

# STAGE C LEARNING OBJECTIVES

Learning Outcome	Tier	R	Y	G
<b>Topic 1: Calculations (Core)</b>				
LO1: To be able to use a method to solve multiplication problems	F	R	Y	G
LO2: To be able to use a method to solve division problems	F	R	Y	G
LO3: To be able to use BIDMAS to calculate solutions	F	R	Y	G
LO4: To be able to state a value to a required degree of accuracy	F	R	Y	G
<b>Topic 2: Algebra (Core)</b>				
LO1: TBAT simplify like terms	F	R	Y	G
LO2: TBAT expand brackets and simplify the result	F	R	Y	G
LO3: To be able to factorise expressions	F	R	Y	G
<b>Topic 3: Fractions (Core)</b>				
LO1: To be able to use the property of fractional equivalence	F	R	Y	G
LO2: To be able to add and subtract fractions	F	R	Y	G
<b>Topic 4: Area and Volume (Core)</b>				
LO1: To be able to calculate area of compound shapes	F	R	Y	G
LO2: To be able to derive and use formula for area	F	R	Y	G
LO3: To be able to apply the formula for volume of a prism (excluding cylinders)	F	R	Y	G
<b>Topic 5: Percentages (Core)</b>				
LO1: Calculate a percentage of a quantity using a calculator where appropriate	F	R	Y	G
LO2: Express a quantity as a percentage of an amount	F	R	Y	G
<b>Topic 6: Algebra (Core)</b>				
LO1: TBAT solve simple equations with integer solutions	F	R	Y	G
LO2: TBAT recognise the difference between an equation, formula and identity	F+	R	Y	G
LO3: TBAT rearrange and substitute into formulae	F	R	Y	G
LO4: TBAT interpret simple expressions as function machines	F	R	Y	G
<b>Topic 7: Graphing (Core)</b>				
LO1: TBAT plot simple graphs of linear functions	F	R	Y	G
LO2: TBAT plot simple graphs of quadratic functions	F	R	Y	G
<b>Topic 8: Probability (Core)</b>				
LO1: TBAT identify when events are mutually exclusive and know the sum of these events would be 1	F	R	Y	G

F - Foundation

F+ - Additional foundation

H – Higher

**Stage C – Topic 1 Calculations****LO1: To be able to use a method to solve multiplication problems**

1	$£213 \times 16$
2	$32.40 \times 23$
3	A DVD costs £12.25. Work out the cost of 9 of these DVDs.
4	John takes 27 boxes out of his van. The weight of each box is 41.7 kg. Work out the total weight of the 27 boxes.

**LO2: To be able to use a method to solve division problems**

1	Work out a) $325 \div 5$ b) $448 \div 8$ c) $221 \div 13$ d) $377 \div 29$
2	Work out a) $9 \div 0.3$ b) $6 \div 0.1$ c) $12 \div 0.4$ d) $0.56 \div 0.08$
3	A box can hold 19 books. Work out how many boxes will be needed to hold 646 books.
4	A teacher has £539 to spend on books. Each book costs £26 How many books can the teacher buy?
5	A box contains 7 books, each weighing 2.5 kg. Work out the total weight of the box.
6	John takes 13 boxes out of his van. The weight of each box is 25.5 kg Work out the total weight of the 13 boxes.

**LO3: To be able to use BIDMAS to calculate solutions**

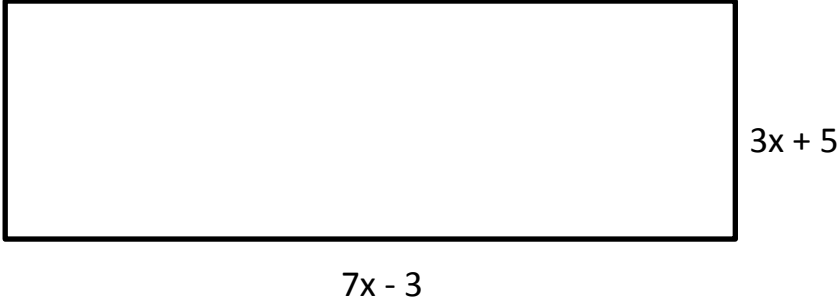
	Work out the following.
1	$6 \times 5 + 2$
2	$(9 + 2) \times 2 + 5$
3	$4 \times (1 + 4) - 6$
4	$6 \times 4 - 3 \times 5$
5	$\frac{7 - 2^2}{4^2 - 15}$
6	$\frac{20 - 3^2}{10 - (5 + 4)}$

**LO4: To be able to state a value to a required degree of accuracy**

1	Round these numbers to the nearest 10: a) 26    b) 62    c) 75    d) 231    e) 797  Round these numbers to the nearest 100: a) 78    b) 223    c) 549    d) 1450    e) 1382  Round these numbers to the nearest 1000: a) 850    b) 1455    c) 3230    d) 7500 e) 8455
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2	Round the following numbers to 1 decimal place a) 48.9732            b) 163.9299            c) 19.952
3	Round the following numbers to 2 decimal places a) 10.697            b) 8.993            c) 14.9964
4	Work out the answer to $2.6882 \times 14.71728$ and give your answer correct to 2 decimal places.
5	Work out the answer to $64.2 \div 5.7$ and give your answer correct to 1 decimal place.
<b>Mixed Problems</b>	
1	David is saving for a new bike which costs £175. He has been saving £7 a week for 9 weeks. How much more does he need to save?
2	18 eggs are needed to make an omelette for 6 people, how many eggs are needed to make an omelette for 4 people?
3	I bought a card costing £1.76 and a chocolate bar costing 63p. There was a 10% sale that day. How much did I spend?
4	Carmen weighs 53kg. Her sister weighs 18kg less. She said: 'Together, we weigh 23kg less than our Dad!' How much does their Dad weigh?

<b>Stage C – Topic 2 - Algebra</b>	
<b>LO1: To be able to simplify like terms</b>	
1	<i>Simplify the following expressions:</i> a) $y + y + y$ b) $z \times z \times z \times z \times z \times z$ c) $a + 5a + 2a + 3a$ d) $4a + 9a$ e) $8b - 10b$ f) $3f + 6g + 4f + 5g$ g) $5a + 2b + 6a - 2b$ h) $6c + 5d - 3c + 8d$ i) $7b + 6a - 5b + 3a$ j) $3ab - 2bc + 6ab + 9bc + 5ad$ k) $2x^2 - 3x + 3x^2 + 6x$ l) $6ab + (-6ab) - 3bc - (-4bc)$ m) $5h \times 6h$
<b>LO2: To be able to expand brackets and simplify the result</b>	
1	Expand: a) $3(x+4)$ b) $6(x-2)$ c) $5(x+4)$ d) $3(x+9)$ e) $4(2x+3)$ f) $5(4x-2)$ g) $-(x+1)$ h) $-(4x-2)$
2	Expand and Simplify: a) $2(x+1) + 3(x+2)$ b) $4(x+3) + 2(x+7)$ c) $5(x+3) + 2(x+7)$ d) $8(x+10) + 2(x+4)$
3	Expand and Simplify: ( <i>watch out for the negative signs</i> ) a) $4(x+4) - 3(x+2)$ b) $5(x+2) - 2(x+1)$ c) $7(x+3) - 4(x+2)$ d) $2(5x+10) - 2(3x+1)$
4	<b>5. Expand and Simplify: (as tricky as they get)</b> a) $4(x-5) - 2(x-3)$ b) $4(x-2) - 6(x-4)$

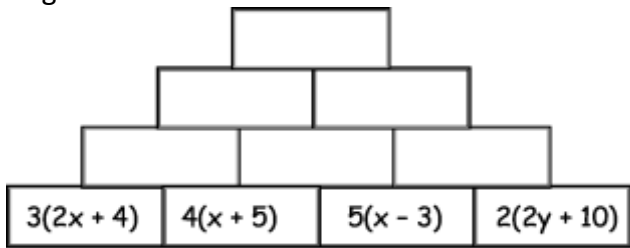
	c) $4(2x-4)-5(2x-1)$	d) $6(3x-2)-4(5x-9)$
5	A rectangle measures $(x+3)$ m by 5m. Write an expression for the: a) area of the rectangle                      b) perimeter of the rectangle	
6	Write an expression for the <b>perimeter</b> and the <b>area</b> of the rectangle below.	
		

**LO3: To be able to factorise expressions**

1	Factorise the following: a) $4t + 20$ b) $8u - 40$ c) $12v - 30$ d) $24 + 8w$ e) $6d - 3$
2	Factorise the following: a) $w^2 + 8w$ b) $a + 2a^2$ c) $2a^2 - 3a$ d) $6d^2 - 3d$ e) $4p^2 - 2p$
3	Factorise the following: a) $4b + 10ab$ b) $2cd - 5c$ c) $ab + bc - bd$ d) $6ab^2 + 15a^2b$
4	Factorise the following fully: a) $abc - 2bc$ b) $4b + 8b^2$ c) $12m - 18m^2$ d) $8k^2 + 12k^3$
5	Factorise the following fully: a) $4c^2d^3 - 10cd^2$ b) $2ab + 3a^2b + 4a^2b^2$
6	Factorise the following fully: $6a^4b^6 - 8a^3b^5 + 12a^2b^3$

**Extension**

Work out what each of the bricks at the bottom simplify to, then add the 2 bricks next to each other to give the brick above them.



**Stage C – Topic 3 - Fractions****LO1: To be able to use the property of fractional equivalence**

1 Find the missing values in these equivalent fractions.

$$\frac{2}{5} = \frac{6}{\square} = \frac{\square}{30} = \frac{14}{\square}$$

2 How do you know that  $\frac{3}{7}$  is not equivalent to  $\frac{25}{56}$ ?

3 Write the following fractions in their simplest forms a)  $\frac{2}{4}$  b)  $\frac{5}{10}$  c)  $\frac{4}{6}$  d)  $\frac{6}{9}$

4 Write the following fractions in their simplest forms a)  $\frac{9}{30}$  b)  $\frac{14}{18}$  c)  $\frac{7}{49}$  d)  $\frac{48}{72}$

**LO2: To be able to add and subtract fractions**

1 Work out the following: a)  $\frac{1}{7} + \frac{3}{7}$  b)  $\frac{3}{8} + \frac{1}{4}$  c)  $\frac{2}{3} + \frac{3}{10}$  d)  $\frac{1}{2} + \frac{2}{5}$

2 Work out the following: a)  $\frac{3}{4} - \frac{1}{2}$  b)  $\frac{5}{7} - \frac{2}{3}$  c)  $\frac{5}{8} - \frac{1}{3}$  d)  $\frac{8}{9} - \frac{2}{3}$

3 Work out the following: a)  $2\frac{1}{2} + 1\frac{3}{4}$  b)  $1\frac{2}{5} + \frac{2}{3}$  c)  $3\frac{2}{5} - 1\frac{1}{2}$  d)  $2\frac{3}{8} - \frac{3}{5}$

4 Ted received his pocket money on Friday.

He spent  $\frac{3}{5}$  of his pocket money on games.

He spent  $\frac{1}{10}$  of his pocket money on magazines.

What fraction of his pocket money did he have left?

5 Maisie buys a bag of flour.

She uses  $\frac{1}{4}$  to bake a cake and  $\frac{2}{5}$  to make a loaf.

a) What fraction of the bag of flour was used?

b) What fraction of the bag of flour is left?

**Mixed Problems**

1 Andy and Bob have a pizza each. After they have eaten some of their pizzas, Andy has  $\frac{1}{3}$  of his pizza left and Bob has  $\frac{1}{4}$  of his left. What fraction of pizza do they have left in total?

2 Charlene has a bag of sweets. She gives  $\frac{2}{5}$  to her friend and eats  $\frac{1}{4}$ . What fraction of the bag of sweets does Charlene have left?

3 Dave and Ed are putting together bags of marbles to sell for charity. Dave has  $\frac{3}{5}$  of a bag left over and Ed has  $\frac{2}{3}$  of a bag left. Can they combine what they each have left to make another bag? (*You must show your workings*)

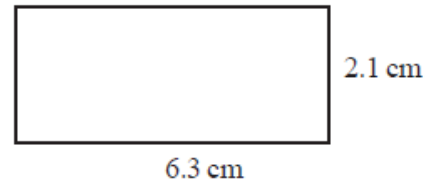
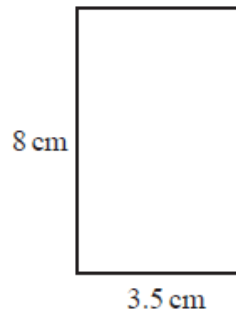
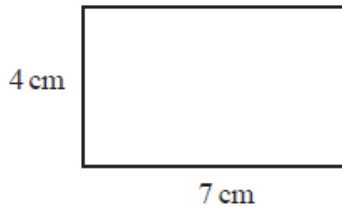
4 Freya wants to make two cakes. She has  $\frac{3}{4}$  of a bag of flour. The first cake requires  $\frac{2}{5}$  of a bag of flour and the second cake needs  $\frac{3}{10}$  of a bag of flour. Does Freya have enough flour to make both cakes?  
(*You must show your workings*)

5	George's van can carry a maximum of 5 tonnes. George needs to deliver two loads weighing $3\frac{1}{4}$ tonnes and $1\frac{5}{6}$ tonnes. Can George take both loads at once? <i>(You must show your workings)</i>
6	Harriet is sowing grass seed in her garden. She has $1\frac{2}{3}$ bags of grass seed. Her front garden needs $\frac{7}{8}$ of a bag and the back garden needs $\frac{5}{6}$ of a bag. Does Harriet have enough grass seed? <i>(You must show your workings)</i>

**Stage C – Topic 4 - Area and Volume**

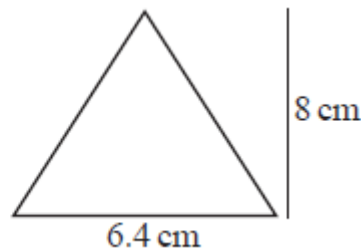
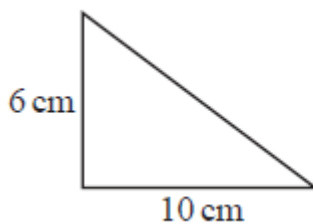
**LO1: To be able to calculate area of compound shapes**

1 Find the area of the following rectangles:



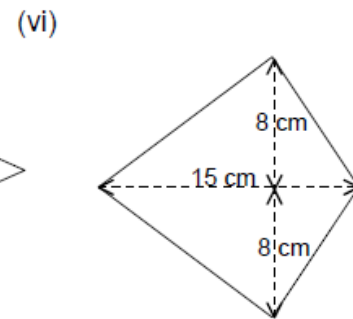
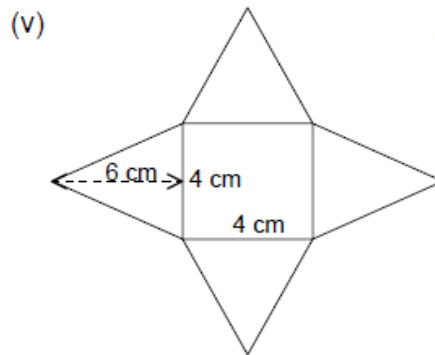
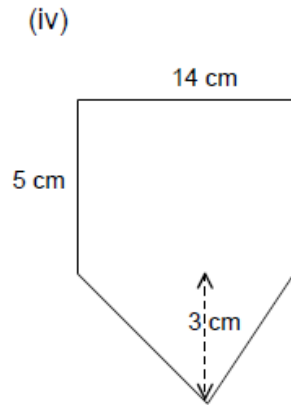
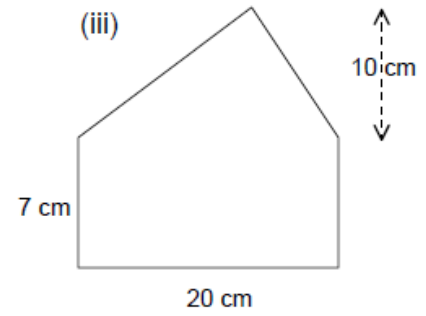
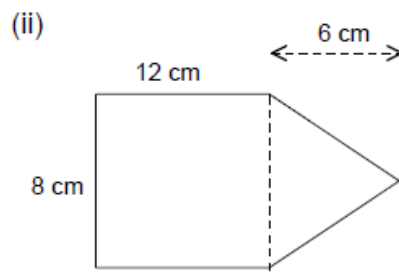
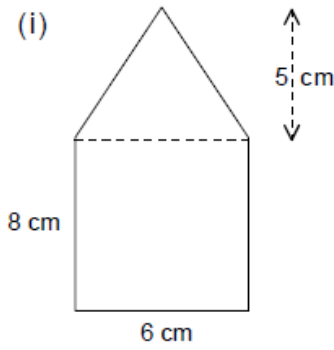
2 A rectangle has an area of  $40\text{cm}^2$  and a length of 8 cm. Sketch the rectangle and find the width.

3 Find the area of the following triangles:

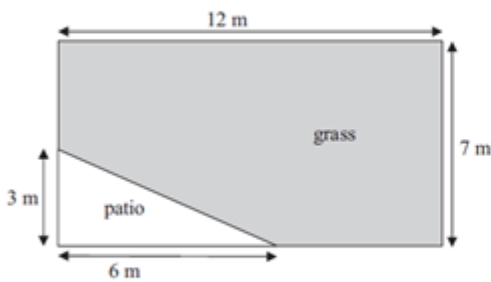


4 The area of a triangle is  $60\text{cm}^2$   
The base of the triangle is 12 cm long.  
Sketch a triangle with this area and base and work out the height of the triangle.

5 Work out the area of the following shapes:



6 Mrs Kunal's garden is in the shape of a rectangle. Part of the garden is a patio in the shape of a triangle. The rest of the garden is grass.



Mrs Kunal wants to spread fertiliser over all her grass.

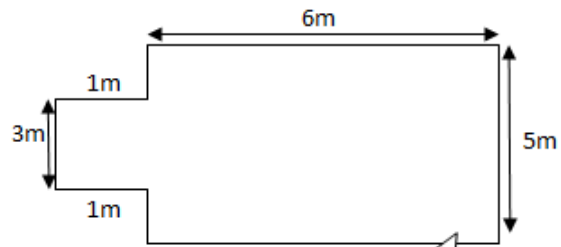
One box of fertiliser is enough for  $32\text{m}^2$  of grass.

How many boxes of fertiliser will she need?

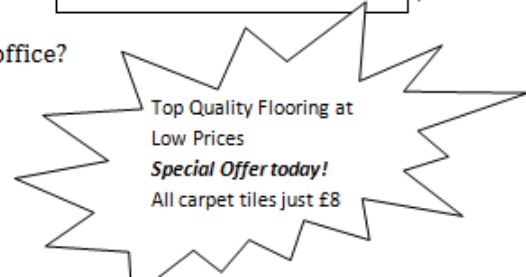
You must show your working.

7 Daniel wants new carpet tiles for his office. A plan of the office is shown below.

a) What area of carpet tiles does Daniel need?



b) How much will it cost Daniel to buy carpet tiles for his office?



**LO2: To be able to derive and use formula for area of parallelogram and trapezium**

1		$A = bh$ $b = 9 \quad h = 6$ $A = 9 \times 6$ $A = 54cm^2$		$A = \frac{a+b}{2} \times h$ $a = 4 \quad b = 6 \quad h = 3$ $A = \frac{4+6}{2} \times 3$ $A = 30cm^2$

**LO3: To be able to apply the formula for volume of a prism (excluding cylinders)**

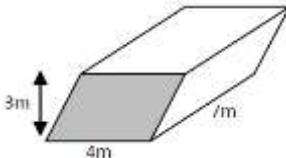
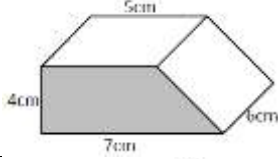
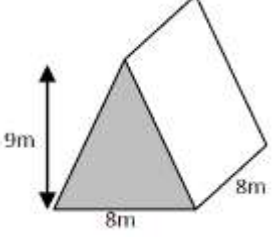
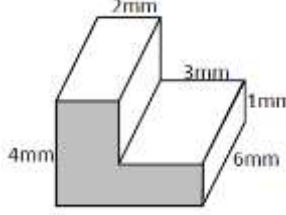
**Volume = cross section area  $\times$  length (or height)**

1				
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**Volume = cross section area  $\times$  length (or height)**

		$A = \frac{bh}{2}$ $A = \frac{5 \times 9}{2}$ $A = 22.5cm^2$	$V = A \times l$ $V = 22.5 \times 10$ $V = 225cm^3$
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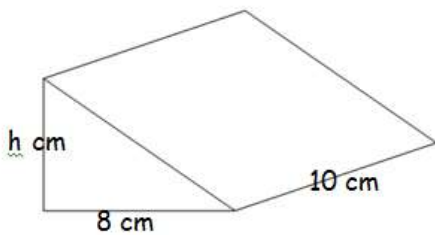


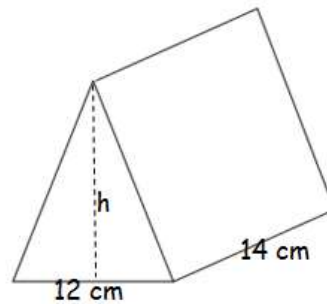
3

Find the lengths marked with a letter.

a) Volume =  $880 \text{ cm}^3$



b) Volume =  $1176 \text{ cm}^3$



**Stage C – Topic 5 Percentages**

LO1: To be able to calculate a percentage of a quantity using a calculator where appropriate

1 Without using a calculator, work out the following:

- a) 10% of £170      b) 30% of £90      c) 17.5% of £600      d) 15% of £68

2 The normal price of a jacket is £54.  
In a sale, the price is reduced by 30%  
What is the sale price?

3 A football costs £14 plus 20% VAT.  
How much is the football?

4	Using a calculator, work out the following: a) 21% of £340      b) 64% of £1080      c) 61.7% of £2000 d) 17.5% of £68.40
5	A computer costs £406 plus VAT at 20%. Work out the total cost of the computer.
6	A car is usually priced at £9800 but now has a discount of 8%. What is the new price of the car?
7	65% of a car, by weight, is steel and iron. If a car weighs 1100 kg, what is the weight of steel and iron in the car?
8	Tony earns £17800 per year and receives a 3.8% pay rise. How much does he now earn?
<b>LO2: To be able to express a quantity as a percentage of an amount</b>	
1	Without using a calculator, write the following as percentages: a) 12 out of 50      b) 15 out of 25      c) 8 out of 10      d) 11 out of 20
2	Tim got 17 out of 20 in a French test. Write 17 out of 20 as a percentage.
3	Work out £14 as a percentage of £40
4	If there are 9 girls and 11 boys in a class, what percentage of the class are girls?
5	Using a calculator, write the following as percentages: a) 12 out of 34      b) 62 out of 85      c) 113 out of 153      d) 2150 out of 3452
6	Sarah sat a Science test and got a score of 64 marks out of 112 possible marks. What was her mark as a percentage? Give your answer to 1 decimal place.
7	In a class of 32 students, 18 of them are boys. What percentage of the class are boys? Give your answer to 1 decimal place.
8	In a French class there are 13 girls and 6 boys. What percentage of the class are girls? Give your answer to 1 decimal place.

9	<p>A new car usually costs £8500.</p> <p>Henry gets a discount of £1000.</p> <p>What is the discount as a percentage of the usual cost?</p> <p>Give your answer to 1 decimal place.</p>
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**Mixed Problems**

1	The captain of a football team scored 17 out of the 85 goals they scored that season. What percentage of the goals did he score?
2	Alex has 3 dolls, 12 teddy bears and 5 soft rabbits. What percentage of her toys are a) teddy bears      b) dolls      c) cuddly toys?
3	Joe buys a new laptop in a sale. He gets a discount of 20%. The laptop originally cost £350 what price did Joe pay?
4	Income tax is 20%. What is the net income of someone who earns £800 per month?
5	The population of grey seals in Scotland is under threat. It has declined by 30% in the last decade. In 2000 there were 1500 grey seals, how many are there today?

**Stage C – Topic 6 Algebra**

**LO1: To be able to solve simple equations with integer solutions**

1	$\begin{array}{r} x - 5 = 18 \\ +5 \quad +5 \\ \hline x = 23 \end{array}$	$\begin{array}{r} 4x = 32 \\ \div 4 \quad \div 4 \\ \hline x = 8 \end{array}$	$\begin{array}{r} \frac{x}{7} = 5 \\ \times 7 \quad \times 7 \\ \hline x = 35 \end{array}$	$\begin{array}{r} 4x - 5 = 15 \\ +5 \quad +5 \\ \hline 4x = 20 \\ \div 4 \quad \div 4 \\ \hline x = 5 \end{array}$
	$2x = 12$	$7 = x - 3$	$\frac{d}{4} = 7$	$3k + 8 = 20$
	$3m - 7 = 20$	$\frac{a}{4} + 7 = 13$	$6n - 4 = 32$	$5c + 9 = 39$
	$7r - 10 = 25$	$\frac{2a}{4} - 7 = 13$	$5x + 7 = 57$	$9m + 5 = 3m + 23$

**LO2: To be able to recognise the difference between an equation, formula and identity**

1	Expression - a mathematical phrase $4z + 3y$	Equation - a mathematical statement that contains unknown values $10z + 8 = 17$	Formula - mathematical relationship or rule expressed in symbols $SA = 6a^2$	Identity - something that is always true for any values of the variables that are involved $2(a + 9) \equiv 2a + 18$
	Put these under the correct heading depending if they are expressions, equations, formula or identities			
	EXPRESSION	EQUATION	FORMULA	IDENTITY
	$A = \pi r^2$ $\frac{x+y}{2} \equiv \frac{x}{2} + \frac{y}{2}$ $\frac{1}{2}bh = A$ $x^2 + y^2 \equiv (x+y)^2 - 2xy$	$3r - 3 = 12$ $A \times B \equiv B \times A$ $2r + 9 = -8$ $C = \frac{5}{9}(F - 32)$	$2(x + y) \equiv 2x + 2y$ $8r - 14$ $S = \frac{D}{T}$ $17r + 3 = 8$	$3x + 2y$ $4 = 3t - 8$ $9x + 15y$ $17x - 11y$

**LO3: To be able to rearrange and substitute into formulae**


1	Claudia owns $f$ films. Barry owns twice as many films as Claudia. a) How many films does Barry own?  b) How many films do Claudia and Barry own in total?  c) How many films would they own in total if they each gave away 3 of their films?			
2	I have $b$ flower bulbs. To find the number of flowers that should grow from them ( $F$ ), multiply the number of bulbs by 3 and then add 5. Write a formula for the number of flowers I can expect.			
3	Alf has £18 in the bank. He gets a job, and for each hour he works, he is paid £8. Assuming he spends nothing, write a formula for the amount of money ( $M$ ) Alf will have after he has worked for $h$ hours.			
4	The cost of hiring crazy golf equipment is a fixed price of £3 plus 8p for every minutes of use. Write a formula for the cost ( $C$ ) of hiring the equipment for $g$ minutes of crazy golf.			
5	If $x = 4$ and $y = 3$ , find $z$ when: a. $z = y - 1$ b. $z = x + y$ c. $z = 3y - 2$ d. $z = 6x - y$			
6	1. If $m = 5$ and $n = 2$ , find $l$ when: a. $l = mn$ b. $l = \frac{2m}{n}$ c. $l = m^2$ d. $l = m - n^2$			

**LO4 To be able to interpret simple expressions as function machines**

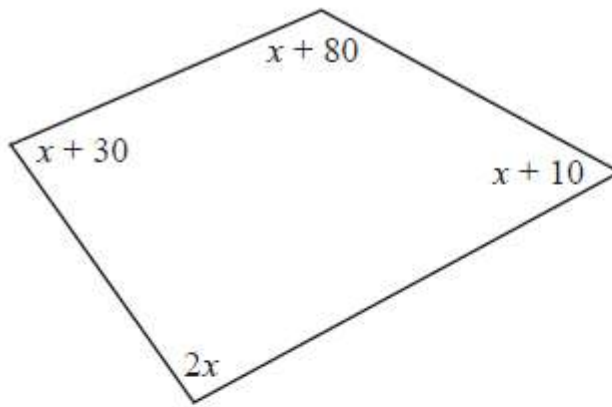
1	Here is a function machine: <div style="text-align: center;"> <span style="border: 1px solid black; padding: 2px 10px;">Input</span> → <span style="border: 1px solid black; padding: 2px 10px;">x 4</span> → <span style="border: 1px solid black; padding: 2px 10px;">+ 8</span> → <span style="border: 1px solid black; padding: 2px 10px;">÷ 3</span> → <span style="border: 1px solid black; padding: 2px 10px;">Output</span> </div>	
	If my input is 7, what will my output be?	If my output is 8, what number did I put in?

2	<p>Here is a function machine:</p> <p style="text-align: center;"> <span style="border: 1px solid black; padding: 2px;">Input</span> → <span style="border: 1px solid black; padding: 2px;">x 7</span> → <span style="border: 1px solid black; padding: 2px;">+ 10</span> → <span style="border: 1px solid black; padding: 2px;">÷ 4</span> → <span style="border: 1px solid black; padding: 2px;">Output</span> </p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">If my input is 6, what will my output be?</td> <td style="width: 50%; padding: 5px;">If my output is 20, what number did I put in?</td> </tr> </table> <p>Here is a function machine:</p> <p style="text-align: center;"> <span style="border: 1px solid black; padding: 2px;">Input</span> → <span style="border: 1px solid black; padding: 2px;">÷ 2</span> → <span style="border: 1px solid black; padding: 2px;">- 4</span> → <span style="border: 1px solid black; padding: 2px;">x 9</span> → <span style="border: 1px solid black; padding: 2px;">Output</span> </p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">If my input is 14, what will my output be?</td> <td style="width: 50%; padding: 5px;">If my output is 108, what number did I put in?</td> </tr> </table>	If my input is 6, what will my output be?	If my output is 20, what number did I put in?	If my input is 14, what will my output be?	If my output is 108, what number did I put in?
If my input is 6, what will my output be?	If my output is 20, what number did I put in?				
If my input is 14, what will my output be?	If my output is 108, what number did I put in?				

**Mixed Problems**

1	<p>The width of a rectangle is <math>x</math> centimetres.  The length of the rectangle is <math>(x + 5)</math> centimetres.</p> <div style="text-align: center; margin: 10px 0;"> <math>x + 5</math>   </div> <p>a) Find an expression, in terms of <math>x</math>, for the perimeter of the rectangle.  Give your answer in its simplest form.</p> <p>The perimeter of the rectangle is 38 centimetres.</p> <p>b) Work out the length of the rectangle.</p>
---	--

2



*Diagram NOT  
accurately drawn*

The sizes of the angles, in degrees, of the quadrilateral are

$$x + 10$$

$$2x$$

$$x + 80$$

$$x + 30$$

- Use this information to write down an equation in terms of  $x$ .
- Use your answer to part (a) to work out the size of the smallest angle of the quadrilateral.

### Stage C – Topic 7 - Graphing

**LO1: To be able to plot simple graphs of linear functions**

1

On the axes draw and label the following straight line graphs (you will not be able to plot all the points on the axes):

1.  $y = x$  (the  $y$  is the same as the  $x$ )

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

2.  $y = 2x$  (times all  $x$  by 2)

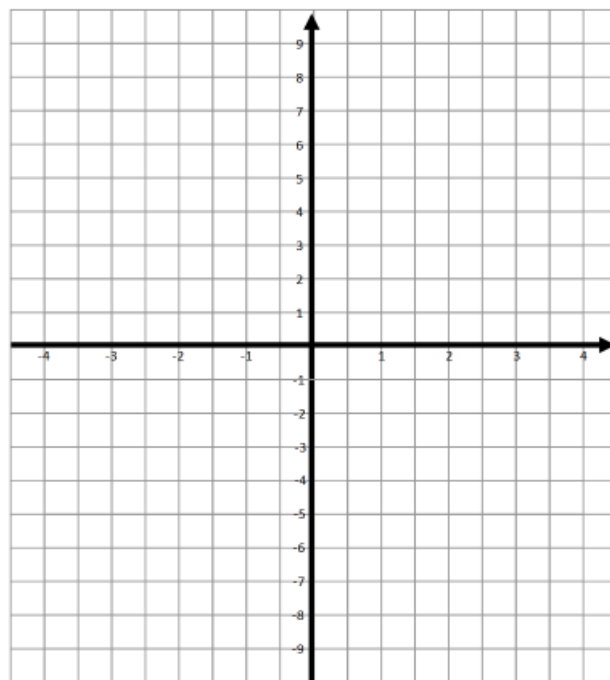
$x$	-4	-3	-2	-1	0	1	2	3	4
$y$									

3.  $y = x + 4$

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

4.  $y = x - 6$

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



Use the new set of axes for these graphs.

5.  $y = -x$  (multiply all  $x$  by -1)

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

6.  $y = 2x + 1$  (multiply all  $x$  by 2 then add 1)

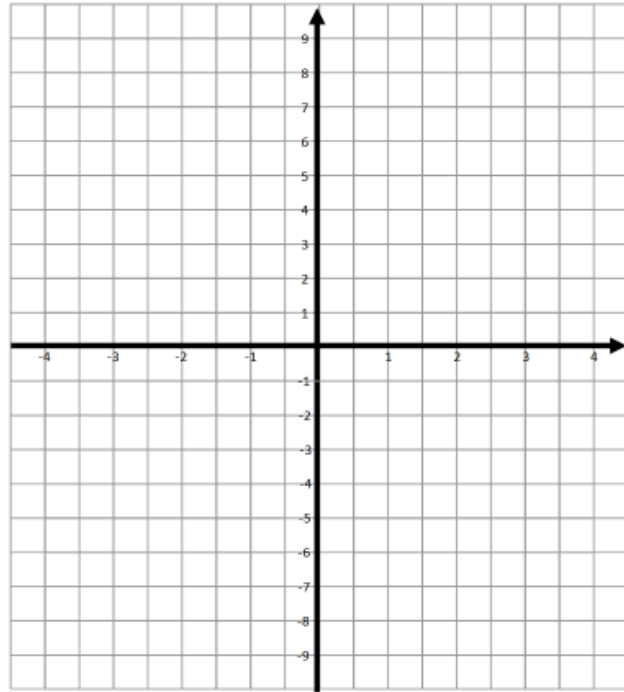
$x$	-4	-3	-2	-1	0	1	2	3	4
$y$									

7.  $y = 3x - 4$  (multiply all  $x$  by 3 then subtract 4)

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

8.  $y = -2x$  (multiply all  $x$  by -2)

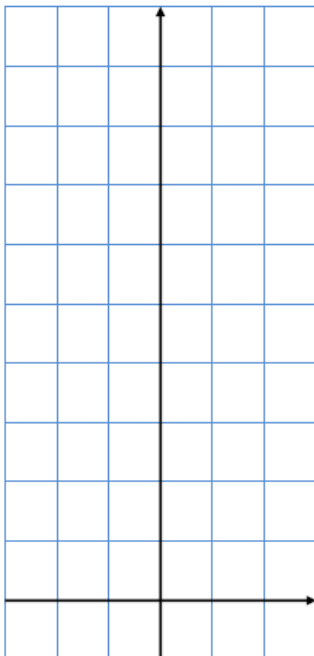
$x$	-4	-3	-2	-1	0	1	2	3	4
$y$									



**LO2: To be able to plot simple graphs of quadratic functions**

$$y = x^2$$

$x$	-3	-2	-1	0	1	2	3
$y$							



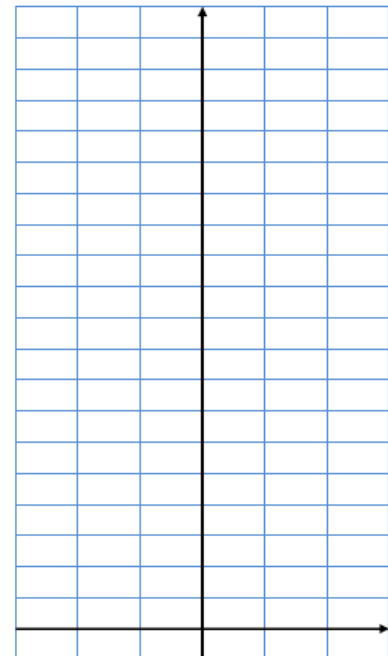
$$y = x^2 + 3$$

$x$	-3	-2	-1	0	1	2	3
$y$							



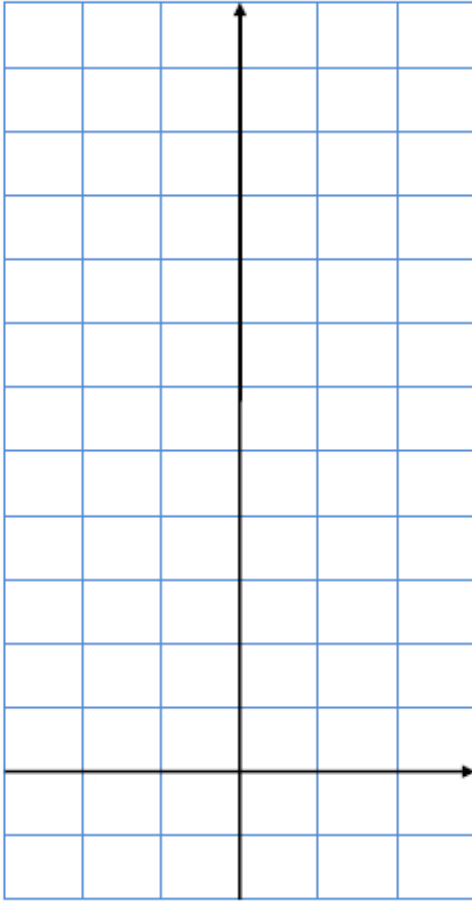
$$y = 2x^2$$

$x$	-3	-2	-1	0	1	2	3
$y$							



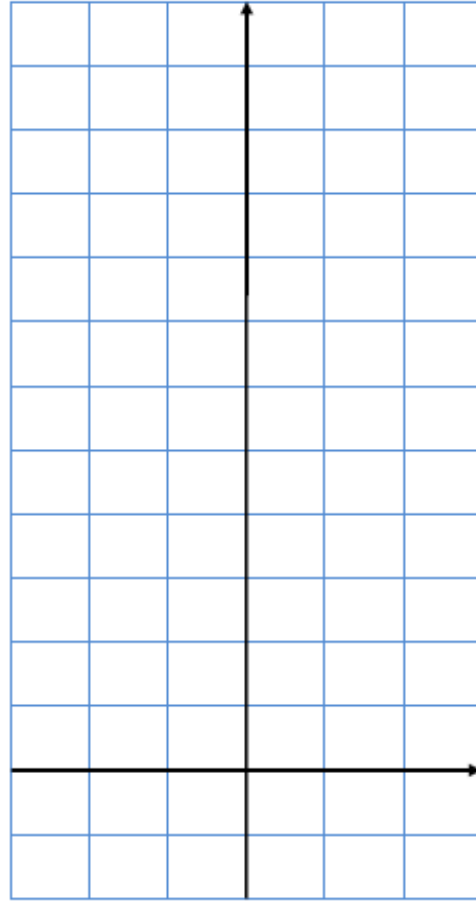
$$y = x^2 + x$$

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



$$y = x^2 - x$$

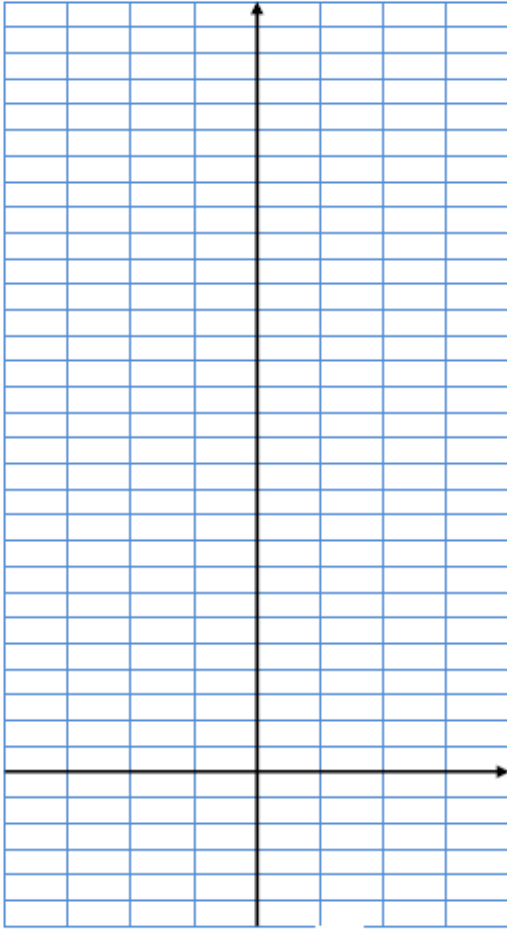
x	-3	-2	-1	0	1	2	3
y							





$$y = x^2 - 2x - 4$$

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



$$y = x^2 + x - 8$$

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

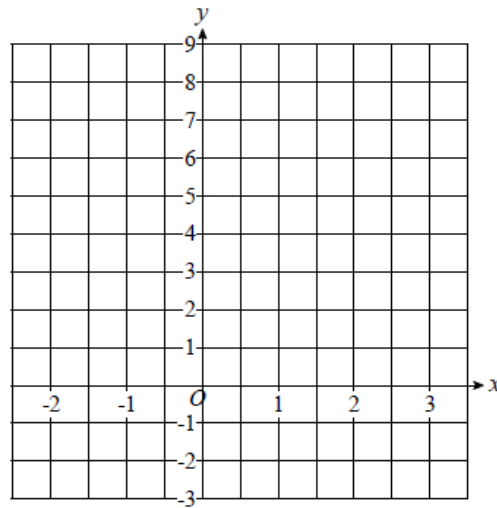


Mixed Problems

1

a) Complete the table of values for  $y = 2x + 2$ 

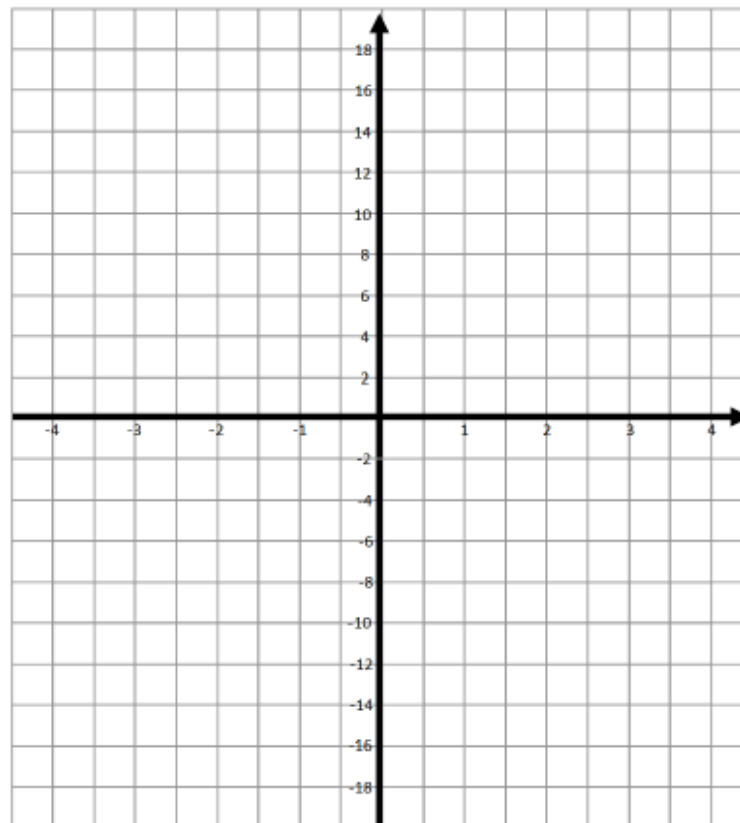
$x$	-2	-1	0	1	2	3
$y$		0	2			

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

2

2.  $y = x^2 + 2$ 

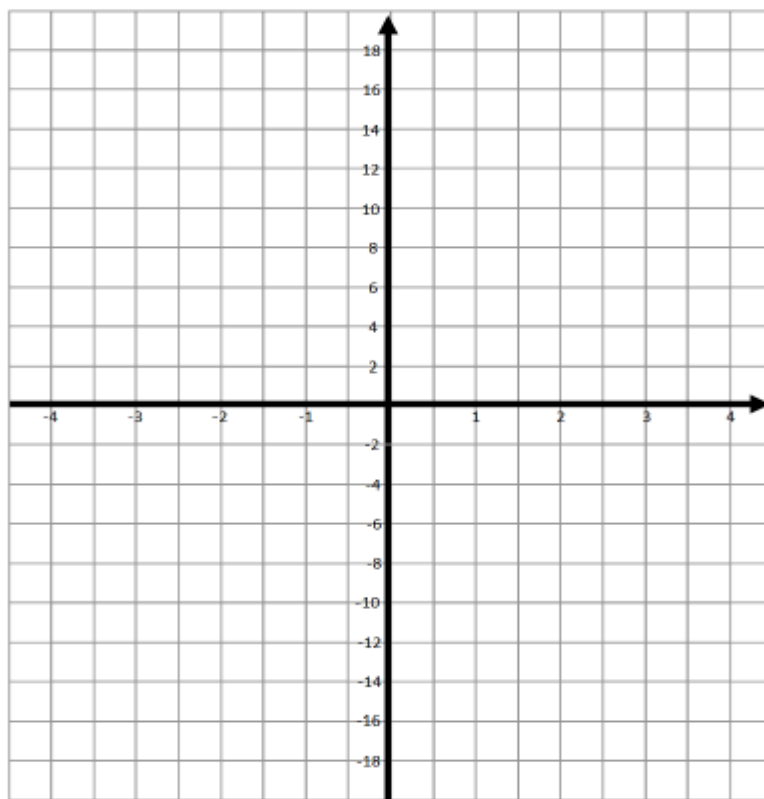
$x$	-4	-3	-2	-1	0	1	2	3	4
$y$		11			2				



3

3.  $y = x^2 - 5$

$x$	-4	-3	-2	-1	0	1	2	3	4
$y$		4							11



4

1) a) Complete the table of values for  $y = 2x - 3$ 

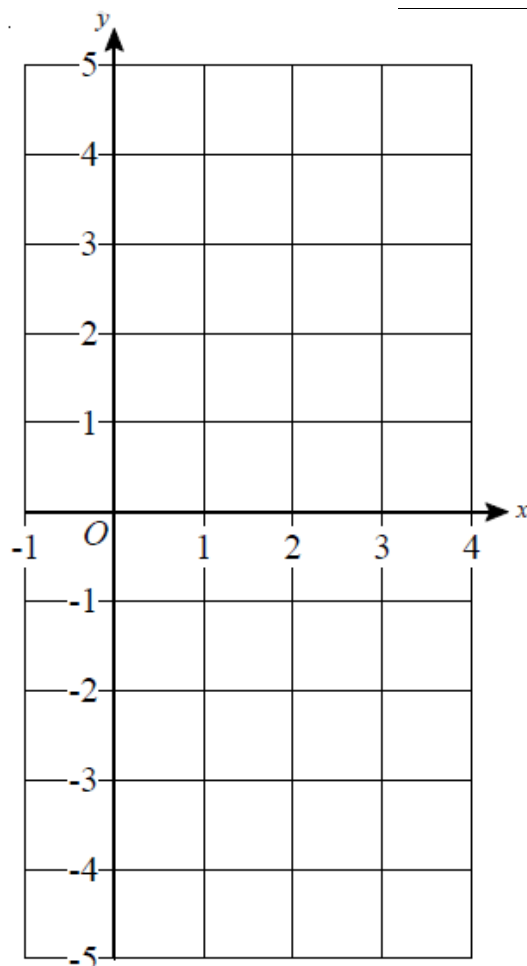
$x$	-1	0	1	2	3	4
$y$				1		

b) Using the axes on the right draw the graph of  $y = 2x - 3$ c) Use your graph to work out the value of  $y$  when  $x = 2.5$ d) Use your graph to work out the value of  $x$  when  $y = 4.5$ 

\_\_\_\_\_

2) a) Complete the table of values for  $y = 2 - x$ 

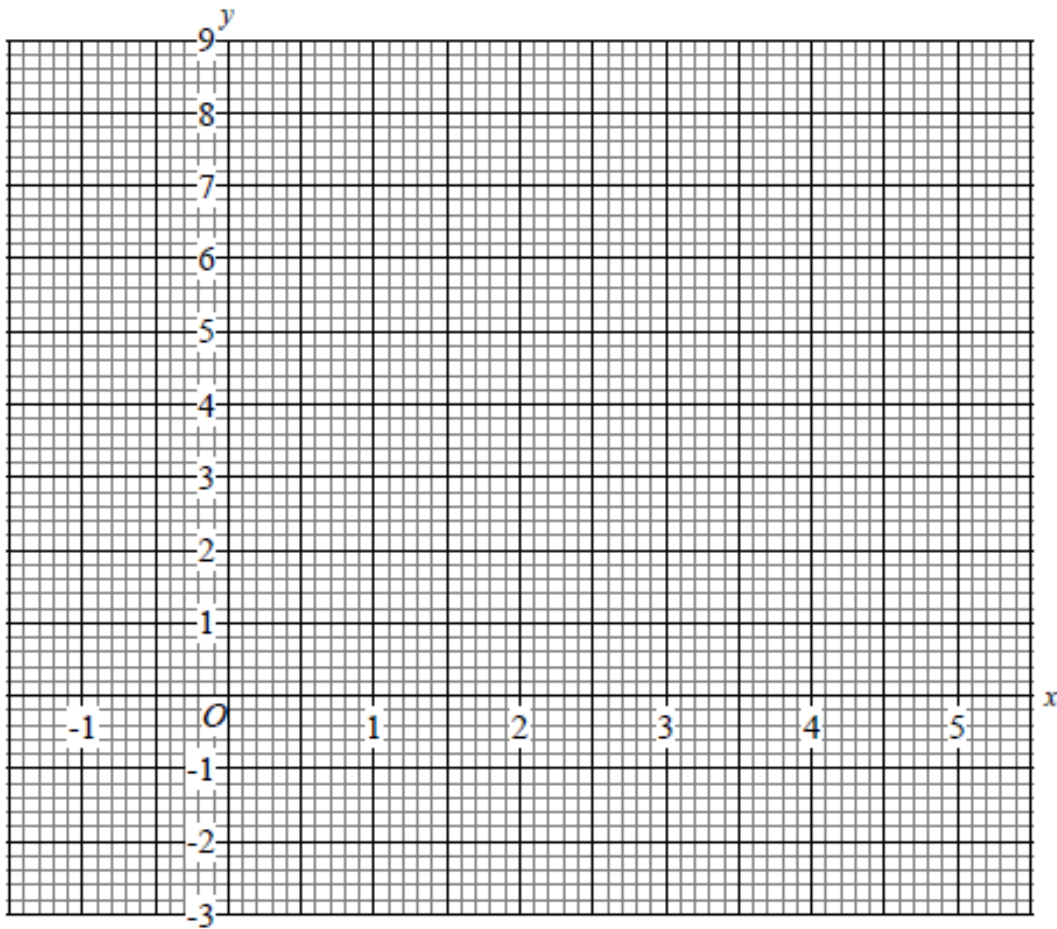
$x$	-1	0	1	2	3	4
$y$					-1	

b) Using the axes on the right, again, draw the graph of  $y = 2 - x$ 

Complete the table of values for  $y = x^2 - 4x + 3$

$x$	-1	0	1	2	3	4	5
$y$		3	0		0		8

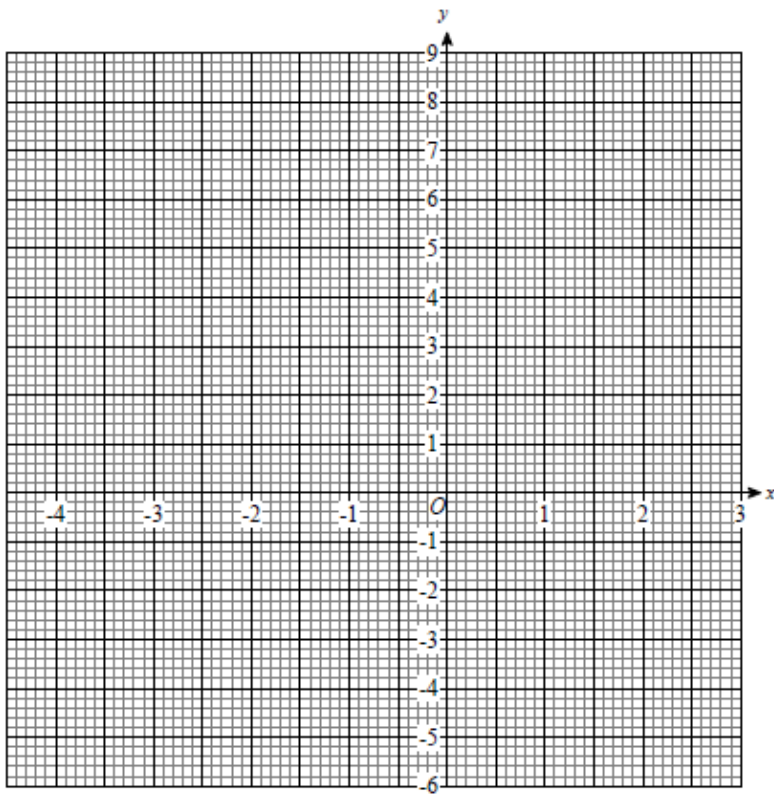
On the grid, draw the graph of  $y = x^2 - 4x + 3$



6

a) Complete the table of values for  $y = x^2 + x - 4$ 

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

b) On the grid, draw the graph of  $y = x^2 + x - 4$ **Stage C – Topic 8 - Probability****LO1: To be able to identify when events are mutually exclusive and know the sum of these events would be 1**1 These events are called *mutually exclusive* because they can't happen at the same time.

A six sided dice is rolled. Which of these pairs of outcomes are mutually exclusive?

- The number is even and a multiple of 3
- The number is odd and a multiple of 2
- The number is odd and square

2 Which of these pairs of events are mutually exclusive?

- Winning a football match and drawing the same match
- Wearing one red sock and one blue sock
- Eating toast for breakfast and Chips for dinner
- Being on time and being late for a day at school

3	The probability that it will rain tomorrow is $\frac{1}{5}$ . What is the probability that it won't rain?										
4	If the probability of passing a driving test is 0.54, what is the probability of failing it?										
5	<p>The probability that a football team will win their next game is <math>\frac{2}{11}</math>.  The probability they will lose is <math>\frac{3}{11}</math>.  What is the probability the game will be a draw?</p>										
6	<p>On the school dinner menu there is only ever one of four options.  Some of the options are more likely to be on the menu than others.  The table shows the options available on any day, together with three of the probabilities.</p> <table border="1" data-bbox="215 779 1248 882"> <tr> <th>Food</th> <th>Curry</th> <th>Sausages</th> <th>Fish</th> <th>Casserole</th> </tr> <tr> <td>Probability</td> <td>0.36</td> <td>0.41</td> <td></td> <td>0.09</td> </tr> </table> <p>a) Work out the probability of the dinner option being Fish.  b) Which option is most likely?  c) Work out the probability that it is a Curry or Sausages on any particular day.  d) Work out the probability that it is <b>not</b> Casserole.</p>	Food	Curry	Sausages	Fish	Casserole	Probability	0.36	0.41		0.09
Food	Curry	Sausages	Fish	Casserole							
Probability	0.36	0.41		0.09							
7	<p>Julie buys a book every week.  Her favourite types are Novel, Drama, Biography and Romance.  The table shows the probability that Julie chooses a particular type of book.</p> <table border="1" data-bbox="237 1406 1131 1525"> <tr> <th>Type of book</th> <th>Novel</th> <th>Drama</th> <th>Biography</th> <th>Romance</th> </tr> <tr> <td>Probability</td> <td>0.24</td> <td>0.16</td> <td><math>x</math></td> <td><math>x</math></td> </tr> </table> <p>a) Work out the probability that she will choose a Novel or a Drama.  b) Work out the probability that she will choose a Biography or a Romance.</p> <p>The probability that she will choose a Biography is the same as the probability she will choose a Romance.</p> <p>c) Work out the probability that she will choose a Biography.</p>	Type of book	Novel	Drama	Biography	Romance	Probability	0.24	0.16	$x$	$x$
Type of book	Novel	Drama	Biography	Romance							
Probability	0.24	0.16	$x$	$x$							

**Mixed Problems**

1 There are some blue, red, green and purple balls in a bag, find the probability of a purple ball being pulled out if these are the probabilities of the other colours:

a.

Blue	Red	Green	Purple
0.1	0.3	0.3	

b.

Blue	Red	Green	Purple
0.15	0.42	0.23	

c.

Blue	Red	Green	Purple
0.4	0.35	0.02	

Complete the table.

2 A dice is rolled.

- List the six mutually exclusive outcomes and their probabilities.
- What is the probability of a 6?
- What is the probability of not getting a 6?

3 Jean is going on an activities holiday. Each activity lasts a whole day. She can only do one activity a day. The probability that she will go pony-trekking on any one day is 0.6

- Work out the probability that Jean will not go pony-trekking on the first day.
- The probability that Jean will go windsurfing on any one day is 0.25  
Work out the probability that Jean will go windsurfing **or** pony-trekking on the first day.

4 A bag contains a number of balls, which are yellow, blue or green. The probability of selecting a ball at random and getting a green is  $\frac{1}{7}$  and the probability of getting a yellow is  $\frac{3}{7}$ .

- What is the probability of getting a blue ball?
- If the bag contains 4 green balls, how many yellow balls does it contain?
- If the bag contains 6 blue balls, how many balls does the bag contain in total?

5 A bag contains 6 red counters, 5 blue counters and 4 pink counters. A counter is selected from the bag at random.

Find, the probability that the counter is:

- either red or pink,
- not pink,
- not red,
- blue or pink.

A bag contains a number of balls of different colours. The probability of obtaining a ball of a particular colour is given in the table below.

Colour	Probability
Red	$\frac{3}{8}$
Green	$\frac{1}{4}$
Blue	$\frac{1}{5}$

What is the probability that a ball taken from the bag is:


- (a) red or green,
- (b) not blue or green,
- (c) not one of the colours listed above?

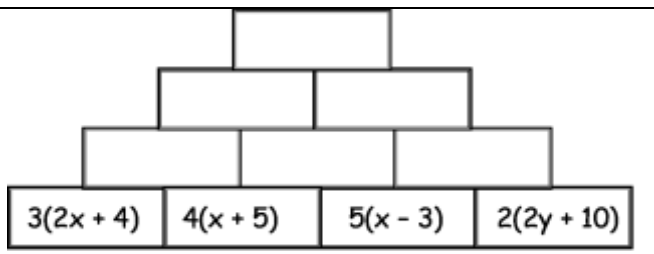


# STAGE C ANSWERS

Stage C : Topic 1 - Answers	
LO1	To be able to use a method to solve multiplication problems
1	£3408
2	745.2
3	£110.25
4	1125.9kg
LO2	To be able to use a method to solve division problems
1	a) 65      b) 56      c) 17      d) 13
2	a) 30      b) 60      c) 30      d) 7
3	34
4	21
5	17.5kg
6	331.5kg
LO3	To be able to use BIDMAS to calculate solutions
1	32
2	27
3	14
4	9
5	3
6	11
LO4	To be able to state a value to a required degree of accuracy
1	Round these numbers to the nearest 10: a) 26      30    b) 62      60    c) 75      80    d) 231      230    e) 797      800 Round these numbers to the nearest 100: a) 78      100    b) 223      200    c) 549      500    d) 1450      1500 e) 1382      1400 Round these numbers to the nearest 1000: a) 850      1000    b) 1455      1000    c) 3230      3000    d) 7500      8000 e) 8455      8000
2	Round the following numbers to 1 decimal place a) 48.9732      b) 163.9299      c) 19.952 49.0              163.9              20.0
3	Round the following numbers to 2 decimal places a) 10.697      b) 8.993      c) 14.9964 10.70              8.99              15.00
4	Work out the answer to $2.6882 \times 14.71728$ and give your answer correct to 2 decimal places. 39.56
5	Work out the answer to $64.2 \div 5.7$ and give your answer correct to 1 decimal place. 11.3
	Mixed Problems
1	$175 - (7 \times 9) = \text{£}112$

2	$18 \div 6 = 3 \times 4 = 12$ eggs or $4 \div 6 \times 18 = 12$ eggs																
3	$(1.76 + 0.63) \times (100\% - 10\%) = \text{£}2.15$																
4	$53 + (53-18) = 88 + 23 = 111\text{kg}$																
<b>Stage C – Topic 2 - Algebra Answers</b>																	
LO1: To be able to simplify like terms																	
1	<p><i>Simplify the following expressions:</i></p> <p>a) <math>y + y + y = 3y</math>      b) <math>z \times z \times z \times z \times z = 5z</math>      c) <math>a + 5a + 2a + 3a = 11a</math>      d) <math>4a + 9a = 13a</math>  e) <math>8b - 10b = -2b</math>      f) <math>3f + 6g + 4f + 5g = 7f + 11g</math>      g) <math>5a + 2b + 6a - 2b = 11a</math>  h) <math>6c + 5d - 3c + 8d = 3c + 13d</math>      i) <math>7b + 6a - 5b + 3a = 9a + 2b</math>      j) <math>3ab - 2bc + 6ab + 9bc + 5ad = 9ab + 7bc + 5ad</math>  k) <math>2x^2 - 3x + 3x^2 + 6x = 5x^2 + 3x</math>      l) <math>6ab + (-6ab) - 3bc - (-4bc) = bc</math>  m) <math>5h \times 6h = 30h^2</math></p>																
LO2: To be able to expand brackets and simplify the result																	
1	Expand:																
Ans	<table style="width: 100%; border: none;"> <tr> <td style="width: 25%;"><math>a) 3(x+4)</math></td> <td style="width: 25%;"><math>b) 6(x-2)</math></td> <td style="width: 25%;"><math>c) 5(x+4)</math></td> <td style="width: 25%;"><math>d) 3(x+9)</math></td> </tr> <tr> <td><math>= 3x + 12</math></td> <td><math>= 6x - 12</math></td> <td><math>= 5x + 20</math></td> <td><math>= 3x + 27</math></td> </tr> <tr> <td><math>e) 4(2x+3)</math></td> <td><math>f) 5(4x-2)</math></td> <td><math>g) -(x+1)</math></td> <td><math>h) -(4x-2)</math></td> </tr> <tr> <td><math>= 8x + 12</math></td> <td><math>= 20x - 10</math></td> <td><math>= -x - 1</math></td> <td><math>= -4x + 4</math></td> </tr> </table>	$a) 3(x+4)$	$b) 6(x-2)$	$c) 5(x+4)$	$d) 3(x+9)$	$= 3x + 12$	$= 6x - 12$	$= 5x + 20$	$= 3x + 27$	$e) 4(2x+3)$	$f) 5(4x-2)$	$g) -(x+1)$	$h) -(4x-2)$	$= 8x + 12$	$= 20x - 10$	$= -x - 1$	$= -4x + 4$
$a) 3(x+4)$	$b) 6(x-2)$	$c) 5(x+4)$	$d) 3(x+9)$														
$= 3x + 12$	$= 6x - 12$	$= 5x + 20$	$= 3x + 27$														
$e) 4(2x+3)$	$f) 5(4x-2)$	$g) -(x+1)$	$h) -(4x-2)$														
$= 8x + 12$	$= 20x - 10$	$= -x - 1$	$= -4x + 4$														
2	Expand and Simplify:																
Ans	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><math>a) 2(x+1) + 3(x+2) = 5x + 8</math></td> <td style="width: 50%;"><math>b) 4(x+3) + 2(x+7) = 6x + 26</math></td> </tr> <tr> <td><math>c) 5(x+3) + 2(x+7) = 7x + 29</math></td> <td><math>d) 8(x+10) + 2(x+4) = 10x + 88</math></td> </tr> </table>	$a) 2(x+1) + 3(x+2) = 5x + 8$	$b) 4(x+3) + 2(x+7) = 6x + 26$	$c) 5(x+3) + 2(x+7) = 7x + 29$	$d) 8(x+10) + 2(x+4) = 10x + 88$												
$a) 2(x+1) + 3(x+2) = 5x + 8$	$b) 4(x+3) + 2(x+7) = 6x + 26$																
$c) 5(x+3) + 2(x+7) = 7x + 29$	$d) 8(x+10) + 2(x+4) = 10x + 88$																
3	Expand and Simplify: ( <i>watch out for the negative signs</i> )																
Ans	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><math>a) 4(x+4) - 3(x+2) = x + 10</math></td> <td style="width: 50%;"><math>b) 5(x+2) - 2(x+1) = 3x + 8</math></td> </tr> <tr> <td><math>c) 7(x+3) - 4(x+2) = 3x + 13</math></td> <td><math>d) 2(5x+10) - 2(3x+1) = 4x + 18</math></td> </tr> </table>	$a) 4(x+4) - 3(x+2) = x + 10$	$b) 5(x+2) - 2(x+1) = 3x + 8$	$c) 7(x+3) - 4(x+2) = 3x + 13$	$d) 2(5x+10) - 2(3x+1) = 4x + 18$												
$a) 4(x+4) - 3(x+2) = x + 10$	$b) 5(x+2) - 2(x+1) = 3x + 8$																
$c) 7(x+3) - 4(x+2) = 3x + 13$	$d) 2(5x+10) - 2(3x+1) = 4x + 18$																
4	Expand and Simplify: ( <i>as tricky as they get</i> )																
Ans	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><math>a) 4(x-5) - 2(x-3) = 2x - 14</math></td> <td style="width: 50%;"><math>b) 4(x-2) - 6(x-4) = -2x + 16</math></td> </tr> <tr> <td><math>c) 4(2x-4) - 5(2x-1) = -2x - 11</math></td> <td><math>d) 6(3x-2) - 4(5x-9) = -2x + 24</math></td> </tr> </table>	$a) 4(x-5) - 2(x-3) = 2x - 14$	$b) 4(x-2) - 6(x-4) = -2x + 16$	$c) 4(2x-4) - 5(2x-1) = -2x - 11$	$d) 6(3x-2) - 4(5x-9) = -2x + 24$												
$a) 4(x-5) - 2(x-3) = 2x - 14$	$b) 4(x-2) - 6(x-4) = -2x + 16$																
$c) 4(2x-4) - 5(2x-1) = -2x - 11$	$d) 6(3x-2) - 4(5x-9) = -2x + 24$																
5	A rectangle measures $(x+3)$ m by 5m. Write an expression for the:																
Ans	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><math>a) \text{ area of the rectangle} = 5x + 15</math></td> <td style="width: 50%;"><math>b) \text{ perimeter of the rectangle} = 2x + 16</math></td> </tr> </table>	$a) \text{ area of the rectangle} = 5x + 15$	$b) \text{ perimeter of the rectangle} = 2x + 16$														
$a) \text{ area of the rectangle} = 5x + 15$	$b) \text{ perimeter of the rectangle} = 2x + 16$																

6	Write an expression for the <b>perimeter</b> and the <b>area</b> of the rectangle below.
	
Ans	<b>Perimeter</b> = $2(7x - 3) + 2(3x + 5) = 20x + 4$ <b>Area</b> = $(3x + 5)(7x - 3) = 21x^2 + 26x - 15$
LO3: To be able to factorise expressions	
1	
Ans	Factorise the following: a) $4t + 20 = 4(t + 5)$ b) $8u - 40 = 8(u - 5)$ c) $12v - 30 = 6(2v - 5)$ d) $24 + 8w = 8(3 + w)$ e) $6d - 3 = 3(2d - 1)$
2	
Ans	Factorise the following: a) $w^2 + 8w = w(w + 8)$ b) $a + 2a^2 = a(1 + 2a)$ c) $2a^2 - 3a = a(2a - 3)$ d) $6d^2 - 3d = 3d(2d - 1)$ e) $4p^2 - 2p = 2p(2p - 1)$
3	
Ans	Factorise the following: a) $4b + 10ab = 2b(2 + 5a)$ b) $2cd - 5c = c(2d - 5)$ c) $ab + bc - bd = b(a + c - d)$ d) $6ab^2 + 15a^2b = 3ab(2b + 5a)$
4	
Ans	Factorise the following fully: a) $abc - 2bc = bc(a - 2)$ b) $4b + 8b^2 = 4b(1 + 2b)$ c) $12m - 18m^2 = 6m(2 - 3m)$ d) $8k^2 + 12k^3 = 4k^2(2 + 3k)$
5	
Ans	Factorise the following fully: a) $4c^2d^3 - 10cd^2 = 2cd^2(2cd - 5)$ b) $2ab + 3a^2b + 4a^2b^2 = ab(2 + 3a + 4ab)$
6	
Ans	Factorise the following fully: $6a^4b^6 - 8a^3b^5 + 12a^2b^3 = 2a^2b^3(3a^2b^3 - 4ab^2 + 6)$
Extension	
	Work out what each of the bricks at the bottom simplify to, then add the 2 bricks next to each other to give the brick above them.



**Stage C – Topic 3 - Fractions Answers**

LO1: To be able to use the property of fractional equivalence

1 Find the missing values in these equivalent fractions.

$$\frac{2}{5} = \frac{6}{15} = \frac{12}{30} = \frac{14}{35}$$

2 How do you know that  $\frac{3}{7}$  is not equivalent to  $\frac{25}{56}$ ?

You have to multiply 7 by 8 to get 56 but when you multiply 3 by 8 you get 24 not 25

3 a)  $\frac{2}{4}$   $\frac{1}{2}$  b)  $\frac{5}{10}$   $\frac{1}{2}$  c)  $\frac{4}{6}$   $\frac{2}{3}$  d)  $\frac{6}{9}$   $\frac{2}{3}$

4 a)  $\frac{9}{30}$   $\frac{3}{10}$  b)  $\frac{14}{18}$   $\frac{7}{8}$  c)  $\frac{7}{49}$   $\frac{1}{7}$  d)  $\frac{48}{72}$   $\frac{2}{3}$

LO2: To be able to add and subtract fractions

1 a)  $\frac{1}{7} + \frac{3}{7}$   $\frac{4}{7}$  b)  $\frac{3}{8} + \frac{1}{4}$   $\frac{5}{8}$  c)  $\frac{2}{3} + \frac{3}{10}$   $\frac{29}{30}$   
 d)  $\frac{1}{2} + \frac{2}{5}$   $\frac{9}{10}$

2 a)  $\frac{3}{4} - \frac{1}{2}$   $\frac{1}{4}$  b)  $\frac{5}{7} - \frac{2}{3}$   $\frac{1}{21}$  c)  $\frac{5}{8} - \frac{1}{3}$   $\frac{7}{24}$   
 d)  $\frac{8}{9} - \frac{2}{3}$   $\frac{2}{9}$

3 a)  $2\frac{1}{2} + 1\frac{3}{4}$   $4\frac{1}{4}$  c)  $3\frac{2}{5} - 1\frac{1}{2}$   $1\frac{9}{10}$   
 b)  $1\frac{2}{5} + \frac{2}{3}$   $2\frac{1}{15}$  d)  $2\frac{3}{8} - \frac{3}{5}$   $1\frac{31}{40}$

4 Ted received his pocket money on Friday.  
 He spent  $\frac{3}{5}$  of his pocket money on games.  
 He spent  $\frac{1}{10}$  of his pocket money on magazines.  
 What fraction of his pocket money did he have left?  $\frac{3}{10}$

5	<p>Maisie buys a bag of flour.</p> <p>She uses <math>\frac{1}{4}</math> to bake a cake and <math>\frac{2}{5}</math> to make a loaf.</p> <p>a) What fraction of the bag of flour was used? <math>\frac{13}{20}</math></p> <p>b) What fraction of the bag of flour is left? <math>\frac{7}{20}</math></p>
Mixed Problems	
1	
Ans	<p>Andy and Bob have a pizza each. After they have eaten some of their pizzas, Andy has <math>\frac{1}{3}</math> of his pizza left and Bob has <math>\frac{1}{4}</math> of his left. What fraction of pizza do they have left in total? <math>\frac{7}{12}</math></p>
2	
Ans	<p>Charlene has a bag of sweets. She gives <math>\frac{2}{5}</math> to her friend and eats <math>\frac{1}{4}</math>. What fraction of the bag of sweets does Charlene have left? <math>\frac{13}{20}</math></p>
3	
Ans	<p>Dave and Ed are putting together bags of marbles to sell for charity. Dave has <math>\frac{3}{5}</math> of a bag left over and Ed has <math>\frac{2}{3}</math> of a bag left. Can they combine what they each have left to make another bag? (<i>You must show your workings</i>) <math>\frac{19}{15} = 1\frac{4}{15}</math>, Yes</p>
4	
Ans	<p>Freya wants to make two cakes. She has <math>\frac{3}{4}</math> of a bag of flour. The first cake requires <math>\frac{2}{5}</math> of a bag of flour and the second cake needs <math>\frac{3}{10}</math> of a bag of flour. Does Freya have enough flour to make both cakes?  <i>(You must show your workings)</i> <math>\frac{3}{4} - \frac{2}{5} = \frac{7}{20}</math>; <math>\frac{7}{20}</math> is greater than <math>\frac{3}{10}</math>, so Yes</p>
5	
	<p>George's van can carry a maximum of 5 tonnes. George needs to deliver two loads weighing <math>3\frac{1}{4}</math> tonnes and <math>1\frac{5}{6}</math> tonnes. Can George take both loads at once? (<i>You must show your workings</i>)</p> <p><math>\frac{13}{4} + \frac{11}{6} = \frac{39+22}{12} = \frac{61}{12} = 5\frac{1}{12}</math>, Yes</p>
6	
	<p>Harriet is sowing grass seed in her garden. She has <math>1\frac{2}{3}</math> bags of grass seed. Her front garden needs <math>\frac{7}{8}</math> of a bag and the back garden needs <math>\frac{5}{6}</math> of a bag. Does Harriet have enough grass seed? (<i>You must show your workings</i>)</p> <p><math>\frac{5}{3} - \frac{7}{8} = \frac{40-21}{24} = \frac{19}{24} - \frac{5}{6} = \frac{19-20}{24} = -\frac{1}{24}</math>, So No</p>

**Stage C – Topic 4 – Area and Volume Answers**

LO1: To be able to calculate area of compound shapes

1

4 cm  $4 \times 7 = 28 \text{ cm}^2$  7 cm

8 cm  $8 \times 3.5 = 28 \text{ cm}^2$  3.5 cm

2.1 cm  $6.3 \times 2.1 = 13.23 \text{ cm}^2$  6.3 cm

2 A rectangle has an area of  $40 \text{ cm}^2$  and a length of 8 cm.  
Sketch the rectangle and find the width.  $40 \div 8 = 5 \text{ cm}$

3 7) Find the area of the following triangles:

$10 \times 6 = 60$   
 $60 \div 2 = 30$   
 $30 \text{ cm}^2$

$8 \times 6.4 = 51.2$   
 $51.2 \div 2 = 25.6$   
 $25.6 \text{ cm}^2$

$24 \times 20 = 480$   
 $480 \div 2 = 240$   
 $240 \text{ cm}^2$

4 The area of a triangle is  $60 \text{ cm}^2$   
The base of the triangle is 12 cm long.  
Sketch a triangle with this area and base and work out the height of the triangle.

$60 \times 2 = 120$   
 $120 \div 12 = 10$

10 cm 12 cm

5 i)  $48 + 15 = 63 \text{ cm}^2$  ii)  $96 + 24 = 120 \text{ cm}^2$  iii)  $140 + 100 = 240 \text{ cm}^2$  iv)  $70 + 21 = 91 \text{ cm}^2$   
v)  $16 + 48 = 64 \text{ cm}^2$  v)  $120 \text{ cm}^2$

6  $(12 \times 7) - (6 \times 3 \div 2) = 75 \div 32 = 2.34375$ , hence 3 boxes

7 a)  $(6 \times 5) + (1 \times 3) = 33 \text{ cm}^2$   
b)  $33 \times 8 = \text{£}264$

LO2: To be able to derive and use formula for area of parallelogram and trapezium

1

Ans a)  $5 \times 4 = 20 \text{ cm}^2$  b)  $7 \times 8 = 56 \text{ ft}$  c)  $\{(5 + 7) \div 2\} \times 6 = 36 \text{ cm}^2$  d)  $\{(3 + 5) \div 2\} \times 6 = 24 \text{ cm}^2$

LO3: To be able to apply the formula for volume of a prism (excluding cylinders)

1

Ans	a) $25 \times 10 = 250\text{cm}^3$ b) $30 \times 17 = 510\text{cm}^3$ c) $12 \times 21 = 252\text{cm}^3$ d) $105 \times 45 = 4725\text{cm}^3$
2	
Ans	a) $3 \times 4 \times 7 = 84\text{cm}^3$ b) $\{(5 + 7) \div 2\} \times 4 \times 6 = 144\text{cm}^3$ c) $(8 \times 9 \div 2) \times 8 = 288\text{cm}^3$ d) $(2 \times 4 \times 6) + (3 \times 1 \times 6) = 66\text{cm}^3$
3	
Ans	a) $880 \div 10 \times 2 \div 8 = 22\text{cm}$ b) $1176 \div 14 \times 2 \div 12 = 14$

	Stage C : Topic 5 Percentages - Answers
LO1	To be able to calculate a percentage of a quantity using a calculator where appropriate
1	a) 10% of £170 <b>£17</b> b) 30% of £90 <b>£27</b> c) 17.5% of £600 <b>£105</b> d) 15% of £68 <b>£10.20</b>
2	The normal price of a jacket is £54. In a sale, the price is reduced by 30% What is the sale price? <b>£37.80</b>
3	A football costs £14 plus 20% VAT. How much is the football? <b>£16.80</b>
4	a) 21% of £340 <b>£71.40</b> b) 64% of £1080 <b>£691.20</b> c) 61.7% of £2000 <b>£1234</b> d) 17.5% of £68.40 <b>£11.97</b>
5	A computer costs £406 plus VAT at 20%. Work out the total cost of the computer. <b>£487.20</b>
6	A car is usually priced at £9800 but now has a discount of 8%. What is the new price of the car? <b>£9016</b>
7	65% of a car, by weight, is steel and iron. If a car weighs 1100 kg, what is the weight of steel and iron in the car? <b>715 kg</b>
8	Tony earns £17800 per year and receives a 3.8% pay rise. How much does he now earn? <b>£18476.40</b>
LO2	To be able to express a quantity as a percentage of an amount

1	<p>a) 12 out of 50      <b>24%</b>    b) 15 out of 25      <b>60%</b></p> <p>c) 8 out of 10      <b>80%</b>    d) 11 out of 20      <b>55%</b></p>
2	<p>Tim got 17 out of 20 in a French test.</p> <p>Write 17 out of 20 as a percentage.    <b>85%</b></p>
3	<p>Work out £14 as a percentage of £40    <b>35%</b></p>
4	<p>If there are 9 girls and 11 boys in a class, what percentage of the class are girls?    <b>45%</b></p>
5	<p>a) 12 out of 34      <b>35.3%</b>    b) 62 out of 85      <b>72.9%</b></p> <p>c) 113 out of 153    <b>73.9%</b>    d) 2150 out of 3452    <b>62.3%</b></p>
6	<p>Sarah sat a Science test and got a score of 64 marks out of 112 possible marks.</p> <p>What was her mark as a percentage?    <b>57.1%</b></p> <p>Give your answer to 1 decimal place.</p>
7	<p>In a class of 32 students, 18 of them are boys.</p> <p>What percentage of the class are boys?    <b>56.3%</b></p> <p>Give your answer to 1 decimal place.</p>
8	<p>In a French class there are 13 girls and 6 boys.</p> <p>What percentage of the class are girls?    <b>68.4%</b></p> <p>Give your answer to 1 decimal place.</p>
9	<p>A new car usually costs £8500.</p> <p>Henry gets a discount of £1000.</p> <p>What is the discount as a percentage of the usual cost?    <b>11.8%</b></p> <p>Give your answer to 1 decimal place.</p>
Mixed Problems	
1	<p>The captain of a football team scored 17 out of the 85 goals they scored that season. What percentage of the goals did he score?    <b>20%</b></p>
2	<p>Alex has 3 dolls, 12 teddy bears and 5 soft rabbits. What percentage of her toys are</p> <p>a) teddy bears?    <b>60%</b>      b) dolls?    <b>15%</b>      c) cuddly toys?    <b>25%</b></p>
3	<p>Joe buys a new laptop in a sale. He gets a discount of 20%. The laptop originally cost £350 what price did Joe pay?    <b>£280</b></p>
4	<p>Income tax is 20%. What is the net income of someone who earns £800 per month?    <b>£160</b></p>



5 The population of grey seals in Scotland is under threat. It has declined by 30% in the last decade. In 2000 there were 1500 grey seals, how many are there today? **1050**

**Stage C: Topic 6 Algebra - Answers**

LO1	To be able to solve simple equations with integer solutions			
1	$2x = 12$  $x = 6$	$7 = x - 3$  $x = 10$	$\frac{d}{4} = 7$  $d = 28$	$3k + 8 = 20$  $k = -2$
	$3m - 7 = 20$  $m = 9$	$\frac{a}{4} + 7 = 13$  $a = 24$	$6n - 4 = 32$  $n = 6$	$5c + 9 = 39$  $c = 6$
	$7r - 10 = 25$  $r = 5$	$\frac{2a}{4} - 7 = 13$  $a = 40$	$5x + 7 = 57$  $x = 10$	$9m + 5 = 3m + 23$ $6m = 18$ $m = 6$

LO2 To be able to recognise the difference between an equation, formula and identity

1	<b>Expression - a mathematical phrase</b>  $4z + 3y$	<b>Equation - a mathematical statement that contains unknown values</b>  $10z + 8 = 17$	<b>Formula - mathematical relationship or rule expressed in symbols</b>  $SA = 6a^2$	<b>Identity - something that is always true for any values of the variables that are involved</b>  $2(a + 9) \equiv 2a + 18$
Put these under the correct heading depending if they are expressions, equations, formula or identities				
	EXPRESSION	EQUATION	FORMULA	IDENTITY
	$3x + 2y$ $8r - 14$ $9x + 15y$ $17x - 11y$	$3r - 3 = 12$ $4 = 3t - 8$ $2r + 9 = -8$ $17r + 3 = 8$	$A = \pi r^2$ $\frac{1}{2}bh = A$ $S = \frac{D}{T}$ $C = \frac{S}{T} (F - 32)$	$2(x+y) \equiv 2x + 2y$ $\frac{x+y}{2} \equiv \frac{x}{2} + \frac{y}{2}$ $A \times B \equiv B \times A$ $x^2 + y^2 \equiv (x+y)^2 - 2xy$

LO3 To be able to rearrange and substitute into formulae

1	<p>Claudia owns <math>f</math> films. Barry owns twice as many films as Claudia.</p> <p>a) How many films does Barry own? <b><math>2f</math></b></p> <p>b) How many films do Claudia and Barry own in total? <b><math>f + 2f = 3f</math></b></p> <p>c) How many films would they own in total if they each gave away 3 of their films?</p> <p><b><math>f - 3 + 2f - 3 = 3f - 6</math></b></p>
2	<p>I have <math>b</math> flower bulbs. To find the number of flowers that should grow from them (<math>F</math>), multiply the number of bulbs by 3 and then add 5.</p>

	Write a formula for the number of flowers I can expect. $F = 3b + 5$																						
3	Alf has £18 in the bank. He gets a job, and for each hour he works, he is paid £8. Assuming he spends nothing, write a formula for the amount of money ( $M$ ) Alf will have after he has worked for $h$ hours $M = £8h + £18$																						
4	The cost of hiring crazy golf equipment is a fixed price of £3 plus 8p for every minutes of use. Write a formula for the cost ( $C$ ) of hiring the equipment for $g$ minutes of crazy golf. $C = £3 + 8g$																						
5	a) $z = 2$ b) $z = 7$ c) $z = 7$ d) $z = 21$																						
6	a) $l = 10$ b) $l = 5$ c) $l = 25$ d) $l = 1$																						
LO4	To be able to interpret simple expressions as function machines																						
1	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">If my input is 7, what will my output be? <b>12</b></td> <td style="width: 50%;">If my output is 8, what number did I put in? <b>4</b></td> </tr> </table>	If my input is 7, what will my output be? <b>12</b>	If my output is 8, what number did I put in? <b>4</b>																				
If my input is 7, what will my output be? <b>12</b>	If my output is 8, what number did I put in? <b>4</b>																						
2	<p>Here is a function machine:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 5px;">Input</td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;"><math>\times 7</math></td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;"><math>+ 10</math></td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;"><math>\div 4</math></td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;">Output</td> </tr> </table> <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 50%;">If my input is 6, what will my output be? <b>13</b></td> <td style="width: 50%;">If my output is 20, what number did I put in? <b>10</b></td> </tr> </table> <p>Here is a function machine:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: 1px solid black; padding: 5px;">Input</td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;"><math>\div 2</math></td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;"><math>- 4</math></td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;"><math>\times 9</math></td> <td style="padding: 0 10px;">→</td> <td style="border: 1px solid black; padding: 5px;">Output</td> </tr> </table> <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 50%;">If my input is 14, what will my output be? <b>27</b></td> <td style="width: 50%;">If my output is 108, what number did I put in? ? <b>32</b></td> </tr> </table>	Input	→	$\times 7$	→	$+ 10$	→	$\div 4$	→	Output	If my input is 6, what will my output be? <b>13</b>	If my output is 20, what number did I put in? <b>10</b>	Input	→	$\div 2$	→	$- 4$	→	$\times 9$	→	Output	If my input is 14, what will my output be? <b>27</b>	If my output is 108, what number did I put in? ? <b>32</b>
Input	→	$\times 7$	→	$+ 10$	→	$\div 4$	→	Output															
If my input is 6, what will my output be? <b>13</b>	If my output is 20, what number did I put in? <b>10</b>																						
Input	→	$\div 2$	→	$- 4$	→	$\times 9$	→	Output															
If my input is 14, what will my output be? <b>27</b>	If my output is 108, what number did I put in? ? <b>32</b>																						
	Mixed Problems																						
1	a) $4x + 10$ b) $x = 7$ ; hence Length = $7 + 5 = 12$																						
2	a) $5x + 120 = 360$ b) $x = 48^\circ$ ; hence smallest angle = $48 + 10 = 58^\circ$																						

**Stage C – Topic 7 – Graphing Answers**

LO1: To be able to plot simple graphs of linear functions

1

On the axes draw and label the following straight line graphs (you will not be able to plot all the points on the axes):

1.  $y = x$  (the  $y$  is the same as the  $x$ )

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

2.  $y = 2x$  (times all  $x$  by 2)

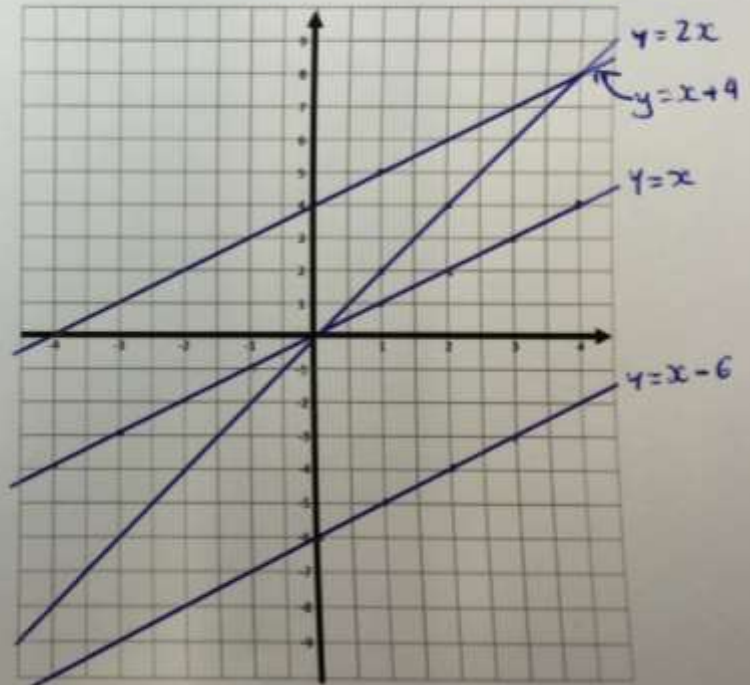
x	-4	-3	-2	-1	0	1	2	3	4
y	-8	-6	-4	-2	0	2	4	6	8

3.  $y = x + 4$

x	-4	-3	-2	-1	0	1	2	3	4
y	0	1	2	3	4	5	6	7	8

4.  $y = x - 6$

x	-4	-3	-2	-1	0	1	2	3	4
y	-10	-9	-8	-7	-6	-5	-4	-3	-2



2

Use the new set of axes for these graphs.

5.  $y = -x$  (multiply all  $x$  by -1)

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

6.  $y = 2x + 1$  (multiply all  $x$  by 2 then add 1)

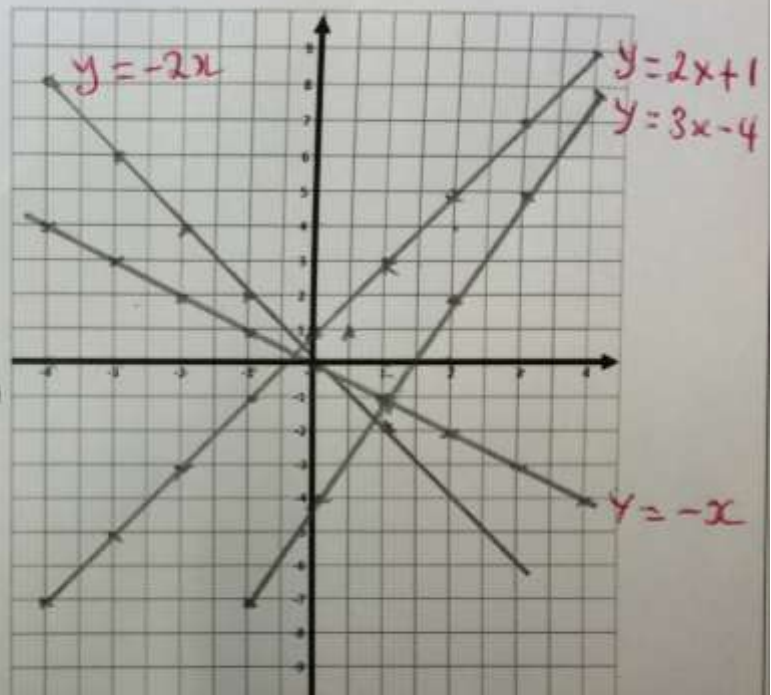
x	-4	-3	-2	-1	0	1	2	3	4
y	-7	-5	-3	-1	1	3	5	7	9

7.  $y = 3x - 4$  (multiply all  $x$  by 3 then subtract 4)

x	-4	-3	-2	-1	0	1	2	3	4
y	-16	-13	-10	-7	-4	-1	2	5	8

8.  $y = -2x$  (multiply all  $x$  by -2)

x	-4	-3	-2	-1	0	1	2	3	4
y	8	6	4	2	0	-2	-4	-6	-8

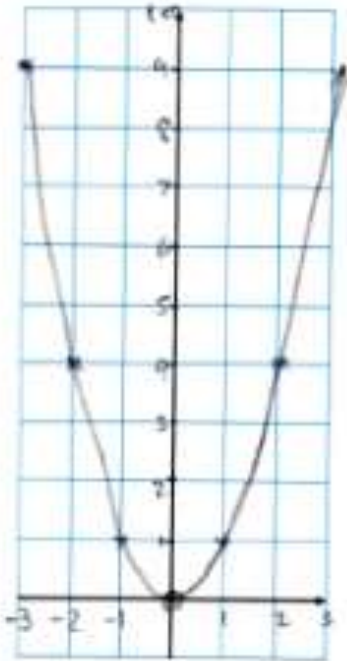


LO2: To be able to plot simple graphs of quadratic functions

1

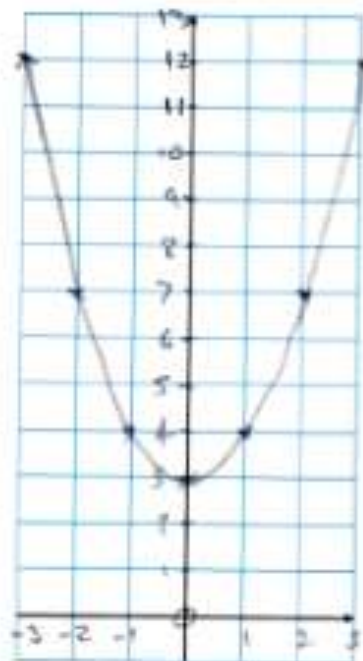
$$y = x^2$$

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9



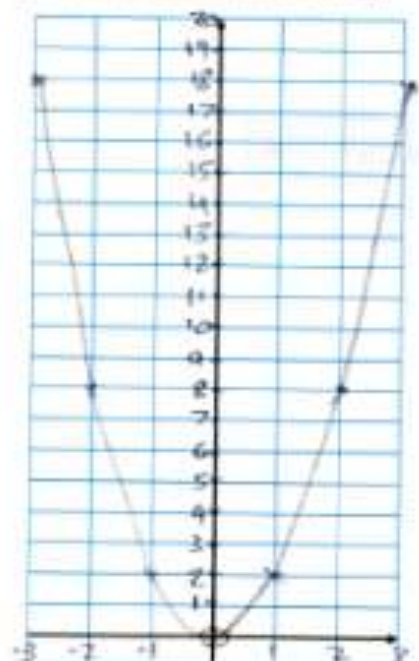
$$y = x^2 + 3$$

x	-3	-2	-1	0	1	2	3
y	12	7	4	3	4	7	12



$$y = 2x^2$$

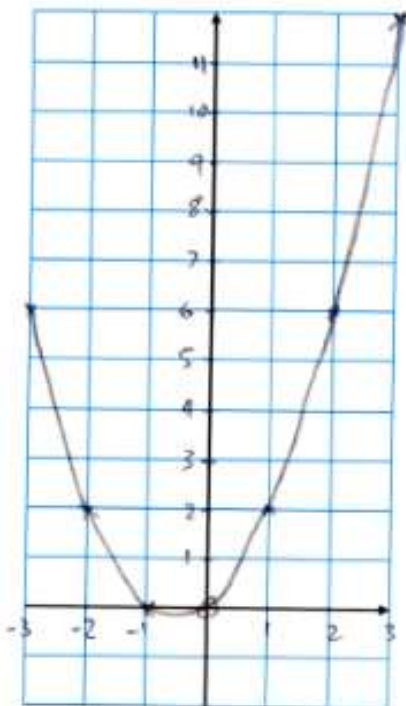
x	-3	-2	-1	0	1	2	3
y	18	8	2	0	2	8	18



2

$$y = x^2 + x$$

x	-3	-2	-1	0	1	2	3
y	6	2	0	0	2	6	12



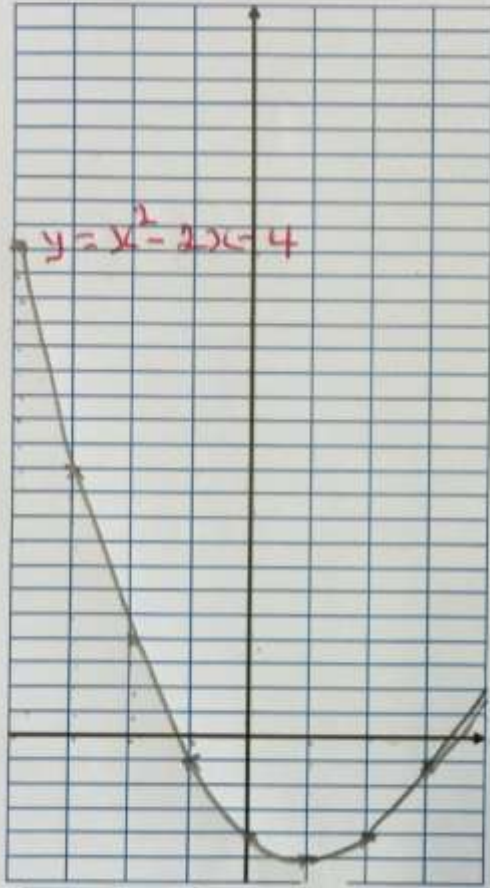
$$y = x^2 - x$$

x	-3	-2	-1	0	1	2	3
y	12	6	2	0	0	2	6



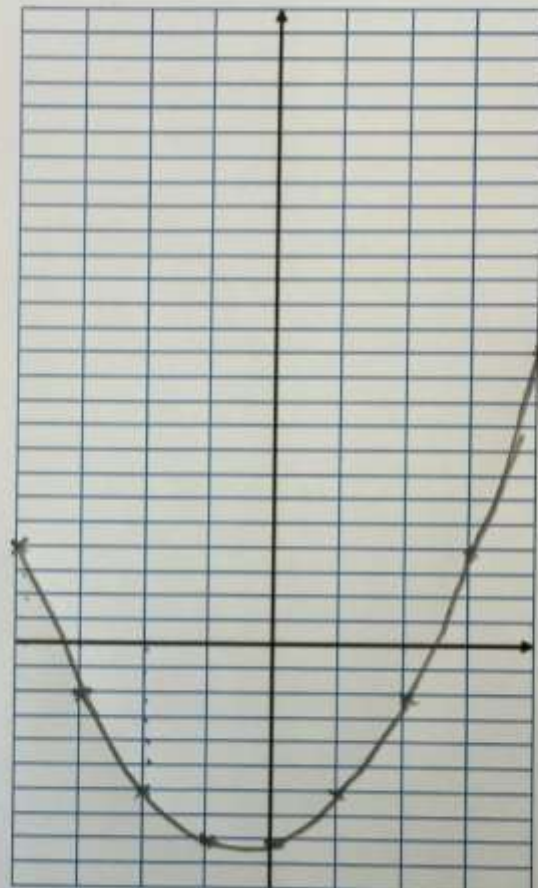
$$y = x^2 - 2x - 4$$

x	-4	-3	-2	-1	0	1	2	3	4
y	20	11	4	-1	-4	-5	-4	-1	4



$$y = x^2 + x - 8$$

x	-4	-3	-2	-1	0	1	2	3	4
y	4	-2	-6	-8	-8	-6	-2	4	12

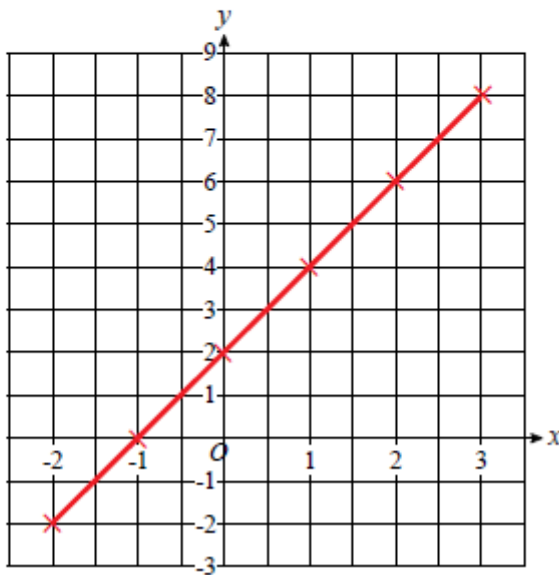


Mixed Problems

1

a) Complete the table of values for  $y = 2x + 2$ 

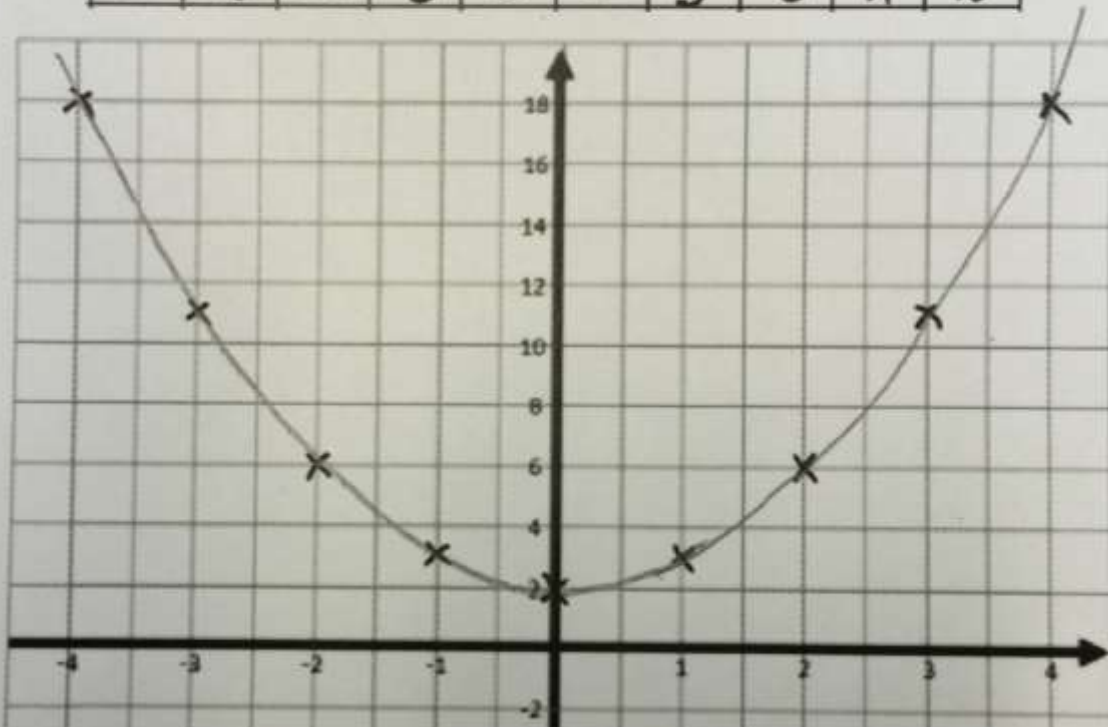
$x$	-2	-1	0	1	2	3
$y$	-2	0	2	4	6	8

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

2

2.  $y = x^2 + 2$

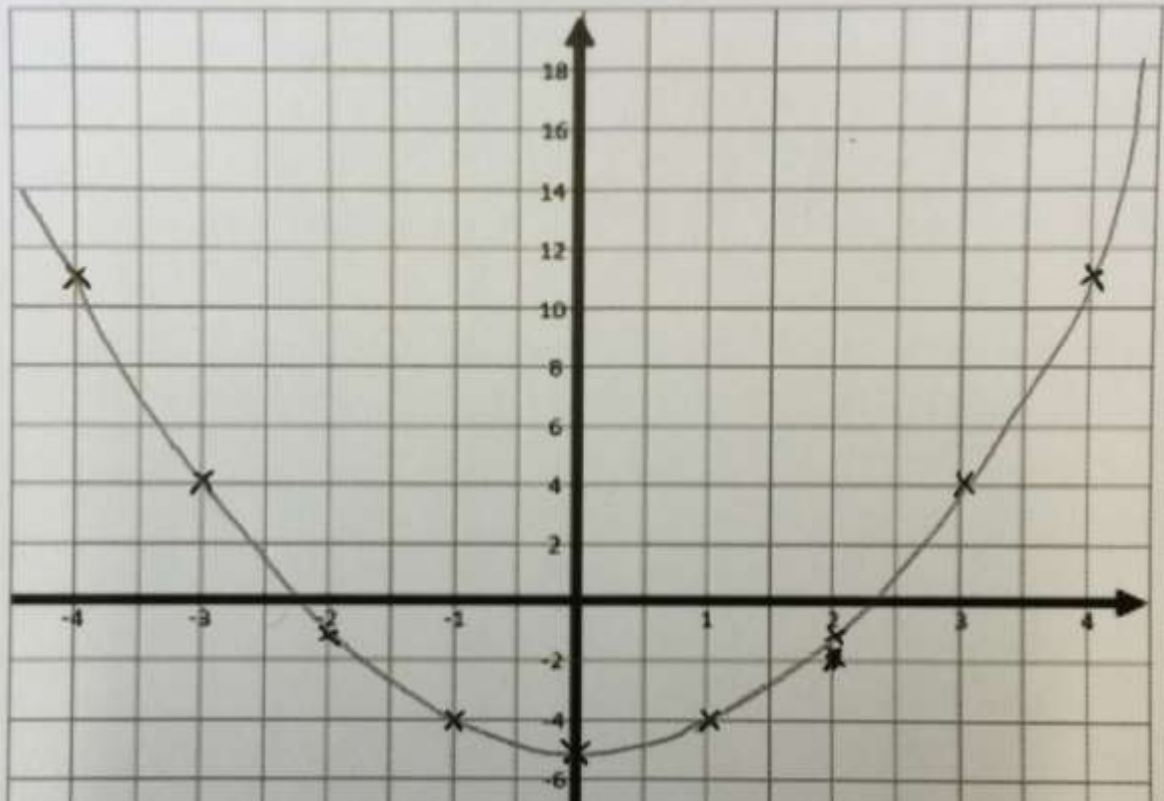
$x$	-4	-3	-2	-1	0	1	2	3	4
$y$	18	11	6	3	2	3	6	11	18



3

3.  $y = x^2 - 5$

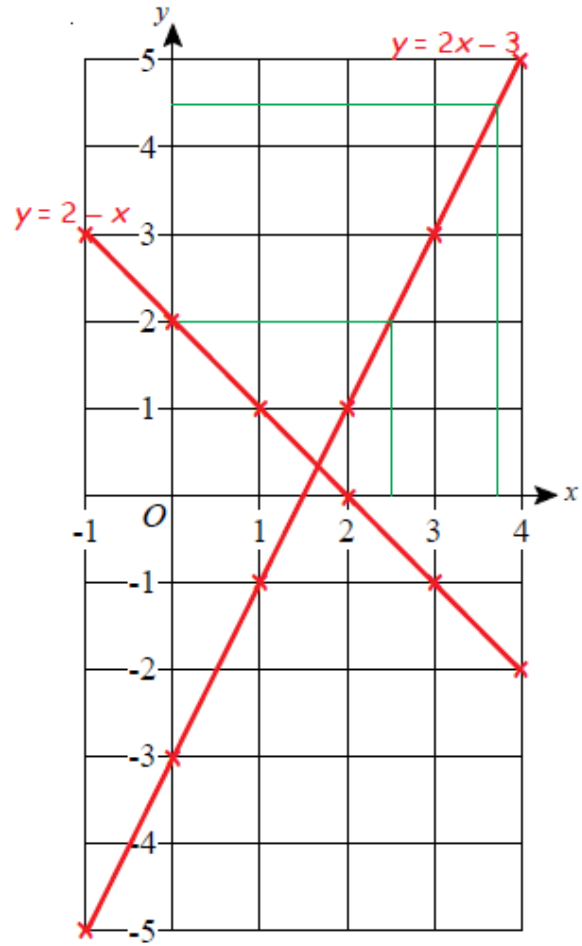
x	-4	-3	-2	-1	0	1	2	3	4
y	11	4	-1	-4	-5	-4	-1	4	11



4

1) a) Complete the table of values for  $y = 2x - 3$ 

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

b) Using the axes on the right draw the graph of  $y = 2x - 3$ c) Use your graph to work out the value of  $y$  when  $x = 2.5$   $y = 2$ d) Use your graph to work out the value of  $x$  when  $y = 4.5$   $x = 3.75$ 2) a) Complete the table of values for  $y = 2 - x$ 

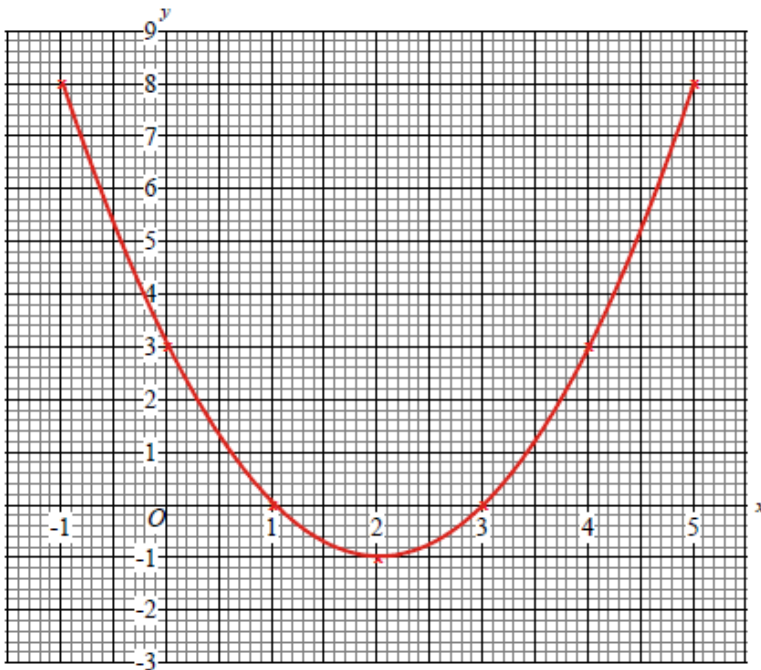
x	-1	0	1	2	3	4
y	3	2	1	0	-1	-2

b) Using the axes on the right, again, draw the graph of  $y = 2 - x$ 

5

1) Complete the table of values for  $y = x^2 - 4x + 3$ 

x	-1	0	1	2	3	4	5
y	8	3	0	-1	0	3	8

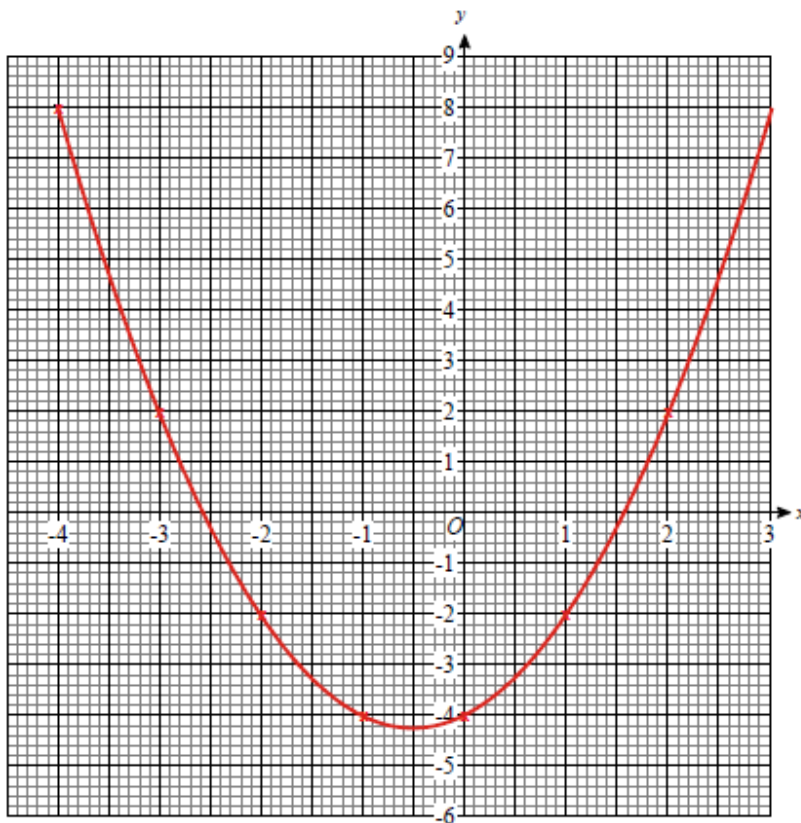
On the grid, draw the graph of  $y = x^2 - 4x + 3$ 



6

a) Complete the table of values for  $y = x^2 + x - 4$ 

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

b) On the grid, draw the graph of  $y = x^2 + x - 4$ **Stage – Topic 8 – Probability Answers**

LO1: To be able to identify when events are mutually exclusive and know the sum of these events would be 1

1

A six sided dice is rolled. Which of these pairs of outcomes are mutually exclusive?

Ans

- A The number is even and a multiple of 3 **Not mutually exclusive**
- c. The number is odd and a multiple of 2 **mutually exclusive**
- d. The number is odd and square **Not mutually exclusive**

2

Which of these pairs of events are mutually exclusive?

Ans

- a. Winning a football match and drawing the same match **mutually exclusive**
- b. Wearing one red sock and one blue sock **Not mutually exclusive**
- c. Eating toast for breakfast and Chips for dinner **Not mutually exclusive**
- d. Being on time and being late for a day at school **mutually exclusive**

3											
Ans	The probability that it will rain tomorrow is $\frac{1}{5}$ . What is the probability that it won't rain?										
4											
Ans	If the probability of passing a driving test is 0.54, what is the probability of failing it? <b>0.46</b>										
5											
Ans	The probability that a football team will win their next game is $\frac{2}{11}$ . The probability they will lose is $\frac{3}{11}$ . What is the probability the game will be a draw? <b><math>\frac{6}{11}</math></b>										
6											
Ans	<p>On the school dinner menu there is only ever one of four options. Some of the options are more likely to be on the menu than others. The table shows the options available on any day, together with three of the probabilities.</p> <table border="1"> <thead> <tr> <th>Food</th> <th>Curry</th> <th>Sausages</th> <th>Fish</th> <th>Casserole</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>0.36</td> <td>0.41</td> <td><b>0.14</b></td> <td>0.09</td> </tr> </tbody> </table> <p>a) Work out the probability of the dinner option being Fish. <b>0.14</b></p> <p>b) Which option is most likely? <b>Sausages</b></p> <p>c) Work out the probability that it is a Curry or Sausages on any particular day. <b>0.77</b></p> <p>d) Work out the probability that it is <b>not</b> Casserole. <b>0.91</b></p>	Food	Curry	Sausages	Fish	Casserole	Probability	0.36	0.41	<b>0.14</b>	0.09
Food	Curry	Sausages	Fish	Casserole							
Probability	0.36	0.41	<b>0.14</b>	0.09							
7											
Ans	<p>Julie buys a book every week. Her favourite types are Novel, Drama, Biography and Romance. The table shows the probability that Julie chooses a particular type of book.</p> <table border="1"> <thead> <tr> <th>Type of book</th> <th>Novel</th> <th>Drama</th> <th>Biography</th> <th>Romance</th> </tr> </thead> <tbody> <tr> <td>Probability</td> <td>0.24</td> <td>0.16</td> <td><math>x</math></td> <td><math>x</math></td> </tr> </tbody> </table> <p>a) Work out the probability that she will choose a Novel or a Drama. <b>0.4</b></p> <p>b) Work out the probability that she will choose a Biography or a Romance. <b>0.6</b></p> <p>The probability that she will choose a Biography is the same as the probability she will choose a Romance.</p> <p>c) Work out the probability that she will choose a Biography. <b>0.3</b></p>	Type of book	Novel	Drama	Biography	Romance	Probability	0.24	0.16	$x$	$x$
Type of book	Novel	Drama	Biography	Romance							
Probability	0.24	0.16	$x$	$x$							

Mixed Problems																									
1																									
Ans	<p>There are some blue, red, green and purple balls in a bag, find the probability of a purple ball being pulled out if these are the probabilities of the other colours:</p> <p>a.</p> <table border="1"> <tr> <td>Blue</td> <td>Red</td> <td>Green</td> <td>Purple</td> </tr> <tr> <td>0.1</td> <td>0.3</td> <td>0.3</td> <td>0.3</td> </tr> </table> <p>b.</p> <table border="1"> <tr> <td>Blue</td> <td>Red</td> <td>Green</td> <td>Purple</td> </tr> <tr> <td>0.15</td> <td>0.42</td> <td>0.23</td> <td>0.2</td> </tr> </table> <p>c.</p> <table border="1"> <tr> <td>Blue</td> <td>Red</td> <td>Green</td> <td>Purple</td> </tr> <tr> <td>0.4</td> <td>0.35</td> <td>0.02</td> <td>0.23</td> </tr> </table>	Blue	Red	Green	Purple	0.1	0.3	0.3	0.3	Blue	Red	Green	Purple	0.15	0.42	0.23	0.2	Blue	Red	Green	Purple	0.4	0.35	0.02	0.23
Blue	Red	Green	Purple																						
0.1	0.3	0.3	0.3																						
Blue	Red	Green	Purple																						
0.15	0.42	0.23	0.2																						
Blue	Red	Green	Purple																						
0.4	0.35	0.02	0.23																						
2																									
Ans	<p>A dice is rolled.</p> <p>a. List the six mutually exclusive outcomes and their probabilities. 1, 2, 3, 4, 5, 6</p> <p>b. What is the probability of a 6? <math>\frac{1}{6}</math></p> <p>c. What is the probability of not getting a 6? <math>\frac{5}{6}</math></p>																								
3																									
Ans	<p>Jean is going on an activities holiday. Each activity lasts a whole day. She can only do one activity a day. The probability that she will go pony-trekking on any one day is 0.6</p> <p>a. Work out the probability that Jean will not go pony-trekking on the first day. 0.4</p> <p>b. The probability that Jean will go windsurfing on any one day is 0.25 Work out the probability that Jean will go windsurfing <b>or</b> pony-trekking on the first day. <math>0.6 + 0.25 = 0.85</math></p>																								
4																									
Ans	<p>a) <math>\frac{3}{7}</math>      b) <math>3 \times 4 = 12</math> balls      c) <math>2 + 6 + 6 = 14</math> balls</p>																								
5																									
Ans	<p>a) <math>P(\text{red or pink}) = \frac{10}{15} = \frac{2}{3}</math></p> <p>b) <math>P(\text{not pink}) = \frac{11}{15}</math></p> <p>c) <math>P(\text{not red}) = \frac{9}{15} = \frac{3}{5}</math></p> <p>d) <math>P(\text{blue or pink}) = \frac{9}{15} = \frac{3}{5}</math></p>																								
6																									
Ans	<p>a) <math>P(\text{red or green}) = \frac{3}{8} + \frac{1}{4} = \frac{5}{8}</math></p> <p>b) <math>P(\text{not blue or green}) = 1 - (\frac{1}{4} + \frac{1}{5}) = \frac{9}{20}</math></p> <p>c) <math>P(\text{not red, green or blue}) = 1 - (\frac{3}{8} + \frac{1}{4} + \frac{1}{5}) = \frac{7}{20}</math></p>																								