Types of Number : Square, Cube, Prime, Odd, Even

Q1.

c and d are positive numbers.

c is even.

d is odd.

Tick **one** box for each expression.

	Even	Odd	Cannot tell
$c + d$	☐	☑	☐
$4c$	☑	☐	☐
$\frac{c}{2}$	☐	☐	☑

(Total 3 marks)

Q2.

Here is a card from a game.

	13		32
8		27	
	15		36

Write down the number **from the card** that is a prime number.

Answer 13

(Total 1 mark)

Q3. Two prime numbers are multiplied together.

The answer is an **even** number between 50 and 60

Complete the calculation.

52	x	29	=	58

(Total 3 marks)

Q4. 20 2 -4 36 8

Write down the number **from the list** that is a square number.

Answer 36

(Total 1 mark)

Q5. The first two cube numbers are 1 and 8

Show that

the 3rd cube number can be written as the sum of three different prime numbers.

27	=	3	+	7	+	17

(Total 3 marks)

Gradients, Intercepts, y=mx+c

Q6. A line has the equation $y = 3x - 5$

(a) Write down the gradient of the line.

Answer 3

(1)

(b) Write down the y-intercept of the line.

Answer -5

(1)

(Total 2 marks)

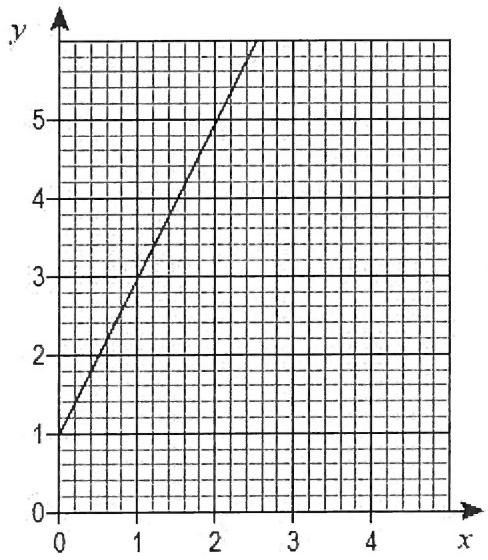
Q7. Write down the equation of a straight line parallel to $y - 2x = 9$

$y - 2x =$ any number

Answer _____

(Total 1 mark)

Q8. Here is a graph of a straight line.



(a) Work out the equation of the line.

$y = 2x + 1$

Answer _____

(2)

(b) Work out the coordinates of the y-intercept of the line that

is parallel to the line in part **(a)**

and passes through (2, 2)

Answer (0 , −2)

(2)

(Total 4 marks)

Q9. A straight line

- has gradient 5
- passes through the point (3, 7)

Circle the equation of the line.

$y = 3x - 2$ $y = 3x + 7$ $y = 5x$ $y = 5x - 8$

(Total 1 mark)

Factors and multiples

Q10. Write down **all** the factors of 20

1 x 20

2 x 10

4 x 5

Answer 1, 2, 4, 5, 10, 20

(Total 2 marks)

Q11. 14 80 400 8 25

Write down the number **from the list** that is a factor of 40

Answer 8

(Total 1 mark)

Q12. Mica says,

"When two multiples of 5 are added, the answer is always a multiple of 10"

Give **one** example to show that he is wrong.

5 + 20 = 25

ANY ADDITION THAT ENDS WITH 5

(Total 1 mark)

Q13. 51 512 0.5 15 56

Write down the number **from the list** that is a multiple of 5

Answer 15

(Total 1 mark)

Direct Proportion

Q14.

In total, the cost of 40 cartons of apple juice and 20 cartons of orange juice is £21.50

Work out the cost of

4 cartons of apple juice and 2 cartons of orange juice.

÷ by 10 40 → 4, 20 → 2

So 21·50 ÷ 10 = 2·15

Answer £ 2·15

(Total 2 marks)

Q15.

The total cost of broadband for 5 months is £99.20

At the same monthly rate, work out the total cost of broadband for 2 **years**.

99·20 ÷ 5 = £19·84 each month

19·84 × 12 months × 2 years =

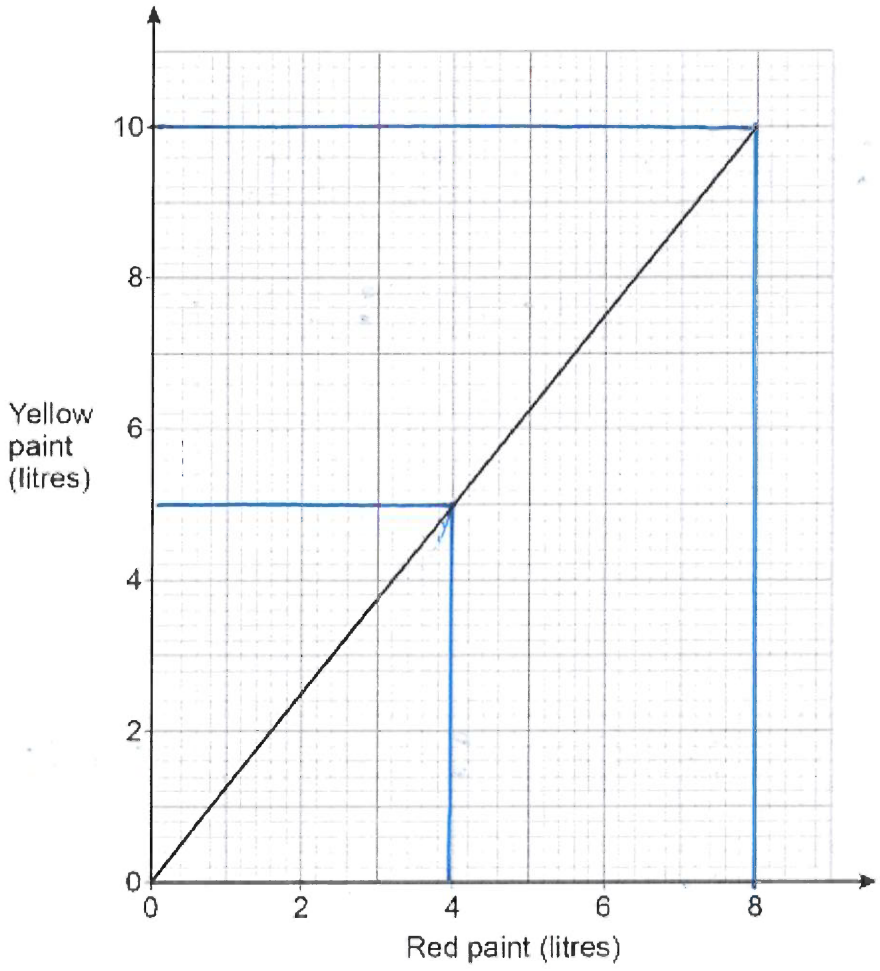
Answer £ 476·16

(Total 3 marks)

Q16.

Ola and Pip make orange paint by mixing red paint and yellow paint.

The graph shows how much of each colour paint to use.



(a) Ola uses 5 litres of yellow paint.

Write down how much **red** paint Ola **uses**.

Answer 4 litres

(1)

(b) Pip uses 10 litres of yellow paint.

How much **orange** paint does Pip **make**?

10L yellow + 8L red =

Answer 18 litres

(2)

(Total 3 marks)

Substitution

Q17.

Popcorn is sold in bags.

8 small bags have a total mass of 496 g

5 small bags and 2 large bags have a total mass of 638 g

Work out the mass of a large bag.

SMALL BAGS

496 ÷ 8 = 62g = 1 small bag

5 small bags = 5 x 62 = 310g

638g − 310g = 328g = 2 large bags

so 1 large bag = 328g ÷ 2

Answer 164 g

(Total 4 marks)

Q18.

Work out the value of $2(a^2 + 3a)$ when $a = 4$

$2 \times (4^2 + 3 \times 4)$

$= 2 \times (16 + 12)$

$= 2 \times 28$

Answer 56

(Total 3 marks)

Q19.

A window cleaner uses this formula.

$C = 2W + 5$

C = cost, in £, for the customer

W = number of windows to be cleaned

(a) How much does it cost for 6 windows to be cleaned?

$C = 2 \times 6 + 5$

$C = 12 + 5$

Answer £ 17

(2)

(b) The cost for another customer was £24

Show why this cost **must** be incorrect.

THE COST MUST BE AN ODD NUMBER

$\times 2 =$ EVEN

EVEN + ODD = ODD

(1)

(Total 3 marks)

Q20.

Work out the value of $2(3x - 5y)$ when $x = 4$ and $y = -2$

$2 \times (3 \times 4 - 5 \times (-2))$

$2 \times (12 - -10) = 2 \times (12 + 10) =$

Answer 44

(Total 2 marks)

Q21.

$d = g^2 - 2h$

Work out the value of d when $g = 15$ and $h = 63$

$d = 15^2 - 2 \times 63$

$d = 225 - 126$

$d = 99$

$d =$ 99

(Total 2 marks)

Q22.

A shopkeeper uses this formula to work out the cost of bags of oranges.

$C = 1.8 \times n$

C is the cost in £

n is the number of bags

(a) Work out the cost of 5 bags.

$1.8 \times 5 = 9$

Answer £ 9

(2)

(b) There are three oranges in each bag.

Work out the cost of **one** orange if they each cost the same.

Give your answer in pence.

Cost of one bag is £1.80 not £1.08

$1.80 \div 3 = 60p$

Answer 60 pence

(2)

(Total 4 marks)

Use of scales on a map or a ratio

Q23.

A map has a scale of 1 : 4000

On the map, the distance from a station to a museum is 7 cm

Is the **actual** distance from the station to the museum **more** than 300 m?

Tick a box.

Yes ☐ No ☑

Show working to support your answer.

7 × 4000 = 28,000 cm

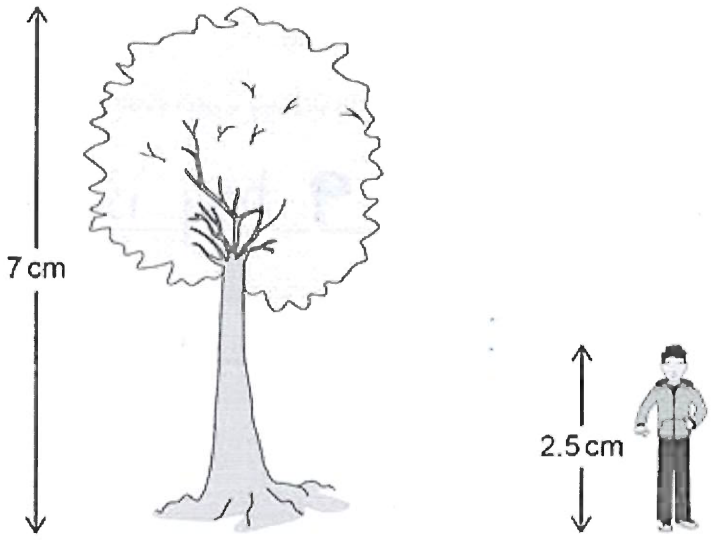
cm ÷ 100 → metres 28000 ÷ 100 =

280 m It is less

(Total 3 marks)

Q24.

The scale drawing shows a tree and a student.



The actual height of the tree is 4.2 metres.

Work out the actual height of the student.

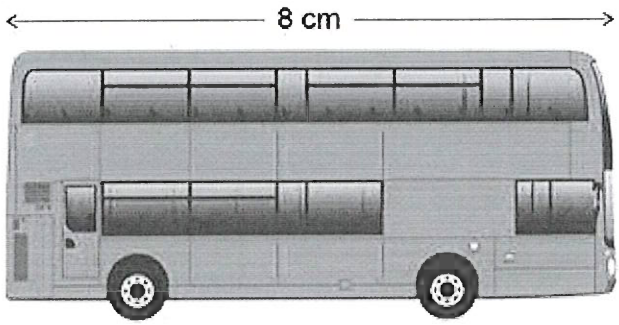
TREE SCALE : 7cm : 4.2 metres ÷7
÷7 ↓ 1cm : 0.6 metres
×2.5 ↓ 2.5cm : 1.5 metres

Answer 1.5 m

(Total 3 marks)

Q25.

This scale drawing of a bus has length 8 cm



Scale 1 cm represents 1.65 m

The actual length of the bus is 3.8 times the actual length of a car.

Work out the actual length of the car.

Give your answer in metres, to the nearest centimetre.

ACTUAL LENGTH OF BUS = 8 × 1.65
× 3.8 = 13.2 metres

CAR BUS so 13.2 ÷ 3.8 =
÷ 3.8

Answer 3.47 metres

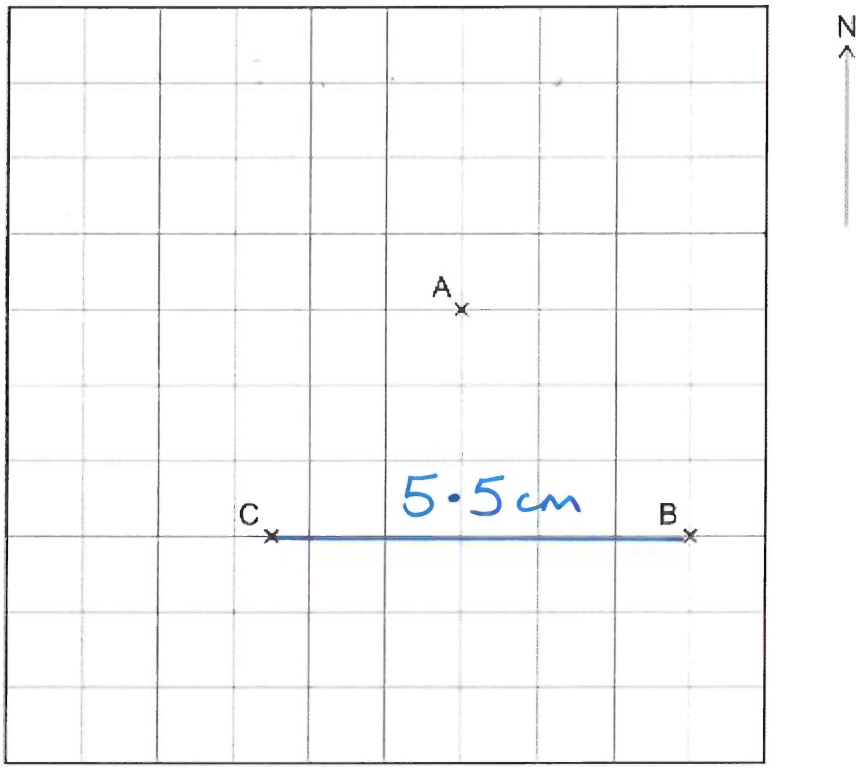
(Total 3 marks)

(347 cm)

Q26.

Here is a scale diagram showing towns A, B and C on a centimetre grid.

Scale 1 : 200000



Work out the **actual** distance from B to C.

Give your answer in kilometres.

5·5 cm × 200,000 = 1,100,000 cm →

cm ÷100 → m ÷ 1000 → km

11,000 m → 11 km

Answer 11 km

(Total 4 marks)

1 km = 1 000 metres

1 metre = 100 cm

Q27.

On a map the distance between two towns is 5 cm.

The actual distance is 2 km.

Work out the scale of the map as a ratio in its simplest form.

5 cm : 2 km

5 cm : 2,000 metres

÷5 ↓ 5 cm : 200,000 cm ↓ ÷5

1 : 40,000

Answer 1 : 40,000

(Total 3 marks)

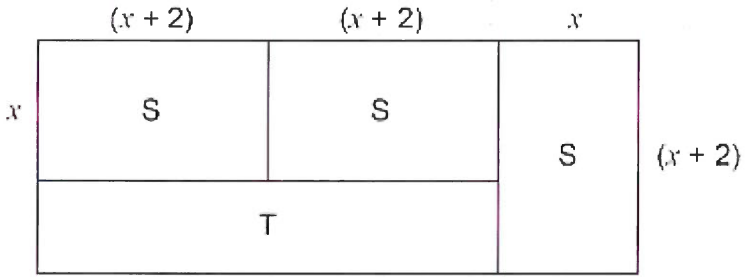
Forming Equations and Formulae

Q28. S and T are rectangles.

S has dimensions $(x + 2)$ and x.

Some of these rectangles make the larger rectangle shown.

Not drawn accurately



Work out an expression for the perimeter of T.

RIM → distance along the edge

Give your answer in its simplest form.

LENGTH OF T = $(x+2)+(x+2) = 2x+4$

WIDTH OF T = $(x+2) - x = 2$

PERIMETER OF T = $2x+4 + 2x+4 + 2 + 2$

$= 4x + 12$

Answer $4x + 12$

(Total 3 marks)

Q29. The total cost of a taxi ride is calculated by adding

a fixed charge of £4

and

a charge of £2 per mile.

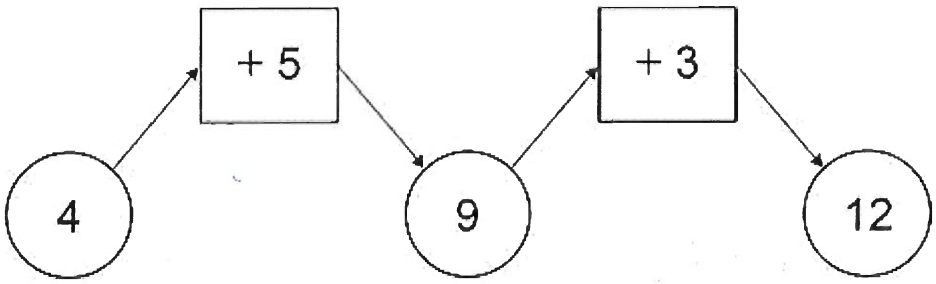
Write a formula to work out the total cost, £C, of a journey of m miles.

$C = 2m + 4$

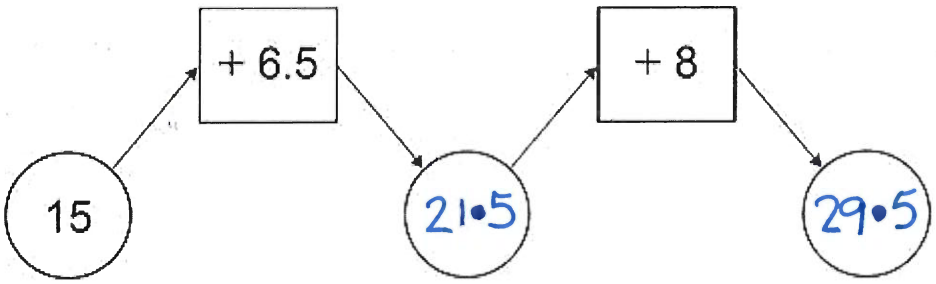
$C =$ $2m + 4$

(Total 2 marks)

Q30. Here is a diagram.

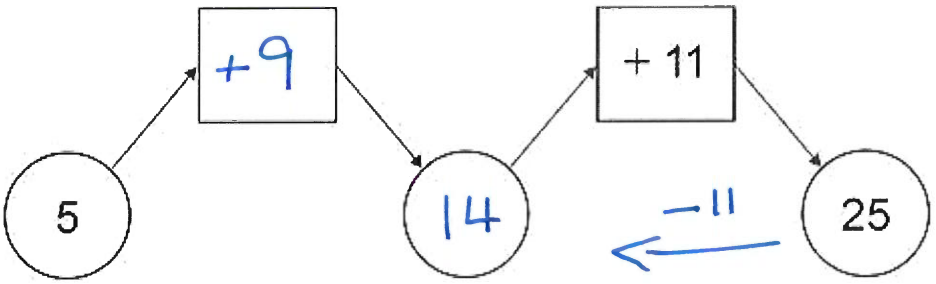


(a) Complete this diagram.



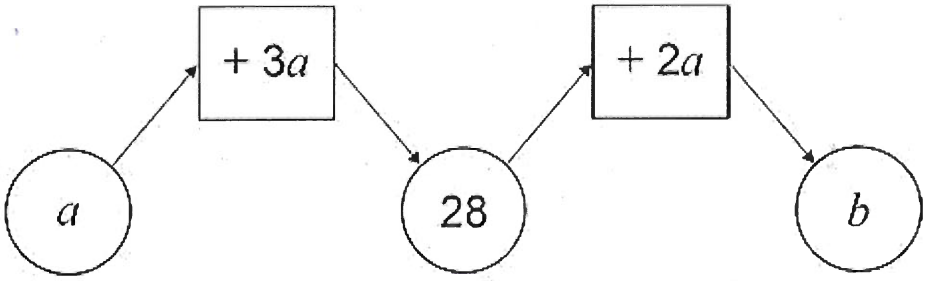
(1)

(b) Complete this diagram.



(2)

(c)



Work out the value of b.

$a + 3a = 28$ so $4a = 28$ so $a = 7$

$28 + 2a = b$ so $28 + (2 \times 7) = b$

$b =$ 42 **(3)**

(Total 6 marks)

Q31. I am thinking of a number (n).

I subtract 3 from my number.
I divide the answer by 5
My final answer is 2

Work out my final answer if I add 7 to my number (n) and then divide by 4

$\frac{n-3}{5} = 2$ so $n-3 = 10$

so $n = 13$

I add 7 $7+13=20$ then $\div 4$

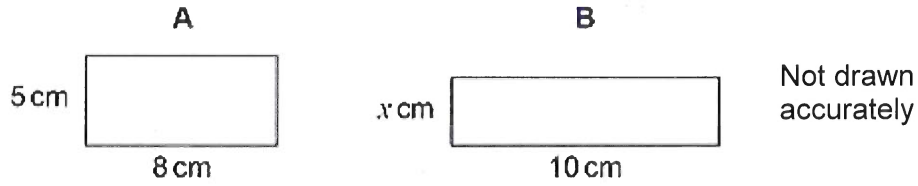
$20 \div 4 =$

Answer 5

(Total 4 marks)

Area of Shapes

Q32. These two rectangles have the **same area**.



Not drawn accurately

Work out the ratio perimeter A : perimeter B

perimeter

A : $5+8+5+8 = 26$ cm

B : $x+10+x+10 = 2x+20$

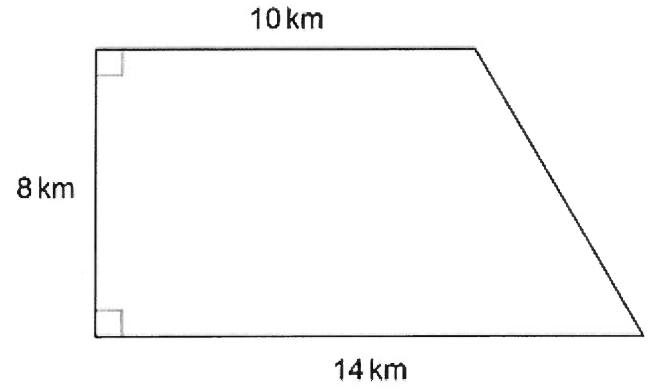
ratio → $26 : 2x+20$ $\div 2$

$\div 2$ → $13 : x+10$

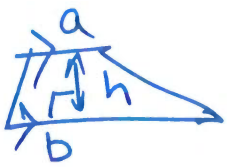
Answer 13 : $x+10$

(Total 4 marks)

Q33. The boundaries of a city form a trapezium.



Not drawn accurately



area of trapezium
= (a+b) ÷ 2 × h

Population density =	number of people / area

The population density of the city is 9450 people per square kilometre.

Work out the number of people who live in the city.

area of trapezium = (10 + 14) ÷ 2 × 8 =
= 24 ÷ 2 × 8 = 96 km²

POP DENSITY = 9450 = people ÷ 96

So people = 9450 × 96 = Answer 907,200

(Total 4 marks)

Money Problems

Q34. Luca spends 71p

He pays the exact amount with 4 coins.

List the coins he uses.

Answer 50p 10p 10p 1p

(Total 2 marks)

Q35.

Annie spends these amounts in four shops using £20 notes, £10 notes and £5 notes.

Shop A	£65
Shop B	£40
Shop C	£115
Shop D	£75

In each shop she

pays the exact amount

uses the **smallest** possible number of notes.

Work out the total number of each note she uses.

A : 20+20 + 20 + 5 = 65

B : 20 + 20 = 40

C : 20 + 20 + 20 + 20 + 20 + 10 + 5 = 115

D : 20 + 20 + 20 + 10 + 5 = 65

Number of £20 notes 13

Number of £10 notes 2

Number of £5 notes 3

(Total 3 marks)

Fractions, Decimals and Percentages

Q36.

Complete the table to show equivalent fractions, decimals and percentages.

Fraction	Decimal	Percentage
$\frac{5}{10}$ or $\frac{1}{2}$	0.5	50%
$\frac{1}{10}$	0.1	10%
$\frac{2}{5}$	0.4	40%

(Total 3 marks)

Q37.

Write 0.27 as a fraction.

Answer $\frac{27}{100}$

(Total 1 mark)

Q38.

Complete each statement using **one** of these symbols.

< = >

2.54	>	2.508
0.25	=	$\frac{1}{4}$
2	<	$\frac{5}{2}$

(Total 3 marks)

Q39.

Work out $\frac{9}{4}$ as a decimal.

$9 \div 4 = 2.25$

Answer 2.25

(Total 1 mark)

Writing as ratio (including form 1:n)

Q40.

There are 30 students in a class.

12 of the students have school lunch.

Work out the ratio

students having school lunch : students not having school lunch

Give your answer in its simplest form.

$30 - 12 = 18$

$12 : 18 \div 6$

$\div 6$ $2 : 3$

Answer 2 : 3

(Total 2 marks)

Q41.

Kai says that 3 : 2 is an equivalent ratio to 9 : 6

Jo says that 1.5 : 1 is an equivalent ratio to 9 : 6

Who is correct?

Tick **one** box.

- [✓] Both of them
- [ ] Kai only
- [ ] Jo only
- [ ] Neither of them

Give reasons for your answer.

KAI ×3 (3 : 2) ×3 ↓ 9 : 6 ✓

JO (1·5 : 1) ×6 ×6 ↓ 9 : 6 ✓

(Total 2 marks)

Q42.

Write the ratio 6 : 2 in the form n : 1

÷2 ÷2

Answer 3 : 1

(Total 1 mark)

Simplifying algebraic expressions

NOT 2M

Q43.

Simplify fully $2m \div m$

$2 \times m = 2m$

So

$2m \div m = 2$

as $2m \div 2 = m$

Answer 2

(Total 1 mark)

Q44.

Multiply out $3(2x + 8)$

$3(2x + 8) =$

Answer $6x + 24$

(Total 2 marks)

Q45.

Simplify fully $y \times y \times y$

(NOT $y + y + y = 3y$)

Answer y^3

(Total 1 mark)

Q46.

Simplify fully $5 \times 2w$

(NOT $2w^5$)

Answer $10w$

(Total 1 mark)

Q47.

Simplify fully $x + 4x$

Answer $5x$

(Total 1 mark)

Q48.

Write the ratio $6a : 5a$ in the form $n : 1$ where n is a **decimal**.

$\div 5a \quad \div 5a$

$1.2 : 1$

NOTE: $5a \div 5a = 1$

Answer $1.2 : 1$

(Total 2 marks)

Q49.

Simplify fully $4(a + 2) + a$

$4 \times (a + 2) + a$

$4a + 8 + a =$

Answer $5a + 8$

(Total 2 marks)

Q50.

Simplify fully $\frac{20w}{4w}$

4w x 5 = 20w

So 20w ÷ 4w = 5

NOT 5w

Answer 5

(Total 2 marks)

Fractions of Amount

Q51.

To get to college, 120 students either walk, cycle or travel by car.

$\frac{3}{8}$ of the students walk.

students who cycle : students who travel by car = 1 : 2

How many students travel by car?

WALK 3/8 of 120 = 120 ÷ 8 x 3

= 45 students walk

NON WALKERS = 120 − 45 = 75

SHARE 75 in ratio 1:2

1 + 2 = 3 75 ÷ 3 = 25 1:2 x25 = 25:50

25 cycle 50 car

Answer 50

(Total 3 marks)

Q52.

Work out $\frac{1}{4}$ of 780

780 ÷ 4 =

Answer 195

(Total 1 mark)

Q53. One day,

- a company runs 240 trains
- $\frac{1}{8}$ of these trains are late.

The company is charged £350 for each late train.

How much is the company charged that day?

1/8 of 240 = 240 ÷ 8 = 30

30 x 350 =

Answer £ 10,500

(Total 3 marks)

Probability

Q54.

At a lucky dip stall, players pick a ball at random from a tub and then **replace it**.

The tub contains	180 red balls
	170 yellow balls
	50 blue balls.

Caroline has a go at the lucky dip.

(a) What is the probability that Caroline wins a prize with her first pick?

50 OUT OF 50 + 170 + 180 =

Answer 50/400 or 1/8

(2)

(b) Caroline has 16 goes on the lucky dip and wins 3 prizes.

Is this **more** than the expected number?

You **must** show your working.

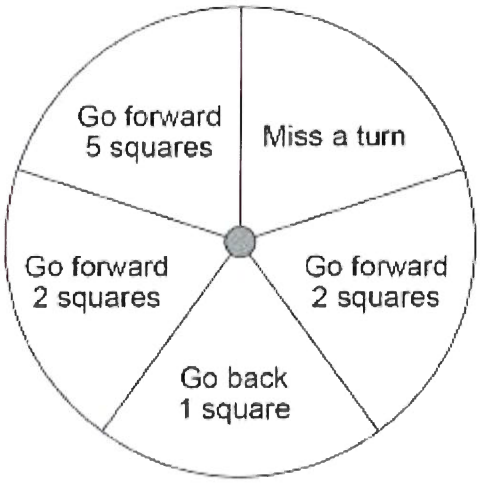
P(win) = 1/8 16 x 1/8 = 2 expected wins

Answer YES

(2)

(Total 4 marks)

Q55. In a game, a fair spinner has five equal sections as shown.



(a) Chloe spins the spinner.

Write down the probability that she gets 'Miss a turn'.

Answer 1/5

(1)

(b) The spinner lands on 'Go back 1 square' three times in a row.

Jamal is next to spin.

Write down the probability that he gets 'Go back 1 square'.

Answer 1/5

(1)

(c) In one game there are 85 spins.

How many of these spins are expected to be 'Go forward 2 squares'?

P(fwd 2 squares) = 2/5

2/5 x 85 =

Answer 34

(2)

(Total 4 marks)

Q56. An experiment is carried out 200 times.

The possible outcomes are K, L and M.

(a) Complete the table.

Outcome	K	L	M
Frequency	84	54	62
Relative frequency	0.42	0.27	0.31

200
−84
−54
TOTAL
200 ÷200
1

(2)

(b) Altogether, the experiment is carried out 500 times.

How many times would you expect the outcome to be K?

0.42 × 500 =

Answer 210

(2)

(Total 4 marks)

Q57. An ordinary fair dice is rolled ten times.

Here are the first nine results.

6 1 3 2 1 5 5 5 5

Write down the probability of getting a 5 on the tenth roll.

Answer $\frac{1}{6}$

(Total 1 mark)

Sequences

Q58. A linear sequence starts

4 +3→ 7 +3→ 10 +3→ 13 +3→

Write down the next number in this sequence.

Answer 16 **(Total 1 mark)**

Q59.

Here is a sequence.

3 6 12 24

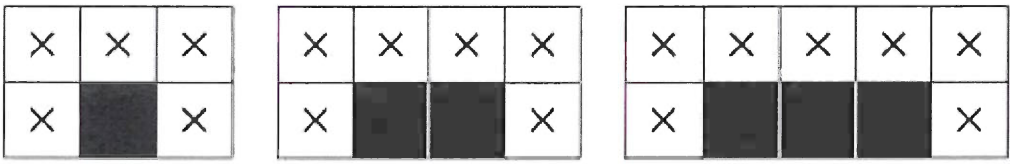
Write down the term-to-term rule for this sequence.

Answer ×2

(Total 1 mark)

Q60.

Here are the first three patterns in a sequence.



Pattern 1 **Pattern 2** **Pattern 3**

Draw Pattern 4 on the grid.

(Total 1 mark)

Q61.

A linear sequence has

- 2nd term = 6
- 5th term = 18

Work out the nth term of the sequence.

1st 2nd 3rd 4th 5th

2nd ? 6 ? ? 18

gap = 18 − 6 = 12

mini gap 12 ÷ 3 = 4 so

2 6 10 14 18 = 4n − 2

Answer 4n − 2

(Total 3 marks)

Q62. Here is the term-to-term rule for a sequence.

Double the previous term and add 3

×2+3 → 8a + 29

The first three terms of the sequence are $a + 1$ $2a + 5$ $4a + 13$

Show that the sum of the first **four** terms is a multiple of 3

$a + 1$

$+ \quad 2a + 5$

$+ \quad 4a + 13$

$+ \quad 8a + 29$

$15a + 48 = 3(5a + 16)$

(Total 3 marks)

% of Amount

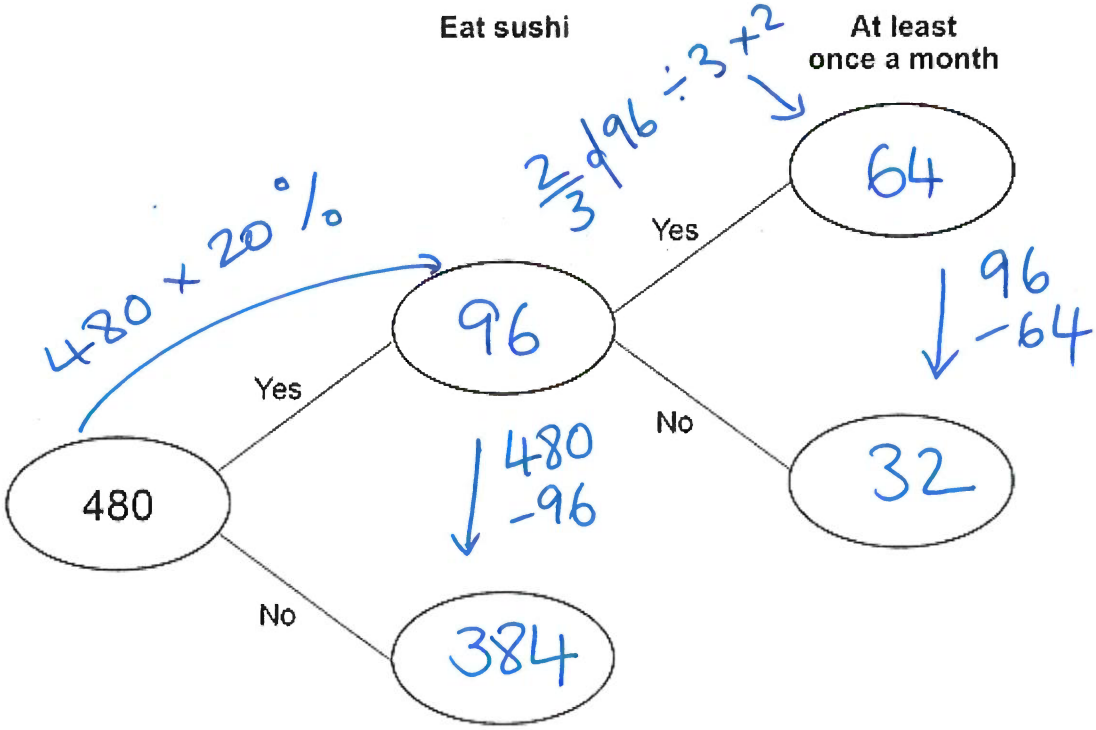
Q63.

480 people are asked if they eat sushi.

20% say Yes.

$\frac{2}{3}$ of the people who say Yes eat sushi at least once a month.

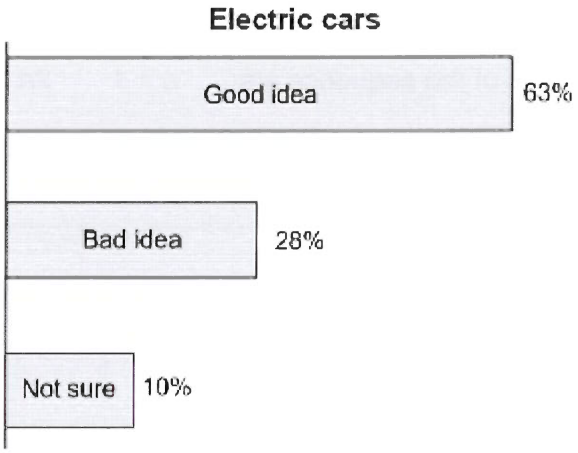
Complete the frequency tree.



(Total 4 marks)

Q64.

The diagram shows the results of a survey of 1200 British motorists.



(a) How can you tell that the percentages are **not** exact figures?

BECAUSE THEY DON'T ADD UP TO 100 %

(1)

(b) Using the percentages given, how many of the motorists think electric cars are a bad idea?

28% x 1200 = 336 OR

1200 x 28 ÷ 100 = 336

Answer 336

(1)

(c) The percentages in the survey are given to the nearest 1%

Work out the **smallest** possible number of motorists who thought electric cars were a good idea.

62.5% of 1200 =

Answer 750

(2)

(Total 4 marks)

Q65.

Ingrid records the number of minutes she uses her mobile phone over four weeks.

140 168 205 192

Work out the range.

BIGGEST TAKE AWAY SMALLEST

205 − 140 =

Answer 65 minutes

(Total 1 mark)

Q66.

Here is a list of five numbers.

5 9 4 16 8

An extra number is put into the list.

The **median** of the numbers is now 7

Work out the extra number.

median

in order 4 5 8 9 16

7 is new median

6 is new number

4 5 6 8 9 16

7

Answer 6

(Total 2 marks)

Q67.

£4.56 is paid using the smallest possible number of coins.

What is the **modal value** of the coins used?

You **must** show your working.

£2 × 2 → modal, most common

50p × 1

5p × 1

1p × 1

Answer £2

(Total 2 marks)

NOT 2

INGRID RECORDS MINUTES FOR MOBILE OVER 4 WEEKS
140 168 205 192

Q68.

Ingrid records the number of minutes for a fifth week.

The mean for all **five** weeks is 178 minutes.

Work out the number of minutes used in the fifth week.

mean = 178

total = 178 x 5 = 890 minutes

total for 1st 4 weeks 140 + 168 + 205 + 192 = 705 MINS

5th week = 890 − 705 =

Answer 185 minutes

(Total 3 marks)

Q69.

Hot drinks are sold at a station in the ratio

tea : coffee : hot chocolate = 3 : 5 : 2

2600 hot drinks are sold.

How many coffees are sold?

TOTAL
10 → x 260
2600

5 x 260 =

Answer 1300

(Total 3 marks)

Time Calculations

Q70. Paul leaves home at 7.15 am

He travels to work in 20 minutes.

Does Paul arrive at work by 7.30 am?

Tick a box

Yes ☐ No ☑

Give a reason for your answer.

7.15 + 20 mins = 7.35

(Total 1 mark)

Q71a. The table shows information about two workers on one day.

	Total working time (hours)	Working time spent online (minutes)
Zeke	8	200
Margot	4	110

Zeke says he spent **more than one quarter** of his total working time online.

Is he correct?

Tick a box.

Yes ☑ No ☐

Show working to support your answer.

200 minutes online

8 hrs = 480 minutes (8 × 60)

$\frac{200}{480} > \frac{1}{4}$

(Total 3 marks)

Q71b.

Margot started work at 10:30 am

What time did she finish?

Answer 2.30 pm

(Total 1 mark)

Solve Linear Equations

Q72.

Solve $4(2d - 5) = 28$

$4 \times (2d - 5) = 28$

	$8d - 20$	$=$	28	
$+20$	$8d$	$=$	48	$+20$
$\div 8$	d	$=$	6	$\div 8$

$d =$ 6

(Total 3 marks)

Q73.

Solve $-2 + y = 10$

$+2 \quad +2$

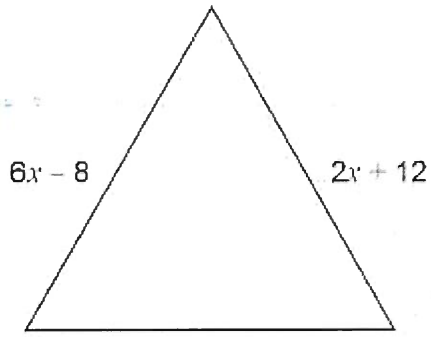
$y = 12$

$y =$ 12

(Total 1 mark)

Q74. Here is an equilateral triangle.

All measurements are in centimetres.



Not drawn accurately

Work out the value of the perimeter of the triangle.

(1) SOLVE TO WORK OUT x

−2x	6x − 8 = 2x + 12	−2x
+8	4x − 8 = 12	+8
÷4	4x = 20	÷4
	x = 5	

(2) CALCULATE A SIDE BY SUBSTITUTION

2x + 12 → 2×5+12 = 22

(3) 3 equal sides 22×3 = Answer 66 cm

(Total 4 marks)

Share in ratio / Apply ratio

Q75.

On a school trip, one teacher is needed for every group of 10 or fewer students.

72 students want to go on the trip.

Lexi tries to work out how many teachers are needed.

72 ÷ 10 = 7.2
7 teachers are needed.

What is wrong with her answer?

7.2 IS MORE THAN 7 SO 8 ARE NEEDED

(Total 1 mark)

Q76.

A sauce is made from cream and stock in the ratio

cream : stock = 1 : 6 ~~TOTAL = 1+6 = 7~~

How much **sauce** can be made using 80 millilitres of cream?

~~80 ÷ 7 = 11.42...~~

TOTAL

1 : 6 → 7

×80 → ×80

80mL → 560mL

Answer 560 ml

(Total 2 marks)

Q77.

Jing has £2450

She saves some and gives the rest to her four brothers.

money saved : money given to brothers = 2 : 5

She gives each of her **four** brothers the **same** amount.

Does each brother receive more than £430 ?

You **must** show your working.

SHARE 2450 in ratio 2:5 2+5=7

2450 ÷ 7 = 350 ×350

700 : 1750

BROTHERS GET 1750

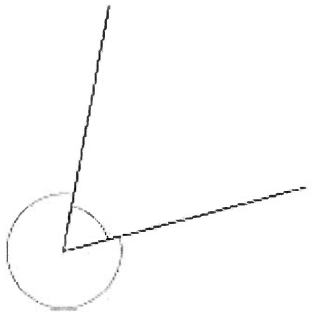
1750 ÷ 4 = 437.50 > ~~400~~ 430

YES

(Total 4 marks)

Q78.

Two angles around a point are shown.



Not drawn accurately

The angles are in the ratio 2 : 7

Show that the larger angle is 280°

SHARE 360 IN RATIO 2:7 2+7=9

360 ÷ 9 = 40 ✓ ✓ ×40

×40

480 280 ✓

(Total 2 marks)

END OF QUESTIONS