STAGE E LEARNING OBJECTIVES

Learning Outcome	Tier	R	Y	G
Topic 1: Fractions (Core)				
LO1: To be able to multiply fractions	F	R	Y	G
LO2: To be able to divide fractions	F	R	Y	G
Topic 2: Percentages (Core)				
LO1: To be able to calculate proportional change	F	R	Y	G
LO2: To be able to calculate repeated proportional change	F+	R	Y	G
Topic 3: Bearings				
LO1: To be able to calculate, measure and use bearings to describe direction	F	R	Y	G
Topic 4: Probability (Core)				
LO1: To be able to calculate the probability of successive independent events	F+	R	Y	G
LO2: To be able to use and apply an understanding of experimental probability	F/F+	R	Y	G
Topic 5: Averages and spread				
LO1: To be able to interpret the averages and spread of data sets	F	R	Y	G
LO2: To be able to calculate averages from frequency tables	F	R	Y	G
Topic 6: Pie charts				
LO1: To be able to construct and interpret pie charts	F	R	Y	G
Topic 7: Area and volume (Core)				
LO1: To be able to calculate lengths and areas of parts of circles	F	R	Y	G
LO2: To be able to calculate the volume of a cylinder	F	R	Y	G
LO3: To be able to calculate the surface area of a cuboid	F	R	Y	G
Topic 8: Fractions (Core)				
LO1: To be able to use BIDMAS to calculate solutions	F	R	Y	G
LO2: To be able to order and compare fractions, decimals and percentages	F	R	Y	G
Topic 9: Ratio and proportion (Core)				
LO1: To be able to use knowledge of ratio and proportion to solve problems in context.	F	R	Y	G
LO2: To be able to divide a quantity into two or more parts and solve problems involving ratio	F	R	Y	G
Topic 10: Properties of numbers (Core)				
LO1: To be able to find the HCF and LCM of two numbers	F	R	Y	G
LO2: To be able to use prime factors	F	R	Y	G
LO3: To be able to round to the appropriate number of significant figures	F	R	Y	G

F - Foundation
F+ - Additional foundation
H - Higher

Stage E – Topic 1 - Fractions

LO1: To be able to multiply fractions

Work out the following

1

a) $\frac{1}{2} \times \frac{1}{2}$

b) $\frac{2}{3} \times \frac{1}{3}$

c) $\frac{3}{5} \times \frac{2}{7}$

d) $\frac{4}{7} \times \frac{5}{9}$

2

a) $\frac{1}{2} \times \frac{1}{2}$

b) $\frac{2}{3} \times \frac{1}{3}$

c) $\frac{3}{5} \times \frac{2}{7}$

d) $\frac{4}{7} \times \frac{5}{9}$

3

a) $1\frac{1}{2} \times \frac{1}{3}$

b) $\frac{2}{3} \times 2\frac{2}{5}$

c) $3\frac{1}{2} \times 1\frac{1}{2}$

d) $1\frac{2}{7} \times 3\frac{1}{3}$

LO2: To be able to divide fractions

1

a) $\frac{2}{5} \div \frac{3}{4}$

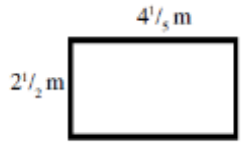
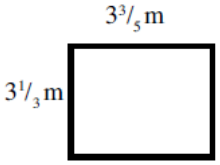
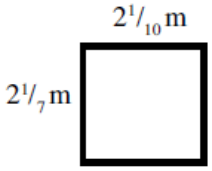
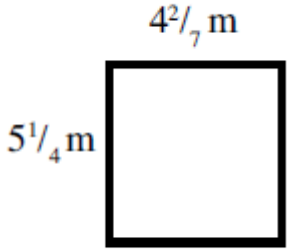
b) $\frac{1}{7} \div \frac{3}{5}$

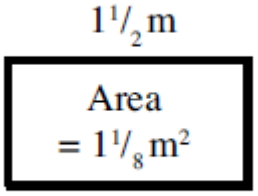
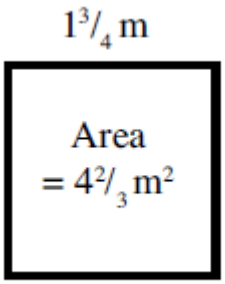
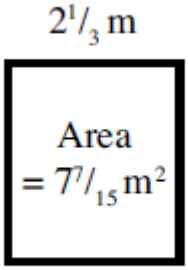
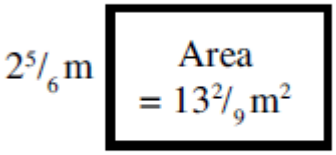
c) $\frac{4}{9} \div \frac{1}{2}$

d) $\frac{3}{10} \div \frac{5}{9}$

2	a) $\frac{1}{2} \div \frac{1}{3}$ b) $\frac{3}{7} \div \frac{4}{7}$ c) $\frac{1}{9} \div \frac{2}{3}$ d) $\frac{2}{5} \div \frac{3}{10}$
3	a) $1\frac{1}{3} \div \frac{1}{4}$ b) $\frac{3}{5} \div 2\frac{2}{3}$ c) $3\frac{2}{3} \div 1\frac{1}{5}$ d) $4\frac{1}{2} \div 1\frac{1}{2}$
4	Andy earns £96.27 a week. After deductions from his wage he takes home $^{2}/_{3}$ of the wage. How much does he take home ?
5	A beach bucket that holds 2400 ml of water is filled to the top. It has a hole in it, and as it is carried around the garden it loses $^{3}/_{5}$ of the water. How much water a). has been lost, b). is still in the bucket ?
6	A brand new car cost Sue £12462. After a week she takes it back to the garage and they tell her it is only worth $^{5}/_{6}$ of what she paid for it. How much a). is the car now worth, b). has it depreciated in value ?
7	Jenny has 9Kg of flour. She drops $^{1}/_{4}$ of it. What weight of flour has she dropped ?
8	At the village fete 23 cakes are sliced ready to eat. At the end of the fete $^{3}/_{4}$ of the cake had been sold. How much had been a). sold b). left ?
9	$7^{3}/_{5}$ Kg of coffee is put into $1^{1}/_{3}$ Kg packets. How many packets will be needed ? Give your answer as a). a fraction, b). the number of packets needed.
10	

11	A field is $17\ ^{2}/_{5}$ hectares. The farmer ploughs $1^{1}/_{5}$ hectares a day of the field. How many days will it take him to plough the field ? Give your answer as a). a fraction, b). the number of days needed.

12	Find the area of the following shapes			
	a	b	c	d
				

13	For each of the following areas, find the size of the missing side.			
	a	b	c	d
				

Stage E – Topic 2 - Percentages

LO1: To be able to calculate proportional change

Work out the following

1	A car dealer is comparing his sales over the past two years. In 2006, he sold 175 cars. In 2007, he sold 196 cars. Work out the percentage increase in the number of cars sold.
2	In September 2005, the number of pupils attending MathsWatch College was 1352. In September 2006, the number of pupils attending MathsWatch College was 1014. Work out the percentage decrease in the number of pupils attending MathsWatch College.
3	Shelley bought some items at a car boot sale and then sold them on ebay. Work out the percentage profit or loss she made on each of these items. a) Trainers bought for £15, sold for £20 b) DVD recorder bought for £42, sold for £60.90 c) Gold necklace bought for £90, sold for £78.30 d) A DVD collection bought for £120, sold for £81.60

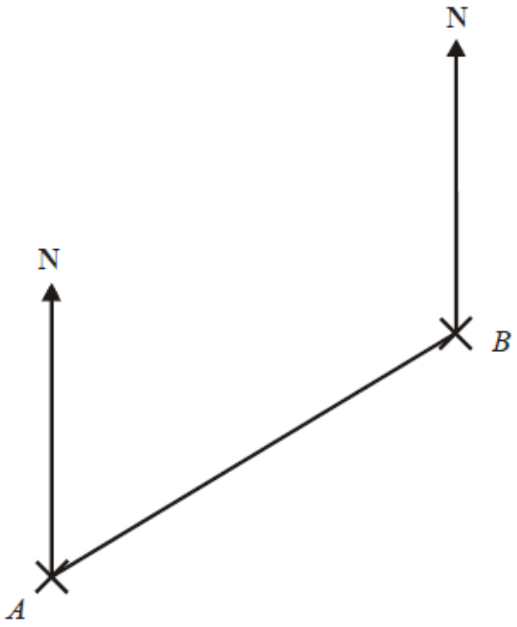
4	A car dealer offers a discount of 15% off the normal price of a car for cash. Emma pays £6120 cash for a car. Calculate the normal price of the car.
5	In a sale, normal prices are reduced by 20%. The sale price of a shirt is £26 Calculate the normal price of the shirt.
6	The price of all rail season tickets to London increased by 4%. a) The price of a rail season ticket from Oxford to London increased by £122.40 Work out the price before this increase. b) After the increase, the price of a rail season ticket from Newport to London was £2932.80 Work out the price before this increase.
LO2: To be able to calculate repeated proportional change	
1	In a sale, normal prices are reduced by 20%. The sale price of a shirt is £26 Calculate the normal price of the shirt.
2	A car dealer offers a discount of 15% off the normal price of a car for cash. Emma pays £6120 cash for a car. Calculate the normal price of the car.
3	In a sale, normal prices are reduced by 13%. The sale price of a DVD recorder is £108.75 Calculate the normal price of the DVD recorder.
4	The price of all rail season tickets to London increased by 4%.
a	The price of a rail season ticket from Oxford to London increased by £122.40 Work out the price before this increase.
b	After the increase, the price of a rail season ticket from Newport to London was £2932.80 Work out the price before this increase.

Stage E – Topic 3 - Bearings

LO1: To be able to calculate, measure and use bearings to describe direction

1

The diagram shows the position of two telephone masts, A and B, on a map.



a) Measure the bearing of B from A.

Another mast C is on a bearing of 160° from B.
On the map, C is 4 cm from B.

b) Mark the position of C with a cross and label it C.

2

The diagram shows the positions of two boats, P and Q.

The bearing of a boat R from boat P is 050°
The bearing of boat R from boat Q is 320°

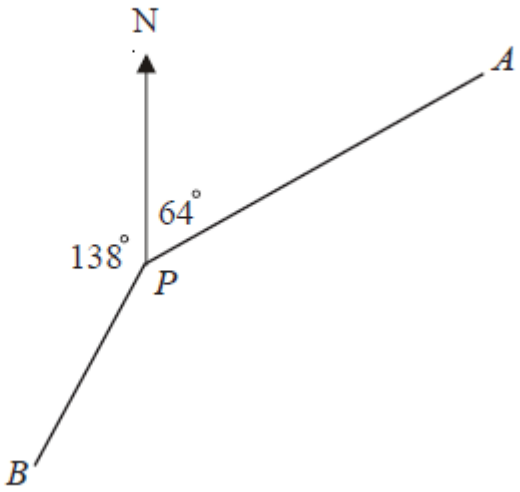
In the space above, draw an accurate diagram to show the position of boat R.
Mark the position of boat R with a cross (×). Label it R.

3

Work out the bearing of

a) B from P

b) P from A



4

School B is due east of school A.
C is another school.
The bearing of C from A is 065°.
The bearing of C from B is 313°.

Complete the scale drawing below.
Mark with a cross the position of C.

5

In the diagram, point A marks the position of Middlewitch.

The position of Middlemarch is to be marked on the diagram as point B

On the diagram, mark with a cross the position of B given that:

B is on a bearing of 320° from A and

B is 5 cm from A

Stage E – Topic 4 - Probability

LO1: To be able to calculate the probability of successive independent events

1

Each morning Bob and Bill catch the same bus. The probability that Bob catches the bus is 0.9 and for Bill it is 0.7. The probabilities are independent of each other.

a). Copy and **complete** the tree diagram.

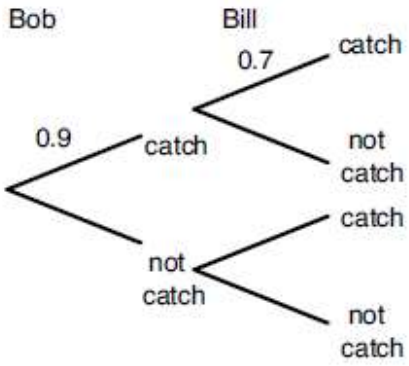
b). Calculate the probability that on a given day :-

i). they both catch the bus,

ii). Bob catches the bus, but not Bill,

iii). neither catch the bus,

iv). at least one of them catch the bus.



2

There are 10 books on a shelf in a library. Seven are fiction and three are nonfiction. A member of the public takes a book at random, looks at it, and then replaces it on the shelf. Another member of the public then takes a book at random from the shelf.

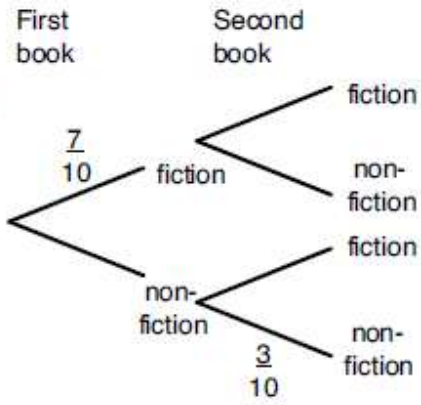
a). Copy and **complete** the tree diagram.

b). What is the probability the two books taken are :-

i). both nonfiction,

ii). both fiction,

iii). one of each ?



3

Four fifths of cars on roads today are of foreign manufacture. A pupil looks out of the window during Science and watches two cars go by. Draw a probability tree for this showing all the probabilities and outcomes.

Hence find the probability that :-

a). both cars are British,

b). both cars are foreign,

c). there is one of each,

d). at least one car is not British.

4

In a bag are 5 red, 3 blue and 4 green counters of equal size. One is picked, the colour noted and then put back into the bag. A second is then drawn. Draw a probability tree for this and show all the probabilities and outcomes.

Hence find the probability that :-

a). both counters are red,

b). one red and one green are drawn,

c). at least one blue is picked,

d). at least one red is picked,

e). neither are green.

LO2: To be able to use and apply an understanding of experimental probability

1

Ahmad does a statistical experiment.
He throws a dice 600 times.
He scores one, 200 times.
Is the dice fair? Explain your answer

2

Chris has a biased coin.
The probability that the biased coin will land on a tail is 0.3
Chris is going to flip the coin 150 times.
Work out an estimate for the number of times the coin will land on a tail.

3

On a biased dice, the probability of getting a six is $\frac{2}{3}$.

The dice is rolled 300 times.
Work out an estimate for the number of times the dice will land on a six.

4

On a biased dice, the probability of getting a three is 0.5
The dice is rolled 350 times.
Work out an estimate for the number of times the dice will land on a three.

5

Jenny throws a biased dice 100 times.
The table shows her results.

Score	Frequency
1	15
2	17
3	10
4	24
5	18
6	16

a

She throws the dice once more.
Find an estimate for the probability that she will get a four.

b

If the dice is rolled 250 times, how many times would you expect to get a five?

Stage E – Topic 5 - Averages and spreads

LO1: To be able to interpret the averages and spread of data sets

1 Kaya made a list of his homework marks.

3 2 3 4 1 4 5 4

a Write down the mode of Kaya's marks.

b Work out his mean homework mark.

2 Lydia rolled an 8-sided dice ten times.
Here are her scores.

5 1 2 5 3 8 6 6 3 2

a Work out Lydia's median score.

b Work out the mean of her scores.

3 In a two-week period, a train was this many minutes late each day:

3 0 0 0 7 4 5 2 0 1 14 0 5 1

a What was the mean average number of minutes late?

b What was the median average number of minutes late?

4 Two small Year 10 classes, Set A and Set B, sat the same Science test.

Set A had these scores for the test:

63%, 71%, 48%, 95%, 46%, 82%, 77%, 36%, 73%

Set B had these scores:

58%, 63%, 85%, 61%, 59% 38%, 90%, 84%, 75%, 48%

How much bigger was Set B's mean average score than Set A's mean average score?
Give your answer correct to 1 decimal place.

5 A rugby team played six games.
The mean score for the six games is 15
The rugby team played one more game.
The mean score for all seven games is 16
Work out the number of points the team scored in the seventh game.

LO2: To be able to calculate averages from frequency tables

1 Tom carried out a survey of the number of school dinners 34 students had in one week.

The table shows this information.

Number of school dinners	Frequency	
0	0	
1	7	
2	14	
3	7	
4	4	
5	2	

a Calculate the mean number of school dinners.
Give your answer to 1 decimal place.

2 Tony asked 32 men about the number of children they had.

The table shows information about his results.

Number of children	Frequency	
0	10	
1	5	
2	7	
3	8	
4	2	
more than 4	0	

a Find the mode.

b Calculate the mean to 1 decimal place.

3 The number of pens in each pupil's pencil case in a classroom has been counted.
The results are displayed in a table.

Number of pens	Number of pupils
0	4
1	6
2	7
3	5
4	3
5	1

a	Work out the total number of pens in the classroom.
b	Write down the modal number of pens in a pencil case.
c	Work out the mean number of pens in a pencil case.
d	Work out the range of the number of pens in a pencil case.

Stage E – Topic 6 - Pie charts

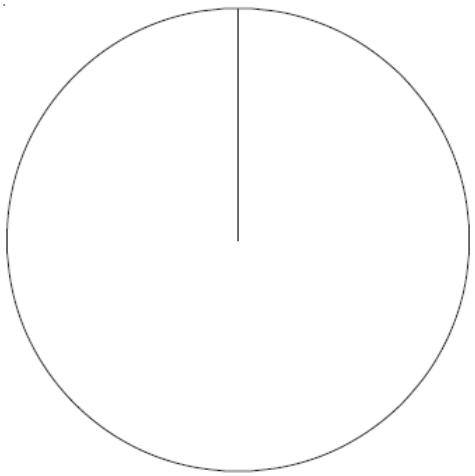
LO1: To be able to construct and interpret pie charts

1

Patrick asked some of his colleagues which was their favourite holiday destination.
The table shows the results.

City	Frequency
Alicante	8
Paris	7
Ibiza	15
St Lucia	1
Biarritz	9

Draw a pie chart to illustrate the information.

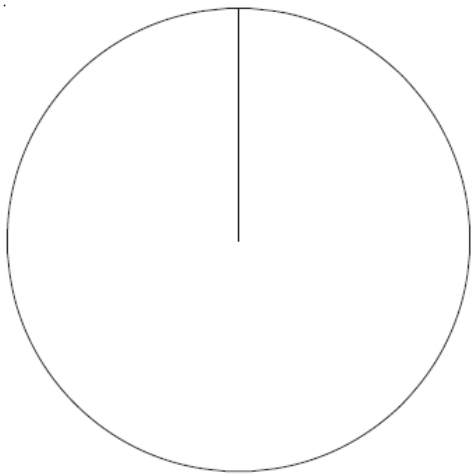


2

Brian asked 60 people which region their favourite rugby team came from.
The table shows the results.

Region	Frequency
Southern England	9
London	23
Midlands	16
Northern England	12
Total	60

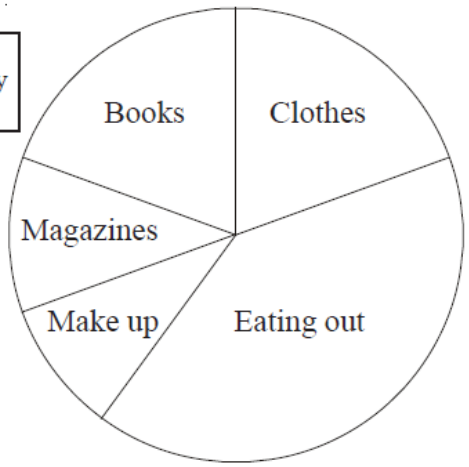
Draw a pie chart to illustrate the information.



3

3) Sophie represents her monthly expenses using a pie chart.

Diagram accurately drawn



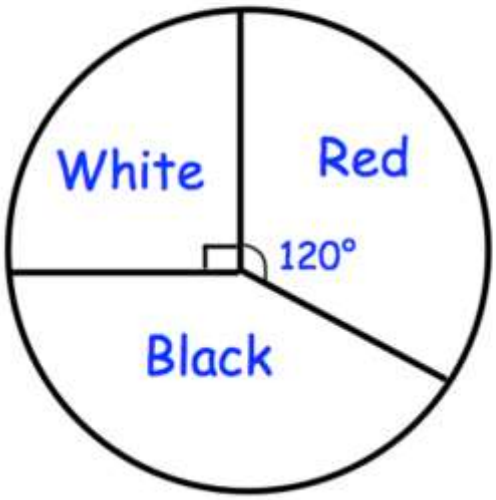
Numbers from her table have been rubbed out by mistake.
Use the pie chart to complete the table.

		Angle
Clothes	£35	
Eating out		
Make up	£17	34°
Magazines		
Books		
Total	£180	

4

A bag contains red, white and black counters.

The pie chart shows information about the counters in the bag.



a

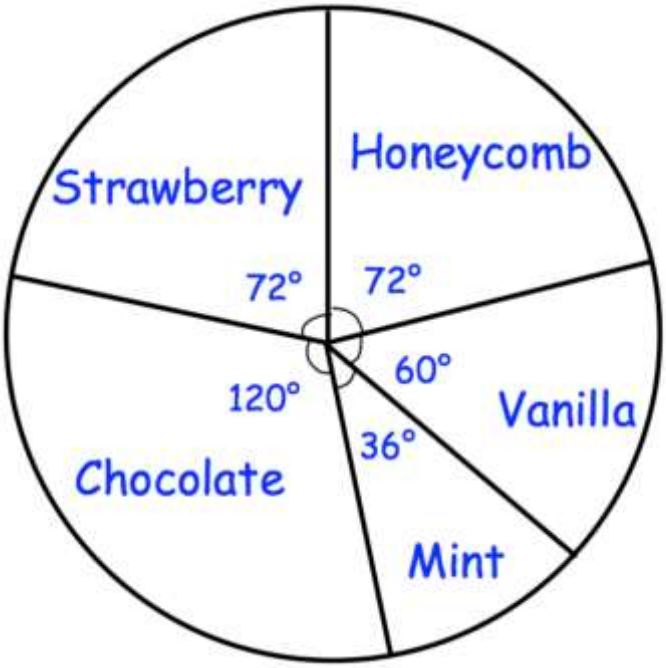
What fraction of the counters are white?
Give your answer in its simplest form

b

What fraction of the counters are red?
Give your answer in its simplest form

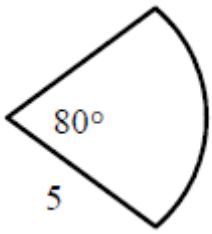
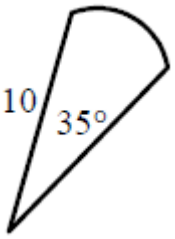
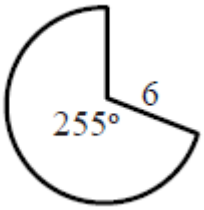
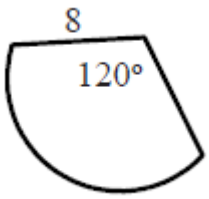
c

There are 24 counters in the bag
Work out how many are black?

5	The pie chart shows the flavours of ice cream sold by a shop in one day. There were a total of 270 ice creams sold. 
a	Calculate the number of vanilla flavoured ice creams sold?
b	Calculate the number of mint flavoured ice creams sold?
c	Calculate the number of strawberry flavoured ice creams sold?

Stage E – Topic 7- Area and Volume

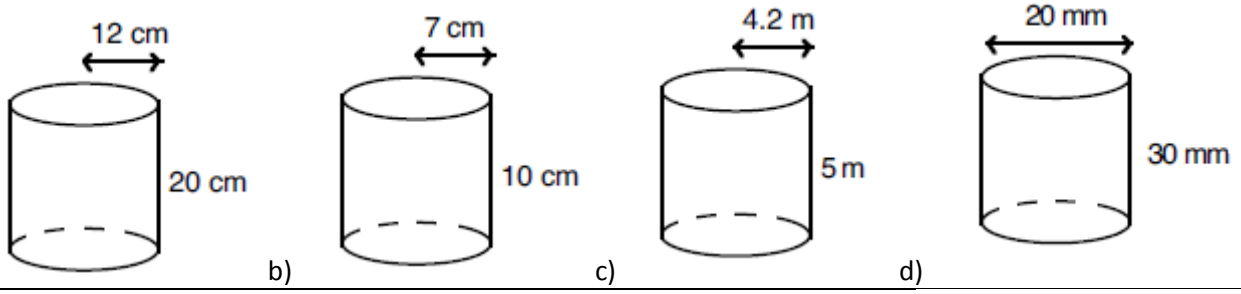
LO1: To be able to calculate lengths and areas of parts of circles

1	For each of the following sectors (all lengths are in cm) find,						
i	Their arc lengths				ii	Their areas	
	a		b		c		d	
2	Find the perimeters of each of the sectors shown in question 1 above.						
3	Use the formulae for length of an arc and area of a sector to fill in the blanks in the following table. Give missing lengths to the nearest cm, areas to the nearest cm^2, and angles to the nearest degrees.						

	Angle°	Radius (cm)	Arc length (cm)	Sector area (cm^2)
(a)	45	7		
(b)	30	20		
(c)	120		50	
(d)		10	1	
(e)	60		40	
(f)	240		100	
(g)		9		150
(h)	100			45
(i)			5	12.5
(j)			45	225

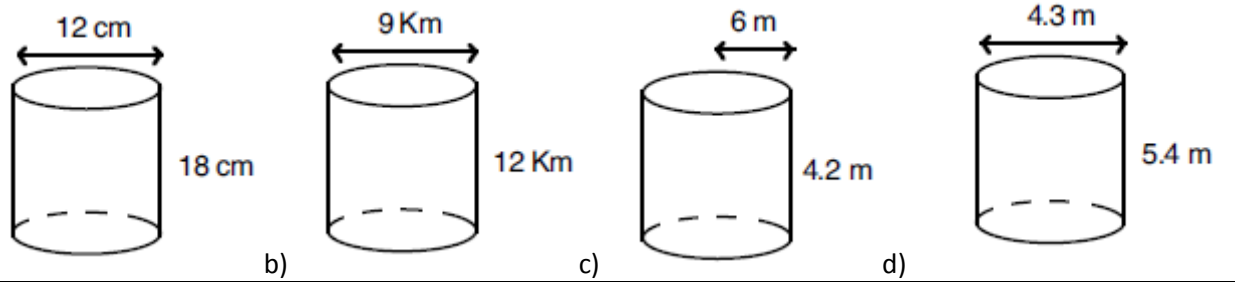
LO2: To be able to calculate the volume of a cylinder

1 Find the volume of each of these cylinders



a) b) c) d)

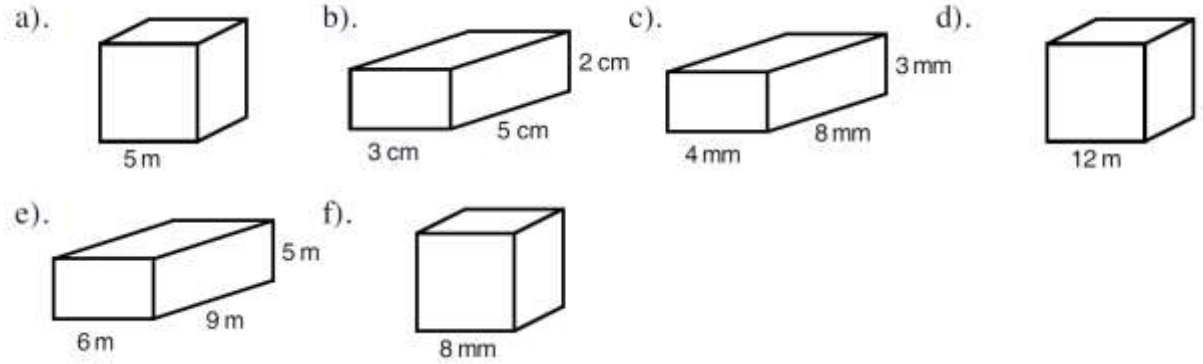
2



a) b) c) d)

LO3: To be able to calculate the surface area of a cuboid

1



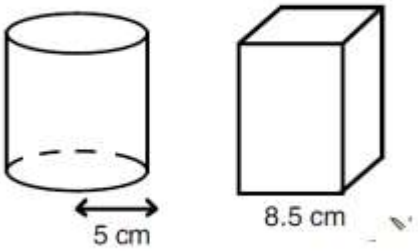
Mixed Problems

1

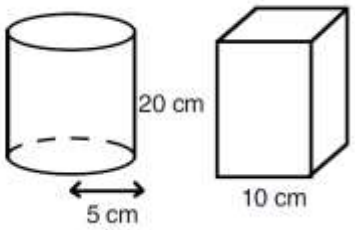
Dog food comes in two types of tins. A square based tin of side 8.5 cm and a circular based tin of radius 5 cm.

a). Calculate the area of the base of
   i). the square based tin,
   ii). the circular based tin.

b). The height of the square based tin is 15 cm.
The height of the circular based tin is 13 cm.
   i). Find the volumes of both tins.
   ii). Which holds the more and by how much ?



A circular can and a square based can both have the same height of 20 cm. The circular based can has a radius of 5 cm and the square based can has a side of length 10 cm. Both are used to hold soup.



a). i). Calculate the volume of each type of can in cm^3.

ii). Change these volumes to capacity in litres.

A School Kitchen pan can hold 32 litres of soup.

b). i). How many square based cans will it take to fill the pan ?

ii). How many circular based cans will it take to fill the pan ?

Stage E – Topic 9 - Ratio and Proportion	
LO1: To be able to use knowledge of ratio and proportion to solve problems in context.	
1	Simplify the following ratios
	a) 6 : 9 b) 10 : 5 c) 7 : 21 d) 4 : 24 e) 12 : 40 f) 4 : 2 : 8 g) 18 : 63 : 9
2	Write in the missing values for the following ratios
	a) 3 : 5 = 12 : ☐ b) 4 : 9 = ☐ : 27 c) ☐ : 7 = 16 : 14
3	The ratio of girls to boys in a class is 4 : 5. What fraction of the class are girls?
4	A model of a plane is made using a scale of 1 : 5.

a	If the real length of the plane is 20 m, what is the length of the model?
b	If the wings of the model are 1.2 m long, what is the actual length of the wings on the plane?
5	Lance goes on holiday to France. The exchange rate is £1 = 1.15 Euros. He changes £350 into Euros.
a	How many Euros should he get?
	In France, Lance buys a digital camera for 115 Euros.
b	Work out the cost of the camera in pounds.
6	The total cost of 5 kg of potatoes and 2 kg of carrots is £4.88. 3 kg of potatoes cost £1.98. Work out the cost of 1 kg of carrots.
7	The cost of 4 kg of bananas is £5.80. The total cost of 3 kg of bananas and 1.5 kg of pears is £5.61. Work out the cost of 1 kg of pears.
8	It takes three people two hours to paint a wall. How long would it take five people to paint the same wall at the same rate?
9	It takes four teachers two and a half hours to mark a set of test papers. How long would it take six teachers to mark the same set of papers at the same rate?
10	Four chefs can cook a dish in twenty minutes. They hire an extra chef. How long will it take the five of them to cook the same dish, if they all work at the same rate as the original four?
11	A journey takes two and a quarter hours when travelling at an average speed of 30 mph. How long would the same journey take when travelling at an average speed of 45 mph?
LO2: To be able to divide a quantity into two or more parts and solve problems involving ratio	
1	Tom and Julie share £48 in the ratio 5 : 3 Work out how much more money Tom gets than Julie gets.
2	Ben and Sue share £60 in the ratio 2 : 3 Work out how much each person gets.

3	A box contains milk chocolates and plain chocolates only. The number of milk chocolates to the number of plain chocolates is in the ratio 2 : 1 There are 24 milk chocolates. Work out the total number of chocolates.
4	4) Andy, Ben and Claire share £54 Ben gets three times as much money as Andy. Claire gets twice as much money as Ben. How much money does Claire get?
5	A piece of string is 180 cm long. Jim cuts it into three pieces in the ratio 2 : 3 : 4 Work out the length of the longest piece.
6	Sally is 13 years old. Tammy is 12 years old. Danny is 10 years old. Sally, Tammy and Danny share £28 in the ratio of their ages. Tammy gives a third of her share to her mother. How much should Tammy now have?
Stage E – Topic 10 - Properties of Numbers	
LO1: To be able to find the HCF and LCM of two numbers	
1	Find the Highest Common Factor of 16 and 24.
2	Find the Highest Common Factor of 21 and 28.
3	Find the Highest Common Factor of 60 and 150.
4	Find the Highest Common Factor of 96 and 108.
5	Find the Lowest Common Multiple of 20 and 60
6	Find the Lowest Common Multiple of 28 and 72.
7	Find the Lowest Common Multiple of 70 and 240.
8	Find the Lowest Common Multiple of 35 and 55.
LO2: To be able to use prime factors	
1	Express 72 as the product of its prime factors.
2	Express 180 as the product of its prime factors.

3	Express 252 as a product of its prime factors.
4	a) Express 45 as a product of its prime factors. b) Find the Highest Common Factor (HCF) of 45 and 30.
5	a) Write 56 as a product of its prime factors. b) Find the Highest Common Factor (HCF) of 56 and 42.
6	(i) Write 42 and 63 as products of their prime factors. (ii) Work out the Highest Common Factor of 42 and 63. (iii) Work out the Lowest Common Multiple of 42 and 63.

LO3: To be able to round to the appropriate number of significant figures

1	Round the following to 1 significant figure							
	a	428	b	783	c	5608	d	3521
2	Round the following to 2 significant figures							
	a	846	b	2647	c	3552	d	46817
3	Round the following to 3 significant figures							
	a	91249	b	64182	c	223058	d	389512
4	Round the following to 1 significant figure							
	a	0.00618	b	0.00482	c	0.00006492	d	0.004981
5	Round the following to 2 significant figures							
	a	0.035812	b	0.00082477	c	0.0038611	d	0.000037211
6	Round the following to 3 significant figures							
	a	0.00143229	b	0.000721981	c	0.0000044251	d	0.000668821

Mixed Problems

1	Work an estimate for the following calculations					
	a	$\frac{304 \times 9.96}{0.51}$	b	$\frac{6.7 \times 192}{0.051}$	c	$\frac{32 \times 4.92}{0.21}$
	d	$\frac{3880}{236 \times 4.85}$	e	$\frac{7.18 \times 19.7}{0.47}$	f	$\frac{6.13 \times 9.68}{3.79 \times 2.56}$

STAGE E ANSWERS

Stage E – Topic 1 – Fractions Answers

LO1: **To be able to multiply fractions**

1

a) $\frac{1}{2} \times \frac{1}{2}$ $\frac{1}{4}$

b) $\frac{2}{3} \times \frac{1}{3}$ $\frac{2}{9}$

c) $\frac{3}{5} \times \frac{2}{7}$ $\frac{6}{35}$

d) $\frac{4}{7} \times \frac{5}{9}$ $\frac{20}{63}$

2

a) $\frac{1}{2} \times \frac{2}{3}$ $\frac{1}{3}$

b) $\frac{3}{4} \times \frac{8}{11}$ $\frac{6}{11}$

c) $\frac{2}{9} \times \frac{3}{4}$ $\frac{1}{6}$

d) $\frac{4}{5} \times \frac{1}{12}$ $\frac{1}{15}$

3

a) $1\frac{1}{2} \times \frac{1}{3}$ $\frac{1}{2}$

b) $\frac{2}{3} \times 2\frac{2}{5}$ $1\frac{3}{5}$

c) $3\frac{1}{2} \times 1\frac{1}{2}$ $5\frac{1}{4}$

d) $1\frac{2}{7} \times 3\frac{1}{3}$ $4\frac{2}{7}$

LO2: **To be able to divide fractions**

1

a) $\frac{2}{5} \div \frac{3}{4}$ $\frac{8}{15}$

b) $\frac{1}{7} \div \frac{3}{5}$ $\frac{5}{21}$

c) $\frac{4}{9} \div \frac{1}{2}$ $\frac{8}{9}$

d) $\frac{3}{10} \div \frac{5}{9}$ $\frac{27}{50}$

2	5) Work out the following: a) $\frac{1}{2} \div \frac{1}{3}$ $1\frac{1}{2}$ b) $\frac{3}{7} \div \frac{4}{7}$ $\frac{3}{4}$ c) $\frac{1}{9} \div \frac{2}{3}$ $\frac{1}{6}$ d) $\frac{2}{5} \div \frac{3}{10}$ $1\frac{1}{3}$
3	a) $1\frac{1}{3} \div \frac{1}{4}$ $5\frac{1}{3}$ b) $\frac{3}{5} \div 2\frac{2}{3}$ $\frac{9}{40}$ c) $3\frac{2}{3} \div 1\frac{1}{5}$ $3\frac{1}{18}$ d) $4\frac{1}{2} \div 1\frac{1}{2}$ 3
4	Andy earns £96.27 a week. After deductions from his wage he takes home $^{2}/_{3}$ of the wage. How much does he take home ?
Ans	£64.18
5	A beach bucket that holds 2400 ml of water is filled to the top. It has a hole in it, and as it is carried around the garden it loses $^{3}/_{5}$ of the water. How much water a). has been lost, b). is still in the bucket ?
Ans	a) 1440 ml b) 960 ml
6	A brand new car cost Sue £12462. After a week she takes it back to the garage and they tell her it is only worth $^{5}/_{6}$ of what she paid for it. How much a). is the car now worth, b). has it depreciated in value ?
Ans	a) £10385 b) £2077
7	$2\frac{1}{4}$
8	a) $17\frac{1}{4}$ b) $5\frac{3}{4}$
9	$5\frac{7}{10}$
10	3

11	a) $14\frac{1}{2}$ b) 15							
12	a	$10\frac{1}{2}$	b	12	c	$4\frac{1}{2}$	d	$22\frac{1}{2}$
13	a	$\frac{3}{4}$	b	$2\frac{2}{3}$	c	$3\frac{1}{5}$	d	$4\frac{2}{3}$

Stage E – Topic 2 – Percentages Answers

LO1: **To be able to calculate proportional change**

1

196 – 175 = 21 $\frac{21}{175} \times 100 = 12$

2

1352 – 1014 = 338 $\frac{338}{1352} \times 100 = 25$

3a

33.3% profit

3b

45% profit

3c

13% loss

3d

32% loss

4

(6120 ÷ 85) × 100 = 7200

5

(26 ÷ 80) × 100 = 32.5

6

a) The price of a rail season ticket from Oxford to London increased by £122.40
Work out the price before this increase. £3060 (122.40 ÷ 4) × 100 = 3060

b) After the increase, the price of a rail season ticket from Newport to London was £2932.80
Work out the price before this increase. £2820
(2932.80 ÷ 104) × 100 = 2820

LO2: **To be able to calculate repeated proportional change**

1

In a sale, normal prices are reduced by 20%.
The sale price of a shirt is £26

Calculate the normal price of the shirt. £32.50
(26 ÷ 80) × 100 = 32.5

2

A car dealer offers a discount of 15% off the normal price of a car for cash.
Emma pays £6120 cash for a car.

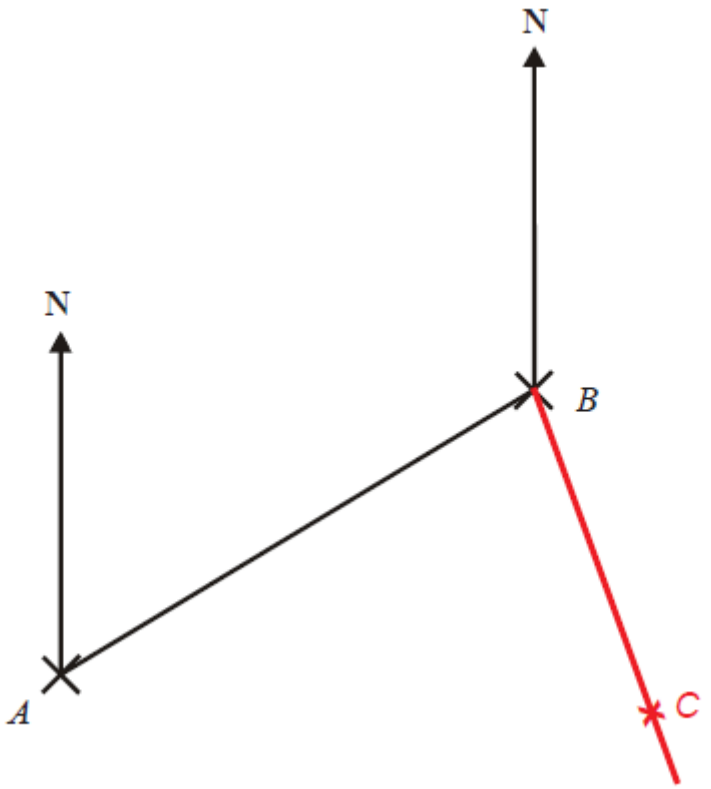
Calculate the normal price of the car. £7200
(6120 ÷ 85) × 100 = 7200

3	In a sale, normal prices are reduced by 13%. The sale price of a DVD recorder is £108.75 Calculate the normal price of the DVD recorder. £125 (108.75 ÷ 87) × 100 = 125
4a	The price of a rail season ticket from Oxford to London increased by £122.40 Work out the price before this increase. £3060 (122.40 ÷ 4) × 100 = 3060
4b	After the increase, the price of a rail season ticket from Newport to London was £2932.80 Work out the price before this increase. £2820 (2932.80 ÷ 104) × 100 = 2820

Stage E – Topic 3 – Bearings Answers

LO1: **To be able to calculate proportional change**

1



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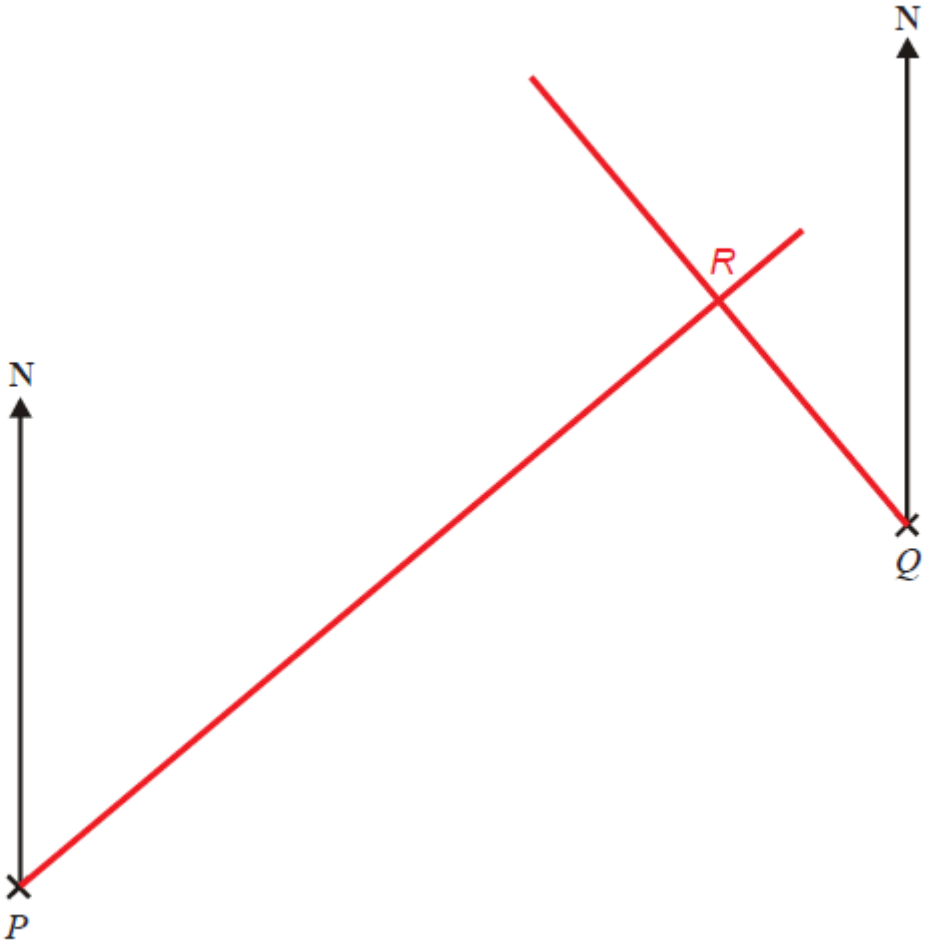

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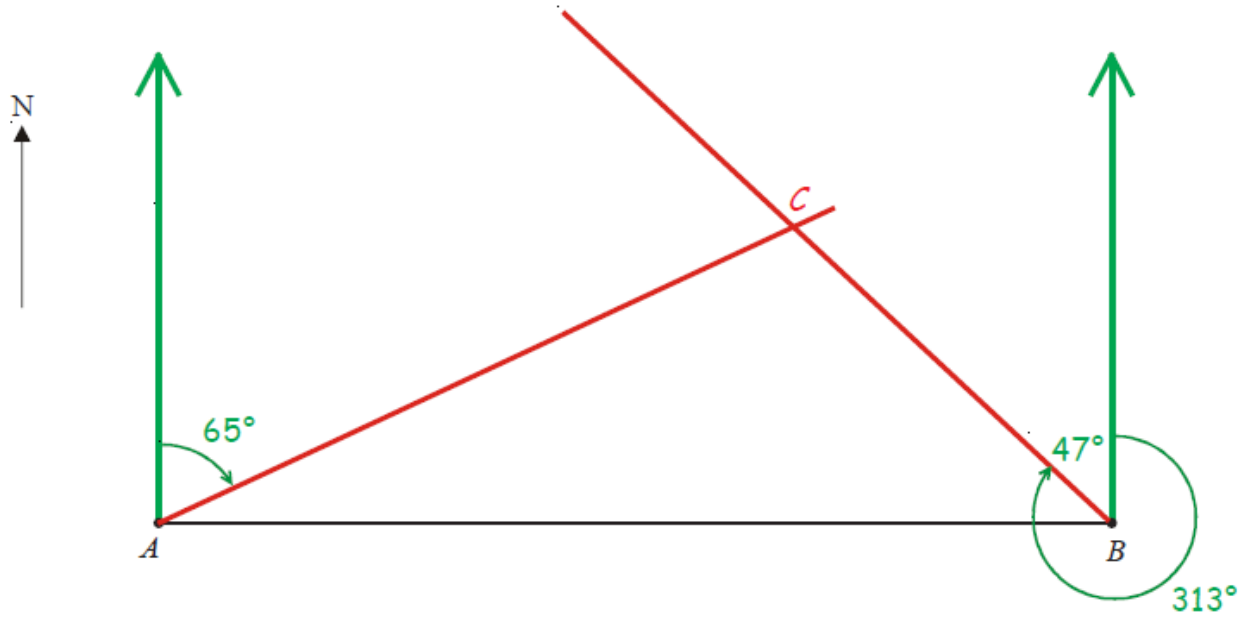
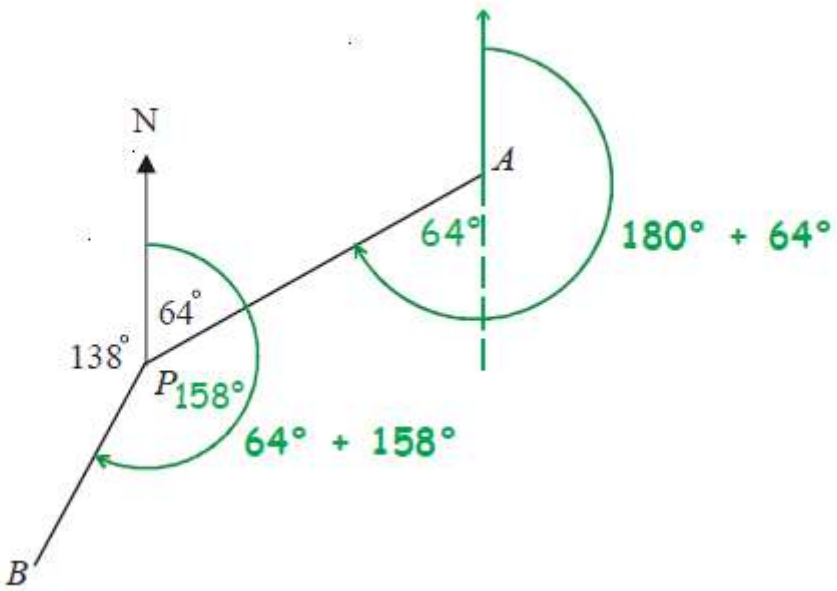
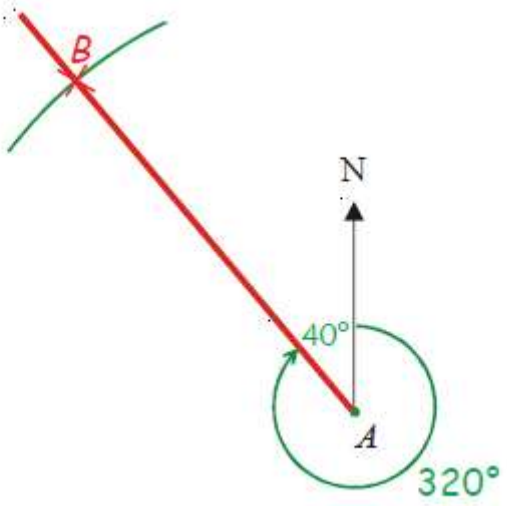


4	
5	

Stage E – Topic 4 - Probability Answers	
LO1: **To be able to calculate the probability of successive independent events**	
1a	Correct diagram
1b	
i	0.63
ii	0.27
iii	0.03
iv	0.97
2	Correct diagram
2b	
i	0.09
ii	0.49
iii	0.42
3	
a	0.04
b	0.64
c	0.32
d	0.96
4	
a	25/144

b	$\frac{5}{18}$
c	$\frac{63}{144}$
d	$\frac{4}{9}$
LO2: **To be able to use and apply an understanding of experimental probability**	
1	No, you would expect to score 1 about 100 times. Yes, although you would expect 1 about 100 times, you could still get it 200 times.
2	$0.3 \times 150 = 45$
3	$\frac{2}{3} \times 300 = 200$
4	$0.5 \times 350 = 175$
5	
a	$\frac{24}{100}$ or 0.24
b	$\frac{18}{100} \times 250 = 45$

Stage E – Topic 5 – Averages and spread Answers

LO1: **To be able to interpret the averages and spread of data sets**

1

Kaya made a list of his homework marks.

3 2 3 4 1 4 5 4

a) Write down the mode of Kaya's marks. 4

b) Work out his mean homework mark. 3.25

3 + 2 + 3 + 4 + 1 + 4 + 5 + 4 26 ÷ 8 = 3.25

2

Lydia rolled an 8-sided dice ten times.
Here are her scores.

5 1 2 5 3 8 6 6 3 2

a) Work out Lydia's median score. 4 ~~1~~, ~~2~~, ~~2~~, ~~3~~, 3, 5, ~~5~~, ~~6~~, ~~6~~, ~~8~~

b) Work out the mean of her scores. 4.1

5 + 1 + 2 + 5 + 3 + 8 + 6 + 6 + 3 + 2 = 41 41 ÷ 10 = 4.1

3 In a two-week period, a train was this many minutes late each day:

3 0 0 0 7 4 5 2 0 1 14 0 5 1

a) What was the mean average number of minutes late? 3 minutes late
42 ÷ 14 = 3

b) What was the median average number of minutes late? 2.5 minutes late

4 Two small Year 10 classes, Set A and Set B, sat the same Science test.

Set A had these scores for the test:

63%, 71%, 48%, 95%, 46%, 82%, 77%, 36%, 73% 65.7%

Set B had these scores:

58%, 63%, 85%, 61%, 59% 38%, 90%, 84%, 75%, 48% 66.1%

How much bigger was Set B's mean average score than Set A's mean average score?
Give your answer correct to 1 decimal place. 66.1% – 65.7% 0.4%

5 A rugby team played six games.
The mean score for the six games is 15
The rugby team played one more game.
The mean score for all seven games is 16
Work out the number of points the team scored in the seventh game. 22

6 × 15 = 90
7 × 16 = 112

Answers

LO2: **To be able to calculate averages from frequency tables**

1 2.4

2

a 0 children

b 1.6 children

3

Number of pens	Number of pupils	
0	4 0 × 4	0
1	6 1 × 6	6
2	7 2 × 7	14
3	5 3 × 5	15
4	3 4 × 3	12
5	1 5 × 1	5
	26	52 Total

3a	52 pens
3b	2 pens
3c	2 pens 52 ÷ 26
3d	5 pens 5 – 0

Stage E – Topic 6 – Piecharts Answers

LO1: **To be able to construct and interpret pie charts**

1

City	Frequency	Angle
Alicante	8 × 9	72°
Paris	7 × 9	63°
Ibiza	15 × 9	135°
St Lucia	1 × 9	9°
Biarritz	9 × 9	81°
	40	360°

360 ÷ ?
360 ÷ 40 = 9

Draw a pie chart to illustrate the information.

2

Region	Frequency	Angle
Southern England	9 × 6	54°
London	23 × 6	138°
Midlands	16 × 6	96°
Northern England	12 × 6	72°
Total	60	360°

360 ÷ ?
360 ÷ 60 = 6

Draw a pie chart to illustrate the information.

3

Diagram accurately drawn

Numbers from her table have been rubbed out by mistake.
Use the pie chart to complete the table.

		Angle
Clothes	£35	70°
Eating out	£73	146°
Make up	£17	34°
Magazines	£20	40°
Books	£35	70°
Total	£180	360°

4

a $\frac{1}{4}$

b	$\frac{1}{3}$
c	Angle for black counters = $360^0 - (120^0 + 90^0)$ $360^0 - 210^0$ $= 150^0$ 360^0 = 24 counters 30^0 = 8 counters 150^0 = 40 counters Answer 40 counters
5	
a	$\frac{60}{360} \times 270 = 45$
b	$\frac{36}{360} \times 270 = 27$
c	$\frac{72}{360} \times 270 = 54$

Stage E – Topic 7 – Area and Volume Answers	
LO1: **To be able to calculate lengths and areas of parts of circles**	
1i	a) 6.98 b) 6.11 c) 26.7 d) 16.8
1ii	a) 17.5 b) 30.5 c) 80.1 d) 67.0
2	a) 17.0 b) 26.1 c) 37.3 d) 32.8
3	

Angle°	Radius (cm)	Arc length (cm)	Sector area (cm²)
45	7	5	19
30	20	10	105
120	24	50	597
6	10	1	5
60	38	40	764
240	24	100	1194
212	9	33	150
100	7	13	45
57	5	5	12.5
258	10	45	225

LO2: **To be able to calculate the volume of a cylinder**	
1	a) 9043.2 b) 1538.6 c) 276.9 d) 9420
2	a) 2034.7 b) 763.0 c) 474.8 d) 78.4
LO3: **To be able to calculate the surface area of a cuboid**	
1	a) 125m^2 b) 62 cm^2 c) 136cm^2 d) 864 cm^2 e) 258 cm^2 f) 128 m^2
Mixed Problems	
1a	
i	72.25
ii	78.5
1 b	
i	108.75, 1020.5
ii	Cuboid 63.25
2a	
i	Cylinder 1570, cuboid 2000
ii	1.57 , 2
2 b	
i	16 tins
ii	20.38 21 tins

Stage E – Topic 9 – Percentages Answers	
LO1: **To be able to calculate proportional change**	
1	a) 6 : 9 — 2 : 3 b) 10 : 5 — 2 : 1 c) 7 : 21 — 1 : 3 d) 4 : 24 — 1 : 6 e) 12 : 40 — 3 : 10 f) 4 : 2 : 8 — 2 : 1 : 4 g) 18 : 63 : 9 — 2 : 7 : 1

2

a) $3 : 5 = 12 : \boxed{20}$

b) $4 : 9 = \boxed{12} : 27$

c) $\boxed{8} : 7 = 16 : 14$

3

The ratio of girls to boys in a class is 4 : 5.

What fraction of the class are girls? $\frac{4}{9}$

4

A model of a plane is made using a scale of 1 : 5.

a) If the real length of the plane is 20 m, what is the length of the model? 4 m

b) If the wings of the model are 1.2 m long, what is the actual length of the wings on the plane? 6 m

5

Lance goes on holiday to France.
The exchange rate is £1 = 1.15 Euros.

He changes £350 into Euros.

a) How many Euros should he get? €402.50 350 × 1.15 = 402.50

In France, Lance buys a digital camera for 115 Euros.

b) Work out the cost of the camera in pounds. £100 115 ÷ 1.15 = 100

6

The total cost of 5 kg of potatoes and 2 kg of carrots is £4.88.
3 kg of potatoes cost £1.98.

Work out the cost of 1 kg of carrots. £0.79

1.98 ÷ 3 = 0.66 5 × 0.66 = 3.30 4.88 - 3.30 = 1.58 1.58 ÷ 2 = 0.79

7	The cost of 4 kg of bananas is £5.80. The total cost of 3 kg of bananas and 1.5 kg of pears is £5.61. Work out the cost of 1 kg of pears. £0.84 5.80 ÷ 4 = 1.45 3 × 1.45 = 4.35 5.61 - 4.35 = 1.26 1.26 ÷ 1.5 = 0.84
8	1 hour 12 mins
9	1 hour 40 mins
10	16 mins
11	1 hour 30 mins
LO2: To be able to XXX	
1	Tom and Julie share £48 in the ratio 5 : 3 Work out how much more money Tom gets than Julie gets. £12
2	Ben and Sue share £60 in the ratio 2 : 3 Work out how much each person gets. Ben gets £24 and Sue gets £36
3	A box contains milk chocolates and plain chocolates only. The number of milk chocolates to the number of plain chocolates is in the ratio 2 : 1 There are 24 milk chocolates. Work out the total number of chocolates. 36 chocolates altogether
4	Andy, Ben and Claire share £54 Ben gets three times as much money as Andy. Claire gets twice as much money as Ben. How much money does Claire get? £32.40
5	A piece of string is 180 cm long. Jim cuts it into three pieces in the ratio 2 : 3 : 4 Work out the length of the longest piece. 80 cm

6	Sally is 13 years old. Tammy is 12 years old. Danny is 10 years old. Sally, Tammy and Danny share £28 in the ratio of their ages. Tammy gives a third of her share to her mother. How much should Tammy now have? £6.40 35 shares Sa Ta Da 13 12 10 £28 ÷ 35 = £0.80 Tammy: 12 × £0.80 = £9.60

Stage E – Topic 10 – Properties of Numbers Answers

LO1: **To be able to find the HCF and LCM of two numbers**

1	Find the Highest Common Factor of 16 and 24. 8
2	Find the Highest Common Factor of 21 and 28. 7
3	Find the Highest Common Factor of 60 and 150. 30
4	Find the Highest Common Factor of 96 and 108. 12
5	Find the Lowest Common Multiple of 20 and 60. 60
6	Find the Lowest Common Multiple of 28 and 72. 504
7	Find the Lowest Common Multiple of 70 and 240. 1680
8	Find the Lowest Common Multiple of 35 and 55. 385

LO2: **To be able to use prime factors**

1	Express 72 as the product of its prime factors. 2 × 2 × 2 × 3 × 3
2	Express 180 as the product of its prime factors. 2 × 2 × 3 × 3 × 5
3	Express 252 as a product of its prime factors. 2 × 2 × 3 × 3 × 7
4a	Express 45 as a product of its prime factors. 3 × 3 × 5
4b	Find the Highest Common Factor (HCF) of 45 and 30. 15
5a	Write 56 as a product of its prime factors. 2 × 2 × 2 × 7

5b	Find the Highest Common Factor (HCF) of 56 and 42. 14
6i	Write 42 and 63 as products of their prime factors. $42 = 2 \times 3 \times 7$ $63 = 3 \times 3 \times 7$
6ii	Work out the Highest Common Factor of 42 and 63. 21
6iii	Work out the Lowest Common Multiple of 42 and 63. 126

Answers

LO3: To be able to round to the appropriate number of significant figures

1

Round the following numbers to 1 significant figure:

a) 428 400

b) 783 800

c) 5608 6 000

d) 3 521 4 000

2

Round the following numbers to 2 significant figures:

a) 846 850

b) 2 647 2600

c) 3 552 3600

d) 46 817 47000

3

Round the following numbers to 3 significant figures:

a) 91 249 91 200

b) 64 182 64 200

c) 223 058 223 000

d) 389 512 390 000

4

Round the following numbers to 1 significant figure:

a) 0.00618 0.006

b) 0.00482 0.005

c) 0.00006492 0.00006

d) 0.004981 0.005

5

Round the following numbers to 2 significant figures:

a) 0.035812 0.036

b) 0.00082477 0.00082

c) 0.0038611 0.0039

d) 0.000037211 0.000037

6

Round the following numbers to 3 significant figures:

a) 0.00143229 0.00143

b) 0.000721981 0.000722

c) 0.0000044251 0.00000443

d) 0.000668821 0.000669

Mixed Problems

1a

Work out an estimate for $\frac{304 \times 9.96}{0.51}$ 6000

$\frac{300 \times 10}{0.5}$

1b

Work out an estimate for $\frac{6.7 \times 192}{0.051}$ 28000

$\frac{7 \times 200}{0.05}$

1c

Work out an estimate for $\frac{32 \times 4.92}{0.21}$ 750

$\frac{30 \times 5}{0.2}$

1d	Work out an estimate for $\frac{3880}{236 \times 4.85}$	4	$\frac{4000}{200 \times 5}$		
1e	Work out an estimate for $\frac{7.18 \times 19.7}{0.47}$	280	$\frac{7 \times 20}{0.5}$		
1f	$\frac{6.13 \times 9.68}{3.79 \times 2.56}$	5	$\frac{6 \times 10}{4 \times 3}$	$\frac{60}{12}$	