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GCSE (9–1) Mathematics
J560/01 Paper 1 (Foundation Tier)
Sample Question Paper

Date – Morning/Afternoon
Time allowed: 1 hour 30 minutes

Model Solutions

You may use:
- A scientific or graphical calculator
- Geometrical instruments
- Tracing paper

First name									
Last name									
Centre number						**Candidate number**				

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- This document consists of **20** pages.

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Answer **all** the questions

1 **(a)** Write 40 : 2000 as a ratio in its simplest form.

$40 : 2000$

$\div 40$ $1 : 50$ $\div 40$

(a) .....1..... : .....50..... **[2]**

(b) Two people share £350 in the ratio 1 : 6.

Calculate each share.

£350 split into 1+6=7 parts

$\frac{£350}{7}$ = £50 per part

So 1:6 is 1×£50 : 6×£50

£50 : £300

(b) £ .....50..... £ .....300..... **[2]**

(c) Find 20% of 450.

0.2×450=90

(c) .....90..... **[2]**

2 Write these in order, smallest first.

0.34 $\frac{1}{3}$ 3.5%

0.34 = 0.340 biggest

1/3 = 0.333

3.5% = 0.035 smallest

.....3.5%..... .....1/3..... .....0.34..... **[2]**

smallest

3 Colin drinks $\frac{3}{8}$ of a litre of milk each day.

Milk costs 89p for a 2-litre carton and 49p for a 1-litre carton.

What is the smallest amount that Colin would have to spend to buy milk for one week? Show your working.

1 week = 7 days

Amount needed → 7×3/8 = 2.625 Litres

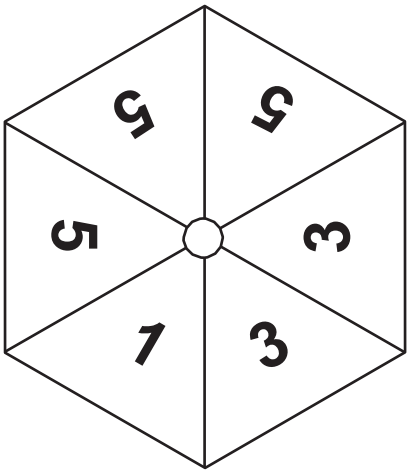
So will have to buy minimum 3 Litres

Cost → (1×1 Litre) + (1×2 Litre)

49p + 89p = £1.38

£ .....1.38..... **[3]**

4 An unbiased spinner is shown below.



(a) Write a number to make each sentence true.

(i) It is **evens** that the spinner will land on number ...5... . **[1]**

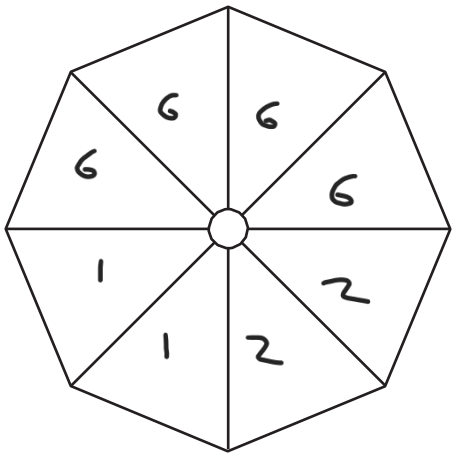
(ii) There is a probability of $\frac{1}{6}$ that the spinner will land on number ...1... . **[1]**

(iii) It is **impossible** that the spinner will land on number ...2... . **[1]**

(b) The spinner below has the following properties.

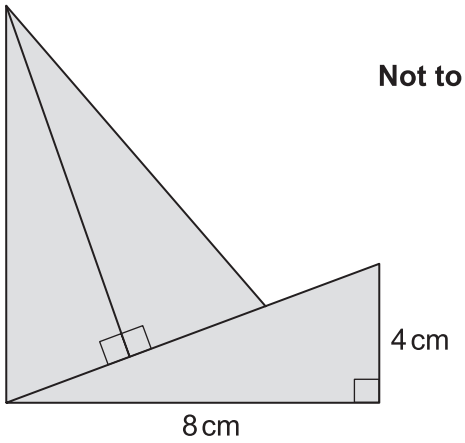
- There are eight equal sections, each showing one number.
- There are three different numbers on the spinner.
- The probability of the spinner landing on an even number is greater than the probability of it landing on an odd number.
- It is more likely that the spinner will land on a 6 than either of the other numbers.

Complete the spinner to show one possible arrangement of numbers.



[3]

5 This shape is made from three congruent right-angled triangles.



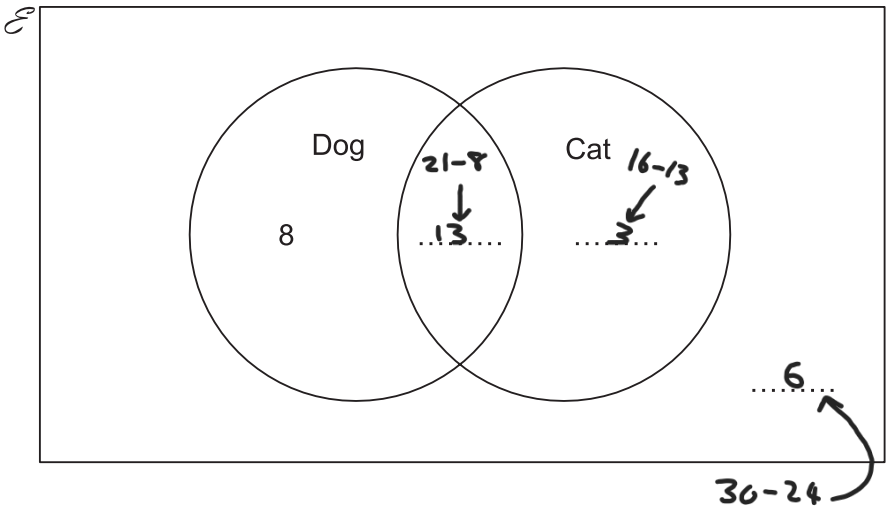
Find the total area of the shape.

Area of 1 → 1/2 × 8 × 4 = 16 cm²

Total → 3 × 16 cm² = 48 cm²

..... 48 ..... cm² **[3]**

6 Here is a Venn diagram.



30 students are asked if they have a dog or cat.

- 21 have a dog.
- 16 have a cat.
- 8 have a dog, but not a cat.

Complete the Venn diagram. **[3]**

7 **(a)** Write numbers in the boxes below to make the statement true.

$$15 \times 20 = 5 \times \boxed{60} = 6 \times \boxed{50}$$

[2]

(b) Angus thinks of a number.
If he cubes his number and then adds 9, he gets 17.

What number is he thinking of?

number thinks of is x

$x^3 + 9 = 17$

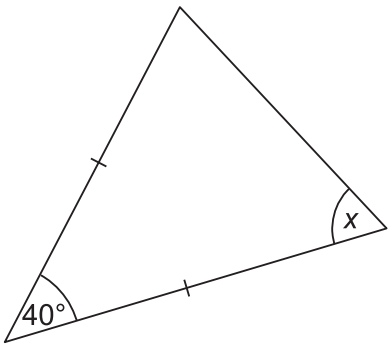
$x^3 = 8$

$x = \sqrt[3]{8}$

$x = 2$

(b) ..... 2 ..... **[2]**

8 The diagram shows a triangle.



Not to scale

Find the value of x.
Give a reason for each step of your working.

The two lines on each side indicate these sides are equal so this is an isosceles triangle.

$180 - 40 = 140$ because total angles in triangle $= 180°$

$\frac{140}{2} = 70°$ for bottom angles because 2 sides in an isosceles are equal.

$x =$ ..... $70°$ ..... ° **[3]**

9 The pictogram shows how some passengers spent most of their time on a flight.

Reading	⊞ ⊞
Watching films	⊞ ⊞ □
Listening to music	⊞ □
Playing games	⊞ ⊞ ▯
Other	⊞

Key: ⊞ represents 40 people

(a) How many passengers spent most of their time playing games?

$40 \times 2.5 = 100$

(a) 100 **[1]**

(b) How many **more** passengers spent most of their time watching films than reading?

1/4 square more

So $1/4 \times 40 = 10$ more

(b) 10 **[1]**

(c) There were 360 passengers on the plane.

Complete the pictogram for listening to music. **[3]**

$360 - (100 + 40 + 90 + 80) = 50$ passengers for music

$\frac{50}{40} = 1\ 1/4$ so 1 1/4 squares

10 **(a)** Insert one of $<$, $>$ or $=$ to make each statement true.

(i) $^{-}5$ ..... ? ..... $^{-}7$ **[1]**

(ii) 0.09 ..... < ..... 0.8 **[1]**

(iii) 6^2 ..... ? ..... 12 **[1]**

(b) Work out the value of $5^2 \times 10^2$.

$5^2 \times 10^2 = 25 \times 100 = 2500$

(b) ..... 2500 ..... **[2]**

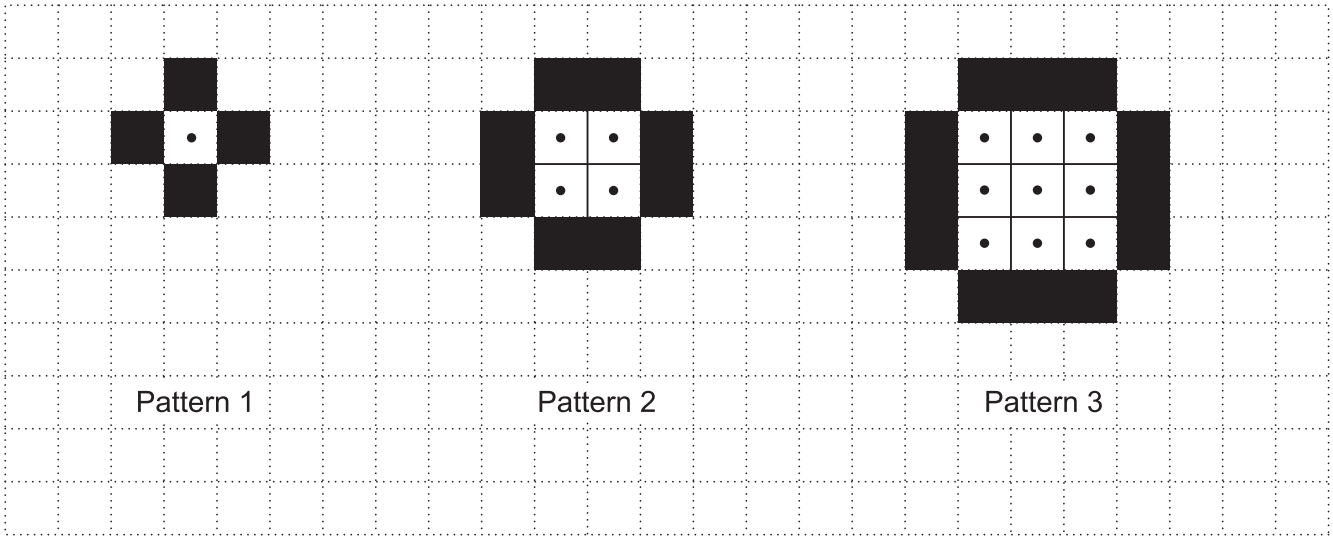
11 Show that $4(a + 3) - 3(a - 2) = a + 18$. **[2]**

$4(a+3) - 3(a-2)$

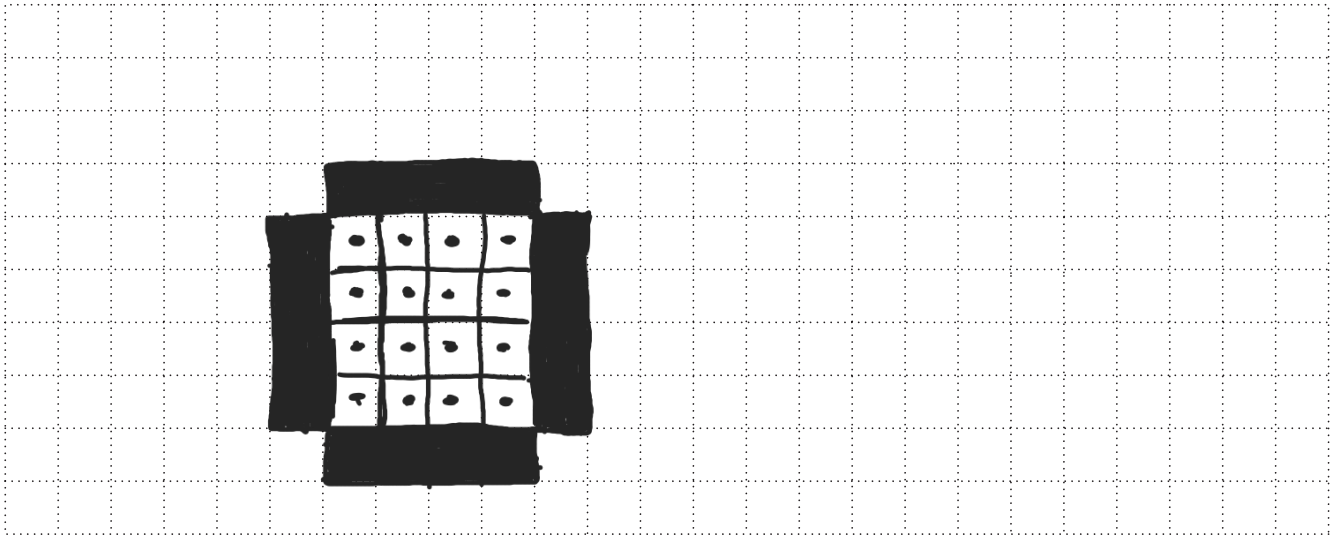
$4a+12 - 3a+6$

$a+18$

12 Here are the first three patterns in a sequence.



(a) Draw Pattern 4 in this sequence on the grid below.



[2]

(b) Pattern 3 has 9 dotted squares and 12 black squares.

How many **dotted** squares will there be in Pattern 8?

Dotted squares → area of dots

For 3 → 3×3=9

For 8 → 8×8 =64

(b) .....64..... **[2]**

(c) Write an expression for the number of **black** squares in the *n*th pattern.

Black = perimeter of inner circle

So $n+n+n+n = 4n$

(c) $4n$ **[2]**

(d) Sally looks at the patterns.
She says

> If the pattern number is odd, the total number of squares will be odd.
> If it is even, the total number of squares will be even.

Explain clearly why Sally is right for **all** patterns in the sequence.

Black always even as multiple of 4 → $4n$

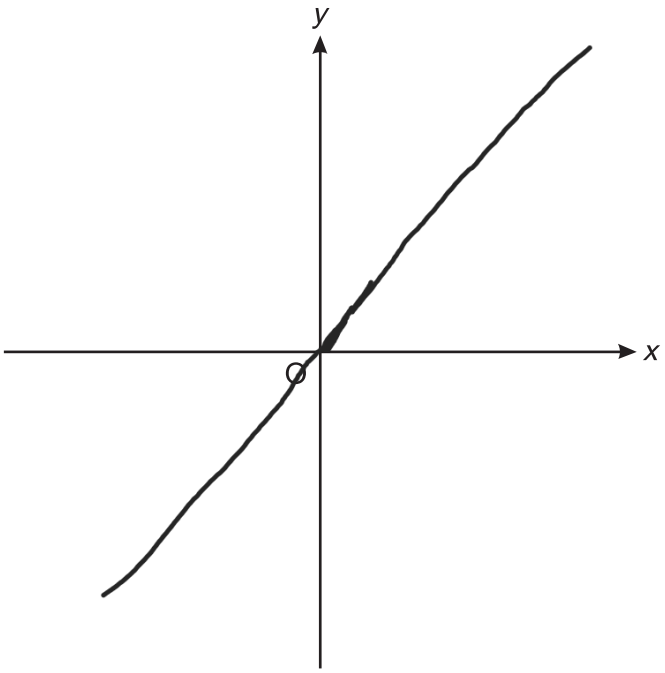
Dotted is pattern number squared

$odd^2 = odd \times odd = odd$

Black + dotted = even + odd = odd

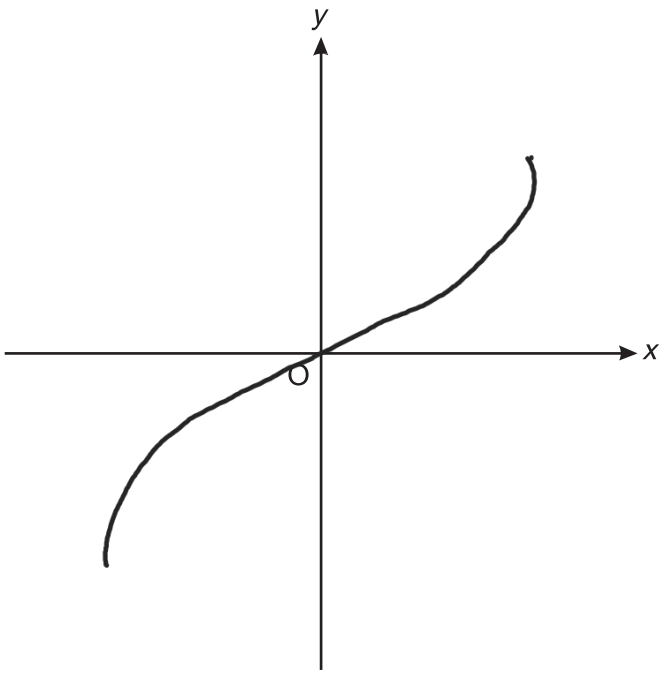
So when pattern number is odd so is number of squares **[6]**

13 (a) (i) Sketch a graph on the axes below that shows that y is directly proportional to x.



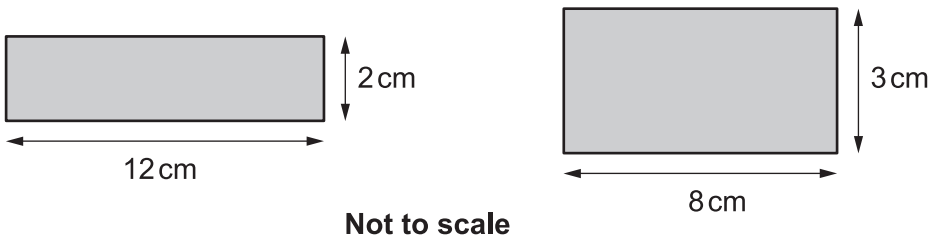
[2]

(ii) Sketch a graph on the axes below that shows $y = x^3$.



[2]

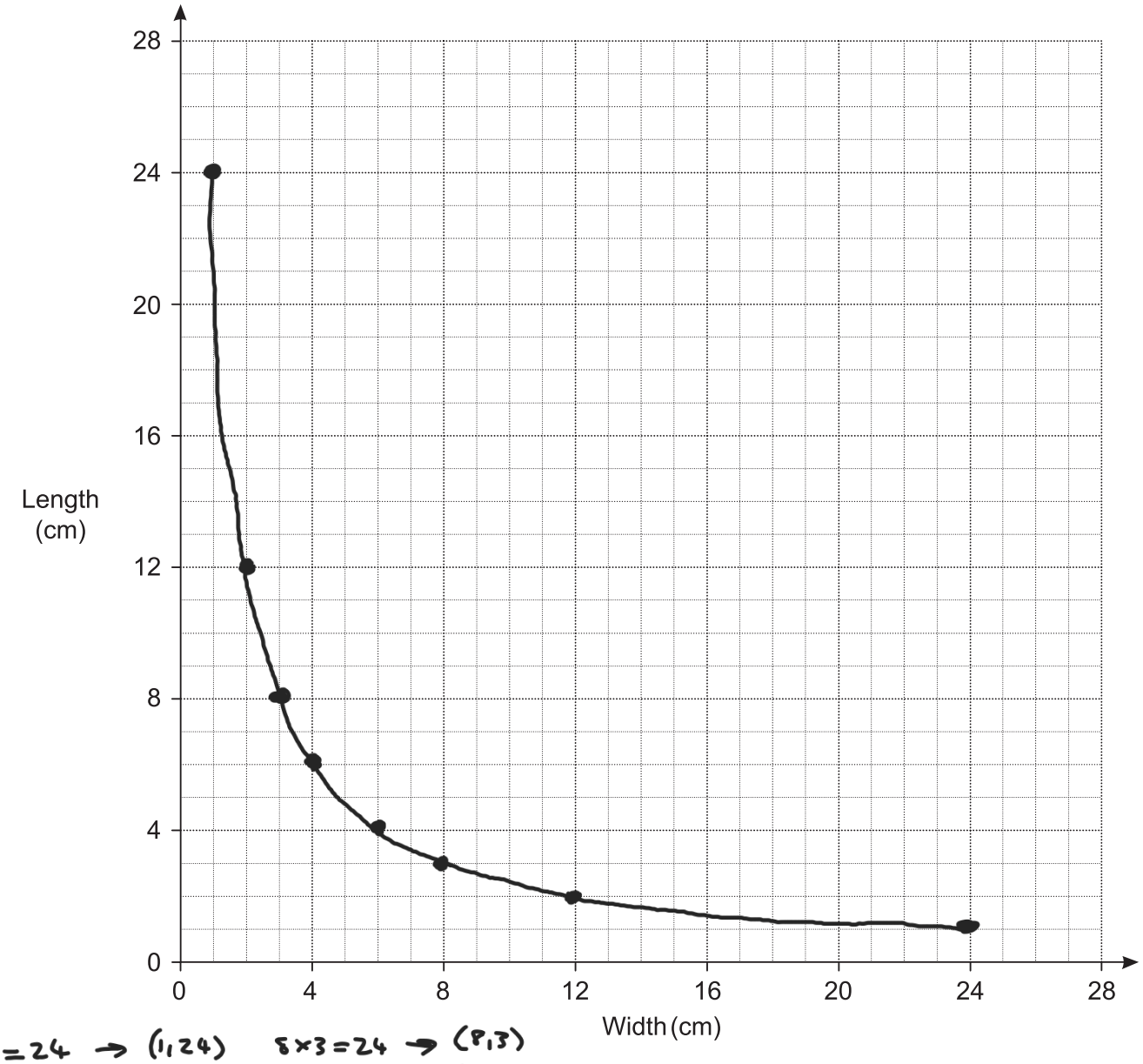
(b) It is possible to draw many rectangles that have area 24 cm^2.
Here are two of them.



Not to scale

(i) Plot the dimensions of these two rectangles on the grid below. **[1]**

(ii) Complete the graph to show the relationship between length and width for rectangles with area 24 cm^2. **[3]**



$1 \times 24 = 24 \rightarrow (1,24)$
$2 \times 12 = 24 \rightarrow (2,12)$
$3 \times 8 = 24 \rightarrow (3,8)$
$4 \times 6 = 24 \rightarrow (4,6)$
$6 \times 4 = 24 \rightarrow (6,4)$
$8 \times 3 = 24 \rightarrow (8,3)$
$12 \times 2 = 24 \rightarrow (12,2)$
$24 \times 1 = 24 \rightarrow (24,1)$

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14 The value of a car £V is given by

$$V = 20\,000 \times 0.9^t$$

where t is the age of the car in complete years.

(a) Write down the value of V when $t = 0$.

$V = 20{,}000 \times 0.9^0$
$= 20{,}000 \times 1$
$= 20{,}000$

(a) £ ...20,000... **[1]**

(b) What is the value of V when $t = 3$?

$V = 20{,}000 \times 0.9^3$
$= 14{,}580$

(b) £ ...14,580... **[2]**

(c) After how many complete years will the car's value drop below £10 000?

$20000 \times 0.9^t < 10000$
$0.9^t < \frac{10000}{20000}$
$0.9^t < 1/2$

When $t = 5 \rightarrow 0.9^5 = 0.59049 > 0.5$
When $t = 6 \rightarrow 0.9^6 = 0.531441 > 0.5$
When $t = 7 \rightarrow 0.9^7 = 0.4782969 < 0.5$

So $t = 7$

(c) ...t=7 years... **[2]**

15 Kieran, Jermaine and Chris play football.

- Kieran has scored 8 more goals than Chris.
- Jermaine has scored 5 more goals than Kieran.
- Altogether they have scored 72 goals.

How many goals did they each score?

① $k = C + 8$

② $J = k + 5$

③ $k + C + J = 72$

Set ① and ② in terms of C

① $k = C + 8$ ② $J = k + 5$, $J = C + 13$

Now plug these in ③

$J + k + C = 72$

$(C + 13) + (C + 8) + C = 72$

$3C + 21 = 72$

$3C = 51$

$C = 17$

① $k = C + 8$, $k = 17 + 8$, $k = 25$

② $J = C + 13$, $J = 17 + 13$, $J = 30$

Kieran ....25.....

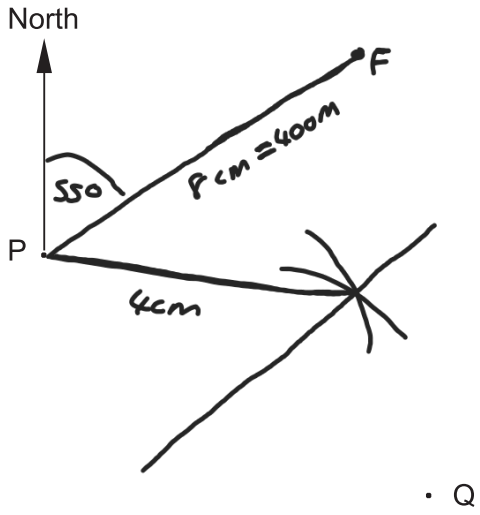
Jermaine ....30.....

Chris ....17.....

[5]

16 Otis keeps bees in two beehives.
They are marked P and Q in the scale drawing below.

Scale: 1 cm represents 50 metres



(a) If Otis walks at about 2 m/s, estimate how long it takes him to walk from beehive P to beehive Q.

Distance PQ = 6cm
= 6 x 50m
= 300 metres

Time = distance / speed

= 300 / 2m/s = 150 seconds

(a) 150 seconds **[3]**

(b) Bees can indicate to other bees where flowers are.

A bee indicates that there are flowers

- on a bearing of 055° from P
- at a distance of 400 m from P.

On the scale drawing, show the point where the flowers are.
Label this point F. **[2]**

(c) Otis plants some fruit trees, which are

- the same distance from P and from Q
- 200 m or less from P.

Indicate on the scale drawing where Otis plants the trees.
You must show all your construction lines. **[4]**

Draw arc radius 4cm = 200m
from P and Q and draw line where
they meet. Flowers planted on this line.

17 Six equations are shown below, each labelled with a letter.

A	B	C
$y = -6x$	$x = \frac{1}{6}y$	$y = \frac{-3}{x}$

D	E	F
$x = \frac{6}{y}$	$y = 6x$	$y = \frac{2}{x} + 2$

Choose the correct letters to make each statement true.

(a) Equation **B** and equation ..E.. are equivalent. **[1]**

(b) Equation ..C.. and equation ..D.. each show x is inversely proportional to y. **[2]**

18 Jo went for a bike ride one evening.
She travelled x kilometres in 5 hours.

Show that her average speed can be written as $\frac{x}{18}$ m/s. **[4]**

Speed = $\frac{\text{distance}}{\text{time}}$ → $\frac{x \text{ km}}{5 \text{ hours}}$

$= \frac{1000x \text{ meters}}{300 \text{ minutes}}$

$= \frac{1{,}000x \text{ meters}}{18{,}000 \text{ seconds}}$

$= \frac{1x \text{ m}}{18 \text{ s}} = \frac{x \text{ m}}{18 \text{ s}} = \frac{x}{18}$ m/s

19 Peter makes a large amount of pink paint by mixing red and white paint in the ratio 2 : 3.

Red paint costs £80 per 10 litres.
White paint costs £5 per 10 litres.

Peter sells his pink paint in 10-litre tins for £60 per tin.

Calculate how much **profit** he makes for each tin he sells.

Money in → £60

10 Litre tin in R:W 2:3 ratio which is total 5 parts.

Red = $\frac{2}{5} \times 10 = 4$ Litre Cost → £80 for 10 Litre so $\frac{4}{10} \times 80 = £32$

White = $\frac{3}{5} \times 10 = 6$ Litre Cost → £5 for 10 Litre so $\frac{6}{10} \times £5 = £3$

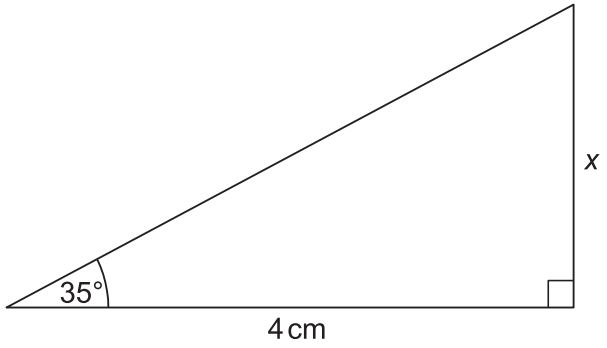
Total cost → £32 + £3 = £35

Profit → Money in − cost

= £60 − £35 = £25

£ ..25.. **[5]**

20 The diagram shows a right-angled triangle.



Not to scale

Calculate x.

We have to use opposite and adjacent sides so use TOA $\rightarrow \tan x = \frac{O}{A}$

$\tan x = \frac{O}{A}$

In our case it is $\tan 35 = \frac{x}{A}$

$\tan 35 = x/4$

$4 \times \tan 35 = x = 2.80$ cm

.....2.80..... cm **[3]**

21 Louise travels to work and home again by train.
The probability that her train to work is late is 0.7.
The probability that her train home is late is 0.4.

What is the probability that **at least** one of her trains is late?

P(Train to work isn't late) = 1 − 0.7 = 0.3

P(Train home isn't late) = 1 − 0.4 = 0.6

P(Both trains not late) = 0.3 × 0.6 = 0.18

P(at least 1 late) = 1 − 0.18 = 0.82

.....0.82..... **[4]**

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