STAGE D LEARNING OBJECTIVES

Learning Outcome	Tier	R	Y	G
Topic 1: Fractions (Core)				
LO1: To be able to add and subtract fractions by writing them with a common denominator	F	R	Y	G
LO2: To be able to calculate a fraction of an amount	F	R	Y	G
Topic 2: 2D Shape (Core)				
LO1: To be able to identify and state using mathematical notation horizontal, vertical, parallel and perpendicular lines	F	R	Y	G
LO2: To be able to describe quadrilaterals using their properties	F	R	Y	G
LO3: To be able to identify any congruent shapes and prove for simple shapes	F	R	Y	G
Topic 3: Circles (Core)				
LO1: To be able to name parts of a circle	F	R	Y	G
LO2: To be able to know and use the formula for the circumference of a circle	F/F+	R	Y	G
LO3: To know and be able to use the formula for the area of a circle	F	R	Y	G
Topic 4: Scatter Graphs				
LO1: To be able to construct and interpret scatter graphs	F	R	Y	G
Topic 5: Graphing (Core)				
LO1: To be able to plot conversion graphs in various contexts	F	R	Y	G
LO2: To be able to plot and interpret graphs of real life situations	F	R	Y	G
Topic 6: Calculations (Core)				
LO1: To be able to use BIDMAS to solve calculations with squares and 3 operations	F	R	Y	G
LO2: To be able to use BIDMAS involving adding and subtracting negatives	F	R	Y	G
LO3: To be able to understand the effect of multiplying or dividing by a number between 0 & 1	F	R	Y	G
Topic 7: Percentages				
LO1: To be able to express a quantity as a percentage of an amount	F	R	Y	G
LO2: To be able to calculate % increase/decrease without a calculator	F	R	Y	G
LO3: To be able to calculate % increase/decrease using a multiplier	F	R	Y	G
Topic 8: Angles (Core)				
LO1: To be able to calculate angles in parallel lines	F	R	Y	G
LO2: To be able to calculate internal and external angles of regular polygons	F	R	Y	G
Topic 9: Probability (Core)				
LO1: To be able to construct and use sample space diagrams	F	R	Y	G
LO2: To be able to construct and use Venn diagrams	F	R	Y	G
LO3: To be able to construct and use frequency tables	F	R	Y	G

F - Foundation
F+ - Additional foundation
H - Higher

STAGE D WORKSHEETS

Stage D – Topic 1 - Fractions

LO1: To be able to add and subtract fractions by writing them with a common denominator

1 Leave answers as mixed numbers where appropriate, cancel down where possible

1). $\frac{3}{4} + \frac{1}{8}$ 2). $\frac{2}{3} + \frac{1}{6}$ 3). $\frac{3}{4} - \frac{5}{8}$ 4). $\frac{4}{9} + \frac{1}{3}$

5). $\frac{3}{4} - \frac{1}{2}$ 6). $\frac{1}{4} + \frac{5}{12}$ 7). $\frac{8}{9} - \frac{2}{3}$ 8). $\frac{7}{8} - \frac{1}{2}$

9). $\frac{3}{4} - \frac{2}{3}$ 10). $\frac{2}{5} + \frac{1}{3}$ 11). $\frac{4}{5} - \frac{1}{2}$ 12). $\frac{1}{5} + \frac{2}{3}$

13). $\frac{3}{4} + \frac{1}{6}$ 14). $\frac{1}{4} + \frac{3}{5}$ 15). $\frac{5}{7} - \frac{2}{3}$ 16). $\frac{3}{8} + \frac{1}{6}$

2

1). $\frac{3}{4} + \frac{2}{5} = \_\_$ 2). $\frac{2}{3} + \frac{3}{7} = \_\_$ 3). $\frac{3}{10} + \frac{2}{3} = \_\_$

4). $\frac{5}{6} + \frac{3}{4} = \_\_$ 5). $\frac{1}{4} + \_\_ = \frac{7}{12}$ 6). $\frac{3}{5} + \frac{1}{2} = \_\_$

7). $\_\_ + \frac{1}{3} = \frac{5}{6}$ 8). $\frac{1}{5} + \_ = \frac{8}{15}$ 9). $\frac{3}{4} + \_ = \frac{19}{20}$

10). $\frac{5}{6} + \frac{2}{7} = \_\_$ 11). $\frac{3}{4} + \_\_ = 1\frac{1}{4}$ 12). $\_\_ + \frac{1}{6} = \frac{17}{30}$

3 Work out the following giving your answer as a fraction in its simplist form

a) $1\frac{2}{5} + 6\frac{1}{5}$ b) $2\frac{3}{4} + 1\frac{1}{5}$ c) $4\frac{1}{6} - 3\frac{1}{3}$ d) $7\frac{4}{9} - 2\frac{5}{9}$

4 There are $2^{3}/_{4}$ litres of milk in a bowl. $^{7}/_{8}$ of a litre of milk is added to the bowl. How much milk is now in the bowl ?

5 Henry walks $3^{3}/_{4}$ miles towards Paul's house. The actual distance is $5^{1}/_{4}$ miles. How far does he have to walk to finish the journey to Paul's house ?

6 Two parcels weigh $2^{3}/_{5}$ Kg and $4^{9}/_{10}$ Kg. What is their combined weight ?

LO2: To be able to calculate a fraction of an amount

1 Find

1). $\frac{2}{3}$ of 39	2). $\frac{2}{5}$ of 45	3). $\frac{3}{4}$ of 60	4). $\frac{2}{7}$ x 56	5). $\frac{3}{5}$ x 80
6). $\frac{4}{5}$ x 105	7). $\frac{2}{3}$ x 96	8). $\frac{3}{4}$ x 108	9). $\frac{2}{3}$ x 132	10). $\frac{2}{5}$ x 220
11). $\frac{3}{4}$ x 172	12). $\frac{4}{5}$ x 285	13). $\frac{2}{3}$ x 276	14). $\frac{3}{5}$ x 345	15). $\frac{3}{4}$ x 364
16). $\frac{5}{6}$ x 840	17). $\frac{3}{5}$ x 730	18). $\frac{4}{7}$ x 147	19). $\frac{3}{7}$ x 119	20). $\frac{4}{9}$ x 288

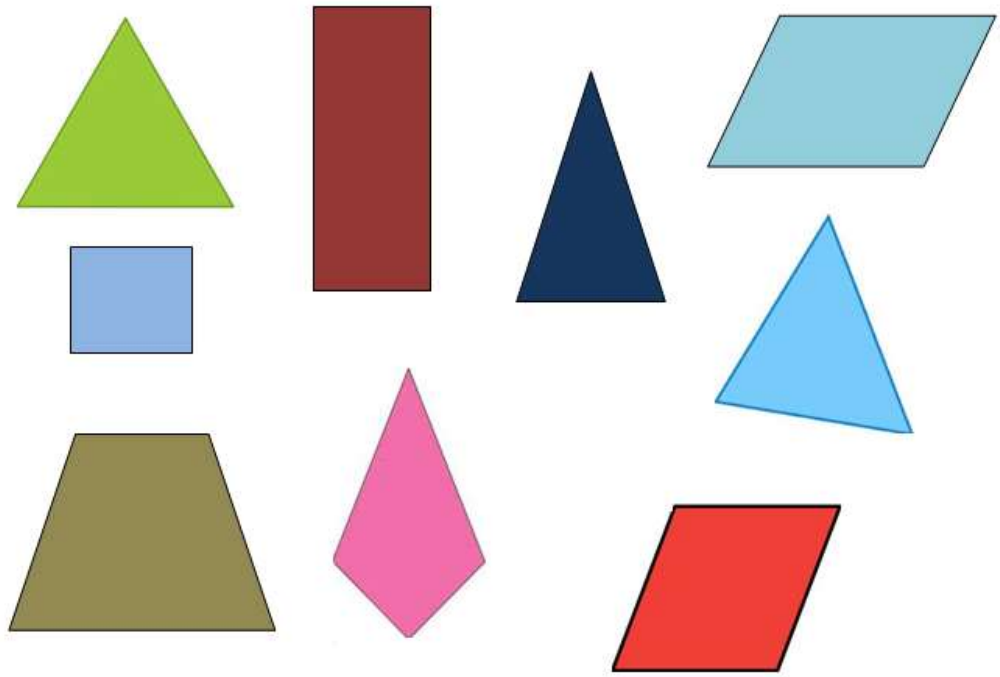
2

21). $\frac{4}{11}$ x 73	22). $\frac{3}{10}$ x 87	23). $\frac{7}{9}$ x 49	24). $\frac{5}{8}$ x 95	25). $\frac{7}{12}$ x 83
26). $\frac{4}{15}$ x 67	27). $\frac{8}{13}$ x 55	28). $\frac{11}{12}$ x 77	29). $\frac{9}{14}$ x 97	30). $\frac{13}{15}$ x 88

Stage D – Topic 2 – 2D shapes

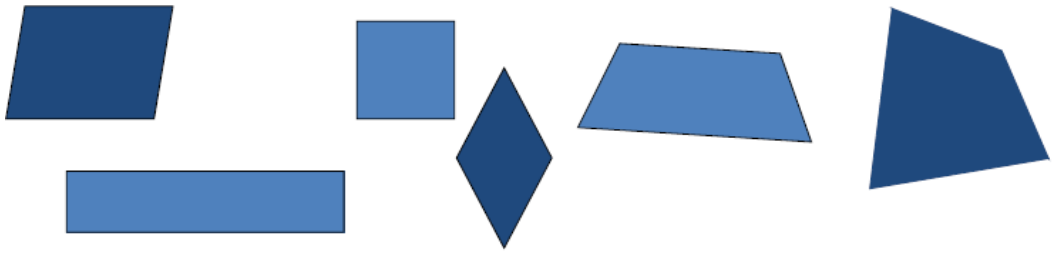
LO1: To be able to identify and state using mathematical notation horizontal, vertical, parallel and perpendicular lines

1 On each shape, state using mathematical notation horizontal, vertical, parallel and perpendicular lines



LO2: To be able to describe quadrilaterals using their properties

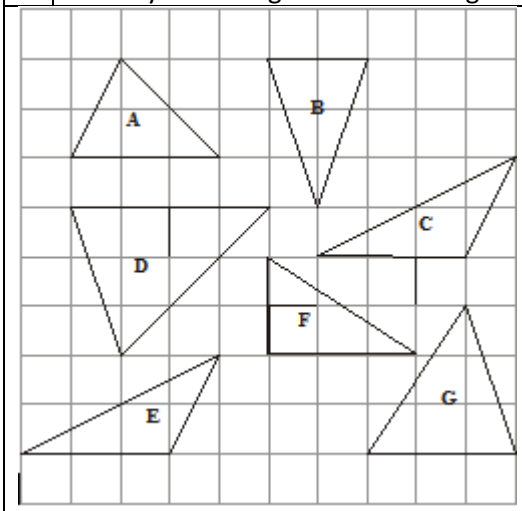
1 Complete the table below, identifying the properties of different quadrilaterals



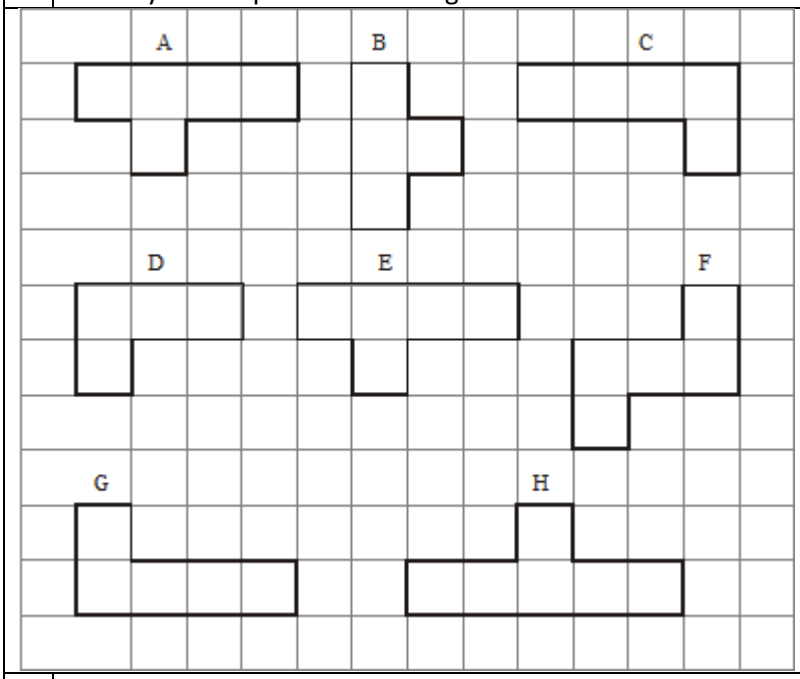
	Square	Rectangle	Parallelogram	Rhombus	Kite	Trapezium
4 Right angles						
Opposite angles are equal						
Opposite sides are equal						
2 pairs of parallel sides						
Lines of symmetry ?						
Rotational Symmetry						
Diagonals cross at right angles						
1 pair of parallel sides						

LO3 To be able to identify any congruent shapes and prove for simple shapes

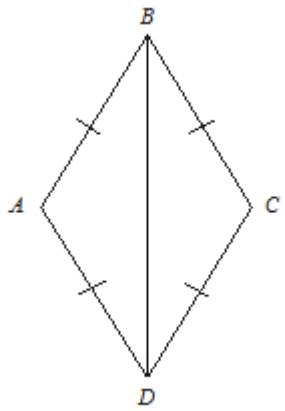
1 Identify the triangles that are congruent



2	Identify the shapes that are congruent



3	



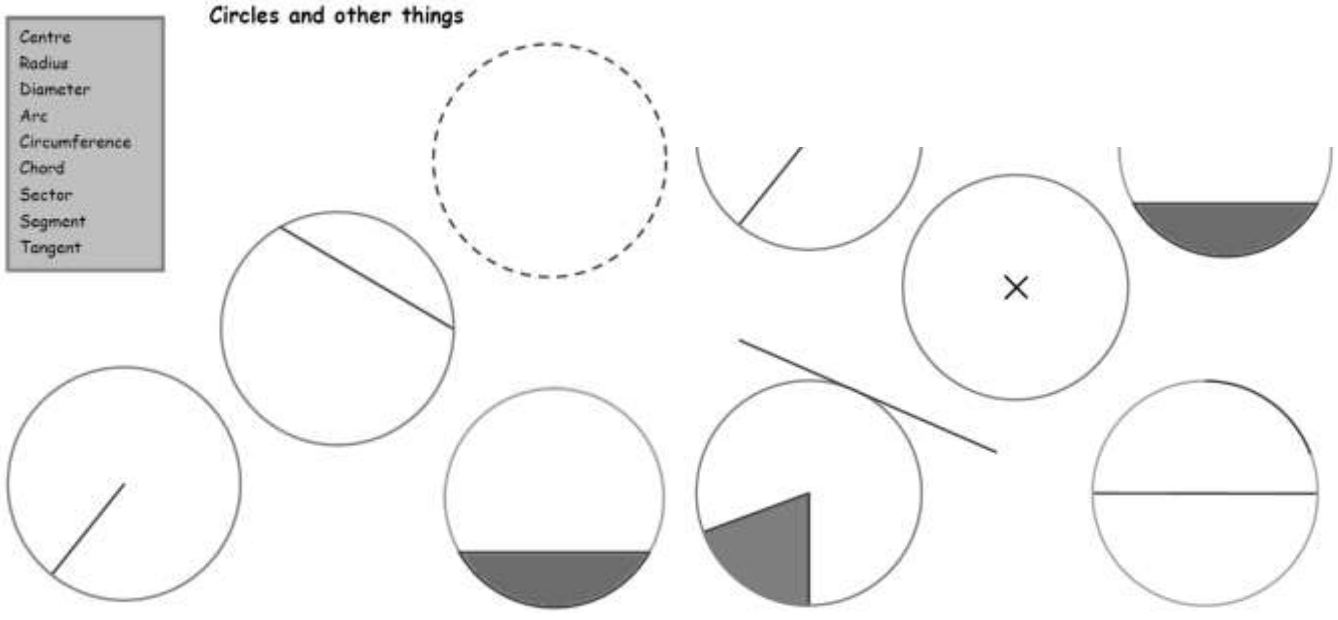
In the diagram, $AB = BC = CD = DA$.

Prove that triangle ADB is congruent to triangle CDB.

Stage D – Topic 3 - Circles

LO1: To be able to name parts of a circle

1	From the list in the grey box, label the parts of the circle



LO2: To be able to know and use the formula for the circumference of a circle

1. Use $\pi = 3.14$. Calculate the circumference of each circle to 2 d.p., if the diameter is :

   a). 12 cm b). 20 cm c). 35 cm d). 90 cm e). 2 cm

   f). 6.5 cm g). 10.5 mm h). 0.5 Km i). 105.1 m j). 6.35 m

2. Using the π button on your calculator, calculate the circumference of these circles to 2 d.p. when the radius is:

   a). 10 cm b). 55 cm c). 12 m d). 560 m e). 490 Km

   f). 0.6 mm g). 0.125 m h). 35.8 mm i). 345 Km j). 80.04 Km

3. The minute hand on a watch is 1.5 cm long. What distance does the tip of this hand travel through in a). 1 hour ?

   b). 1 day ?

4. A farmer has a circular field which is 250 metres across. He wishes to put a fence around the field. What length of fencing does he require ?

5. A car tyre has a 55 cm radius.

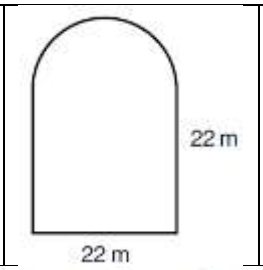
   a). If the wheel travels through 1 complete revolution, how far has the car travelled?

   b). The wheel rotates 2500 times, how far has the car travelled

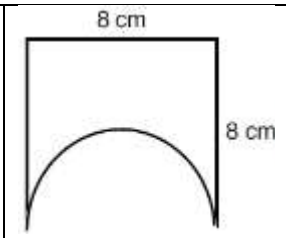
   i). in cm, ii). in m, iii). in Km ?

6. The following shapes are made up of full circles, semi-circles or quarter circles. Find the circumference of each of the following shapes.

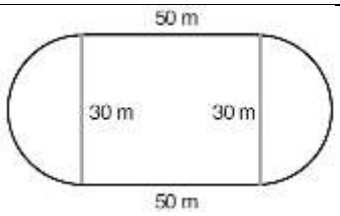
   a

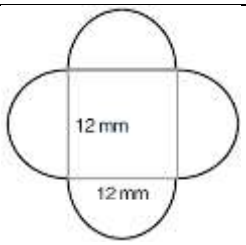
   b

   c

   d

7. Susan makes a trundle wheel. The radius of the wheel is 0.2 metres. She pushes the wheel across the playground. The wheel makes 30 complete revolutions.
   Find the distance across the playground.

LO3: To know and be able to use the formula for the area of a circle

1

Find the area of the following circles. Take $\pi = 3.14$. Leave the answer to 3 sig. figs..

a). radius = 7 cm b). radius = 28 m c). radius = 1.4 Km d). radius = 5.6 m

e). diam. = 28 m f). diam. =112 mm g). diam. = 84 cm h). diam. = 3.5 m

2

The minute hand on a watch is 2.5 cm long. Over what area does this hand travel in1 hour ?

3

A farmer has a circular field which is 170 metres across. He wishes to cover it with plastic sheeting. What area of sheeting does he require ?

4

Rover is tied to a post in the middle of the garden with a rope 12 ft long. On what area of the garden can poor little Rover walk ?

5

A circular table is 1.8 metres across. What is the area of the table top ?

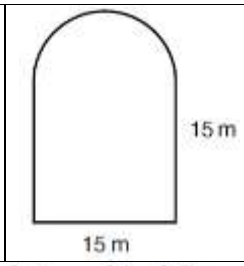
6

By measuring, what is the area in cm^2 of one side of a

a). £1 coin b). 10p coin c). 5p coin d). 2p coin e). 1p coin ?

7

a



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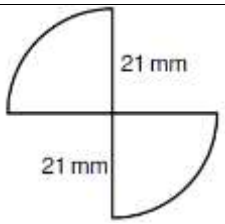

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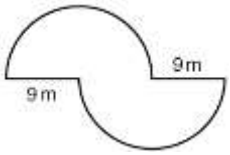
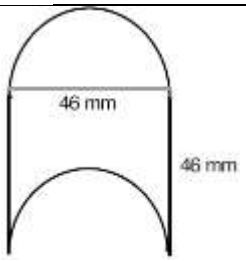


d



8

Find the radii of these circles, if the **area** is:-

1). 314 cm^2 2). 78.5 m^2 3). 706.5 Km^2 4). 1256 mm^2 5). 200.96 cm^2

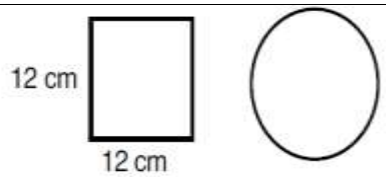
Mixed Problems

1

The square and the circle have the same area.

a). Find the radius of the circle.

b). What is the circumference of the circle ?

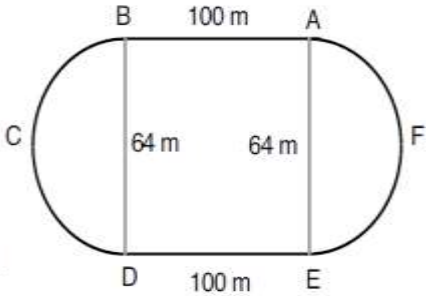


2

The diagram shows a running track. BA and DE are parallel and straight. They are 100 m long. BCD and EFA are semicircular. They each have a diameter of length 64 m.

a). Calculate the perimeter of the track.

b). Calculate the total area enclosed inside the track.



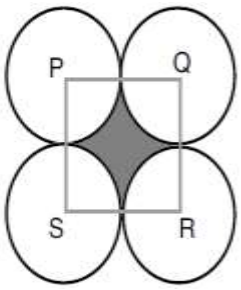
3

a). A circle has a radius of 34 cm. Calculate its circumference.

b). The diagram shows four touching circles. Each circle has a radius of 34 cm. P, Q, R and S are centres of the circles and PQRS is a square.

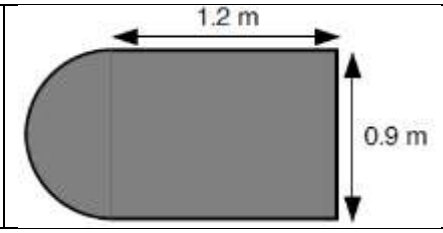
i). What is the perimeter of the shaded region ?

ii). Calculate the area of the shaded region.

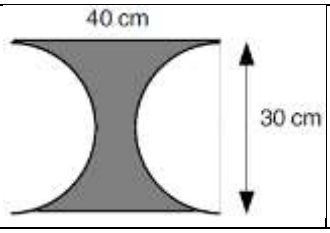


Find the **area** and **perimeter** of the shaded regions in the following shapes.

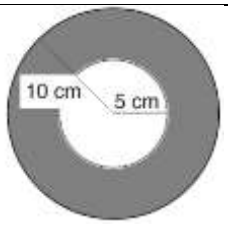
a



b



c

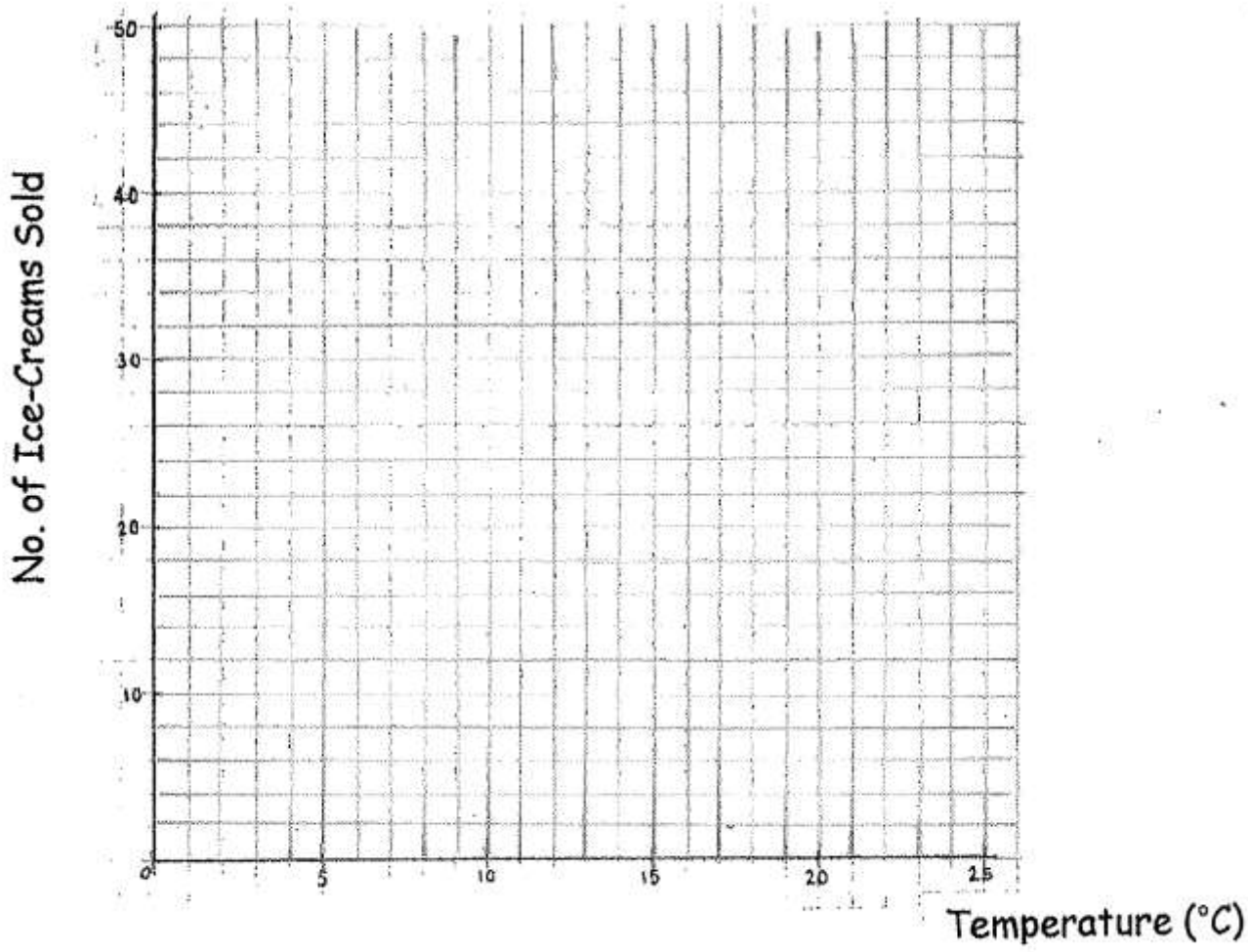


Stage D – Topic 1 - Scatter graphs

LO1: To be able to construct and interpret scatter graphs

1

Temperature (°C)	4	23	17	8	20	14	18	6	24	12
No. of Ice-Creams Sold	6	42	25	16	37	22	30	9	46	19



(a) Plot the points on the axis below.

(b) Describe the correlation between the temperature and sales of ice-creams.

(c) Draw a best-fit line on the scattergraph.

(d) Use your line of best-fit to find an estimate of the number of ice-creams sold when the temperature is 10°C.

2 Choose the most appropriate scatter diagram for the following situations.

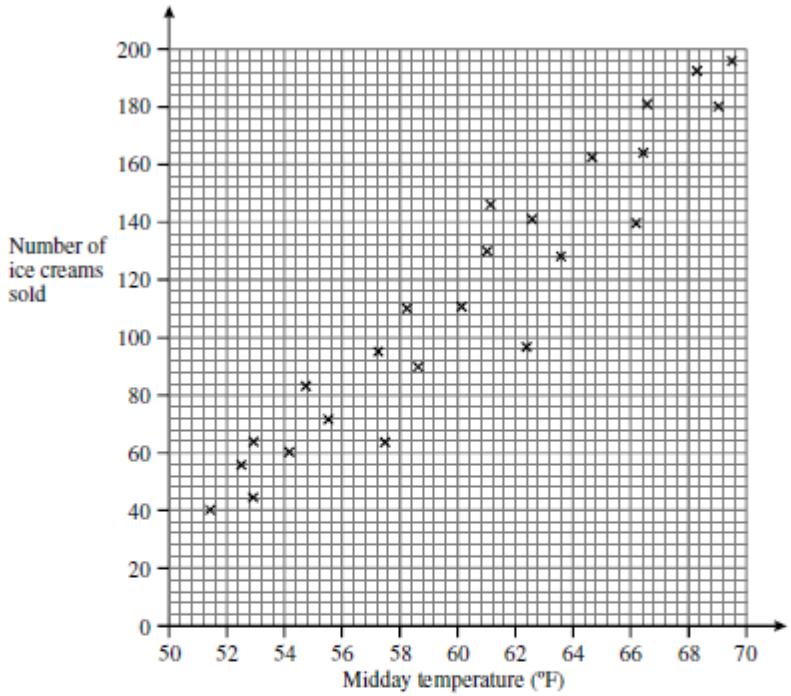
A B C

a. As you get older your reaction speed slows down.

b. People who are good at maths are usually good at music.

c. There is no connection between height and hair length of 14 yr old girls

3 The scatter graph shows the number of ice creams sold plotted against the midday temperature.



(a) Draw a line of best fit on the scatter graph.

(b) Describe the relationship between the number of ice creams sold and the midday temperature.

.....

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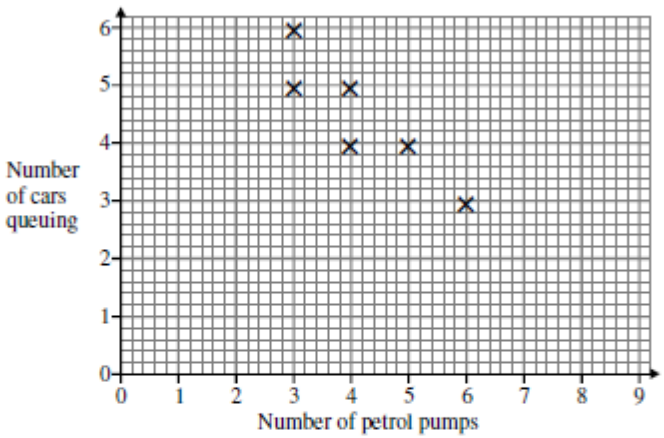
4 The scatter graph shows the number of petrol pumps and the number of cars queuing at midday at six garages.



(a) State the type of correlation shown.

Answer .....

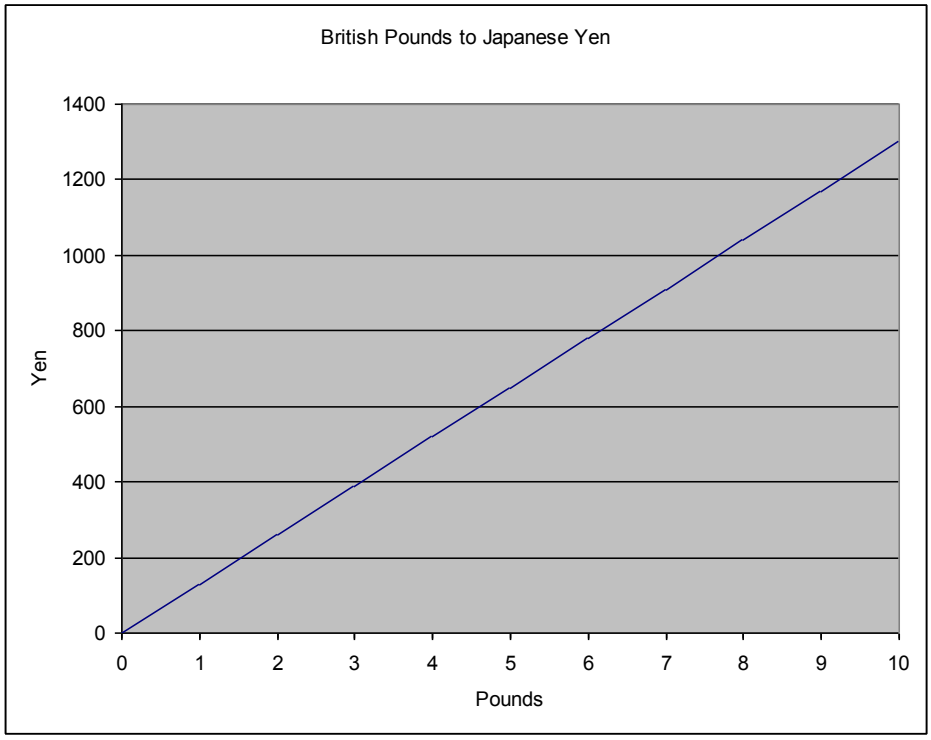
(b) Use the scatter graph to estimate the number of cars queuing at a garage with 8 petrol pumps.

Answer .....

Stage D – Topic 5 - Graphing

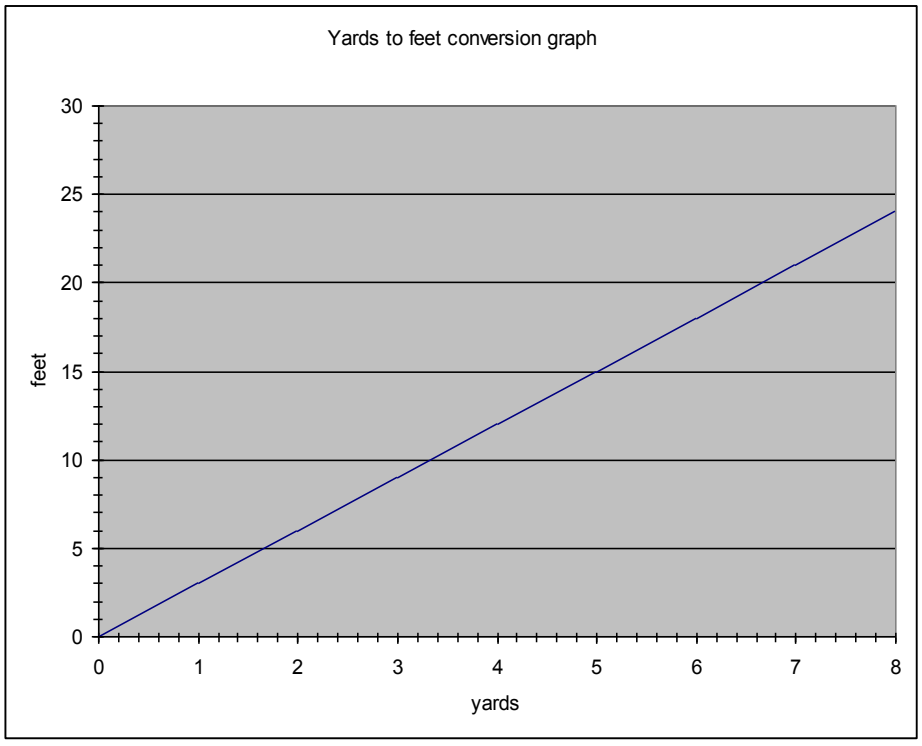
LO1: To be able to plot conversion graphs in various contexts

1 The conversion graph shows conversions between British Pounds and Japanese Yen.



a) Convert £2 into Yen
b) Convert 1200 Yen into pounds.
c) Mimi buys an MP3 player in the UK for £50 and a memory stick for £10. She notices the same items in Japan for 6500 Yen and 1600 Yen respectively. Mimi believes the **total cost** in the UK is more than the total cost in Japan. Is she right? You must explain your answer.

2 The following conversion graph shows conversions between feet and yards. Use it to answer the following questions



	a) How many feet are there in 5 yards? b) 24 feet is the same as how many yards? c) 10 yards is the same as how many feet? d) David measures his living room to be 20 feet long. Esra measures her living room to be 7 yards long. David says his living room is longer. Explain why he is wrong.

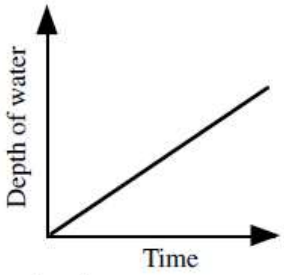
LO2: To be able to plot and interpret graphs of real life situations

1 Here are the side cross sections of five swimming pools

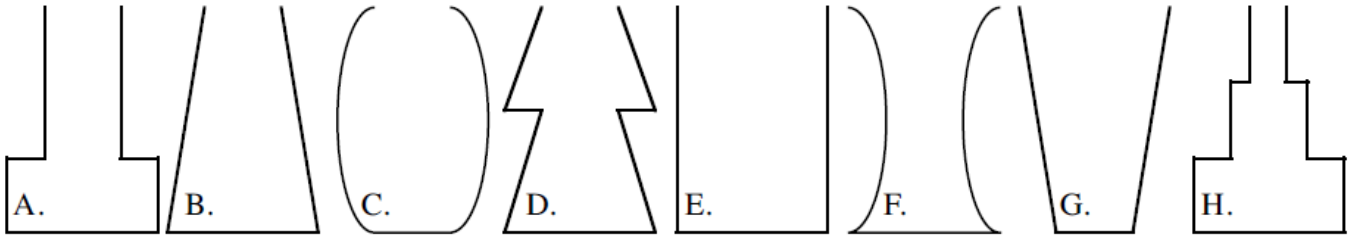
The pools are filled with water at a constant rate.

a). The graph shown is for one of the above swimming pools being filled. Which one does it represent ?

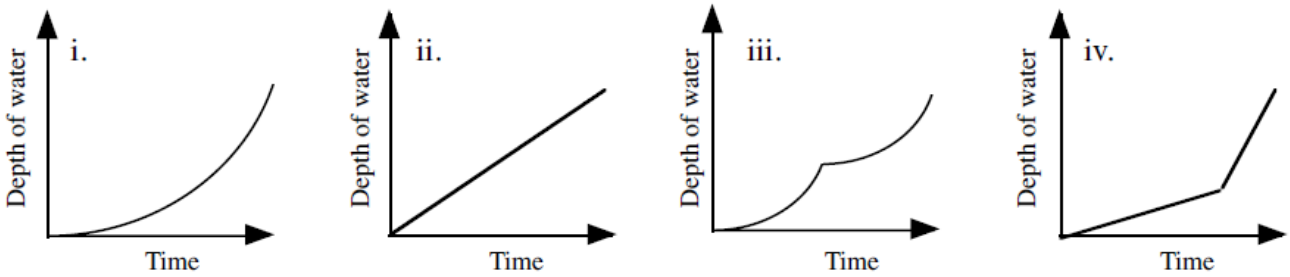
b). Draw graphs for the other 4 swimming pools that would show them being filled with water at a constant rate.



2 Water is poured at a constant rate into each one of the following beakers



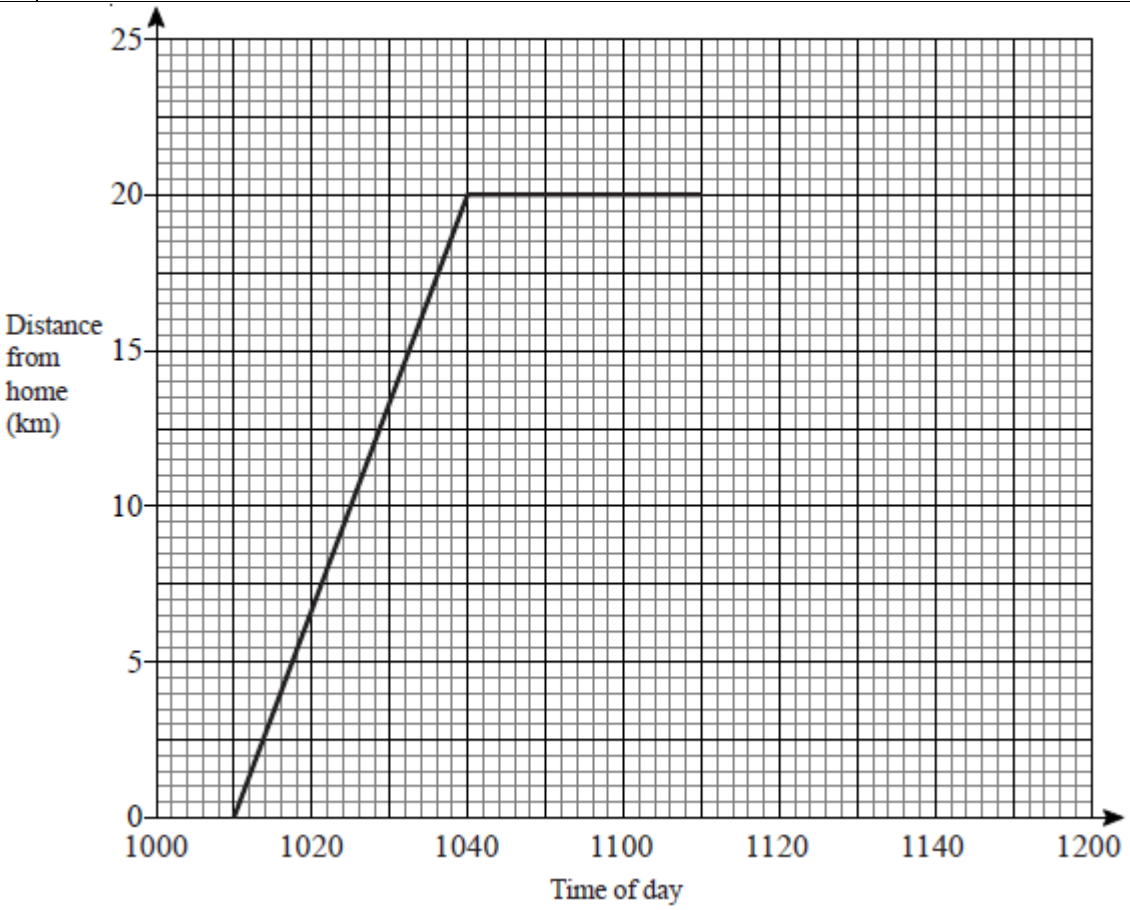
Four graphs are shown below.



a). Draw the graphs in your book. Next to each draw the beaker that it represents.

b). Draw the beakers that haven't been used. Next to each diagram draw a graph that would represent the beaker.

3	Sarah travelled 20 km from home to her friend's house. She stayed at her friend's house for some time before returning home. Here is the travel graph for part of Sarah's journey.



a) At what time did Sarah leave home?

b) How far was Sarah from home at 10 30?

Sarah left her friend's house at 11 10 to return home.

c) Work out the time in minutes Sarah spent at her friend's house.

Sarah returned home at a steady speed.
She arrived home at 11 50

d) Complete the travel graph.

e) Work out Sarah's average speed on her journey from her home to her friend's house.
Give your answer in kilometres per hour.

Stage D – Topic 6 - Calculations

LO1: To be able to use BIDMAS to solve calculations with squares and 3 operations

1

1).	$7 + 6 \times 2$	2).	$5 \times 3 + 4$	3).	$9 \div 3 + 5$	4).	$7 - 10 \div 2$
5).	$7 + 12 \div 4$	6).	$21 \div 7 - 2$	7).	$12 - 42 \div 6$	8).	$14 + 30 \div 5$
9).	$19 - 15 \div 3$	10).	$12 + 18 \div 6$	11).	$(3 + 5) \times 2$	12).	$12 \div (7 - 3)$
13).	$15 \times (9 - 7)$	14).	$(16 - 13) \div 3$	15).	$(11 + 9) \div 4$	16).	$7 + 24 \div 6$
17).	$22 - 6 \times 3$	18).	$4 \times 5 - 12$	19).	$40 \div (12 - 4)$	20).	$(24 - 9) \div 3$
21).	$4 + 3^2$	22).	$17 - 4^2$	23).	$10 - 2^3$	24).	$7 + 5^2$
25).	$(3 + 2)^2$	26).	$(14 \div 2)^2$	27).	$(6 - 2)^2$	28).	$6 - 2^2$
29).	$(2 \times 4)^2$	30).	$10 + 7^2$	31).	$3^3 - 7$	32).	$7^2 - 20$
33).	3×4^2	34).	$20 \div 2^2$	35).	$36 - 3^2$	36).	$(16 \div 8)^2$
37).	$6^2 \div 4$	38).	$(4 + 6)^3$	39).	$4^3 \div 8$	40).	4×5^2
41).	$6 + 12 \div 4 - 2$	42).	$(3 + 9) \div (2 + 1)$	43).	$6 + 4 \div 2 + 3^2$	44).	$(6 + 2)^2 - 1$
45).	$30 \div (4 \div 2) + 3$	46).	$5 \times (2 + 3) - 4$	47).	$36 \div (6 \div 2)^2$	48).	$(8 \div 4) \times 3 - 2^2$
49).	$2 + (4 + 3)^2$	50).	$(1 + 4^2) \times 2 - 4$	51).	$(7 + 23) \div 6 + 8$	52).	$(4 + 2)^2 \div 4$

LO2: To be able to use BIDMAS involving adding and subtracting negatives

1

a) $33 \div 11 \times (-4) - 5$

b) $29 - 18 \times (-2) + 8$

c) $11 \times 4 + 88 \div (-8)$

d) $-8 - 2 \times 3 \div 2$

LO3: To be able to understand the effect of multiplying or dividing by a number between 0 & 1

1 Circle the calculations which will have an answer of less than 50

50 x 0.3	50 ÷ 0.7	50 x 0.9	50 ÷ 28	50 ÷ 1.6
50 x 0.04	50 x 1.5	50 ÷ 2.5	50 x 5.333	50 ÷ 0.0001

2 Tick the calculation from each row which has an answer less than 1.04

A	a) 1.04 ÷ 0.58	b) 1.04 x 2.6	c) 1.04 x 0.99
B	a) 1.04 x 0.88	b) 1.04 ÷ 0.5	c) 1.04 x 3.4
C	a) 1.04 x 1.22	b) 1.04 ÷ 2.6	c) 1.04 x 2

3 Which of these will have an answer greater than 1.83? Explain.

a) 1.83 ÷ 2.7 b) 1.83 x 0.27 c) 1.83 x 2.7

d) 1.83 ÷ 0.27 e) $1.83 \div \frac{23}{100}$ f) $1.83 \times \frac{23}{100}$

4 Decide which of these statements could be correct (✓) and which are definitely wrong (X). Justify your decision, but do not calculate the answers

a) 5.02 x 0.3 = 15.06	b) 2.75 ÷ 0.02 = 1.375	c) 6.24 x 1.2 = 7.488
d) 8.127 ÷ 1.4 = 58.05	e) 2.75 x 0.86 = 2.365	f) 2.75 ÷ 0.8 = 3.4375

Stage D – Topic 7 - Percentages

LO1: To be able to express a quantity as a percentage of an amount

1 Calculate

1). 15 as a percentage of 60
2). 120 as a percentage of 600
3). 200 as a percentage of 2000
4). 30 as a percentage of 60
5). 80 as a percentage of 200
6). 60 as a percentage of 300
7). 74 as a percentage of 200
8). 42 as a percentage of 168
9). 112 as a percentage of 160
10). 42 as a percentage of 56
11). 36 as a percentage of 50
12). 132 as a percentage of 150
13). 216 as a percentage of 360
14). 45 as a percentage of 225
15). 189 as a percentage of 420
16). 222 as a percentage of 370
17). 6 as a percentage of 150
18). 324 as a percentage of 360
19). 45 as a percentage of 60
20). 153 as a percentage of 180

2 A farmer has 350 birds, of which 140 are ducks. What percentage of ducks does he have ?

3 In a crate of apples 33 are bad. The crate holds 264 apples. What percentage are bad ?

4 In a school of 400 pupils, 250 are girls. What percentage are girls

LO2: To be able to calculate % increase/decrease without a calculator

1 Increase:

a) 500 by 10%
c) 80 by 15%

b) 320 by 10%
d) 75 by 20%

2 Decrease:

a) 400 by 10%
c) 140 by 15%

b) 380 by 10%
d) 35 by 20%

3 The price of laptop is increased by 15%.
The old price of the laptop was £300.
Work out the new price.

4 The price of a £6800 car is reduced by 10%.
What is the new price?

LO3: To be able to calculate % increase/decrease using a multiplier

1

1). 30 by 20%	2). 70 by 40%	3). 60 by 15%	4). 120 by 5%
5). 300 by 48%	6). 200 by 4%	7). 120 by 35%	8). 440 by 85%
9). 170 by 34%	10). 215 by 46%	11). 720 by 4%	12). 90 by 17%
13). 440 by 68%	14). 960 by 12%	15). 740 by 8%	16). 490 by 24%

2

1). 60 by 20%	2). 90 by 20%	3). 80 by 15%	4). 220 by 5%
5). 500 by 48%	6). 800 by 4%	7). 120 by 35%	8). 440 by 85%
9). 370 by 34%	10). 115 by 46%	11). 320 by 4%	12). 80 by 17%
13). 940 by 68%	14). 760 by 12%	15). 780 by 8%	16). 590 by 34%

3

The price of a mobile phone is £78.40 plus VAT.
VAT is charged at a rate of 17.5%.
What is the total price of the mobile phone?

4

In a sale, normal prices are reduced by 7%.
The normal price of a camera is £89.
Work out the sale price of the camera.

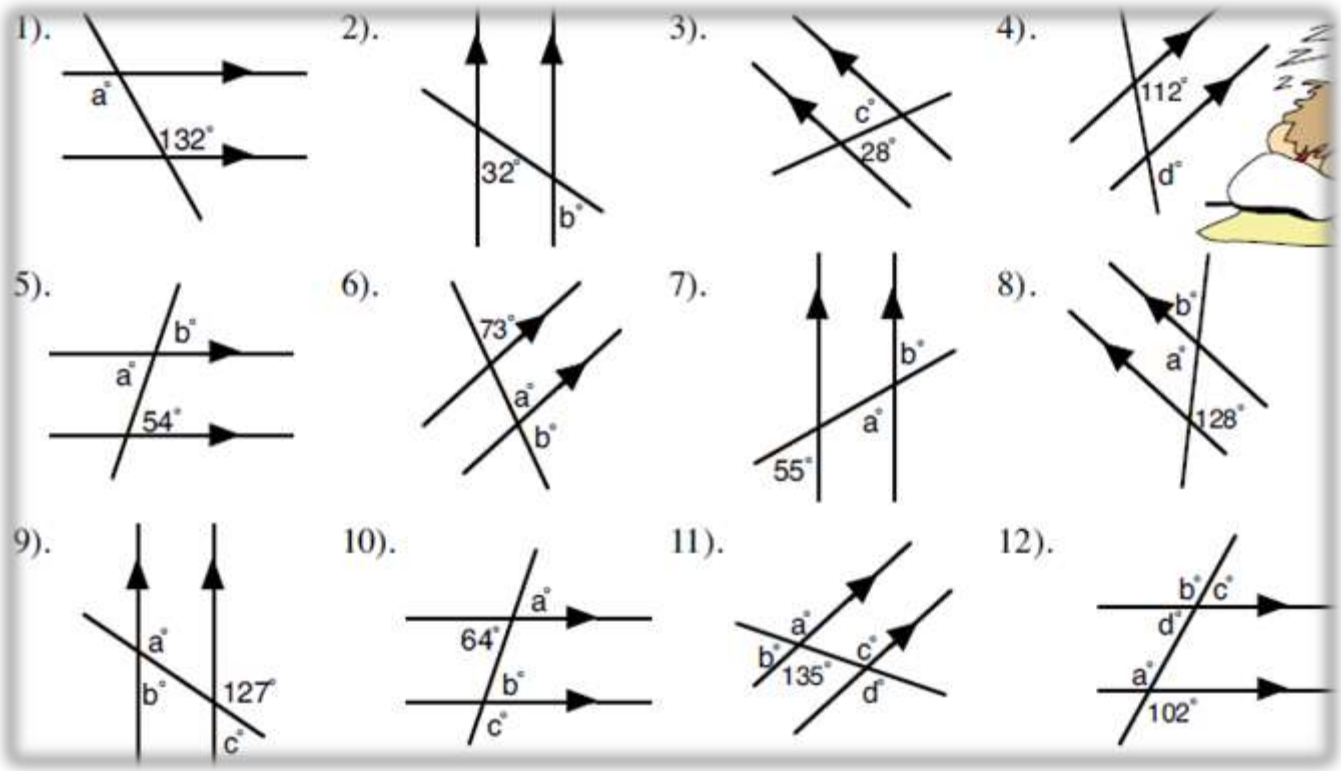
5

An antique clock cost £540. It's price is increased by 18% in a year. What is it now worth ?

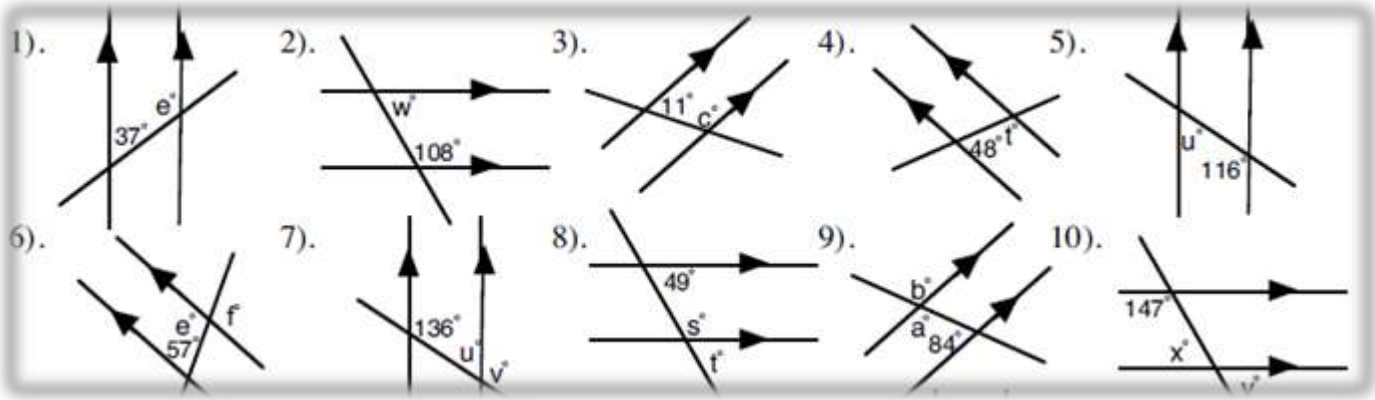
Stage D – Topic - Angles

LO1: To be able to calculate angles in parallel lines

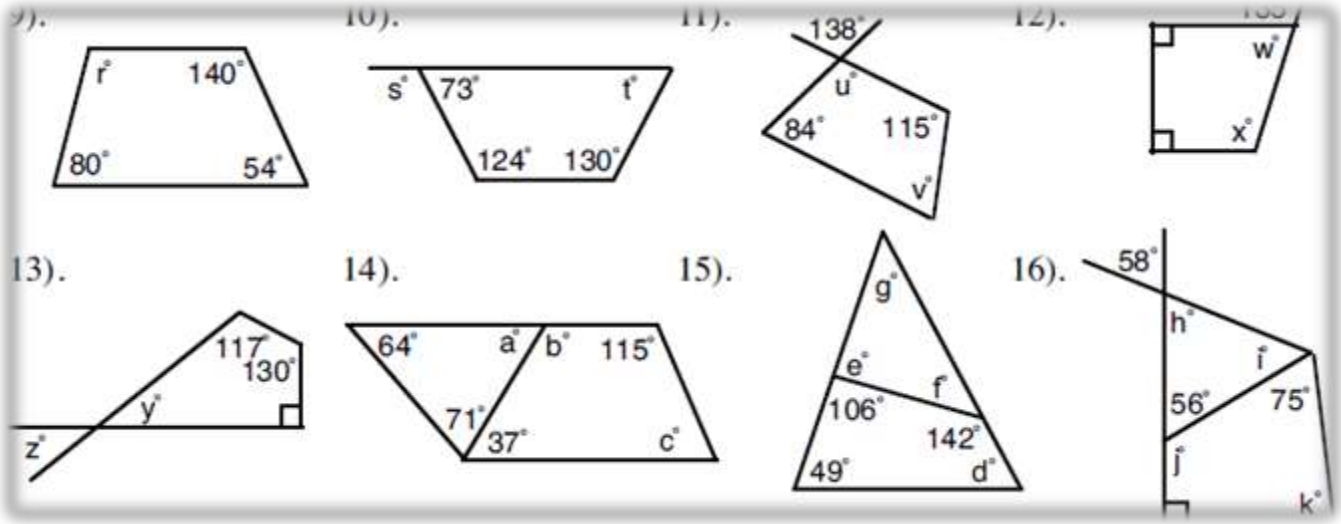
1 Calculate the value of the unknown angle, giving a reason for your answer.



2	Calculate the value of these supplementary angles



3	Calcuate the value of the missing angles, giving reasons for answers



LO2: To be able to calculate internal and external angles of regular polygons

1 Use the formula for the number of sides in a polygon to determine the angle sum of a polygon with

a). 11 sides b). 14 sides c). 19 sides d). 23 sides e). 33 sides
f). 38 sides g). 47 sides h). 51 sides i). 120 sides j). 152 sides.

2 Find the number of sides of a polygon if the sum of the angles is

a). 1980° b). 2700° c). 3600° d). 9180° e). 4680°
f). 7920° g). 4860° h). 18720° i). 13500° j). 24480°

3 Find the size of each exterior angle in a regular polygon which has

a). 8 sides b). 18 sides c). 12 sides d). 24 sides e). 40 sides
f). 36 sides g). 75 sides h). 25 sides i). 80 sides j). 32 sides.

4 Find the number of sides in a regular polygon that has an exterior angle of

a). 72° b). 40° c). 18° d). 24° e). 12°
f). 5° g). 8° h). 22.5° i). 7.5° j). 14.4°.

Stage D – Topic 9 - Probability

LO1: To be able to construct and use sample space diagrams

1 Two coins are thrown. Draw the sample space. What is the probability of getting :-
a). 2 heads, b). 2 tails, c). one of each ?

2 A die and a coin are thrown together, draw this sample space. Use the diagram to find :-
a). the probability of a tail and a 3,
b). the probability of a head and a 5,
c). the probability of a tail and a 7.

3 A fair spinner has four numbers 1, 2, 3, 4. It is spun twice. The **sum** of the scores is noted. Draw a possibility space and find the probability that :-
a). the sum is 3, b). the sum is 5, c). the sum is 9, d). the sum is 8.

4 In a game a normal fair dice is rolled, then a card is picked at random from 5 cards numbered from 1 to 5. Draw a possibility space. Find the probabilities that :-
a). the numbers are both 4,
b). the numbers are both the same,
c). the number on the die is a 5 or a 6, the number on the card is a 4 or 5,
d). the sum of the numbers is 6.

LO2: To be able to construct and use Venn diagrams

1 Draw a Venn diagram for each of the following questions, placing the numbers 1-10 in their correct sections
a) Multiples of 2 and multiples of 3
b) Less than 5 and factors of 12
c) Square numbers and even numbers

2 There are 12 cards in a deck labeled 1 to 12. One card is chosen at random.
(a) Insert the cards into the correct section of the Venn diagram.
(b) What is the probability of choosing a number that is even **and** prime?
(c) What is the probability of choosing a number that is even **but not** prime?
(d) What is the probability of choosing a number that is prime **but not** even?
(e) What is the probability of choosing a number that is **neither** even **or** prime?

(f) What is the probability of choosing a number that is even **or** prime?
(g) What is the probability of choosing a number that is even **or** prime **but not** both?

LO3: To be able to construct and use frequency tables

1 Majid carried out a survey of the number of school dinners students had in one week. The table shows this information. Copy and complete the table.

a) Write down the mode.
b) How many students were there altogether?
c) How many school dinners were served during the week?
d) Calculate the mean number of school dinners

Number of school dinners	Frequency	
0	0	
1	8	
2	12	
3	6	
4	4	
5	2	

2 Josh asked some adults how many cups of coffee they each drank yesterday. The table shows his results. Copy and complete the table

a) Write down the mode.
b) How many adults were asked altogether?
c) How many cups of coffee were drank altogether yesterday by the people asked?
d) Calculate the mean number of cups of coffee drank yesterday.

Number of cups	Frequency	
0	5	
1	9	
2	7	
3	4	
4	3	
5	2	

3 The table gives some information about the number of tracks on each CD. Copy and complete the table.

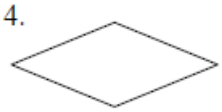
a) Write down the mode.
b) How many CDs were there?
c) How many tracks were there on these CDs?
d) Calculate the mean number of tracks per CD.

Number of tracks	Frequency	
11	1	
12	3	
13	0	
14	2	
15	4	

Stage D – Topic 10 - Transformations

LO1: To be able to transform shapes using symmetry and rotations

1 Draw the lines of symmetry on each shape

1. 
2. 
3. 
4. 
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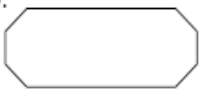
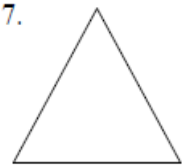
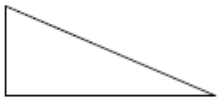
6. 
7. 
8. 
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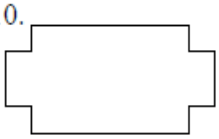
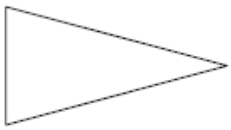
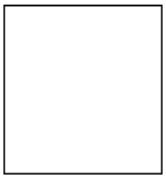
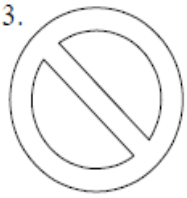
10. 
11. 
12. 
13. 
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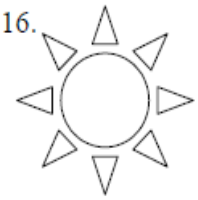
16. 
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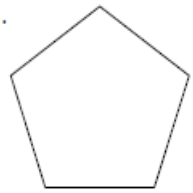
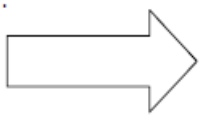
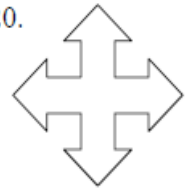
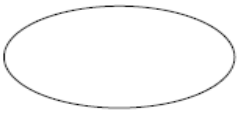
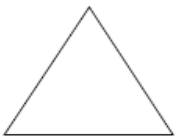
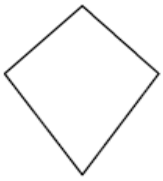
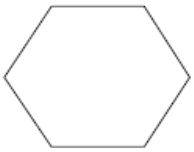
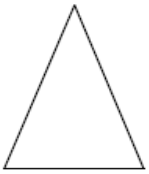
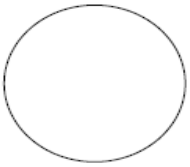
18. 
19. 
20. 

2 State the order of rotational symmetry for each shape

1). 
2). 
3). 
4). 
5). 
6). 
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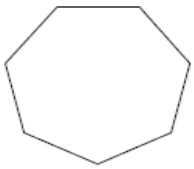
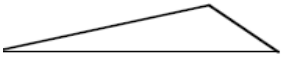
8). 
9). 
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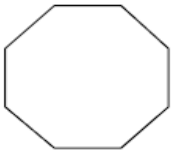
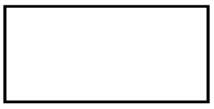
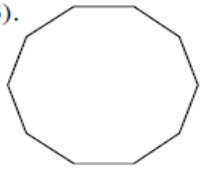
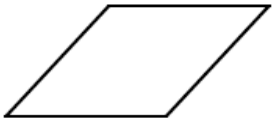
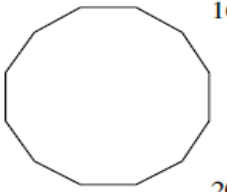
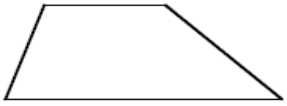
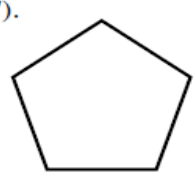
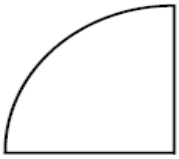
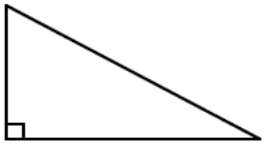
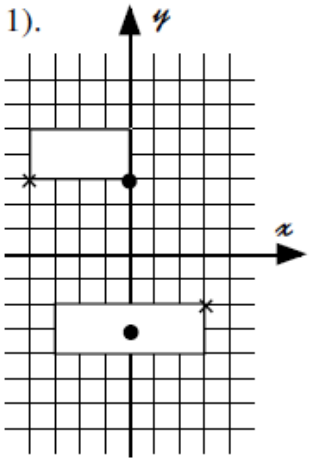
11). 
12). 
13). 
14). 
15). 
16). 
17). 
18). 
19). 
20). 

3	Rotate the shapes about the given centre of rotation

Rotate 90° Clockwise for Questions 1, 2, 3 and 4.

1).



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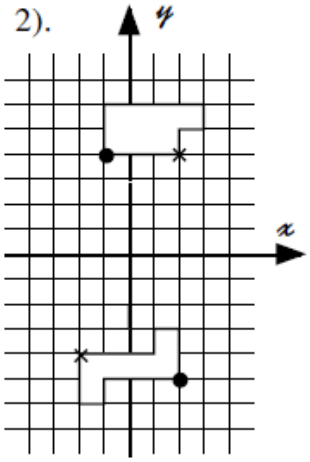

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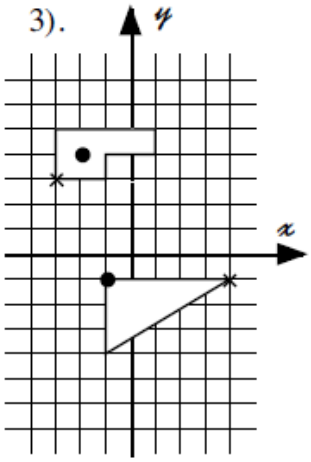

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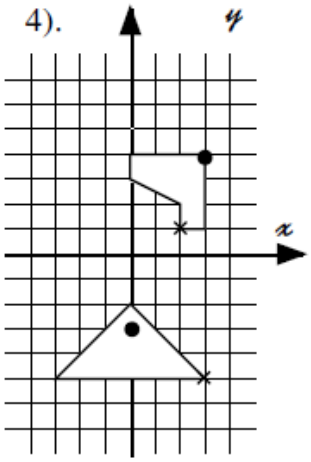
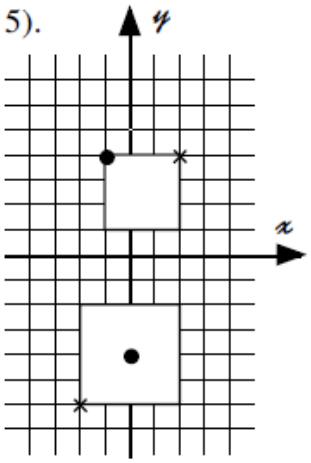
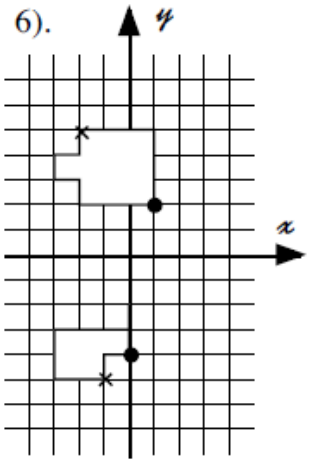


Rotate 90° Anticlockwise for Questions 5, 6, 7 and 8.

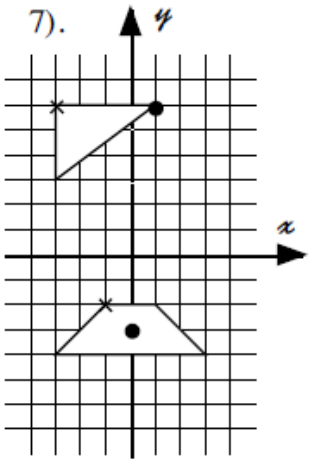
5).



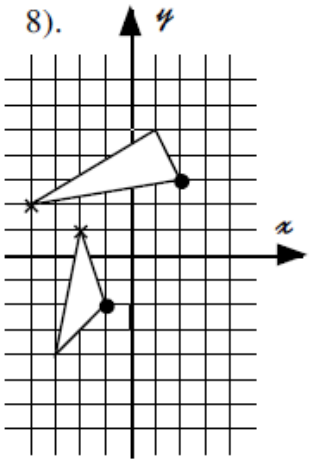
6).



7).



8).



STAGE D ANSWERS

Stage D – Topic 1 - Fractions Answers

LO1: To be able to add and subtract fractions by writing them with a common denominator

1

1). $\frac{7}{8}$ 2). $\frac{5}{6}$ 3). $\frac{1}{8}$ 4). $\frac{7}{9}$

5). $\frac{1}{4}$ 6). $\frac{2}{3}$ 7). $\frac{2}{9}$ 8). $\frac{3}{8}$ 9). $\frac{1}{12}$

10). $\frac{11}{15}$ 11). $\frac{3}{10}$ 12). $\frac{13}{15}$ 13). $\frac{11}{12}$ 14). $\frac{17}{20}$

15). $\frac{1}{21}$ 16). $\frac{13}{24}$ 17). $\frac{5}{18}$ 18). $\frac{7}{30}$ 19). $1\frac{11}{20}$

2

1). $1\frac{3}{20}$ 2). $1\frac{2}{21}$ 3). $\frac{29}{30}$ 4). $1\frac{7}{12}$ 5). $\frac{1}{3}$

6). $1\frac{1}{10}$ 7). $\frac{1}{2}$ 8). $\frac{1}{3}$ 9). $\frac{1}{5}$ 10). $1\frac{5}{42}$

11). $\frac{1}{2}$ 12). $\frac{2}{5}$ 13). $\frac{19}{30}$ 14). $\frac{4}{21}$ 15). $\frac{1}{12}$

3

1) $7\frac{3}{5}$ 2) $3\frac{11}{20}$ 3) $\frac{5}{6}$ 4) $4\frac{8}{9}$

4

$3\frac{5}{8}$

5

$1\frac{1}{2}$

6

$7\frac{1}{2}$

LO2: To be able to calculate a fraction of an amount

1

1). 26 2). 18 3). 45 4). 16 5). 48 6). 84 7). 64 8). 81

9). 88 10). 88 11). 129 12). 228 13). 184 14). 207 15). 273 16). 700

17). 438 18). 84 19). 51 20). 128

2

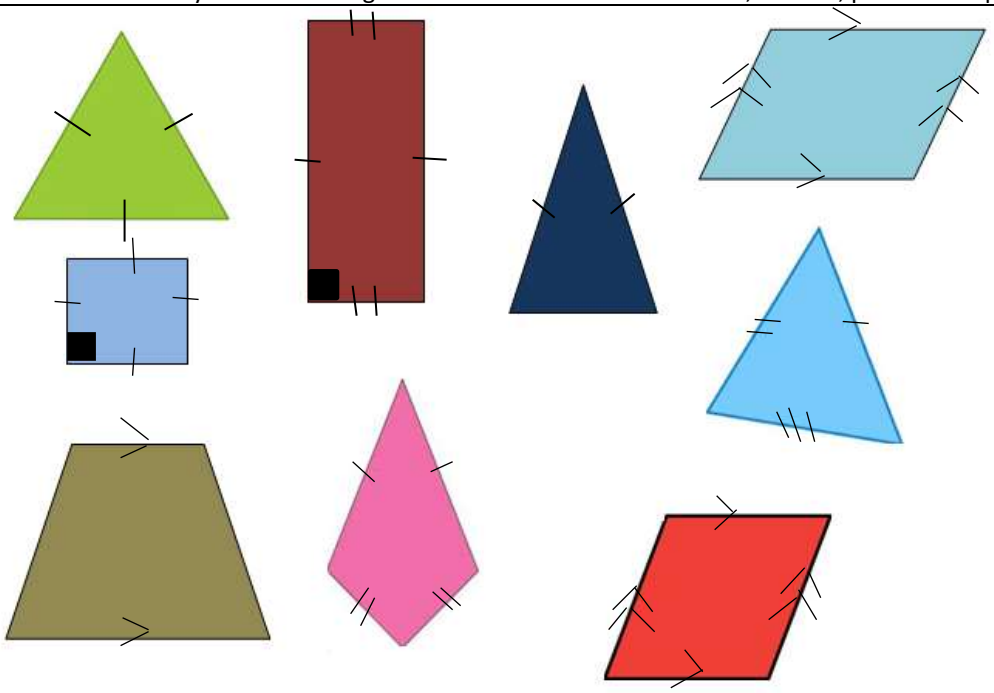
21). $26\frac{6}{11}$ 22). $26\frac{1}{10}$ 23). $38\frac{1}{9}$ 24). $59\frac{3}{8}$ 25). $48\frac{5}{12}$

26). $17\frac{13}{15}$ 27). $33\frac{11}{13}$ 28). $70\frac{7}{12}$ 29). $62\frac{5}{14}$ 30). $76\frac{4}{15}$

Stage D – Topic 2 – 2D shapes Answers

LO1: To be able to identify and state using mathematical notation horizontal, vertical, parallel and perpendicular lines

1



LO2: To be able to describe quadrilaterals using their properties

1

	Square	Rectangle	Parallelogram	Rhombus	Kite	Trapezium
4 Right angles						
Opposite angles are equal						
Opposite sides are equal						
2 pairs of parallel sides						
Lines of symmetry ?						
Rotational Symmetry						
Diagonals cross at right angles						
1 pair of parallel sides						

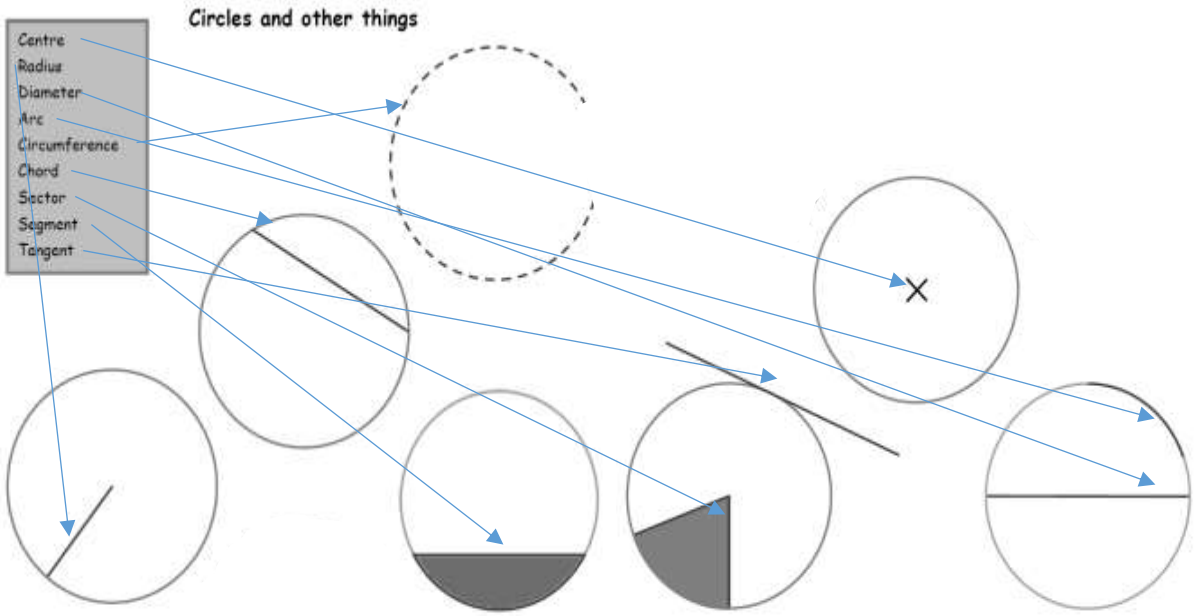
LO3 To be able to identify any congruent shapes and prove for simple shapes

1	C and E
2	A AND E, C AND G
3	*AD* = *CD* equal sides *AB* = *CB* equal sides *BD* is common *ADB* is congruent to *CDB* (SSS)

Stage D – Topic 3 - Circles Answers

LO1: To be able to name parts of a circle

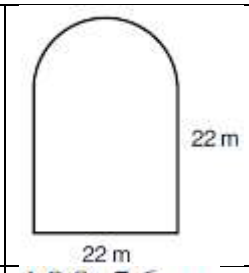
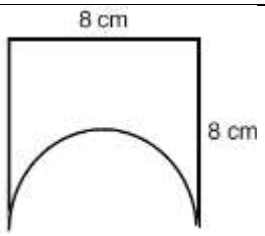
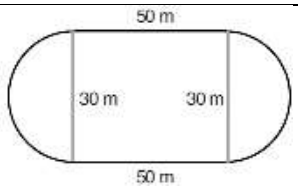
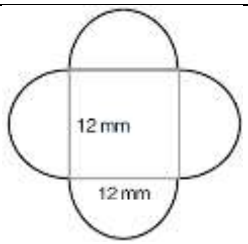
1	From the list in the grey box, label the parts of the circle



LO2: To be able to know and use the formula for the circumference of a circle

1	Use $\pi = 3.14$. Calculate the circumference of each circle to 2 d.p., if the diameter is : a). 12 cm b). 20 cm c). 35 cm d). 90 cm e). 2 cm f). 6.5 cm g). 10.5 mm h). 0.5 Km i). 105.1 m j). 6.35 m
Ans	a). 37.68 cm b). 62.8 cm c). 109.9 cm d). 282.6 cm e). 6.28 cm f). 20.41 cm g). 32.97 mm h). 1.57 Km i). 330.01 m j). 19.94 m
2	Using the π button on your calculator, calculate the circumference of these circles to 2 d.p. when the radius is: a). 10 cm b). 55 cm c). 12 m d). 560 m e). 490 Km f). 0.6 mm g). 0.125 m h). 35.8 mm i). 345 Km j). 80.04 Km
Ans	a). 62.83 cm b). 345.58 cm c). 75.40 m d). 3518.58 m e). 3078.76 Km f). 3.77 mm g). 0.79 m h). 224.94 mm i). 2167.70 Km j). 502.91 Km
3	The minute hand on a watch is 1.5 cm long. What distance does the tip of this hand travel through in a). 1 hour ? b). 1 day ?
Ans	a). 9.42 cm b). 226.20 cm
4	A farmer has a circular field which is 250 metres across. He wishes to put a fence around the field. What length of fencing does he require ?
Ans	785 m

5	A car tyre has a 55 cm radius. a). If the wheel travels through 1 complete revolution, how far has the car travelled? b). The wheel rotates 2500 times, how far has the car travelled i). in cm, ii). in m, iii). in Km ?
Ans	a). 345.575 cm b). i). 863937.98 cm ii). 8639.38 m iii). 8.64 Km
6	The following shapes are made up of full circles, semi-circles or quarter circles. Find the circumference of each of the following shapes.

7	a		b		c		d	
Ans		100.56 m		87.41 mm		194.25 m		75.40 mm

8	Susan makes a trundle wheel. The radius of the wheel is 0.2 metres. She pushes the wheel across the playground. The wheel makes 30 complete revolutions. Find the distance across the playground.
Ans	37.70 m

Stage D – Topic 4 – Scatter graph Answers	
LO1: To be able to construct and interpret scatter graphs	
1	a) Points plotted correctly b) Positive correlation c) Line drawn evenly through points, ignoring outliers d)
2	A) People who are good at maths are usually good at music B) As you get older your reaction speed slows down C) There is no connection between height and hair length of 14 yr old girls
3	a) Line drawn evenly through points, ignoring outliers b) As the midday temperature increases so do the number of ice creams sold
4	a) Negative correlation b) 1, note that in order to gain full marks a line of best fit and guidance lines must be present on scatter graph

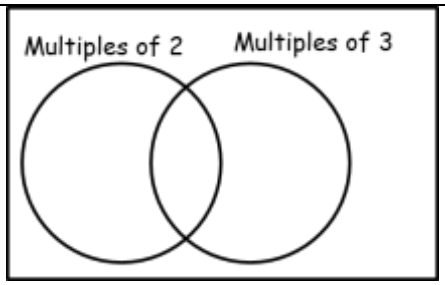
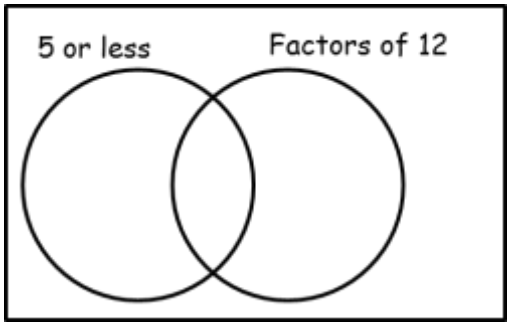
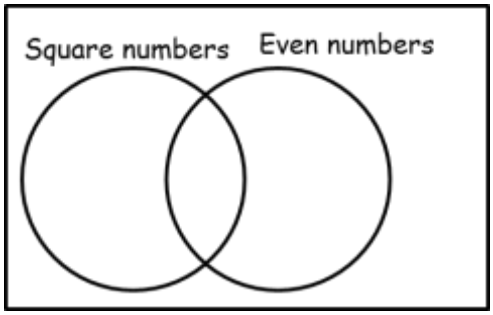
Stage D – Topic 5 - Graphing Answers	
LO1: To be able to plot conversion graphs in various contexts	
1	a) 280 Yen b) £9.20 c) £10 = 1300 Yen Total cost in the UK £60 = 7800 Yen Total cost in Japan = 8100 Yen Mimi is not correct. The cost in Japan is greater than the cost in the UK
2	a) 15 feet b) 8 yards c) 30 feet d) 20 feet = 6 2/3 yard David is not correct. Esra's living room is longer.
LO2: To be able to plot and interpret graphs of real life situations	
1	a) c
2	a) i = B ii = E iii = D iiii = A
3	b) 10:10 c) 13.5 km d) 30 minutes e) Straight line drawn to 11:50 on x axis f) 40 kph

Stage D – Topic 6 - Calculations Answers																
LO1: To be able to use BIDMAS to solve calculations with squares and 3 operations																
1	1).	19	2).	19	3).	8	4).	2	5).	10	6).	1	7).	5	8).	20
	9).	14	10).	15	11).	16	12).	3	13).	30	14).	1	15).	5	16).	11
	17).	4	18).	8	19).	5	20).	5	21).	13	22).	1	23).	2	24).	32
	25).	25	26).	49	27).	16	28).	2	29).	64	30).	59	31).	20	32).	29
	33).	48	34).	5	35).	27	36).	4	37).	9	38).	1000	39).	8	40).	100
	41).	7	42).	4	43).	17	44).	63	45).	18	46).	21	47).	4	48).	2
	49).	51	50).	30	51).	13	52).	9	53).	15	54).	3	55).	72	56).	28
LO1: To be able to use BIDMAS involving adding and subtracting negatives																
1	a) -17 b) 73 c) 33 d) -11															

Stage D – Topic 7 - Percentages Answers																
LO1: To be able to express a quantity as a percentage of an amount																
1	1).	25	2).	20	3).	10	4).	50	5).	40	6).	20	7).	37	8).	25
	9).	70	10).	75	11).	72	12).	88	13).	60	14).	20	15).	45	16).	60
	17).	4	18).	90	19).	75	20).	85	21).	65	22).	90	23).	25	24).	56
2	20%															
3	12.5%															
4	62.5%															

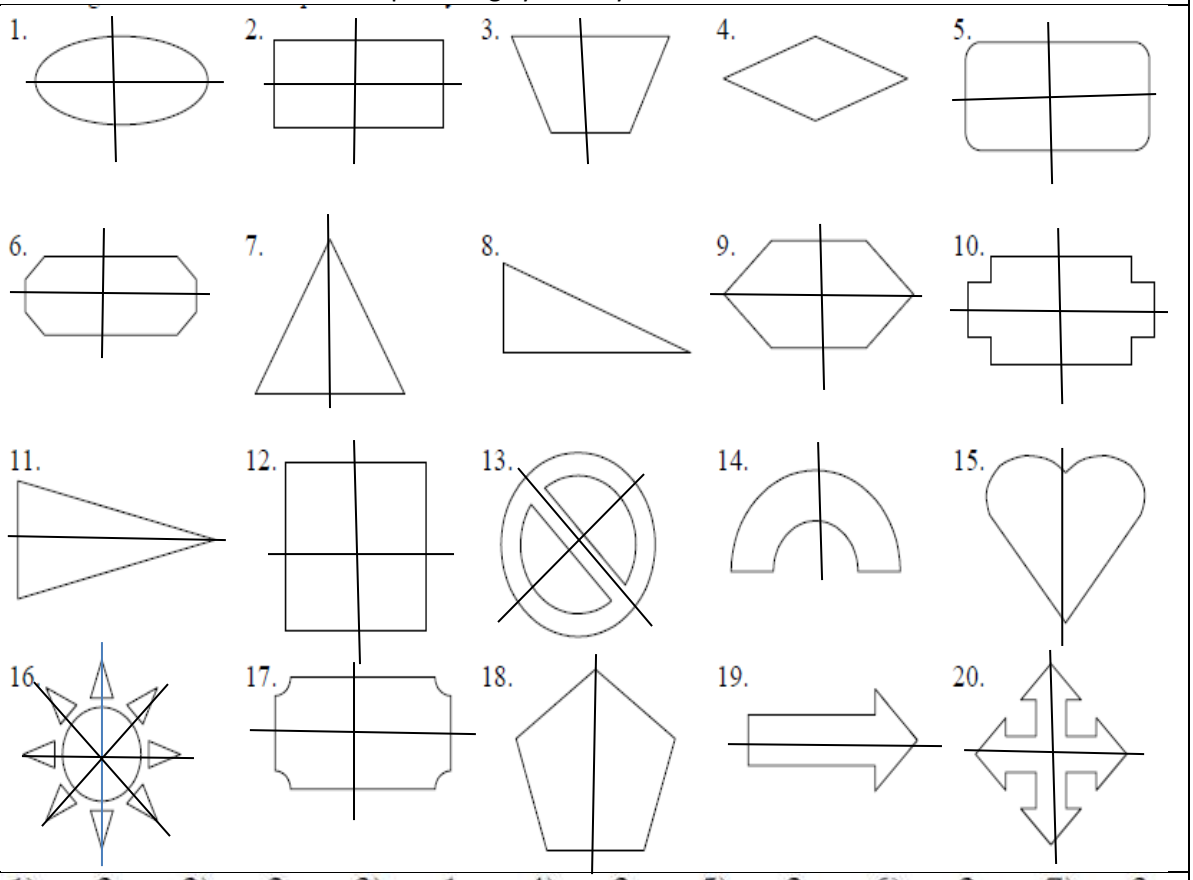
LO2: To be able to calculate % increase/decrease without a calculator	
1	a) 550 b) 352 c) 92 d) 90
2	a) 360 b) 342 c) 119 d) 28
3	£345
4	£6120
LO3: To be able to calculate % increase/decrease using a multiplier	
1	1). 36 2). 98 3). 69 4). 126 5). 444 6). 208 7). 162 8). 814 9). 227.8 10). 313.9 11). 748.8 12). 105.3 13). 739.2 14). 1075.2 15). 799.2 16). 607.6 17). 556.8 18). 499.8
2	1). 48 2). 72 3). 68 4). 209 5). 260 6). 768 7). 78 8). 66 9). 244.2 10). 62.1 11). 307.2 12). 66.4 13). 300.8 14). 668.8 15). 717.6 16). 389.4 17). 33.6 18). 467.2
3	£92.12
4	£82.77
5	£637.2

Stage D – Topic 8 - Angle Answers	
LO1: To be able to calculate angles in parallel lines	
1	1). $a = 132^\circ$ 2). $b = 32^\circ$ 3). $c = 28^\circ$ 4). $d = 112^\circ$ 5). $a = 54^\circ, b = 54^\circ$ 6). $a = 73^\circ, b = 107^\circ$ 7). $a=55^\circ, b = 55^\circ$ 8). $a = 128^\circ, b = 52^\circ$ 9). $a = 127^\circ, b = 53^\circ, c = 53^\circ$ 10). $a = 64^\circ, b = 64^\circ, c = 116^\circ$ 11). $a = 135^\circ, b = 45^\circ, c = 135^\circ, d = 135^\circ$ 12). $a = 102^\circ, b = 102^\circ, c = 78^\circ, d = 78^\circ$
2	1). $e = 143^\circ$ 2). $w = 72^\circ$ 3). $c = 169^\circ$ 4). $t = 132^\circ$ 5). $u = 64^\circ$ 6). $e = 123^\circ$ $f = 123^\circ$ 7). $u = 44^\circ$ $v = 136^\circ$ 8). $s = 131^\circ$ $t = 49^\circ$ 9). $a = 96^\circ$ $b = 96^\circ$ 10). $x = 33^\circ$ $y = 33^\circ$ 11). $c = 19^\circ$ $d = 161^\circ$
3	8). $m = 21^\circ, n = 69^\circ, p = 159^\circ, q = 159^\circ$ 9). $r = 86^\circ$ 10). $s = 107^\circ, t = 33^\circ$ 11). $u = 138^\circ, v = 23^\circ$ 12). $w = 45^\circ, x = 135^\circ$ 13). $y = 23^\circ, z = 23^\circ$ 14). $a = 45^\circ, b = 135^\circ$ 15). $c = 13^\circ, d = 28^\circ, e = 34^\circ, f = 118$ 16). $g = 58^\circ, h = 76^\circ, i = 134, j = 61^\circ$
LO2: To be able to calculate internal and external angles of regular polygons	
1	a). 1620 b). 2160 c). 3060 d). 3780 e). 5580 f). 6480 g). 8100 h). 8820 i). 21240 j). 27000
2	a). 13 b). 17 c). 22 d). 53 e). 28 f). 46 g). 29 h). 106 i). 77 j). 138
3	a). 45 b). 20 c). 30 d). 15 e). 9 f). 10 g). 4.8 h). 14.4 i). 4.5 j). 11.25
4	a). 5 b). 9 c). 20 d). 15 e). 30 f). 72 g). 45 h). 16 i). 48 j). 25

Stage D – Topic 9 - Probability Answers	
LO1: To be able to construct and use sample space diagrams	
1	a) ¼ b) ¼ c) ½
2	a) 1/12 b) 1/12 c) 0
3	a) 1/8 b) ¼ c) 0 d) 1/16
4	a) 1/30 b) 1/6 c) 2/15 d) 1/6
LO2: To be able to construct and use Venn diagrams	
1	a)  b)  c) 
2	a) b) 1/12 c) 5/12 d) 1/3 e) 1/6 f) 5/6 g) 3/4
LO3: To be able to construct and use frequency tables	
1	a) 2 b) 32 c) 2.375
2	a) 1 b) 30 c) 1.9
3	a) 15 b) 10 c) 135 d) 13.5

Stage D – Topic 10 - Transformations Answers

LO1: To be able to transform shapes using symmetry and rotations



1).	2	2).	2	3).	1	4).	2	5).	2	6).	2	7).	3
8).	0	9).	2	10).	2	11).	1	12).	4	13).	2	14).	1
15).	1	16).	8	17).	2	18).	5	19).	1	20).	4	21).	2

1).	(0,7) (1,-6)	2).	(-1,1) (3,-1)	3).	(-3,5) (-1,-6)	4).	(0,5) (-2,-6)
5).	(-1,7) (2,-6)	6).	(-2,-1) (1,-5)	7).	(1,2) (-1,-4)	8).	(3,-3) (-4,-3)