



Year 10 2024 Mathematics 2025 Unit 16 Booklet – Part 1

HGS Maths





Dr Frost Course



Name:

Class:





Year 10 2024 Mathematics 2025 Unit 16 Booklet – Part 2

HGS Maths





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Name:

Class:

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1 Recurring Decimals

Worked Example	Your Turn
Express as a decimal:	Express as a decimal:
a) $\frac{2}{9}$	a) $\frac{8}{9}$
b) $\frac{2}{11}$	b) $\frac{8}{11}$
c) $\frac{2}{15}$	c) $\frac{4}{15}$

Activity

For each of the following fractions, use your calculator to convert it to a decimal, then decide whether it is terminating or recurring. Now find the denominator as a product of its prime factors. Can you spot any patterns?

$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{3}$ $\frac{1}{13}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{4}$ $\frac{1}{11}$ $\frac{1}{11}$ $\frac{1}{11}$ $\frac{1}{5}$ $\frac{1}{11}$ $\frac{1}{11}$ $\frac{1}{111}$ $\frac{1}{5}$ $\frac{1}{111}$ $\frac{1}{111}$ $\frac{1}{1111}$ $\frac{1}{5}$ $\frac{1}{1111}$ $\frac{1}{1111}$ $\frac{1}{11111}$ $\frac{1}{11111}$ $\frac{1}{1111111111111111111111111111111111$	Fraction	Decimal using Calculator	Terminating or Recurring	Denominator as Product of Prime Factors	Fraction	Decimal using Calculator	Terminating or Recurring	Denominator as Product of Prime Factors
$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{13}$ $\frac{1}{13}$ $\frac{1}{4}$ $\frac{1}{13}$ $\frac{1}{13}$ $\frac{1}{13}$ $\frac{1}{5}$ $\frac{1}{14}$ $\frac{1}{14}$ $\frac{1}{14}$ $\frac{1}{6}$ $\frac{1}{15}$ $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{7}$ $\frac{1}{16}$ $\frac{1}{17}$ $\frac{1}{17}$ $\frac{1}{8}$ $\frac{1}{18}$ 0.05 Recurring $2 \times 3 \times 3$ $\frac{1}{19}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$	$\frac{1}{2}$				$\frac{1}{12}$			
$\frac{1}{4}$ $\frac{1}{14}$ $\frac{1}{14}$ $\frac{1}{5}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{6}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{7}$ $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{8}$ $\frac{1}{17}$ $\frac{1}{17}$ $\frac{1}{9}$ $\frac{1}{18}$ 0.05 Recurring $2 \times 3 \times 3$ $\frac{1}{19}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$	$\frac{1}{3}$				$\frac{1}{13}$			
$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{6}$ $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{7}$ $\frac{1}{16}$ $\frac{1}{17}$ $\frac{1}{17}$ $\frac{1}{8}$ $\frac{1}{18}$ 0.05 Recurring $2 \times 3 \times 3$ $\frac{1}{10}$ $\frac{1}{120}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{120}$	$\frac{1}{4}$				$\frac{1}{14}$			
$\frac{1}{6}$ $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{7}$ $\frac{1}{17}$ $\frac{1}{17}$ $\frac{1}{8}$ $\frac{1}{17}$ $\frac{1}{17}$ $\frac{1}{9}$ $\frac{1}{18}$ $0.0\dot{5}$ Recurring $2 \times 3 \times 3$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$	$\frac{1}{5}$				$\frac{1}{15}$			
$\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{17}$ $\frac{1}{17}$ $\frac{1}{8}$ $\frac{1}{18}$ $0.0\dot{5}$ Recurring $2 \times 3 \times 3$ $\frac{1}{9}$ $\frac{1}{10}$ $\frac{1}{19}$ $\frac{1}{120}$ $\frac{1}{20}$ $\frac{1}{20}$	$\frac{1}{6}$				$\frac{1}{16}$			
$\frac{1}{8}$ $\frac{1}{18}$ $0.0\dot{5}$ Recurring $2 \times 3 \times 3$ $\frac{1}{9}$ $\frac{1}{10}$ $\frac{1}{19}$ $\frac{1}{19}$ $\frac{1}{120}$ $\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$ $\frac{1}{20}$	$\frac{1}{7}$				$\frac{1}{17}$			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{1}{8}$				$\frac{1}{18}$	0.05	Recurring	$2 \times 3 \times 3$
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\frac{1}{9}$				$\frac{1}{19}$			
	$\frac{1}{10}$				$\frac{1}{20}$			
$\begin{array}{c c} 1\\ \hline 11 \end{array} \end{array} \qquad $	$\frac{1}{11}$				$\frac{1}{21}$			

Activity

	Fraction	Factorised	The Law of	Simplest	Factors of	Kind of
			Cancellation	Form	Denominator	Decimal
(i)	$\frac{8}{12}$					
(ii)	$\frac{3}{16}$					
(iii)	9 27					
(iv)	$\frac{12}{30}$					
(v)	$\frac{7}{32}$					
(vi)	<u>15</u> 21					
(vii)	$\frac{3}{10}$					
(viii)	$\frac{3}{18}$					
(ix)	$\frac{6}{33}$					
(x)	$\frac{3}{75}$					

Worked Example	Your Turn
Express as a simplified fraction:	Express as a simplified fraction:
0.4	0. Ż

Your Turn
Express as a simplified fraction:
0. 27

Worked Example	Your Turn
Express as a simplified fraction:	Express as a simplified fraction:
0. 279	0. 837

Worked Example	Your Turn
Express as a simplified fraction:	Express as a simplified fraction:
0.789	0.579

Worked Example	Your Turn
Express as a simplified fraction:	Express as a simplified fraction:
3.7654	7.5309

					[FIII	IN 1	the	Ga	ps				[
<i>x</i> as a fraction	2	$x = \frac{1}{2}$																			
Subtract	t c	$y = x_{0}$			00% - 26	cc = X66															
Write out multiples of x	$10x = 7.\dot{7} = 7.7777 \dots$	$x = 0.\dot{7} = 0.77777 \dots$	10x =	x =	$100x = 35.\dot{3}\dot{5} = 35.3535$	$x = 0.\dot{3}\dot{5} = 0.3535$	100x =	= x			1000x =		$100x = 2.\dot{2} = 2.22222$	10x =							
<i>x</i> as recurring decimal	-I (x = 0.7	с v – х	$\lambda = 0.2$, ν ό. Έ	x = 0.5		x = 0.41	- ν - γ	x = 0.27	* – 0 <i>k</i> 1ż	V. U. U. U. U.		x = 0.02	ċ ! ∪ - ~	x = 0.140	, - Λ Ω Υ	706.0 - Y	, – Λ ΛΫ́	207.U = X	$c_{000,0} = x$

Worked Example	Your Turn
Worked Example Write the fraction 0.136 × 0.5 as a fraction in its simplest form	Your Turn Write the fraction 0.681 × 0.1 as a fraction in its simplest form

	Extra Notes	

2 Advanced Straight Line Graphs (L2FM Only)

Worked Example	Your Turn
Find an equation of the line with gradient $-\frac{8}{3}$ and that passes through the point $(-10, -18)$.	Determine an equation of the line with gradient $-\frac{2}{5}$ and that passes through the point (-17, 18).

Worked Example	Your Turn
Find an equation of the line that passes through the points	Find an equation of the line that passes through the points
$(-20, 6)$ and $\left(-18, \frac{38}{2}\right)$. Write your answer in the form	$(-16, 15)$ and $(-15, \frac{78}{2})$. Write your answer in the form
ax + by = c, where a, b and c are integers.	ax + by = c where a b and c are integers

Worked Example	Your Turn
The line l_1 has the equation $4x + 3y - 30 = 0$. The line l_2 is parallel to l_1 and passes through the point $A(9, 10)$ as shown in the diagram below.	The line l_1 has the equation $10x - 12y + 18 = 0$. The line l_2 is parallel to l_1 and passes through the point $A(4, 7)$ as shown in the diagram below.
	$\frac{y}{l_2}$ $\frac{l_2}{1}$ $\frac{1}{x}$
Determine the equation of l_2 . Give your answer in the form $ax + by = c$, where a,b and c are integers.	Determine the equation of l_2 . Give your answer in the form $ax + by = c$, where $a \cdot b$ and c are integers.

Worked Example	Your Turn
The line l_1 has the equation $2x + 3y + 30 = 0$. The line l_2 is perpendicular to l_1 and passes through the point $A\left(-\frac{9}{2},2\right)$ as shown in the diagram below.	The line l_1 has the equation $10x - 12y + 54 = 0$. The line l_2 is perpendicular to l_1 and passes through the point $A\left(\frac{19}{2}, -10\right)$ as shown in the diagram below.
Find the equation of l_2 . Give your answer in the form $ax + by = c$, where a, b and c are integers.	Find the equation of l_2 . Give your answer in the form $ax + by = c$, where a, b and c are integers.

Worked Example	Your Turn
A straight line passes through the points $P(-7, 2)$ and $Q(5, 6)$.	A straight line passes through the points $A(8, 4)$ and $B(-2, 8)$.
Find the equation of the perpendicular bisector of PQ . Give	Find the equation of the perpendicular bisector of AB . Give
your answer in the form $ax + by + c = 0$, where a, b and c	your answer in the form $ax + by + c = 0$, where a, b and c
are integers. Simplify your answer where possible.	are integers. Simplify your answer where possible.
(-7, 2)	(-2,8)
• (5, 6)	• (8,4)

Extra Notes

3 Parallel and Perpendicular Lines

Paralle	l Lines

Worked Exa	ample		Your Turn
a) Write down the equation of a $y = 2x - 3$	line parallel to	a)	Write down the equation of a line parallel to $y = -2x + 3$
b) Write down the equation of th y = 6x + 1 and passes throug	e line that is parallel to (0, 8)	b)	Write down the equation of the line that is parallel to $y = -6x - 1$ and passes through $(0, -8)$

Worked Example	Your Turn
Write down the equation parallel to $y = 4x + 1$ which passes through (2, 17)	Write down the equation parallel to $y = 8x + 5$ which passes through (2, 26)

Worked Example	Your Turn
Find the equation of the line parallel to $y = -\frac{1}{3}x - 4$ that passes through $(-2, 5)$	Find the equation of the line parallel to $y = -\frac{1}{2}x - 3$ that passes through (-2, 5)

Perpendicular Lines

Worked Example	Your Turn
Write the negative reciprocals of: a) 6	Write the negative reciprocals of: a) 7
b) $\frac{1}{6}$	b) $\frac{1}{7}$
c) $\frac{5}{6}$	c) $\frac{2}{7}$
d) $1\frac{5}{6}$	d) $1\frac{2}{7}$
e) 1.2	e) 3.5

P

Fluency Practice



	Worked Example		Your Turn
a) W y	/rite down the equation of a line perpendicular to $= 2x - 3$	a)	Write down the equation of a line perpendicular to $y = -2x + 3$
b) W to	Trite down the equation of the line that is perpendicular by $y = \frac{1}{2}x + 3$ and passes through $(0, -1)$	b)	Write down the equation of the line that is perpendicular to $y = -\frac{1}{2}x + 3$ and passes through (0, 1)

Worked Example	Your Turn
Find the equation of the line perpendicular to $y = \frac{1}{2}x - 4$ that passes through (-2, 5)	Find the equation of the line perpendicular to $y = -\frac{4}{3}x + 3$ that passes through $(-12, -5)$

Worked Example	Your Turn
Write down the equation perpendicular to $y = 4x + 1$ which passes through (8, 17)	Write down the equation perpendicular to $y = 8x + 5$ which passes through (16, 26)

Worked Example	Your Turn
Worked Example Find the equation of the line perpendicular to $3x + 2y = 5$ which passes through the point (3, 7)	Your TurnFind the equation of the line perpendicular to $2x + 3y = 5$ which passes through the point (4, 7)

Worked Example	Your Turn
Worked Example The line L_1 has equation $-3x + 4y = 8$ The line L_2 has equation $4x + 3y = -5$ Determine whether L_1 and L_2 are perpendicular.	Your Turn The line L_1 has equation $-2x + y = 6$ The line L_2 has equation $-3x + 2y = 4$ Determine whether L_1 and L_2 are perpendicular.

Find the midpoint of the line segment <i>AB</i> where $A(-5,3)$ and $B(5, -12)$. The line segment is plotted below. $A(-5,3) = y^{-5} = y^{-5} = y^{-5}$ $A(-3,6) = y^{-5} = y^{-$	Worked Example	Your Turn
$\begin{array}{c} A(-5,3) & y & 5 \\ \hline & & & \\ & & & & \\ & & & \\ & & & \\ & & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & &$	Find the midpoint of the line segment AB where $A(-5,3)$ and $B(5, -12)$. The line segment is plotted below.	Find the midpoint of the line segment AB where $A(-3, 6)$ and $B(3, -7)$. The line segment is plotted below.
	B(3, -12). The line segment is plotted below.	B(3, -7). The line segment is plotted below. A(-3,6) y -5 -10 B(3,-7)
Worked Example	Your Turn	
--	---	
Worked Example Find the midpoint of the line segment between (-2,4) and (-9,9)	Your Turn Find the midpoint of the line segment between (2, -4) and (11,8)	

Worked Example	Your Turn
X is the point $(-10, a)$	X is the point $(-6, a)$
Y is the point $(0, -8)$	Y is the point $(2, -2)$
M is the point $(b, -4)$	<i>M</i> is the point (<i>b</i> , 2)
<i>M</i> is the midpoint of <i>XY</i> .	<i>M</i> is the midpoint of <i>XY</i> .
Find the value of a and the value of b .	Find the value of <i>a</i> and the value of <i>b</i> .

Worked Example	Your Turn
A sketch of the line with equation $3x - 8y = 24$ is shown below. The line passes through the points A , B and M , where M is the midpoint of the line AB .	A sketch of the line with equation $6x + 5y = 30$ is shown below. The line passes through the points A, B and M, where M is the midpoint of the line AB.
y B X A	
Calculate the coordinates of <i>M</i> .	Calculate the coordinates of <i>M</i> .

Fill in the missing information in the table.

Point A	Point B	Midpoint of the line segment AB	<u>Length</u> of the line segment AB	<u>Gradient</u> of the line segment AB	Equation of the line through A and B.
(1,3)	(5,11)				
(-3,2)	(5, -6)				
$\left(\frac{-7}{3}, \frac{-22}{3}\right)$	$\left(\frac{11}{3}, \frac{-4}{3}\right)$				
	(-7,11)	$\left(-11,\frac{7}{2}\right)$			
	(-2, -4)		2√5		x + 2y + 10 = 0
		(4,1)	20	$\frac{3}{4}$	
(4,1)			4√13		2x + 3y - 11 = 0

<u>To consider:</u>

- Which of these have multiple possible answers?
- If you were not given either point A or point B, what is the minimum information required to complete the row?

Worked Example	Your Turn
The point <i>M</i> lies on the line segment <i>AB</i> where $A(-1, -3)$ and $B(8, 3)$. Given that $AM : MB = 2 : 1$, find the coordinates of <i>M</i> .	The point <i>M</i> lies on the line segment <i>AB</i> where $A(-5, -1)$ and $B(7, 3)$. Given that $AM : MB = 3 : 1$, find the coordinates of <i>M</i> .

Ratio AX: XB	Point A	Point X	Point <i>B</i>
2:1	(2,4)		(8,16)
4:2	(2,4)		(8,16)
1:2	(2,4)		(8,16)
1:2	(2,4)	(8,16)	
1:2		(2,4)	(8,16)
	(2,4)	(8,16)	(26,52)
	(26,52)	(8,16)	(2,4)
	(13,26)	(4,8)	(1,2)
3 : 1		(4,7)	(0,1)
4:1		(4,7)	(0,1)
5 : 1		(4,7)	(0,1)
1:1		(4,7)	(0,1)

Fill in th	e Blanks	Dividiu	ng a Line i	n a Ratio
		ne line segment	. Ab in the given	ratio.
Point A	Point B	AC : CB	Point C	Midpoint of AB
(0,0)	(3, 6)	2:1		(1.5, 3)
(1, 1)	(7, 4)	1:2		
(10,5)	(0, 0)	4:1		
(0,0)	(10,5)	2:3		
(-1, 0)	(11,8)	3:1		
(4,7)	(8, -5)	1:3		
(2.3, -5.1)	(4.8, 2.4)	3:2		
(0,0)	(-5, -7)	5:2		
(0,0)		3:1		(2,4)
	(5, 2)	1:2		(3.5, 0.5)
(-1, 6)		3:2	(5, 3)	
(11, -5)	(-3,2)		(5, -2)	
(0, 2a)		2:1	(<i>-4a</i> , <i>4a</i>)	
$\left(-\frac{9}{10},\frac{2}{3}\right)$	$\left(\frac{1}{2}, 5\frac{1}{3}\right)$		$\left(-\frac{1}{10},\frac{10}{3}\right)$	
		2:1	(6, -3)	(4, -2)
		2:5	$\left(\frac{11b}{14},-2b\right)$	(b, b)

Worked Example	Your Turn
A sketch of $2x + 3y = -30$ is shown below. The line passes though the points R , S and T , where RS : ST is in the ratio $4 : 1$.	A sketch of $3x - 5y = 60$ is shown below. The line passes though the points <i>P</i> , <i>Q</i> and <i>R</i> , where PQ : QR is in the ratio $3 : 1$.
T y x R R	P R x x
Work out the coordinates of <i>S</i> .	Work out the coordinates of Q .

Worked Example	Your Turn
PQR is a straight line.	PQR is a straight line.
P has coordinates (a, 1)	P has coordinates (3, b)
Q has coordinates (5 a , 4)	Q has coordinates (6, 9 b)
R has coordinates (45, b)	R has coordinates (a, 7)
PQ: QR is 2:5	PQ:QR is $2:3$
Find <i>a</i> and <i>b</i>	Find <i>a</i> and <i>b</i>

Q	а	b	m	a to m : m to b	a to m : a to b	m is $rac{?}{?}$ along the line segment ab
1	(1,5)	(13, 11)		1:1		
2		(12, 10)	(7,8)		1:2	
3	(2,6)		(8,9)			$\frac{1}{2}$
4	(2,6)	(14, 12)		1:2		
5	(2,6)	(14, 12)	(10, 10)			
6		(14, 12)	(9,9)			$\frac{2}{3}$
7		(14, 12)	(9,9)		3:4	
8	(-6,0)		(9,9)			3 5
9	(-6,0)	(14, 10)		3:2		
10	(-6,0)	(26, 16)	(6,6)			
11	(-6,0)		(-6,-6)			$\frac{3}{8}$
12	(-12,0)	(-12, -32)	(-12, -12)			

Worked Example	Your Turn
A is the point (3, 8)	A is the point (3,8)
B is the point $(1, -2)$	B is the point (1, 4)
<i>C</i> is the midpoint of <i>AB</i>	<i>C</i> is the midpoint of <i>AB</i>
Find the equation of the line perpendicular to AB which passes through C	Find the equation of the line perpendicular to AB which passes through C

Worked Example	Your Turn
ABCD is a rhombus. A has coordinates (5, 10) The equation of <i>DB</i> is $y = \frac{1}{2}x + 5$ Find an equation of diagonal <i>AC</i>	ABCD is a rhombus. A has coordinates (5, 11) The equation of <i>DB</i> is $y = \frac{1}{2}x + 6$ Find an equation of diagonal <i>AC</i>
$ \begin{array}{c} y \\ \downarrow \\$	$y \uparrow \qquad $

Equation	Point on the Line (1)	Point on the Line (2)	Gradient	y intercept	The parallel line that goes through (2, 5)	Gradient of all perpendicular lines
y = 2x + 8						
y = 4x - 1						
	(1,5)	(3,11)				
	(5,9)	(8,12)				
	(4,6)	(6,2)				
	(4,3)		-3			
	(2,9)		6			
	(-1,2)		3			
	(2,10)			(0,4)		
	(3,11)				y = 5x - 5	
	(4,3)					-2

Equation of line	Point on the line (1)	Point on the line (2)	Gradient	y - intercept	x - intercept	Gradient of a perpendicular line
y = 2x + 1	(-2,)	(2, 🚺)				
y = -1 - x	(, 1)	(, -2)				
	(4, -4)	(4, 3)				
	(-1,5)	(2,-4)				
	(-3, -2)	(-8, -2)				
	(-3, 5)	(3, 🚺)	<u>-4</u> 3			
	(4, 0)	(, -6)	<u>3</u> 4			
2y = 3x - 5	(1,)	(3, 🚺)				
3y = 4x - 7	(, -1)	(, 3)				

Fill in the Blanks

Coordinate Geometry with Two Points

(x_1, y_1)	(x_2, y_2)	Gradient m	Perpendicular Gradient	Midpoint of Line	Length of Line	Equation of Line
(0,3)	(2,7)	$\frac{7-3}{2-0} = 2$	$-\frac{1}{2}$	(1,5)	$\sqrt{2^2 + 4^2}$ $= 4.47$	y = 2x + 3
(0,2)	(4,14)		$-\frac{1}{3}$			
(0,5)	(3,8)				$\sqrt{3^2 + 3^2}$ $= 4.24$	
(2,1)	(0,9)					
(3,6)	(1,10)					
(3,3)	(2, -1)					
(3,7)	(6,8)					
(5,11)				(4,9)		
	(2,9)		1		$\sqrt{8}$	

Extra Notes

4 Graphical Inequalities











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Templates											
equalities 1		IIC)		1(f)		1(i)	α α α α α α α α α α α α α α α α α α α		1(I)		
Craphical Ine Octoor Wideo 180 on WWW.Co	emplates	100 1(a)	4 - - - - - - - - - - - - -	tion 1(d) 1(e) $\frac{5}{6}$	φ φ φ φ	tion 1(g) 1(h)	2 4 0 0 - 0		tion 1(i) 1(k)	9 9 4 3 5 4 9 9 4 3 5 1 5 9 9 4 3 5 1 1 5 9 9 4 3 5 1 1 5 9 9 4 3 5 1 1 1 9 9 4 3 5 1 1 1 9 9 4 3 5 1 1 1 9 9 4 3 5 1 1 1 9 9 4 3 4 3 4 9 9 4 3 4 3 9 4 3 5 1 1 0 10 1 1 1 1 1 1	
Corbett	Template		- 0 0 0 0 0	Question 1(d)		Question 1(g)			Ouestion 1(i)	φ φ φ φ φ φ φ φ φ φ φ φ φ φ	





















Graphical Inequalities 2

Videos 181, 182 on www.corbettmaths.com

Question 5: The region below shows information about the number first class passengers and the number of economy passengers on a flight.

x = number of economy passengers and y = number of first class passengers

- (a) Can 15 first class and 60 economy passengers be on the flight?
- (b) Can 30 economy and 40 first class passenger be on the flight?

The profit made by the airline for each economy passenger is £90 and for each first class passenger is £200.

Corbett maths



(c) What is the maximum profit the airline can make on one flight?

Question 6:A football stadium holds a maximum of 1000 fans.
Adult tickets cost £5 each and child tickets cost £2 each.
The football club needs to raise at least £3000 to cover costs.
The football club aims to sell at least one child ticket for two adult tickets sold
Let x = number of child tickets sold and y = number of adult tickets sold

Explain why: (a) $x + y \le 1000$ (b) $2x + 5y \ge 3000$ (c) $y \le 2x$

(d) Represent this information on a graph.

Answers














Extra	Notes

5 Non-Linear Graphs

Quadratic Graphs

A quadratic graph is produced from an equation of the form

 $y = ax^2 + bx + c$

where a, b and c are constants and a is non-zero.



Interpreting Quadratic Graphs

- *y*-intercept where the graph intercepts the *y*-axis
- *x*-intercept or root or solution where the graph intercepts the *x*-axis
- Turning point or vertex or minimum/maximum where the graph stops decreasing and starts increasing or vice-versa



- a) Complete the table and draw the graph of $y = x^2 + 2x$ for x = -4 to x = 2
- b) Write down the equation of the line of symmetry of your graph
- c) Use your graph to find:
 - i) the value of y when x = 0.5ii) the values of x when y = 6
- Here is a table of values for $y = x^2 + 2x$.

x	-4	-3	-2	-1	0	1	2
y	8		0	-1			8

2 А a) Complete the table and draw the graph of $y = x^2 - 2x - 4$ for x = -2 to x = 4

Worked Example

- b) Write down the equation of the line of symmetry of your graph
- c) Write down the values of *x* where the graph crosses the *x*-axis

Here is a table of values for $y = x^2 - 2x - 4$.

x	-2	-1	0	1	2	3	4
y		-1	-4			-1	





1. Here is a table of values for $y = x^2 - 2$.

x	-3	-2	-1	0	1	2	3
y	7		-1	-2			7

a) Complete the table of values.

b) On the grid, draw the graph of $y = x^2 - 2$ for x = -3 to x = 3.



d) Write down the coordinates of the minimum point.

2. Here is the table of values for $y = 3 - x^2$.

x	-3	-2	-1	0	1	2	3
y	-6		2	3		-1	

Fluency Practice

a) Complete the table of values.

b) On the grid, draw the graph of $y = 3 - x^2$ for x = -3 to x = 3.



d) Write down the values of *x* where the graph crosses the *x*-axis.



Use this graph to solve these equations:

a) $x^2 - 2x - 2 = 0$ b) $x^2 - 2x - 5 = 0$



Use this graph to solve these equations:

Use this graph to solve these equations:

a)
$$x^2 = 2x + 3$$

b) $x^2 = x + 4$

b)
$$x^2 = x +$$





Use this graph to solve these equations:

c)
$$x^{2} + x - 1 = 0$$

d) $x^{2} - 2x - 1 = 0$







Fluency Practice



x	-5	-4	-3	-2	-1	0	1	2
y	6	0		-6		-4		

a) Complete the table of values.

b) On the grid, draw the graph of $y = x^2 + 3x - 4$.



Fluency Practice

5. The graphs $y = x^2 - 3x - 2$ and y = x - 2 are shown below.





Worked Example	Worked Example
a) Complete the table and draw the graph of $y = x^3 - 4$ for $x = -4$ to $x = 4$ b) Use the graph to find the value of y when $x = 4$ Here is a table of values for $y = x^3 - 4$.	 a) Complete the table and draw the graph of y = x³ - 4x² + 5 for x = -2 to x = 5 b) Use your graph to find the solutions to: i) x³ - 4x² + 5 = 0 ii) x³ - 4x² - x + 5 = 0 Here is a table of values for y = x³ - 4x² + 5.
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	<i>y</i> -19 5 -4 5
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Worked Example					Wo	orke	ed E	xar	npl	е		
Complete the tables and draw the graph of $y = \frac{2}{x}$ for $x = -5$ to $x = 5$	Complete	e the t	ables	and d	raw th	e gra	ph of <u>í</u>	<i>y</i> = -	$-\frac{1}{x}$ for	<i>x</i> = –	5 to $x = 5$	
Here is a table of values for $y = \frac{2}{x}$.	Here is a tab	le of valu	ues for y	$=-\frac{1}{x}$								
x 0.25 0.4 0.5 0.8 1 2 4 5	x	0.2	0.4	0.5	0.8	1	2	3	4	5		
	У											
x -0.25 -0.4 -0.5 -0.8 -1 -2 -4 -5	x	-0.2	-0.4	-0.5	-0.8	-1	-2	-3	-4	-5		
	У											
8-					.							
6-				5- 5-								
				4								
3-				3.								
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									*			
-2-	-5 -	4 –3	-2	-1 C -1	1	2	3	4 5	*			
-3- -4-				-2								
-5-				-3								
-7-				-4-								
-8-				-5								

				W	/ork	ed	Exa
Comple	ete the	tables	and	draw	the gr	aph o	fy =
Here is a ta	ble of value	s for $y = \frac{1}{x}$	<u>4</u> - 1 [.]				
x	1.5	2	3	5	6	9	11
У							
x	0.5	0	-1	-3	-4	-7	-9
У							
			<i>y</i> † 8 -				
			7- 6-				
			5-				
			4- 3-				
			2 - 1-				
-12 -10	-8 -6	-4 -2	0 2	2 4	6 8	10 12	x
			1- 2-				
			3 - 4-				
			5				
			6- 7-				
			8-				

	Fluency Practice																Fİ	uer	icy F	Prac	tice				
1.	Here are	e some tab	le of valu	ues for $y =$	$=\frac{4}{x}$.							3. a) Her	e are so	ome table	e of v	alues f	or $y =$	$\frac{8}{x+2}$						
	x	0.2	0.4	0.5	1	2	4	5	8	10		-	x	-12	-10	-7	-6	-4	-3	-1	0	2	3	6	8
	y		10		4	2		0.8					у												
											L				4	duquu		ub of	8	for 10		10			
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$										d c) On	your ad which v	alues of	x is j	$y = \frac{8}{x+1}$	tne gra	pn or y	$=\frac{1}{x+2}$	tor – 12	<i>< x < </i>	12.			
	y											4. a) Cor	nplete ti	ne table	of va	lues fo	r <i>y</i> = 3	$-\frac{2}{x}$, x	≠ 0.					
	a) Com	plete the ta	able of va	alues.								[x	-3	-2	-1	-().5	-0.1	0.1	0.5	1	2	3	
	b) On ye	our additio	nal shee	t, draw the	e graph of	f $y = \frac{4}{x}$ for	⁻ –10 ≤ <i>x</i>	i ≼ 10.					у												
	c) Use y	our graph	to find a	n estimate	e for the s	olutions o	of $\frac{4}{x} = 4$ -	- <i>x</i> .																	
2.	2. On your additional sheet, draw the graph of $y = -\frac{3}{x}$ for $-10 \le x \le 10$.											b c) On) This Writ	your ad s graph æ down	ditional s approact the equa	sheet hes tv ation	, draw wo line of eacl	the gra s witho n of the	ph of <i>y</i> ut touch ese two l	$= 3 - \frac{2}{x}$ ling then lines.	for –3 s m. These	$\leq x \leq 3$ e lines a	re calleo	l asympt	otes.









Fluency Practice

Fluency Practice

1. Here is a table of values for $y = 4^x$.



a) Complete the table of values.

b) On the grid, draw the graph of $y = 4^x$ for $-2 \le x \le 2$.



ii) the value of x when y = 11

2. Here is the table of values for $y = 3^{-x}$.

x	-3	-2	-1	0	1	2
У						

a) Complete the table of values.

b) On the grid, draw the graph of $y = 3^{-x}$ for $-3 \le x \le 2$.



Your Turn

Four graphs are sketched below.



Four graphs are sketched below.





Dr Frost 426b



Extra Notes