallel lines with equations.

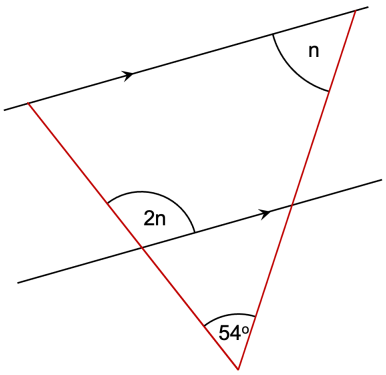
Worked Example

State what the angle n is, giving reasons for your answer.



Your Turn

State what the angle n is, giving reasons for your answer.



Fluency Practice

Equations & Parallel Lines

Use angle facts for parallel lines to find the value of the variables a to p.
For each question, state **all** the angle rules you have used.