1

a) i) How many times 4 is 16? ii) Write their ratio.

b) i) How many times 16 is 4? ii) Write their ratio.

c) i) How many times $\frac{1}{2}$ is $\frac{2}{3}$? ii) Write their ratio in whole numbers.

d) i) How many times $\frac{2}{3}$ is $\frac{1}{2}$? ii) Write their ratio in whole numbers.

e) i) What part of 8 is 5 ? ii) What part of 5 is 8?

2

The ratio of boys to girls in a school is 11 : 10.

a) How many girls are in the school if there are 220 boys?

b) What percentage of the number of girls is the number of boys?

c) What part of the number of pupils in the school are the boys?

3

Paul intends to plant 150 trees in his orchard.

He has divided the orchard into two parts in the ratio 2 : 3.

How many trees should he plant in:

a) the smaller part of the orchard?

b) the larger part of the orchard?

4

From 1 kg of fresh apples you can get 150 g of dried apple.

a) i) What part of the fresh apples is the dried apple?

ii) What percentage of the fresh apples is the dried apple?

b) i) What part of the mass of the fresh apples is lost in the drying process?

ii) What percentage of the mass of fresh apples is lost?

c) Complete the table.

Mass of fresh apple (kg)	0	5	10	15	20				
Mass of dried apple (kg)						15	3	1.5	0.15

5

Write different plans for each question. Use one of your plans to work out the answer.

3 lb of butter can be made from 25 litres of milk.

a) How much butter can be made from 48 litres of milk?

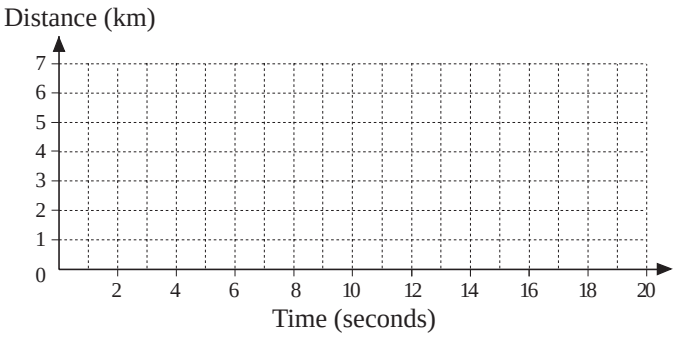
b) How much milk produces 17 lb of butter?

1 The human voice travels through the air at 330 metres per second.

a) Complete the table.

Time (seconds)	1	2	3	4	5	6	6.5	7	$7\frac{1}{4}$	20
Distance (km)										

b) Draw a graph to show the relationship between time and distance.



c) Fill in the missing words.

The graph is a [ ] [ ].

Time and distance are in [ ] proportion.

2 Different vehicles travelled at different average speeds over a 40 km route.

a) Complete the table to show the time taken at certain average speeds.

Speed (km/h)	40	30	20	16	10	8	5	4	80	120	100
Time (hours)											

b) Draw a graph in your exercise book to show the relationship between average speed (in km per hour) and time (in hours).

c) Complete the sentence. Speed and time are in [ ] proportion.

3

a) 600 litres of juice are poured into bottles which have a capacity of 75 cl. How many bottles are needed?

b) How many bottles would be needed if the bottles had a capacity of:

i) half a litre ii) 1 litre iii) 1.5 litres iv) 2 litres?

c) Show the data in a table. What kind of proportion do you notice?

4 The volume of a cuboid is 240 cm^3.

If a = 10 cm, complete the table for edges b and c.

V = 240 cm^3	a	10	10	10	10	10	10	10
	b	1	3			4.8		7
	c			4	10		3.6	

5 Which of the formulae has elements which are in: i) direct ii) inverse proportion?

$100 = e \times f$, $A = 8 \times b$, $b = \frac{A}{8}$, $8 = \frac{A}{b}$, $e = \frac{100}{f}$, $f = \frac{100}{e}$

1 In a mix of concrete, the ratio of gravel to sand to cement is 6:2:1.

a) Draw a pie chart to show the components of the concrete.

b) How much gravel, sand and cement would be in these amounts of concrete:

i) 100 kg ii) 1 tonne iii) 7 tonnes iv) 10 tonnes?

2 If a handspan is 9 inches and an inch is 2.54 cm, calculate the missing values and write them in the table.

In handspans	1			4			7		
In inches	9		27			54			81
In cm		45.72			114.3			182.88	

3 Dianne measured the table with her hand and its length was 6 handspans.

Then she measured the length of the table in metres and it was $\frac{6}{5}$ m.

a) What is the length of Dianne's handspan in metres?

b) Write the length of her handspan in centimetres and in millimetres.

4 From 1 kg of fresh ham we can get about 625 g of smoked ham.

a) What percentage of the mass of the fresh ham is lost by smoking?

b) How much smoked ham can we get from 6 kg of fresh ham?

c) How much fresh ham is needed to produce 6 kg of smoked ham?

5 The areas of two rectangular gardens are equal. The first garden is 64 m long and 30 m wide. The length of the second garden is 120% of the length of the first garden.

a) How wide is the second garden?

b) What **part** of the width of the first garden is the width of the second garden?

6 Write different plans to answer each question.

a) What is 32% of £524.50? b) What is 106% of £524.50?

c) What is *p*% of £524.50?

7 Write different plans to answer each question.

a) 25% of which length is 72.5 cm? b) 125% of which length is 72.5 cm?

c) What is the whole length if *p*% of it is 72.5 cm?

1

a) What part is:

i) 350 of 400 ii) 350 of 250?

b) What is the ratio between:

i) 350 and 400 ii) 350 and 250?

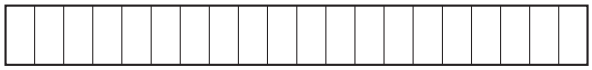
c) What percentage is:

i) 350 of 400 ii) 350 of 250?

2

The ratio of the population of 3 cities (A, B and C) is 5 : 7 : 8.

a) Colour this strip in different colours to show the ratio.



b) How many people live in each city if the population of B is 80 000 more than the population of A?

c) How many people live in the three cities altogether?

d) What is the ratio of the population in each city to the total in all three cities?

3

In a garden, 30% of the area is used to grow flowers, 20% of the area is used to grow vegetables and the remaining area is used to grow fruit.

a) Calculate the area of the garden if the vegetable plot is 220 m^2.

b) Calculate the area used to grow: i) flowers ii) fruit.

c) What is the ratio of the three different parts of the garden?

4

Write a plan first, then calculate the result. Write the answer in a sentence.

a) The price of an item was £438 but in the sale the price has been cut by 10%.

i) What is its sale price?

ii) What percentage is the sale price of the original price?

b) 28% of the inhabitants of a village live in blocks of flats.

i) How many people live in houses if 406 people live in flats?

ii) How many people live in this village?

iii) What percentage of the population of the village live in houses?

c) The price of an item was cut by 10% and it now costs £113.40.

i) What was the original price of the item?

ii) What percentage is the original price of the reduced price?

d) What percentage is 31.5 of 90?

1 Write the ratio of these amounts using the smallest possible **whole** numbers.

a) 0.4, 0.12, 3.3, 4.18 ☐ : ☐ : ☐ : ☐

b) $\frac{3}{5}, \frac{2}{3}, \frac{1}{6}, \frac{11}{15}$ ☐ : ☐ : ☐ : ☐

c) $12\frac{1}{2}\%$, 42%, 64.5%, 11% ☐ : ☐ : ☐ : ☐

2 Solve these problems in your exercise book.

a) Tom had blackcurrants, gooseberries, loganberries, raspberries and strawberries in his garden. One summer he gathered all the fruit and put it in his freezer.

This is the ratio of the fruit in Tom's freezer. B : G : L : R : S = 6 : 7 : 5 : 4 : 2

If there are 36 lbs of fruit in the freezer, how many lbs of each type of fruit did Tom pick?

b) In a school with 1350 pupils, the ratio of boys to girls is 11 : 14 and the ratio of teachers to pupils is 2 : 45.

i) How many girls and how many boys are in the school?

ii) How many teachers are in the school?

c) The ratio of *red* to *blue* to *green* beads in a jar is 7 : 13 : 17. If there are 126 *red* beads, how many *blue* and how many *green* beads are in the jar?

3 A certain distance was covered by 6 different people in different ways.

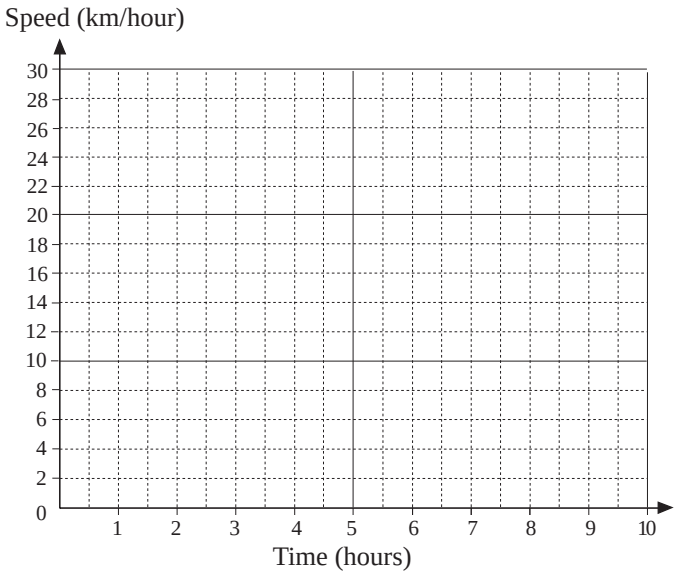
a) Complete the table.

Speed (km/hour)	30	6	20		10	
Time (hours)	1	5		7.5		2.5

b) What was the distance they all travelled?

c) Show the data in a graph.

d) Join up the points with a curved line.



e) What kind of proportion is there between speed and time?

. . . . . .

f) Read from the graph the speed needed to cover the distance in 4 hours.

g) How might the 6 people have travelled the 30 km?

1

Two *green* marbles and one *pink* marble come out of a machine one after the other in a random order. Calculate the probability of each of these outcomes.

a) The first marble is *pink*. b) The first marble is *green*.

c) The order of the three marbles is *green*, *green*, *pink*.

d) The order of the marbles is *green*, *pink*, *green*.

2

A computer program writes the letters A, B and C in a random order.
What is the probability of each of these outcomes?

a) The first letter is A. b) The second letter is A.

c) The third letter is C. d) The order is B, C, A.

3

A computer program writes the digits 1, 2, 3 and 4 in a random order.
What is the probability of each of these outcomes?

a) The first digit is 3. b) The first digit is 1.

c) The second digit is 3. d) The second digit is 1.

e) The last digit is 2. f) The last digit is 4.

g) The first two digits are 4, 3 in this order. h) The order is 3, 1, 2, 4.

4

A computer program writes 2-digit, positive, whole numbers at random.
What is the probability of each of these outcomes?

a) The number is 37. b) The first digit is 8.

c) The last digit is 5. d) The first digit is 0.

e) The last digit is 0. f) The number is even.

5

In a primary school, the number of girls is 176, which is 55% of the total number of pupils at the school.

a) How many boys attend this school?

b) How many pupils attend this school?

c) If a computer program prints out the files of all the pupils in a random order, what is the probability of the computer selecting a file belonging to:

i) a girl ii) a boy?

6

In a drawer there are 2 dark *grey* socks and 3 dark *blue* socks, all the same size. If you take out two socks without looking at them, what is the probability of getting:

a) a pair of dark *grey* socks b) a pair of dark *blue* socks?

c) two socks of the same colour? *Give the probabilities as percentages.*

1

A cash box contains *gold* and *silver* coins. The ratio of *gold* coins to *silver* coins is 47 to 53. The number of *silver* coins is 159.

a) How many: i) *gold* coins ii) coins are in the cash box?

b) If you take out a coin with your eyes shut, what is the probability of the coin being *gold*? *Give your answer as a percentage.*

2

In a game of *Roulette*, a wheel is spun and a ball comes to rest on one of the numbers 0 to 36. The even numbers from 2 to 36 are *red* numbers.

What is the probability of each of these outcomes?

a) 0 wins b) 21 wins c) 7 **or** 8 wins d) 31 **or** 34 wins

e) 24 **or** 25 **or** 26 wins f) $12 \leq n \leq 17$ wins g) $1 \leq n \leq 12$ wins

h) The winning number gives a remainder of 2 when divided by 3.

i) A *red* number wins. j) The numbers 25 to 36 do **not** win.

3

In a pack of 52 playing cards, there are **13** cards (Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King) in each of **4** suites: Diamonds and Hearts (*red*), Clubs and Spades (*black*).

If you take a card from the pack at random, what is the probability that the card is:

a) an Ace b) a 9 c) a Club d) a *red* card

e) a Queen of Diamonds f) a Jack **or** a King of Spades

g) an Ace of Clubs **or** a King of Hearts h) **not** an Ace?

4

These are the probabilities for certain outcomes when throwing a dice.
Write a question to match each probability.

a) $\frac{1}{6}$ b) 0 c) $\frac{5}{6}$ d) 1 e) $\frac{1}{3}$

f) $\frac{1}{2}$ g) $\frac{2}{3}$ h) $33\frac{1}{3}\%$ i) 50% j) 100%

5

These are the probabilities of certain outcomes when 4 coins are tossed one after the other. Write an outcome to match each probability.

a) 0 b) $\frac{1}{16}$ c) $\frac{2}{16}$ d) $\frac{3}{16}$ e) $\frac{4}{16}$

f) $\frac{5}{16}$ g) $\frac{6}{16}$ h) $\frac{7}{16}$ i) $\frac{8}{16}$ j) $\frac{9}{16}$

k) $\frac{10}{16}$ l) $\frac{11}{16}$ m) $\frac{12}{16}$ n) $\frac{13}{16}$ o) $\frac{14}{16}$

p) $\frac{15}{16}$ q) $\frac{16}{16}$ r) 50%

1 Calculate the sums.

a)
$$\begin{array}{r} 8704 \\ 1607\,1 \\ 8032\,6 \\ +\quad 9565 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 4302.2 \\ 7214.5 \\ 908\,8.3 \\ +\,1116 \\ \hline \end{array}$$

c) $\frac{4}{9} + 1\frac{3}{5} =$

d) $43.2 + 10\frac{4}{5} =$

2 Calculate the differences.

a)
$$\begin{array}{r} 72049 \\ -\,52138 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 6310.08 \\ -\,1634.1 \\ \hline \end{array}$$

c) $2\frac{1}{4} - \frac{5}{6} =$

d) $23\frac{3}{4} - 15.05 =$

3 Calculate the products.

a)
$$\begin{array}{r} 682 \\ \times\,36 \\ \hline \end{array}$$

b)
$$\begin{array}{r} 4.15 \\ \times\,0.71 \\ \hline \end{array}$$

c) $4\frac{2}{5} \times \frac{3}{7} =$

4 Calculate the quotients.

a) $9 \overline{)5183}$

b) $26 \overline{)1646.8}$

c) $5\frac{1}{3} \div \frac{2}{5} =$

5

a) Six friends went on a day trip in a minibus. They spent £186.50 on petrol and £133.50 on food.

If they shared the costs equally, how much did they each have to pay?

b) Bob wanted to fill a 260 litre barrel from a 545 litre tank full of water.

He transferred the water from the tank to the barrel using two 5 litre buckets at a time. How many times did he need to fill the two 5 litre buckets?

c) A beetle was 108 times as fast as a snail. If the beetle covered 54 cm in a certain time, how far could the snail move in the same time?

d) The edges of a cuboid are 8 cm, 5.3 cm and 36 mm. What is its volume?

1

The Ladder Game

Rule: **A** says a natural number from 1 to 5. **B** adds on a natural number 1 to 5. **A** adds a natural number, 1 to 5, to **B**'s sum, and so on.

The winner is the player who reaches 40.

a) Play the game with a partner. b) Work out a strategy for each player.

c) Which player can be sure of winning each time if he makes no mistakes?

2

The *Ladder Game* can be changed so that the player who says '40' is **not** the winner.

a) Play this version of the game with a partner.

b) Work out a strategy

c) Which player can be sure of winning this game if he makes no mistakes?

3

a) Continue the pattern in your exercise book.

Write the first 10 terms in this sequence of **triangular** numbers.

b) Continue the pattern in your exercise book.

Write the first 10 terms in this sequence of **square** numbers.

4

A family gathered 4 kg of cherries from the 1st tree in their orchard, 8 kg from the second tree and so on. They always gathered 4 kg more cherries from the next tree than from the one before it.

a) If there were 10 trees in the orchard, what mass of cherries was gathered altogether?

b) What mass of cherries would the family have collected if they had gathered 6 kg from the first tree and 4 kg more from one tree to the next?

5

a) $1 + 2 + 3$ and $2 + 3 + 4$ and $3 + 4 + 5$ are exactly divisible by 3.
What can you say about the **sum** of three adjacent positive whole numbers?

b) $1 \times 2 \times 3$ and $2 \times 3 \times 4$ and $3 \times 4 \times 5$ are exactly divisible by 6.
What can you say about the **product** of 3 adjacent positive whole numbers?

6

a) The difference between two numbers is 2.1. What is the larger number if the smaller number is x?

b) Laura has n stamps. Laura and George have 125 stamps altogether.
How many stamps does George have?

1

In a box of mixed fruit jellies, there are 60 sweets altogether.

There are blackcurrant, lemon, orange and strawberry flavours in the ratio of 6 : 3 : 4 : 2.

a) If you took out a sweet with your eyes closed, what is the probability that the sweet will be:

i) lemon ii) strawberry iii) neither lemon **nor** strawberry

iv) **not** blackcurrant v) orange **or** lemon vi) banana?

b) What is the **least** number of sweets you must take out of the bag with your eyes closed to be **certain** of getting a lemon jelly?

2

Practice calculation.

a) $\frac{3}{7} + \frac{3}{4} =$ b) $\frac{5}{8} + \frac{7}{8} =$ c) $\frac{7}{11} + \frac{1}{2} =$ d) $\frac{4}{9} + \frac{9}{13} =$

e) $\frac{5}{6} \times \frac{1}{6} =$ f) $\frac{11}{12} \times \frac{7}{11} =$ g) $\frac{15}{24} \times \frac{6}{55} =$ h) $\frac{11}{52} \times \frac{4}{13} =$

3

Do the calculations in your exercise book.

a) i) 9815 + 27 082 + 90 437 + 8455 ii) 541.3 + 8325.6 + 1057.01 + 954

b) i) 83 506 – 63 049 ii) 5421.19 – 2745.2 iii) $5\frac{2}{5} - 3.8$

c) i) 3065×27 ii) 431^2 iii) 2073.4×2.07 iv) $7\frac{7}{8} \times 0.25$

d) i) $6259 \div 23$ ii) $3759.29 \div 5.3$ iii) $10\frac{1}{5} \div \frac{17}{25}$

4

These are the probabilities for certain outcomes when drawing a card from a normal pack of 52 cards. Write a question to match each probability.

a) $\frac{1}{13}$ b) $\frac{1}{4}$ c) $\frac{1}{2}$ d) $\frac{13}{26}$ e) $\frac{3}{13}$

f) $\frac{3}{52}$ g) $\frac{1}{26}$ h) $\frac{5}{13}$ i) $\frac{8}{13}$ j) 0

5

Solve the problems.

a) The sum of two numbers is 8.3 and their difference is 1.1. What are the 2 numbers?

b) I thought of a 3-digit number. Both the number and the **square root** of the number are 1 more than a whole 10. What could my number be?

c) Adam has 20 more CDs than Caroline. David has 15 fewer CDs than Belinda. Caroline and David together have the same number of CDs as Belinda.

If David has 8 CDs, how many CDs does each person have?

1

The **base set** is the set of positive, whole numbers.

a) Write 4 numbers which have exactly 2 factors. . . . . .

b) Write a number which has exactly one factor. . . . . .

c) Write 3 numbers which have exactly 3 factors. . . . . .

d) Write 3 numbers which have exactly 4 factors. . . . . .

2

Simplify these fractions.

a) $\frac{42}{60}$ = b) $\frac{36}{48}$ = c) $\frac{56}{40}$ = d) $\frac{140}{56}$ =

3

Decide whether the sum is exactly divisible by 3, then do the calculation.

a) $(36 + 18 + 27 + 45) \div 3$ =

b) $(36 + 14 + 66 + 19) \div 3$ =

c) $(45 + 73 + 46 + 90) \div 3$ =

4

Decide whether the sum is exactly divisible by 4, then do the calculation.

a) $(33 + 41 + 62 + 240) \div 4$ =

b) $(44 + 60 + 20 + 12) \div 4$ =

c) $(26 + 27 + 28 + 29) \div 4$ =

5

Decide whether the difference is exactly divisible by 5, then do the calculation.

a) $(75 - 40) \div 5$ = b) $(78 - 43) \div 5$ =

c) $(82 - 35) \div 5$ = d) $(36 - 14) \div 5$ =

e) $(54 - 26) \div 5$ = f) $(90 - 36) \div 5$ =

6

$$(35 + 4\square + 28) \div 7$$

Which digit could be written in the box so that the sum inside the brackets:

a) is exactly divisible by 7 b) gives a remainder of 3 when divided by 7

c) gives a remainder of 6 when divided by 7?

7

Simplify the fractions in your exercise book. Check that you are correct.

a) $\frac{4 + 6 + 8}{2}$ b) $\frac{4 \times 6 \times 8}{2}$ c) $\frac{10 + 25 + 55}{5}$ d) $\frac{10 \times 25 \times 55}{5}$

1 Write **five** 3-digit numbers which are exactly divisible by:

a) 2 b) 5 c) 10.

2 Write **five** 4-digit numbers which are exactly divisible by:

a) 4 b) 25 c) 100.

3 Write **four** 5-digit numbers which are exactly divisible:

a) by 2 and by 5 b) by 4 and by 25.

4 Decide on the remainder **before** doing the calculation by writing the remainder for each term below it.

a) $(45 + 63 + 18) \div 3 =$ b) $(41 + 72 + 81) \div 3 =$

c) $(53 + 90 + 19) \div 3 =$ d) $(1000 + 100 + 10 + 6) \div 3 =$

e) $(300 + 20 + 4) \div 3 =$ f) $(4000 + 100 + 70 + 1) \div 3 =$

5 Write the remainder after dividing each number by 9.

a) 100 ☐ b) 200 ☐ c) 800 ☐ d) 900 ☐

e) 1000 ☐ f) 2000 ☐ g) 6000 ☐ h) 9000 ☐

i) 819 ☐ j) 7368 ☐ k) 12 534 ☐ l) 88 888 ☐

6 Decide on the remainder **before** doing the calculation by writing the remainder for each term below it.

a) $(45 + 63 + 18) \div 9 =$ b) $(41 + 72 + 81) \div 9 =$

c) $(53 + 90 + 19) \div 9 =$ d) $(1000 + 100 + 10 + 6) \div 9 =$

e) $(300 + 20 + 4) \div 9 =$ f) $(4000 + 100 + 70 + 1) \div 9 =$

7 Write the remainder after dividing each number by 3.

a) 100 ☐ b) 200 ☐ c) 800 ☐

d) 900 ☐ e) 1000 ☐ f) 2000 ☐

g) 6000 ☐ h) 9000 ☐ i) 819 ☐

j) 7368 ☐ k) 12 534 ☐ l) 88 888 ☐

1

a) Write **four** 5-digit numbers which are exactly divisible by 9.

b) **Increase** the numbers so that when the new numbers are divided by 9:

i) there is a remainder of 1 ii) there is a remainder of 4.

c) **Decrease** the original numbers so that when the new numbers are divided by 9 there is a remainder of 8.

2

a) Write **four** 4-digit numbers which are exactly divisible by 3.

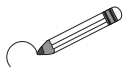
b) **Increase** the numbers so that the new numbers are exactly divisible by 9.

c) **Increase** the original numbers so that when the new numbers are divided by 3:

i) there is a remainder of 1 ii) there is a remainder of 2.

3

a) Circle the numbers which are divisible by 2 and also by 3.

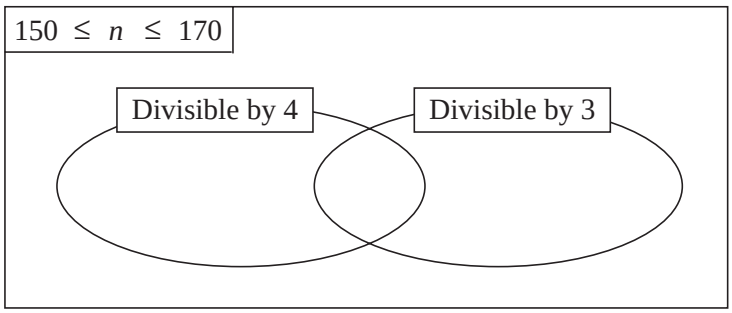


23 461 72 534 183 5606 444

b) Calculate the remainder when each number is divided by 6.

4

a) Write the **natural** numbers from 150 to 170 in the Venn diagram.



b) Complete this sentence.

A natural number is divisible by 12 **only** if it is divisible by ☐ and by ☐.

5

a) Write the **natural** numbers from 150 to 170 in the correct place in the table.

150 ≤ *n* ≤ 170	Multiple of 6	Not a multiple of 6
Multiple of 4		
Not a multiple of 4		

b) Complete this sentence.

If a natural number is divisible by 4 and by 6, then it is also divisible by ☐.

6

a) Write a number which is exactly divisible by 7, 11 and 13. . . . . .

b) Multiply 215 by 7, then multiply the product by 11, then multiply this product by 13. Explain the result in your exercise book.

1 Calculate: a) five times $3\frac{1}{4}$ b) one fifth of $\frac{3}{7}$ c) half of $2\frac{4}{5}$

2 Write these fractions in decreasing order in your exercise book.

$$\frac{3}{4},\quad \frac{8}{10},\quad \frac{3}{6},\quad \frac{75}{100},\quad \frac{4}{5},\quad \frac{11}{20}$$

3 Practise calculation.

a) $1\frac{2}{5} + 2\frac{2}{3} + 3\frac{4}{5} - 4\frac{1}{2} =$

b) $234 \times 0.34 =$

c) $\left(34\frac{3}{5} - 12.4\right) \times 5 =$

d) $\left(3\frac{1}{4} + 2\frac{1}{2}\right) \times \frac{2}{5} =$

e) $\left(7\frac{3}{4} + 9\frac{4}{5}\right) \div \frac{3}{7} =$

f) $48.3 \div 1.5 =$

4 Write a plan, do the calculation, check it and write the answer in a sentence.

a) If an adult eats on average $\frac{7}{10}$ kg of bread each day, how much bread might be eaten by a family of 6 adults in a week?

b) A group of students decided to walk a distance of 24 km over 4 days.
On the first day, they walked 6 and 2 fifths km, on the second day they walked 7 and 3 eighths km and on the third day they walked 5 and 3 quarter km.
What distance did they still have to walk on the 4th day?

c) The income of a group of 6 friends over a period of 3 weeks was £4500 in the first week, £3725.40 in the second week and £4105.50 in the third week.
What was the average income per person per week?

d) The Council has laid $12\frac{1}{2}$ km of a cycle track, which is $\frac{7}{8}$ of the planned length.

i) What length will the cycle track be when it is completed?

ii) Next year, the Council plans to extend the cycle track by $2\frac{1}{3}$ times the original length. How long will the cycle track be then?

1 Write a digit in each box so that the quotient is a whole number.

a) $(177 - 4\square) \div 5$ b) $(84 + 5\square) \div 7$ c) $(38\square - \square 5) \div 4$

d) $(2\square 6 - 1\square) \div 6$ e) $(78\square - \square 7) \div 10$ f) $(1\square 5 + \square) \div 11$

2

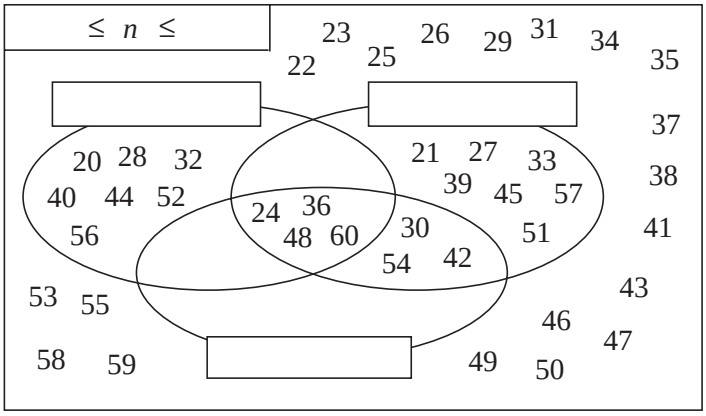
1723 3978 1254 8350 1011

a) Circle the numbers which are exactly divisible by 3.

b) Change 1 digit in each number so that the new numbers are exactly divisible by:

i) 4 ii) 5 iii) 6 iv) 7 v) 8 vi) 9

3 a) Write the missing labels in the Venn diagram.



b) Complete this sentence about what the digram shows.

A number which is divisible by $\square$ and by $\square$ and by $\square$ is also divisible by $\square$.

c) Write true statements about the different sections, including the empty areas.

4 Practise calculation.

a) $4\frac{1}{6} + \frac{1}{4} + 8\frac{2}{3} - 11\frac{1}{2}$ b) 364×4.36 c) $\left(3\frac{5}{12} + 12.5\right) \times 6 =$

d) $\left(4\frac{3}{4} + 6\frac{1}{3}\right) \div \frac{5}{6}$ e) $(\sqrt{16} \times 12)^2$ f) $1864 \div \left(\sqrt{100}\right)^2$

5 The 24 windows in the school library were being painted. A 2 litre tin of paint was needed for every $2\frac{1}{3}$ windows.

a) How many 2 litre tins of paint had to be bought? b) How much paint was left?

1

Write the quotient as a fraction and as a decimal in your exercise book.

a)	i)	$1 \div 2 =$	ii)	$3 \div 6 =$	iii) $479 \div 958 =$
b)	i)	$23 \div 4 =$	ii)	$34.5 \div 6 =$	iii) $1 \div 4 =$
c)	i)	$2 \div 5 =$	ii)	$18 \div 5 =$	iii) $2.1 \div 5 =$
d)	i)	$3 \div 16 =$	ii)	$51 \div 20 =$	iii) $17 \div 80 =$
e)	i)	$2 \div 3 =$	ii)	$5 \div 7.5 =$	iii) $4 \div 9 =$

2

Convert the fractions to decimals in your exercise book.

a)	$\frac{43}{64} =$	b)	$\frac{89}{125} =$	c)	$\frac{74}{20} =$
d)	$\frac{5}{6} =$	e)	$\frac{14}{30} =$	f)	$\frac{55}{36} =$
g)	$\frac{2}{7} =$	h)	$\frac{20}{35} =$	i)	$\frac{4}{11} =$

3

At the end of the Second World War in 1945, about $\frac{11}{28}$ of the 3210 villages in Hungary had electricity. By 1960, about 92.5% of Hungarian villages had electricity and by 1963, $\frac{10}{10}$ had electricity.

a) How many villages had electricity in:

i) 1945 ii) 1960 iii) 1963?

b) Express the numbers in 1945 and in 1963 as percentages of the total number of Hungarian villages.

4

In a factory on a certain day, 63 products were found to be faulty. This was 3.5% of the number of products made that day.

a) How many products were made that day?

b) How many products were **not** faulty?

c) If this was an average day, what percentage of faulty products would you expect there to be in a year?

5

The length of an aluminium cuboid is 150 cm, which is 150% of its width.

The height of the cuboid is $\frac{3}{5}$ of its width.

If the mass of 1 m^3 of aluminium is 2700 kg, what is the mass of the cuboid?

1 Write the numbers in increasing order.

a) $0.8,\ \frac{2}{3},\ -0.9,\ \frac{1}{2},\ \frac{4}{5},\ -\frac{3}{5}$ b) $2\frac{4}{5},\ \frac{3}{4},\ -\frac{1}{2},\ \frac{4}{6},\ -\frac{3}{2}$

2 a) Round 7812 529 to the nearest:

i) 10 ii) 100 iii) 1000 iv) 1 000 000.

b) Round 5.465 to the nearest:

i) unit ii) tenth iii) hundredth.

3 Solve the equations.

a) $2.75 + a = 7.1$ b) $b + \frac{2}{7} = 1\frac{4}{5}$ c) $c - 8.02 = 3.8$

d) $5 - d = 3\frac{5}{8}$ e) $7.2 \times e = 36$ f) $f \div 4.2 = 10.5$

g) $\frac{4}{3} \div g = \frac{2}{5}$ h) $\frac{5}{6} \div h = 0$ i) $\frac{72}{i} = 1.2$

4 a) James had a 6.25 m length of wire. He used 125 cm one day, then he used 1.6 m on the next day, then $2\frac{1}{2}$ m on the day after that. How much wire was left?

b) The sides of a rectangular park are 800 m and $1\frac{1}{4}$ km long.

What is: i) the perimeter of the park ii) the area of the park?

c) Calum has 45 stamps. Vanessa has $\frac{8}{9}$ of that number and George has 120% of that number. How many stamps do Vanessa and George each have?

5 a) A box of sugar lumps weighs 650 g and each lump of sugar weighs 2 g.
If 6 sugar lumps were eaten:

i) what mass of sugar was left ii) how many lumps were left?

b) The sugar content in a jar of honey is 83%. How much sugar is there in 45 kg of honey?

c) The weight of 1cm^3 of steel is 300% of the weight of 1 cm^3 of aluminium.

i) What is the **ratio** of the weight of a 25 cm^3 aluminium cuboid and that of a 25 cm^3 steel cuboid?

ii) What is the **mass** of the aluminium cuboid if the steel cuboid's is 202.5 g?

iii) How many grams is 1 cm^3 of steel?

iv) How many grams is 1 cm^3 of aluminium?

1

84% of an apple is water.

a) How much water is in these quantities of apples?

i) 1 kg ii) 2 kg iii) 5 kg iv) $3\frac{1}{2}$ kg v) 0.4 kg

b) What amount of apples contains these quantities of water?

i) 420 g ii) 2.52 kg

2

Two fifths of a garden had already been landscaped. Five gardeners were employed to complete the job. If they shared the remaining work equally, what part of the whole garden were they each responsible for?

3

Charlie spent his time between 2 o'clock and 6 o'clock in the afternoon doing different things. He went shopping for $\frac{2}{5}$ of the time, played with a friend for $\frac{1}{4}$ of the time and read a book for $\frac{1}{6}$ of the time.

a) What part of the time did Charlie spend doing other activities?

b) How many minutes did Charlie spend on other activities?

4

When experiments in television broadcasting first began in 1923, scientists could only transmit images across a distance of 2.5 metres.

Some years later, a Hungarian engineer, Denes Mihaly, who was working in Berlin in Germany, managed to transmit images across a distance of 1000 m.

a) How many times more is 1000 m than 2.5 m?

b) What percentage is 1000 m of 2.5 m?

c) Write their ratio with whole numbers.

5

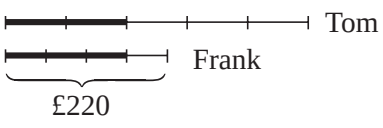
Emma bought shares in the stock market for £100 000 but very soon their value began to fall. To avoid losing too much money, she sold half of her shares at a 15% loss.

Two weeks later, the value of her shares rose again and reached a level which was 20% more than the amount she had paid for them. She then sold the rest of her shares.

How much profit or loss did she make on the shares?

6

$\frac{2}{5}$ of Tom's money is the same as $\frac{3}{4}$ of Frank's money.



a) If Frank has £220, how much does Tom have?

b) What ratio is: i) Tom's to Frank's money ii) Frank's to Tom's money?

1 Do the multiplications.

a) $\frac{1}{7} \times \frac{2}{7} \times \frac{3}{7} \times \frac{4}{7} \times \frac{5}{7} \times \frac{6}{7} =$

b) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} =$

c) $-\frac{4}{9} \times \frac{7}{8} \times \frac{3}{5} \times \left(-\frac{6}{7}\right) \times \left(-\frac{5}{6}\right) =$

2 Solve the equation then check your result.

a) $\left(x + 1\frac{4}{5}\right) + 6 = 10$ $\quad x =$

b) $2\frac{3}{5} \times y = \frac{13}{7}$ $\quad y =$

c) $z \div 4 = 3\frac{1}{4}$ $\quad z =$

3 Calculate in your exercise book:

a) 0.7 of 415 b) 1.43 of 19 c) 3% of 34.2

d) 69% of 5500 e) 210% of 46.1

4 What is the number if:

a) $\frac{3}{10}$ of it is 28.5 b) 2.5 of it is 8260 c) 12% of it is 58.2

d) 99% of it is 346.5 e) 250% of it is 8260?

5 The lengths of the sides of a rectangle are 40 cm and 60 cm.

One of the sides of a second rectangle is 110% of one of the sides of the first rectangle. The adjacent side of the second rectangle is 1.1 times as long as the adjacent side of the first rectangle.

What percentage of the area of the first rectangle is the area of the second rectangle?

6 The perpendicular sides of a right-angled triangle are: $a = 10$ cm, $b = 6.2$ cm.

If we cut 20% off side a and shorten side b to $\frac{4}{5}$ of its length, a 2nd triangle is formed.

a) Calculate the area of both triangles.

b) What percentage of the area of the 1st triangle is the area of the 2nd triangle?

c) What percentage smaller than the 1st triangle is the area of the 2nd triangle?

1

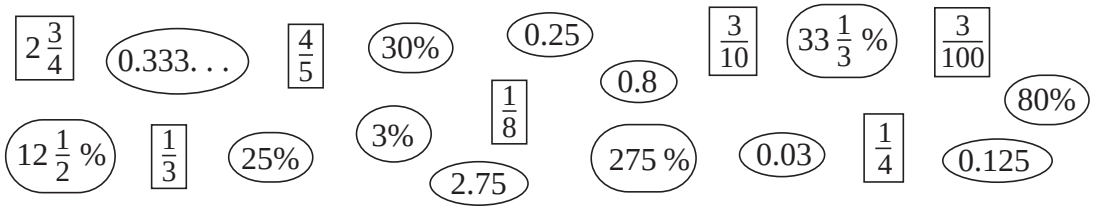
Write each decimal as a division of one-digit numbers.

a) 0.75 b) 1.6 c) $0.\dot{1}$ d) 1.8 e) $0.\dot{6}$

f) 0.625 g) 2.5 h) 1.125 i) 0.375 j) $0.1\dot{6}$

2

Colour the equal values in the same colour.



3

a) Convert the decimals to fractions. Simplify where necessary.

i) 13.64 ii) 9.015 iii) 0.875 iv) $0.\dot{7}$ v) 5.55

b) Convert the numbers to decimals.

i) $\frac{11}{25}$ ii) $1\frac{5}{8}$ iii) $\frac{19}{20}$ iv) $\frac{1}{6}$ v) $\frac{3}{11}$

4

Solve the equations.

a) $a + 3.26 = 8.2$ b) $b - \frac{3}{5} = 4\frac{6}{7}$ c) $0.91 - c = 1$

d) $\frac{2}{9} \times d = \frac{1}{27}$ e) $\frac{3}{4}$ of $e = e - 25$ f) $f \times 2.7 = \frac{27}{100}$

g) $g \div 9 + 2 = \sqrt{49}$ h) $\frac{8}{15} \div h = 2 \div 5$ i) $6.3 \div \mathrm{i} = \sqrt{81}$

5

What is the whole amount if:

a) $\frac{5}{8}$ is 26 km 350 m b) $\frac{4}{15}$ is 6.78 litres c) $\frac{11}{13}$ is £65 23 p

d) 0.75 is 4 kg 308 g e) 1.06 is 7 h 4 min f) its **square root** is 110?

6

Solve the problems in your exercise book.

a) The area of one square is 25% of the area of a second square. If the first square has side 3 cm, what is the length of a side of the second square?

b) The area of one triangle is 2 fifths of the area of a second triangle.
The second triangle has base 4.5 cm and height 3.2 cm.

i) What is the area of the second triangle?

ii) What is the base of the first triangle if its height is 80 mm?

1 Calculate:

a) half of $3\frac{4}{5}$ b) one fifth of $\frac{7}{8}$ c) seven times $2\frac{3}{5}$.

2 A 1 metre metal tube weighs $\frac{9}{20}$ kg. What is the mass of **four** similar 7 metre tubes?

3 a) Convert these fractions to thirtieths: $\frac{5}{6}, \frac{4}{5}, \frac{7}{10}, \frac{2}{3}$

b) Write the fractions in increasing order.

c) What is the sum of the fractions?

4 a) Draw a rectangle which has sides 7 cm and 4 cm long.

b) i) Draw its lines of symmetry.

ii) Which plane shapes did you form by drawing these lines of symmetry?

c) How many times larger than the perimeter of one of the smaller shapes is the perimeter of the original rectangle?

d) How many times larger than the area of one of the smaller shapes is the area of the original rectangle?

5 Write:

a) two 4-digit natural numbers which are divisible by 2, 5 and 6.

b) two 5-digit natural numbers which are divisible by 3, 4 and 25.

6 List these fractions in increasing order: $\frac{3}{5}, \frac{7}{10}, \frac{1}{2}, \frac{60}{100}, \frac{13}{20}, \frac{14}{20}$

7 72 radishes are tied in equal bundles, with no radishes left over. How many radishes could be in each bundle?

8 a) Draw a point, then draw two 3 cm segments from the point so that the angle they form is $60°$.

b) If each of the two segments is half of a diagonal of the same rectangle, construct the rectangle.

c) Measure the necessary dimensions, then calculate:

i) the perimeter of the rectangle ii) the area of the rectangle.

1

$3\frac{2}{3} + 2\frac{4}{5} + 1\frac{1}{2} - 4\frac{3}{4} =$

2

On the 1st day of a 4-day walking holiday, we walked $7\frac{1}{4}$ km. On the 2nd day we walked $6\frac{3}{5}$ km and on the 3rd day we walked $5\frac{7}{8}$ km.

If we walked 25 km altogether, how far did we walk on the 4th day?

3

a) Construct an **isosceles** triangle with base 3 cm long and arms 5 cm long.

b) i) Draw its lines of symmetry.

ii) Which plane shapes did you form by drawing these lines of symmetry?

c) Calculate the area of:

i) one of the smaller shapes ii) the original triangle.

4

A group of 8 people in an office earned these amounts over a period of 4 weeks.

1st week: £3684, 2nd week: £3341, 3rd week: £3435.40, 4th week: £3256.80

How much did each person earn **on average** over the 4-week period?

5

In a recipe for making bread, 1 kg of flour produces 1.8 kg of dough. After the dough has been kneaded and proved, it is put into the oven to bake.

During baking, the dough loses $\frac{1}{5}$ of its mass.

How much bread can be made from 2 kg of flour using this recipe?

6

Dad cut these lengths from a 2.5 m plank of wood: $\frac{4}{5}$ m, $\frac{3}{4}$ m and $\frac{5}{8}$ m.

What length of plank was left?

7

a) Construct an angle of $45°$.

b) Mark a point 4 cm from the vertex on one of the arms of the angle.

c) Draw a line which is perpendicular to the arm at this point and extend it to cut the other arm, forming a triangle.

d) Measure the sides and angles of this triangle.

e) What kind of triangle have you drawn?

f) Calculate its area and perimeter.

1 a) $\frac{3}{4} \times \frac{5}{7}$ b) $\frac{12}{15} \times \frac{1}{6}$ c) $1\frac{3}{5} \times \frac{5}{8}$ d) $2\frac{1}{3} \times 3\frac{1}{4}$

2 Write each percentage as a fraction and as a decimal. a) 43% b) 206%

3 What are these parts of 838 km? a) 0.67 b) $4\frac{1}{3}$ c) 86%

4 A container was $\frac{4}{5}$ full of honey. Then 2 thirds of this honey was sold.

a) What part of the container still contains honey?

b) If the container has a capacity of 50 litres:

i) how much honey was sold

ii) how much honey is left?

5 A jewellery firm bought 3.6 m^2 of gold leaf. First 15% of the gold leaf was used, then $\frac{2}{9}$ of it, then 0.4 of it.

a) How much gold leaf was used altogether?

b) If the firm employed 10 craftsmen, how much gold leaf did each craftsman use on average?

6 a) $\left(3\frac{1}{2} + 2\frac{1}{4}\right) \times \frac{3}{5} =$ b) $\left(8\frac{1}{5} - 2\frac{3}{4}\right) \times \frac{2}{3} =$

7 What quantity is:

a) $\frac{2}{3}$ of 543 m b) $1\frac{3}{4}$ of 615 kg c) $2\frac{1}{2}$ of $15\frac{2}{5}$ km d) 1.17 of 63.3 m^2?

8 In 2003, a firm planned for an income of £25.7 million. They exceeded this plan by 20%. How much income did the firm actually achieve?

9 During a sale, the price of a £185 suit was reduced by 13%, then reduced again by 15%.

a) By how many £s was the price reduced? b) What was the new price?

10 Construct a **rhombus** which has an angle of $60°$ and a longer diagonal of length 7 cm. Measure the necessary data then calculate the perimeter and area of the rhombus.

1 An observatory on a mountain in Scotland measured the temperature at 6 am each day during the second half of February. This table shows the data collected.

Day	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th	26th	27th	28th
Temperature (°C)	0	– 1	– 4	– 5	– 2	– 3	– 2	+ 1	+ 2	0	– 1	+ 1	+ 2	+ 2

a) Draw a graph to show how the temperature changed.

b) Calculate the **mean** temperature.

2 a) $5 \div \frac{2}{3}$ b) $16 \div 4\frac{1}{2}$ c) $54 \div 5\frac{1}{5}$ d) $100 \div \left(8\frac{1}{4} - 7\frac{1}{2}\right)$

3 What is the whole quantity if:

a) $\frac{1}{4}$ of it is 28 kg b) $\frac{2}{3}$ of it is 28 litres c) $2\frac{3}{4}$ of it is 121 m

d) $1\frac{4}{5}$ of it is 189 cm e) 0.17 of it is 61.2 g?

4 What is the whole quantity if:

a) 1% is £4.25 b) 1% is 0.7 m c) 25% is 32.6 kg

d) 10% is 43.75 km e) 50% is £159.80?

5 a) $(6.2 + 5.8) \div \frac{2}{3} =$ b) $\left(5\frac{1}{4} - 3\frac{1}{5}\right) \div 1\frac{1}{2} =$

6 What is the whole quantity if:

a) $\frac{7}{8}$ of it is 315 cm b) $4\frac{1}{3}$ of it is 611 m c) 65% of it is 20.28 kg?

7 A country bought 1 199 300 tonnes of oil, which was 33.5% of its imports that year. What mass of goods did the country import that year?

8 The length of a cuboid-shaped iron block is 140 cm. Its width is 0.7 of its length and $1\frac{5}{9}$ of its height.

a) Calculate: i) its surface area ii) its volume.

b) How much does the block weigh if 1 cm^3 of iron weighs 7.6 g?

1

Use the first difference to work out the value of the other differences.

a) $236.8 - 46.3 =$

b) $236.8 - (46.3 + 2) =$

c) $(236.8 - 5.6) - 46.3 =$

d) $236.8 - (46.3 - 3) =$

e) $(236.8 + 2) - (46.3 - 1) =$

f) $(236.8 - 1) - (46.3 + 1) =$

g) $(236.8 + 10) - (46.3 - 10) =$

h) $(236.8 - 6) - (46.3 - 6) =$

i) $(236.8 + a) - (46.3 + b) =$

j) $(236.8 - 3c) - (46.3 - 5c) =$

2

Use the first product to work out the value of the other products.

a) $325 \times 1.5 =$

b) $(325 \times 3) \times 1.5 =$

c) $325 \times (1.5 \times 3) =$

d) $(325 \div 5) \times 1.5 =$

e) $325 \times (1.5 \div 3) =$

f) $(325 \times 0.2) \times (1.5 \times 4) =$

g) $(325 \div 4) \times (1.5 \div 3) =$

h) $(325 \times 11) \times (1.5 \div 11) =$

i) $(325 \div a) \times (1.5 \div b) =$

j) $(325 \times a) \times (1.5 \div b) =$

3

If $x + y = z$, what are the results of these operations?

a) $(x + 2.3) + y =$

b) $x + \left[y + \left(-\frac{4}{5}\right)\right] =$

c) $\left[x - \left(-3\frac{1}{4}\right)\right] + y =$

d) $(x + 1.2) + (y + 1.6) =$

e) $(x - 7) + (y + 7) =$

f) $(x \times 4) + y =$

4

Construct a **trapezium** ABCD which has:

base AB = 5.5 cm, height = 3 cm, $\angle A = 75°$, $\angle B = 50°$.

a) By measuring and calculating, work out: i) its perimeter ii) its area.

b) Draw any axis *t*. **Reflect** trapezium ABCD in *t*.

5

The sum of the digits of a 4-digit number is 15. The digits in the greatest and smallest place values are the same but are less than the two middle digits. The two middle digits have a difference of 1.

What could the 4-digit number be?

6

The combined ages of the 4 members of a family is 70 years. Mum is 6 times as old as her son and 10 times as old as her daughter. Dad is 2 years older than Mum.

How old is each member of the family?

1 A man walks at an **average** speed of $4\frac{2}{5}$ km/hour. How far does he walk in $2\frac{2}{3}$ hours?

2 What is the whole quantity if:

a) $\frac{6}{7}$ of it is 60 kg b) 55% of it is £273.02 c) $1\frac{3}{5}$ of it is $14\frac{2}{5}$ litres?

3 If $a = 12 \div 3\frac{1}{3}$ and $b = 12 \div 2\frac{3}{4}$, what is the value of:

a) a b) b c) $a + b$ d) $a - b$ e) $a \div b$ f) $b \div a$?

4 If $1\frac{2}{5}$ of a number is $8\frac{2}{3}$, what is $3\frac{2}{5}$ of the same number?

5 Here is some information about the dimensions of an aluminium cuboid:

$a = 38.5$ cm, $b = 80\%$ of a, $b = 1\frac{2}{3}$ of c

a) Calculate the volume of the cuboid.

b) Calculate the mass of the solid if 1 cm^3 of aluminium weighs 2.7 g.

6 a) Draw a square and label its vertices, sides and diagonals.

b) Write true statements about the square, using words or mathematical notation.

7 a) Draw a rectangle and label its vertices A, B, C and D.

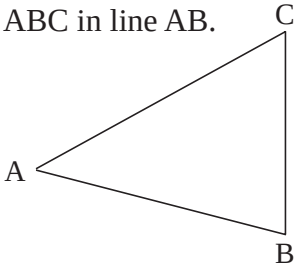
b) Mark the mid-points of the sides and label them E, F, G and H.

c) Draw the line of symmetry through E and G and mark the midpoint of line segment EG. Label the midpoint O.

d) What are the *mirror images* of points F, D and O?

e) What are the *mirror images* of triangles AEG, GCB and AOB?

8 **Reflect** triangle ABC in line AB.



1

a) Draw an **isosceles triangle** and label its vertices.

b) Draw its lines of symmetry.

c) Write 4 true statements about the triangle in words or using mathematical notation.

2

Construct and label:

a) a $45°$ angle b) a $120°$ angle.

3

a) Draw an **equilateral triangle** which has sides of length 2 cm.

b) Draw a triangle which has sides 3 times longer than those in the 1st triangle.

c) How many times more than the area of the 1st triangle is the area of the 2nd triangle?

d) How many times more than the perimeter of the 1st triangle is the perimeter of the 2nd triangle?

4

a) Construct an **isosceles triangle** which has a side of length 4 cm as its base and angles of $75°$ at its baseline.

b) Measure the necessary data then calculate the perimeter of the triangle.

c) Calculate the area of the triangle.

5

a) Construct a **deltoid** which has sides of length 4 cm and 6 cm and the length of the diagonal which lies on its line of symmetry is 8 cm.

b) Calculate its perimeter.

c) Measure the necessary data, then calculate its area.

6

Two opposite angles of a **deltoid** are $50°$ and $110°$.

Calculate the size of the other two angles.

7

a) Construct a **rhombus** which has diagonals 8 cm and 5 cm long.

b) Measure the distance between two opposite sides.

c) Measure its angles and add them together.

d) Calculate the perimeter of the rhombus.

e) Calculate the area of the rhombus.

1

The cross-section of a 3.5 m long pine beam is a 16 cm square.

If 1 m^3 of pinewood weighs 500 kg, what is the mass of the beam?

2

A container shaped like a 35 cm cube was filled with water.

We ladled out half of the water, then ladled out $\frac{2}{5}$ of the remaining water.

How much water was left in the container? *Give your answer in litres.*

3

The spire of a church is shaped like a pyramid. The edges of its square base are 3.5 m long and each of its side faces is 5.2 m high.

How many m^2 of tin plate are needed to cover the spire?

4

The volume of a **square-based pyramid** can be calculated using this formula:

$$V = \frac{A \times h}{3}$$

where A is the area of the base and h is the height of the pyramid.

How high is the pyramid if its base edge is 36 cm and its volume is 17289 cm^3?

5

a) $\left[\frac{4}{5} \times 1\frac{3}{7} - \left(3\frac{1}{4} - 1\frac{5}{6}\right)\right] \times 4\frac{2}{3} = ?$

b) What is $\frac{5}{6}$ of $3\frac{5}{7}$ kg?

c) If $3\frac{1}{2}$ times a length is $21\frac{7}{8}$ m, what is the whole length?

6

A tailor bought 35 rolls of a certain material. Each roll originally contained 26.5 m of material but the tailor has already used 19 and 3 quarter rolls.

How many men's suits can he make from the remaining material if each suit needs on average 3.1 m of material?

7

I spent 9.5% of my money and had £304.08 left. How much money did I have at first?

8

52% of the 350 pupils in a school are girls. How many girls and how many boys attend this school?

9

The edge of a container shaped like a cube is 24 cm. A second container shaped like a cuboid holds the same amount of liquid.

If the base edges of the second container are 36 cm and 24 cm, how high is it?

1

a) i) In how many ways can you put a *blue* and a *white* counter in order?

ii) If it is done randomly, what is the probability that the order will be *blue*, *white*?

b) i) How many ways are there of putting in order a *blue*, a *white* and a *red* counter?

ii) If the orders happen at random, what is the probability that the order will be *red*, *blue*, *white*?

c) i) How many ways are there of putting in order a *blue*, a *white*, a *red* and a *green* counter?

ii) If the orders happen at random, what is the probability that the order will be *white*, *red*, *green*, *blue*?

2

a) i) Three horses, A, B and C, are running in a race. How many orders are possible for 1st, 2nd and 3rd places?

ii) If each of the different orders has an equal chance of happening, what is the probability of the order C, A, B?

b) i) Four horses, A, B, C and D, are running in another race. How many orders are possible for 1st, 2nd and 3rd places?

ii) p (C, A, B) = ?

c) i) Five horses, A, B, C, D and E are running in a 3rd race. How many orders are possible for 1st, 2nd and 3rd places?

ii) p (C, A, B) = ?

3

Two *white* marbles and one *red* marble are in a bag. If you take out a marble with your eyes shut, what is the probability of each of these outcomes?

a) You take out the *red* marble. b) You take out a *white* marble.

c) You take out the *red* marble, replace it then take out the *red* marble again.

d) You take out a *white* marble, then take out the other *white* marble.

e) You take out a *white* marble, replace it then take out a *white* marble again.

f) You take out a *white* marble, replace it then take out the *red* marble.

g) You take out the *red* marble, replace it, then take out a *white* marble.

4

If each member of a group shakes hands with each of the others, how many handshakes occur if there are:

a) 2 members in the group b) 3 members in the group

c) 4 members in the group d) 5 members in the group

e) 11 members in the group f) n members in the group? ($n > 1$)

1

a) Draw an **equilateral triangle** and label its vertices.

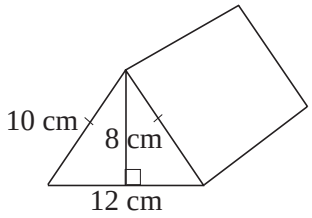
b) Draw its lines of symmetry.

c) Write 4 true statements about the triangle, using words or mathematical notation.

d) Are all equilateral triangles **similar**? *Give a reason for your answer.*

2

This **prism** has 2 triangular faces, each with base 12 cm, height 8 cm and side edges 10 cm.



a) How long is the prism if its volume is 720 cm^3?

b) What is the surface area of the prism?

3

What is the whole quantity if:

a) $\frac{5}{7}$ of it is £60 b) 11% of it is £27.28 c) $2\frac{1}{3}$ of it is $12\frac{3}{5}$ litres?

4

A glass container shaped like a cube has edges 8 cm long.
A second tall glass container shaped like a cuboid has a 4 cm square base.

If the cube is filled with water and the water is then poured into the cuboid, what height will the water level reach?

5

After running a half marathon, I lost 7.5% of my body weight and weighed 94.35 kg.

What did I weigh before the race?

6

There are 2 *red* marbles, 3 *blue* marbles and a *white* marble in a bag. If you take out a marble with your eyes closed, what is the probability of each of these outcomes?

a) You take out a *red* marble. b) You take out a *blue* marble.

c) You take out the *white* marble, replace it then take out the w*hite* marble again.

d) You take out a *red* marble, then take out the other *red* marble.

e) You take out a *blue* marble, replace it then take out a *blue* marble again.

f) If you take out 3 marbles, replacing them each time, what is the probability that:

i) the 3 marbles you take out will be *blue*

ii) you will take out at least 2 different colours?

7

Write problems which have these probabilities as their solutions.

a) $\frac{3}{10}$ b) $\frac{1}{4}$ c) $\frac{5}{6}$ d) $\frac{7}{13}$ e) $\frac{8}{15}$