**1** Work out 10% of £95

$$\frac{95}{10}$$

£ 9.50

(Total for question 1 is 1 mark)

**2** Work out 50% of 1200 grams

$$\frac{1200}{2}$$

600 grams

(Total for question 2 is 1 mark)

**3** Work out 1% of 200 litres

$$\frac{200}{100}$$

2 litres

(Total for question 3 is 1 mark)

**4** Find 21% of £160

$$\frac{160}{10} = 16 \qquad 16 \times 2 = 32 \ (20\%)$$

$$\frac{160}{100} = 1.6 \ (1\%)$$

$$32 + 1.6$$

£ 33.60

(Total for question 4 is 2 marks)

**5** Find 45% of 820

$$\frac{820}{2} = 410 \ (50\%)$$

$$\frac{410}{10} = 41 \ (5\%)$$

$$\begin{array}{r} 410 \\ -\ 41 \\ \hline 369 \end{array}$$

369

(Total for question 5 is 2 marks)

**6** Find 36% of 2500

$$\frac{2500}{10} = 250$$

$$250 \times 3 = 750 \ (30\%)$$

$$750 + 125 + 25$$

$$\frac{250}{2} = 125 \ (5\%)$$

$$\frac{2500}{100} = 25 \ (1\%)$$

900

(Total for question 6 is 2 marks)

**7** Work out 252% of 120.

$$100\% = 120$$

$$120 \times 2 = 240 \ (200\%)$$

$$\frac{120}{2} = 60 \ (50\%)$$

$$\frac{120}{100} = 1.2 \ (1\%)$$

$$1.2 \times 2 = 2.4 \ (2\%)$$

$$\begin{array}{r} 240 \\ 60 \\ + \ \ 2.4 \\ \hline \end{array}$$

$$302.4$$

**(Total for question 7 is 2 marks)**

**8** Which is greater

25% of 90  or  28% of 82

You must show your working.

$$\frac{90}{2} = 45 \quad (50\%)$$

$$\frac{45}{2} = 22.5 \quad (25\%)$$

$$\frac{82}{10} = 8.2$$

$$8.2 \times 3 = 24.6 \ (30\%)$$

$$\frac{82}{100} = 0.82$$

$$0.82 \times 2 = 1.64 \ (2\%)$$

$$24.6 - 1.64 = 22.96$$

28% of 82

**(Total for question 8 is 3 marks)**

**9** Which is greater

30% of 105  or  32% of 98

You must show your working.

$$\frac{105}{10} = 10.5$$

$$10.5 \times 3 = 31.5$$

$$\frac{98}{10} = 9.8$$

$$9.8 \times 3 = 29.4 \ (30\%)$$

$$\frac{98}{100} = 0.98$$

$$0.98 \times 2 = 1.96 \ (2\%)$$

$$29.4 + 1.96 = 31.36$$

30% of 105

**(Total for question 9 is 3 marks)**

**10** Richard gets a bonus of 30% of £130
Connor gets a bonus of £40

Work out the difference between the bonus Richard gets and the bonus Connor gets

$$\frac{130}{10} = 13$$

$$13 \times 3 = \underline{\underline{£39}}$$

$$40 - 39 = 1$$

£.........1.........

**(Total for question 10 is 3 mark)**

**11** There are adults and children in a cinema.
There are 48 adults.
25% of the people at the cinema are children.

Work out the total number of people at the cinema.

$$48 = 75\%$$
$$\div 3 \qquad \div 3$$
$$16 = 25\%$$
$$\times 4 \qquad \times 4$$
$$64 = 100\%$$

.........64.........

**(Total for question 11 is 3 marks)**

**1** Write down the ratio of 350 cm to 25 cm.
Give your answer in its simplest form.

$$350 : 25$$
$$\div 25 \quad \div 25$$
$$14 : 1$$

.................... $14 : 1$ ....................

**(Total for question 1 is 2 marks)**

**2** Write down the ratio of 220 kg to 5 kg.
Give your answer in its simplest form.

$$220 : 5$$
$$\div 5 \quad \div 5$$
$$44 : 1$$

.................... $44 : 1$ ....................

**(Total for question 2 is 2 marks)**

**3** Alex has the following coins:



Write down the ratio of the value of Alex's 20p coins to the value of Alex's 50p coins.

$$40 : 150$$
$$4 : 15$$

.................... $4 : 15$ ....................

**(Total for question 3 is 2 marks)**

**4** (a) Write the ratio 32 : 24 in its simplest form

$\div 8$   $\div 8$

4 : 3

4 : 3

(1)

(b) $\dfrac{1}{9}$ of people in a class are left handed.

Write the ratio of left handed people to right handed people

$\dfrac{1}{9} : \dfrac{8}{9}$

1 : 8

1 : 8

(1)

**(Total for question 7 is 2 marks)**

**5** (a) Write the ratio 15 : 35 in its simplest form.

$\div 5$   $\div 5$

3 : 7

3 : 7

(1)

(b) There are red shapes and blue shapes in a box, $\dfrac{2}{3}$ of the shapes are red.

Write the ratio of red shapes to blue shapes.

$\dfrac{2}{3} : \dfrac{1}{3}$

2 : 1

2 : 1

(1)

**(Total for question 9 is 2 marks)**

**6** (a) Write the ratio $81 : 27$ in its simplest form

$$\div 9 \quad \div 9$$

$$9 : 3$$

$$\div 3 \quad \div 3$$

$$3 : 1$$

................ $3 : 1$ ................

(1)

(b) $\frac{3}{8}$ of chocolates in a box are white chocolate, the rest are milk chocolate.

Write the ratio of white chocolates to milk chocolates.

$$\frac{3}{8} : \frac{5}{8}$$

$$3 : 5$$

................ $3 : 5$ ................

(1)

**(Total for question 6 is 2 marks)**

**7** (a) Write the ratio $24 : 72$ in its simplest form.

$$\div 8 \quad \div 8$$

$$3 : 9$$

$$1 : 3$$

................ $1 : 3$ ................

(1)

(b) In February, it rained on $\frac{3}{7}$ of days

Write the ratio of the days it rained to the number of days it did not rain.

$$\frac{3}{7} : \frac{4}{7}$$

$$3 : 4$$

................ $3 : 4$ ................

(1)

**(Total for question 9 is 2 marks)**

**8**    Write the ratio $7.5 : 2.5$ in the form $n : 1$

$\div 2.5 \quad \div 2.5$

$3 : 1$

$3 : 1$

**(Total for question 8 is 1 mark)**

**9**    Write the ratio $12 : 30$ in the form $1 : n$

$6 : 15$

$2 : 5$

$1 : 2.5$

$1 : 2.5$

**(Total for question 9 is 1 mark)**

**10**    There are some cubes in a bag.

$\frac{1}{6}$ of the cubes are red.

The rest of the cubes are blue.

Write the ratio of the number of red cubes to the number of blue cubes.
Give your answer in the form $1 : n$

$\frac{1}{6} : \frac{5}{6}$

$1 : 5$

$1 : 5$

**(Total for question 10 is 2 marks)**

**11** There are only blue counters, red counters and yellow counters in a bag.

There are twice as many blue counters as yellow counters.
There are three times as many red counters as yellow counters.

B : Y
2 : 1

R : Y
3 : 1

Write down the ratio of blue counters to red counters to yellow counters.

B : R : Y
2 : 3 : 1

.........................................................

**(Total for question 11 is 2 marks)**

**12** There are only green pens, black pens and red pens in a box.

There are four times as many green pens as black pens.   4 : 1
There are twice as many red pens as green pens.   4 : 8

Write down the ratio of green pens to black pens to red pens.

G : B : R
4 : 1 : 8

.............4 : 1 : 8............

**(Total for question 12 is 2 marks)**

**13**   Charlotte, Jo and Mike played a game.

Charlotte's scored four times as many points as Jo.
Mike's scored half as many points as Charlotte.

Write down the ratio of Charlotte's points to Jo's points to Mike's points

$$C : J : m$$
$$4 : 1 : 2$$

........................ 4 : 1 : 2 ........................

**(Total for question 13 is 2 marks)**

**14**   There are 120 people in a school canteen.
Half of the people in the canteen are in year 11 students.  60

The number of year 11 students in the canteen is three times the number of year 10 students.
The rest of the people in the canteen are year 9 students.   $\frac{60}{3} = 20$

the number of year 9 students : the number of year 10 students = $n : 1$

Work out the value of $n$.
You must show how you get your answer.

$$120 - 60 - 20 = 40 \quad \text{YEAR } 9$$

$$40 : 20$$
$$2 : 1$$

$n = $ ........................ 2 ........................

**(Total for question 14 is 2 marks)**

**15** In a bag there are blue sweets, red sweets and yellow sweets.

The number of red sweets is three times the number of blue sweets.
The number of yellow sweets is half the number of red sweets.

Write down the ratio of blue sweets to red sweets to yellow sweets.
Give your answer in the form $a : b : c$ where $a$, $b$ and $c$ are whole numbers

$$B : R : Y$$
$$1 : 3 : 1.5$$
$$2 \quad 6 : 3$$

..............$2 : 6 : 3$..............

**(Total for question 15 is 2 marks)**

**16** In a bag there are blue sweets, red sweets and yellow sweets.

The number of blue sweets is four times the number of yellow sweets.
The number of red sweets is half the number of yellow sweets.

Find the percentage of sweets in the bag that are yellow.

$$B : R : Y$$
$$4 : 0.5 : 1$$
$$8 : 1 : 2$$

Yellow $\dfrac{2}{11}$

$$\dfrac{2}{11} \times 100 \qquad \dfrac{200}{11}$$

.......................% 

**(Total for question 16 is 2 marks)**

$\boxed{18.18 \%}$

**1**   Will and Olly share £80 in the ratio 3 : 2

Work out how much each of them get.

$$\boxed{16} \quad \boxed{16} \quad \boxed{16} \quad : \quad \boxed{16} \quad \boxed{16}$$

$$80 \div 5 = 16$$

$$3 \times 16 = 48$$
$$2 \times 16 = 32$$

Will  £ 48

Olly  £ 32

**(Total for question 1 is 3 marks)**

**2**   Molly, Paige and Demi share 42 sweets in the ratio 3 : 2 : 1

Work out the number of sweets that each of them receives.

$$\boxed{7} \quad \boxed{7} \quad \boxed{7} \quad : \quad \boxed{7} \quad \boxed{7} \quad : \quad \boxed{7}$$

$$42 \div 6 = 7$$

$$3 \times 7 = 21$$
$$2 \times 7 = 14$$
$$1 \times 7 = 7$$

Molly   21   sweets

Paige   14   sweets

Demi   7   sweets

**(Total for question 2 is 3 marks)**

**3**   *ABC* is a straight line.

$$\overset{20}{\rule{2cm}{0.4pt}} \overset{20}{\rule{2cm}{0.4pt}} \overset{20}{\rule{2cm}{0.4pt}} \overset{20}{\rule{2cm}{0.4pt}}$$
A       B             C
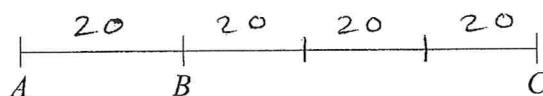
The length of *BC* is three times the length of *AB*.

*AC* = 80 metres.    $3 : 1$

Work out the length *BC*.   $BC : AB$

$$\frac{80}{4} = 20$$

$$3 \times 20 = 60$$

60 metres

**(Total for question 3 is 3 marks)**

**4** Carly and James share some money in the ratio 5 : 3
Carly gets £70 more than James.

Work out how much money James gets.

CARLY | 35 | 35 | 35 | 35 | 35 |

JAMES | 35 | 35 | 35 |

70
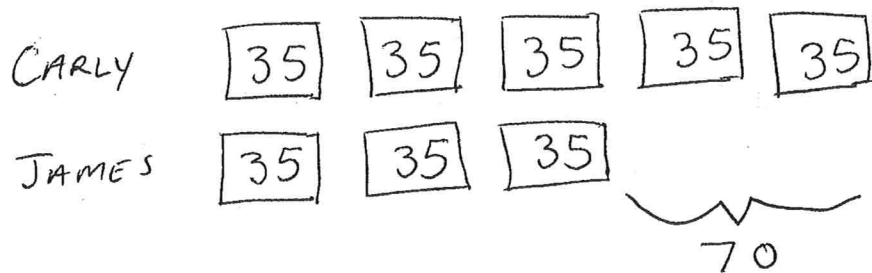
$\frac{70}{2} = 35$          $3 \times 35$

£ 105

(Total for question 4 is 3 marks)

**5** Jerry and Mick share some money in the ratio 2 : 3
Mick gets £900

Work out how much money Jerry gets.

JERRY | 300 | 300 |

MICK | 300 | 300 | 300 |

900
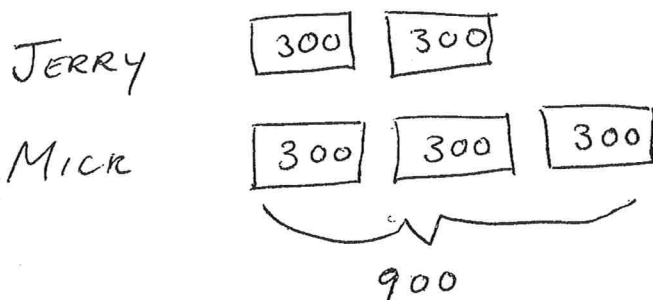
$\frac{900}{3} = 300$          $2 \times 300$

£ 600

(Total for question 5 is 3 marks)

**6** Ali and Steve share some sweets in the ratio 2 : 7
Ali gets 30 more sweets than Steve.

Work out how many sweets Steve gets.

ALI | 6 | 6 |

STEVE | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

30
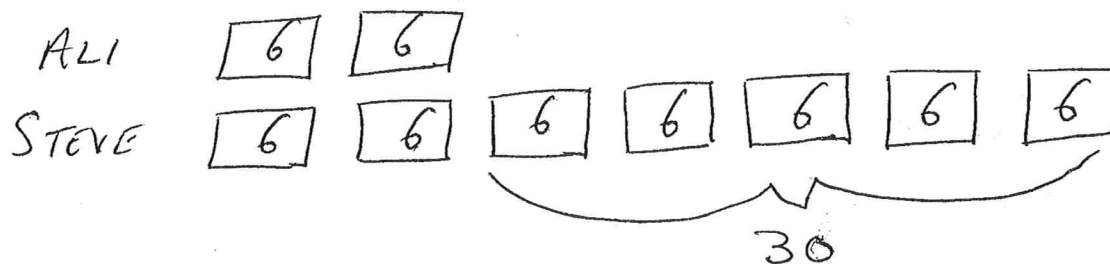
$\frac{30}{5} = 6$

$6 \times 7 = 42$

42

(Total for question 6 is 3 marks)

**7** Dave is making cookies.
He mixes flour, butter and sugar in the ratio 6 : 4 : 1

Dave uses 160 grams of butter.
Work out how much flour and sugar Dave uses.

| 40 | 40 | 40 | 40 | 40 | 40 | : | 40 | 40 | 40 | 40 | : | 40 |

160
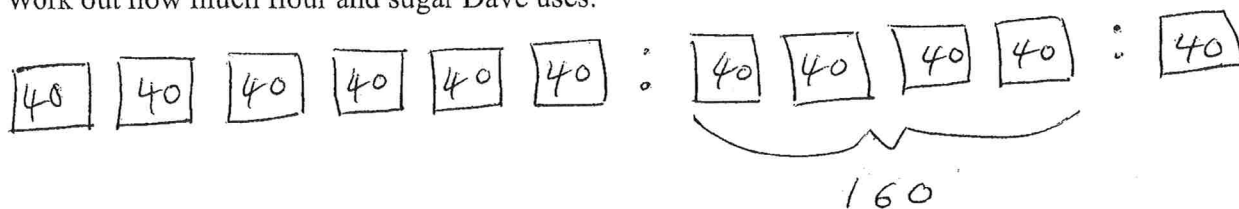
$$\frac{160}{4} = 40$$

$6 \times 40$    flour _____240_____ grams

$1 \times 40$    sugar _____40_____ grams

**(Total for question 7 is 3 marks)**

---

**8** Alvin and Simon shared £540 in the ratio 4 : 5

Alvin gave half of his share to Theo.
Simon gave a tenth of his share to Theo.

What fraction of the £540 did Theo receive?

| 60 | 60 | 60 | 60 | : | 60 | 60 |
| 60 | 60 |
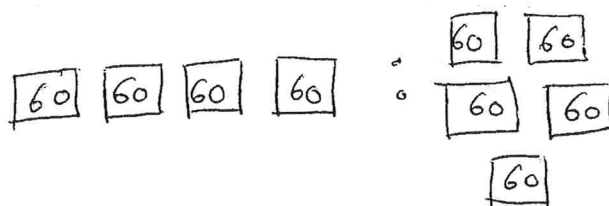
ALVIN    $4 \times 60 = 240$
Simon    $5 \times 60 = 300$

$$\frac{540}{9} = 60$$

THEO gets $\frac{1}{2}$ of $240 = 120$

$\frac{1}{10}$ of $300 = 30$

$$\frac{150}{540} = \frac{15}{54}$$
$$= \frac{5}{18}$$

$120 + 30 = \underline{150}$

_____$\frac{5}{18}$_____

**(Total for question 8 is 3 marks)**

---

**9** ABC is a straight line.

| 25 | 25 | 25 | 25 | 25 |

A      B              C
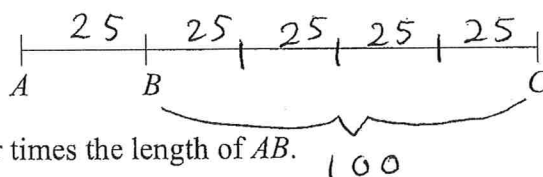
The length of BC is four times the length of AB.   100

BC = 100 metres.
Work out the length AC.

$$\frac{100}{4} = 25$$

$5 \times 25$

_____125_____ metres

**(Total for question 9 is 3 marks)**

**10** Bob is going to make some orange paint.
He needs to mix red paint, yellow paint and white paint in the ratio 5 : 4 : 1

Bob wants to make 750 ml of orange paint.

Bob has

400 ml of red paint    400 > 375
300 ml of yellow paint   300 = 300
200 ml of white paint    200 > 75

Does Bob have enough red paint, yellow paint and white paint to make the orange paint?
You must show all your working.

RED   75  75  75  75  75        5 × 75 = 375 ✓

YELLOW  75  75  75  75           4 × 75 = 300 ✓

WHITE  75                        1 × 75 = 75 ✓

$\frac{750}{10}$ = 75       Yes Bob has enough paint

**(Total for question 10 is 4 marks)**

**11** Megan is going to make a drink using the instructions below.

> Mix 2 parts of fruit juice
> with 5 parts of sparkling water

Megan has 180 ml of fruit juice and 400 ml of sparkling water.

What is the greatest amount of the drink Megan can make?

with 180 ml of fruit juice

90  90  :  90  90  90  90  90

180                5 × 90 = 450 ml
                          (NOT ENOUGH)
$\frac{180}{2}$ = 90

with 400 ml of sparkling water   $\frac{400}{5}$ = 80

80  80  :  80  80  80  80  80

160              400              560  ml

**(Total for question 11 is 3 marks)**

**12** In a bag there are only red counters, blue counters and white counters.
A counter is taken at random from the bag.

The table shows the probability of getting a red counter.

| Colour | Red | Blue | White |
|---|---|---|---|
| **Probability** | 0.35 | 0.26 | 0.39 |

the number of blue counters : the number of white counters = 2 : 3

Complete the table.

$$1 - 0.35 = 0.65$$

| 0.13 | 0.13 | : | 0.6 | 0.13 | 0.13 |

$$\frac{0.65}{5} = 0.13$$

$$2 \times 0.13 = 0.26$$
$$3 \times 0.13 = 0.39$$

**(Total for question 12 is 4 marks)**

---

**13** Al, Tom and Joe share €3000.

The ratio of the amount Al gets to the amount Tom gets is in the ratio 5 : 4
Joe gets 1.5 times the amount Tom gets.

Work out the amount of money that Tom gets.

$$1.5 \times 4 = 6$$
Joe gets 6 parts

$$5 : 4 : 6$$

| 200 | 200 | 200 | 200 | 200 | : | 200 | 200 | 200 | 200 | : | 200 | 200 | 200 | 200 | 200 | 200 |

$$\frac{3000}{15} = \frac{6000}{30} = 200$$

$$4 \times 200$$

€ _800_

**(Total for question 13 is 4 marks)**

**14** Harry and Gary have a total of 300 stickers.
The ratio of the number of stickers Harry has to the ratio of the number of stickers Gary has is in the ratio 7 : 3

Harry gives Gary some stickers.
The ratio of the number of stickers Harry has to the ratio of the number of stickers Gary has is now in the ratio 8 : 7

Work out how many stickers Harry gives to Gary.
You must show all your working.

| 30 | 30 | 30 | 30 | 30 | 30 | 30 | : | 30 | 30 | 30 |

$$\frac{300}{10} = 30$$

$$7 \times 30 = \boxed{210}$$
$$3 \times 30 = 90$$

___
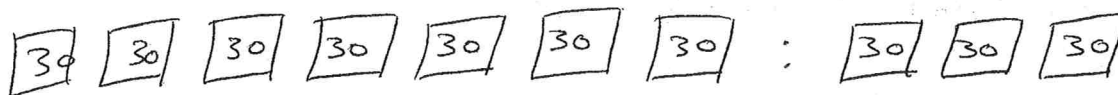
| 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | : | 20 | 20 | 20 | 20 |
| 20 | 20 | 20 |
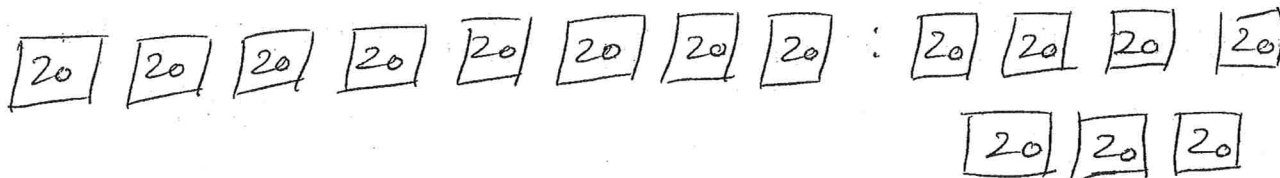
$$\frac{300}{15} = 20$$

$$8 \times 20 = \boxed{160}$$
$$7 \times 20 = 140$$

$$210 - 160 = \underline{\underline{50}}$$

........................................ 50

**(Total for question 14 is 4 marks)**

**15** A shop sells small chocolate bars and large chocolate bars.

There are
        small chocolate bars are sold in packs of 4
        large chocolate bars are sold in packs of 9

On one day

    the number of packs of  :  the number of packs of  = 5 : 2
    small chocolate bars sold    large chocolate bars sold

A total of 95 chocolate bars were sold.

Work out the number of small chocolate bars sold.

Chocolate bars sold
$$S : L$$
$$5 \times 4 : 2 \times 9$$
$$20 : 18$$
$$10 : 9$$

⑤ ⑤ ⑤ ⑤ ⑤ ⑤ ⑤ ⑤ ⑤ ⑤ : ⑤ ⑤ ⑤ ⑤ ⑤ ⑤ ⑤
                                          ⑤ ⑤

19 parts

$$\frac{95}{19} = 5$$

$$10 \times 5 = \underline{\underline{50}}$$

                                        50

**(Total for question 15 is 4 marks)**

1. Here is a list of ingredients for making **10 Flapjacks**.

| Ingredients for 10 Flapjacks |
|---|
| 80 g rolled oats |
| 60 g butter |
| 30 ml golden syrup |
| 36 g light brown sugar |

5  Flapjacks

40 g

30 g

15 ml

18 g

Work out the amount of each ingredient needed to make **15 Flapjacks**.

X 1. 5

......120..... g rolled oats

.......90....... g butter

........45...... ml golden syrup

......54...... g light brown sugar

(Total 3 marks)

2. Fred has a recipe for 30 biscuits.

Here is a list of ingredients for 30 biscuits.    15 biscuits

| | | |
|---|---|---|
| Self-raising flour | : 230g | 115 |
| Butter | : 150g | 75 |
| Caster sugar | : 100g | 50 |
| Eggs | : 2 | 1 |

Fred wants to make 45 biscuits.

(a) Complete his new list of ingredients for 45 biscuits.

Self-raising flour : 345 g

Butter : 225 g

Caster sugar : 150 g

Eggs : 3

(3)

Gill has only 1 kilogram of self-raising flour. She has plenty of the other ingredients.

(b) Work out the maximum number of biscuits that Gill could bake.

$$230 g = 30 \text{ biscuits}$$

$$\frac{230}{30} g = 1 \text{ biscuits}$$

$$7\frac{2}{3} g = 1 \text{ biscuit.}$$

$$\frac{230 g}{23} = 30 \text{ biscuits}$$

$$100 g = \frac{30}{23} \text{ biscuits}$$

$$1000 g = \frac{3000}{23} \text{ biscuits}$$

$$\begin{array}{r} 0\ 1\ 30.4... \\ 23\overline{\smash{\big)}3\ 0^70\ ^10.^{10}0} \end{array}$$

.......130.......

(3)

(6 marks)

3. Here are the ingredients needed to make 16 gingerbread men.

Ingredients
to make 16 gingerbread men

180 g  flour
40 g  ginger
110 g  butter
30 g  sugar

$\frac{8}{90}$
90
20
55
15

Hamish wants to make 24 gingerbread men.
Work out how much of each of the ingredients he needs.

............270............g  flour

............60............g ginger

............165............g butter

............45............g sugar

(3 marks)

**1**  A sprinter runs a distance of 200 metres in 25 seconds.
Work out the average speed of the sprinter.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$= \frac{200}{25} = 8 \text{ m/s}$$

........................8.................... m/s

**(Total for question 1 is 1 mark)**

**2**  A block exerts a force of 120 Newtons on the ground.
The block has an area of 2 m$^2$.

Work out the pressure on the ground.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$$\text{pressure} = \frac{120}{2} = 60 \text{ N/m}^2$$

........................60.................... N/ m$^2$

**(Total for question 2 is 1 mark)**

**3**  A piece of gold has a mass of 760 grams and a volume of 40 cm$^3$.
Work out the density of the piece of gold.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

$$= \frac{760}{40} = 19 \text{ g/cm}^3$$

........................19.................... g/cm$^3$

**(Total for question 3 is 1 mark)**

**4**  A rock has a mass of 56 grams and a density of 3.5 grams/cm$^3$.
Work out the volume of the rock.

$$\text{volume} = \frac{\text{mass}}{\text{density}}$$

$$= \frac{56}{3.5} = \frac{112}{7} = 16 \text{ cm}^3$$

........................16.................... cm$^3$

**(Total for question 4 is 1 mark)**
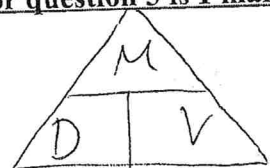
**5**  A car travels a distance of 230 miles in 4 hours and 15 minutes.   *4.25 hours*
Work out the average speed of the car, in miles per hour.
Give your answer to 1 decimal place.

$$speed = \frac{distance}{time}$$

$$= \frac{230}{4.25}$$

$$= 54.1 \ mph$$

.............. 54.1 .............. miles/hour

**(Total for question 5 is 2 marks)**

**6**  A block exerts a force of 84 Newtons on a table.
The pressure on the table is 30 N/m².

Work out the area of the box that is in contact with the table.

$$\boxed{pressure = \frac{force}{area}}$$

$$area = \frac{force}{pressure}$$

$$= \frac{84}{30} = 2.8 \ m^2$$

.............. 2.8 .............. m²

**(Total for question 6 is 2 marks)**

**7**  A liquid has a density of 1.3 grams per ml.
Find the mass of 250 ml of the liquid.

$$mass = density \times volume$$

$$= 1.3 \times 250$$

$$= 325 \ g$$

.............. 325 .............. g

**(Total for question 7 is 1 mark)**

**8**  Dani leaves her house at 08 00.
She drives 63 miles to work.
She drives at an average speed of 27 miles per hour.
At what time does Dani arrive at work?
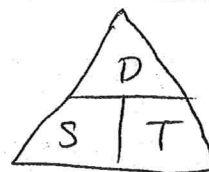
$$time = \frac{distance}{speed}$$

$$= \frac{63}{27}$$

$$= 2.\dot{3} \ hours$$

$$= 2 \ hours \ 20 \ mins$$

.............. 10:20 ..............

**(Total for question 8 is 2 marks)**

**9** Anthony travels from Newcastle to Manchester at an average speed of 65 miles per hour.
The journey takes him 2 hours and 15 minutes. 2.25 hours

Declan makes the same journey in 2 hours and 35 minutes.

(a) Work out Declan's average speed for the journey.
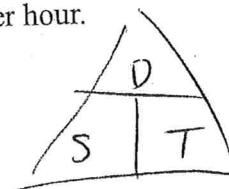
Anthony:    distance = speed × time

$$= 65 × 2.25$$

$$= 146.25 \text{ miles}$$

Declan:

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$= \frac{146.25}{2.58\dot{3}}$$

$$= 56.6 \text{ miles/hour} \quad (1dp)$$

2hrs  35 mins

$$\frac{35}{60} = 0.58\dot{3} \text{ or } \frac{7}{12}$$

56.6  mph

(4)

took a different roads for   could
(b) If Declan ~~stopped for a break during~~ his journey, how ~~would~~ this affect your answer to part (a)?

~~The ans.~~ If the distance was increased
the speed would be higher.
(If the distance decreased the speed would be lower)

(1)

**(Total for question 9 is 5 marks)**

**10** Rachel drives 300 miles from London to Newcastle.
She drives the first 165 miles at an average speed of 60 mph.
From this point it takes Rachel 3 hours and 15 minutes to complete her journey.

What was Rachel's average speed for the whole journey?
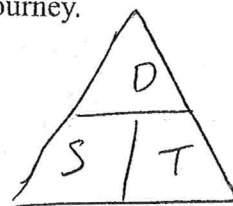
FIRST 165 MILES

$$time = \frac{distance}{speed}$$

$$= \frac{165}{60} = 2.75 \text{ hours}$$

$$= 2 \text{ hours } 45 \text{ mins}$$

2 hours 45 + 3 hours 15 = 6 hours

~~135 MILES LEFT~~

$$average\ speed = \frac{total\ distance}{total\ time}$$

$$= \frac{300}{6}$$

$$= 50 \text{ mph}$$

..................50.............. mph

(Total for question 10 is 4 marks)

**11**    Andrew ran 3.1 miles in 14 minutes and 35 seconds.

He assumes he can run 8 miles at the same speed.

(a) Work out how long it would take Andrew to run 8 miles.

Give your answer in minutes and seconds to the nearest second.

$$speed = \frac{distance}{time}$$

$$14 \text{ mins } 35 \text{ secs} = 14.58\dot{3} \text{ mins}$$

$$= \frac{3.1}{14.58\dot{3}}$$

$$= 0.21257... \text{ miles/min}$$

$$\cancel{distance = speed \times ti...}$$

$$time = \frac{distance}{speed}$$

$$= \frac{8}{0.21257} = 37 \text{ mins } 38 \text{ sec}$$

.........37......... mins .........38......... secs

(4)

Andrew's speed actually decreases the further he goes.

(b) How does this affect your answer to part (a)?

It would take longer to run 8 miles
(the answer would be higher)

(1)

**(Total for question 11 is 5 marks)**

**12** Liquid **A** has a density of 1.2 g/cm$^3$

150 cm$^3$ of Liquid **A** is mixed with some of Liquid **B** to make Liquid **C**.

Liquid **C** has a mass of 210 g and a density of 1.12 g/cm$^3$

Find the density of Liquid **B**.

Liquid A :  mass = density × volume

= 1.2 × 150

= 180 g

Liquid C   volume = $\dfrac{mass}{density}$

= $\dfrac{210}{1.12}$

= 187.5 cm$^3$

Liquid B   Volume = Liquid C  —  Liquid A

= 187.5  —  150

= 37.5 cm$^3$

Liquid B   mass = Liquid C — Liquid A

= 210 — ~~150~~ 180

= 30 g

Liquid B   density = $\dfrac{mass}{volume}$ = $\dfrac{30}{37.5}$ = 0.8

.............. 0.8 .............. g/cm$^3$

**(Total for question 12 is 3 marks)**

**13**  100ml of liquid A and 200ml of liquid B are mixed together to make liquid C.
Liquid A has a density of 0.7g/ml.
Liquid B has a density of 1.1 g/ml.

Work the density of liquid C.
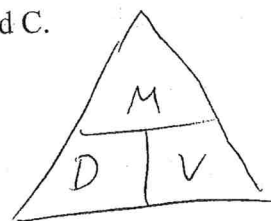
Liquid A:     mass = density × volume

= 0.7 × 100

= 70 g

Liquid B:   mass = 1.1 × 200

= 220 g

Liquid C density = $\dfrac{\text{total mass}}{\text{total volume}}$

= $\dfrac{70 + 220}{100 + 200}$

= $\dfrac{290}{300}$

= 0.96 g/ml

..................0.96.................. g/ml

**(Total for question 13 is 4 marks)**

$\left[\dfrac{29}{30}\right]$

**1** On the grid, reflect the shaded shape in the mirror line.



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - mirror line
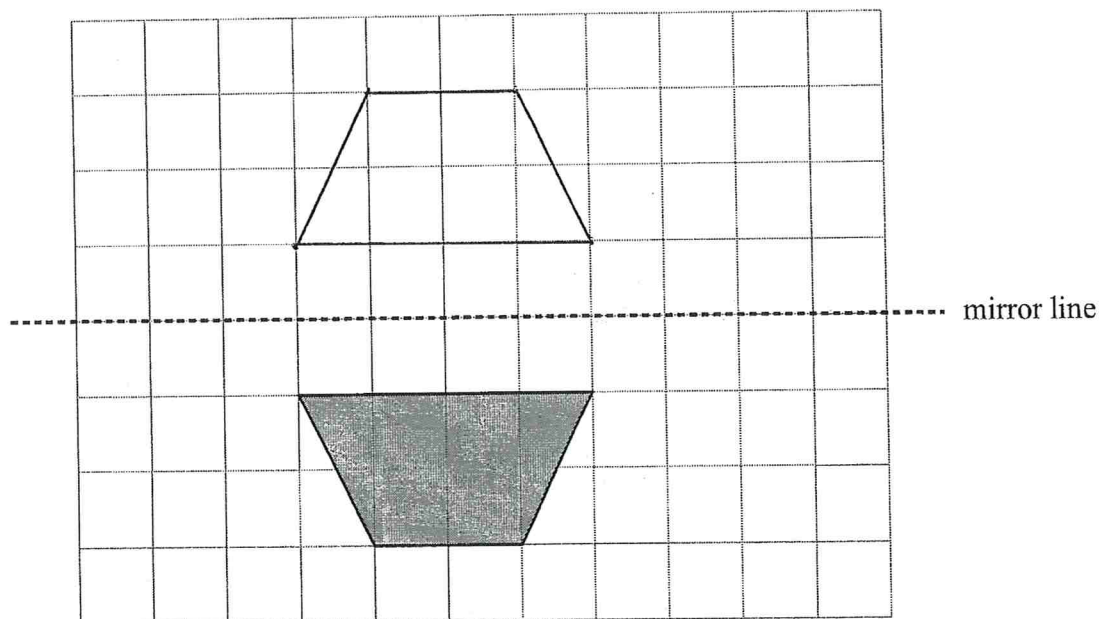
**(Total for question 1 is 1 mark)**

**2**
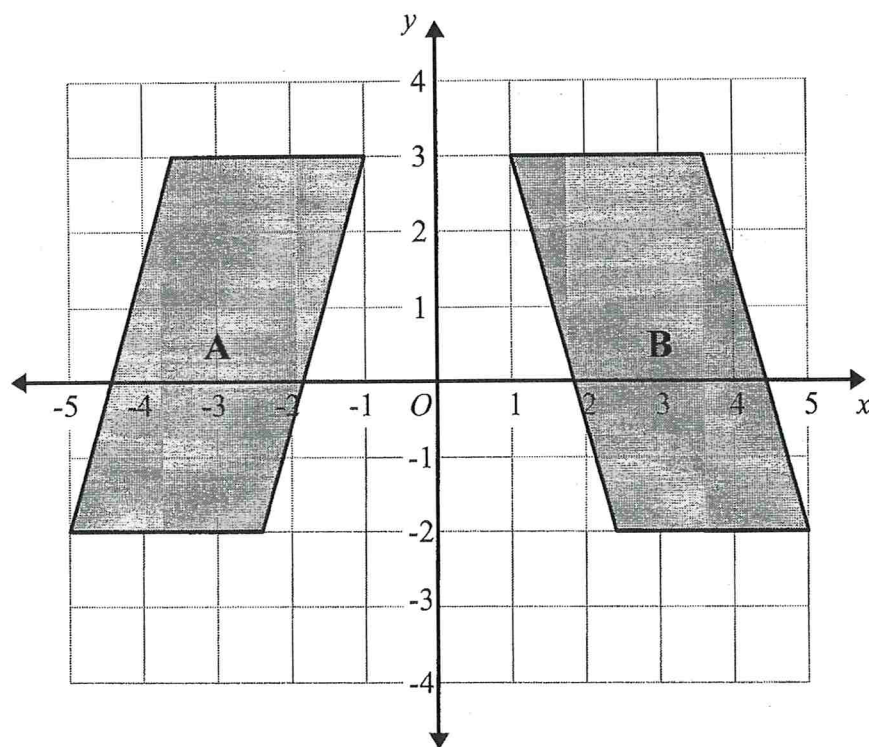


Describe fully the single transformation that maps shape **A** onto shape **B**.

*Reflection in the y-axis*

**(Total for question 2 is 2 marks)**

**3**
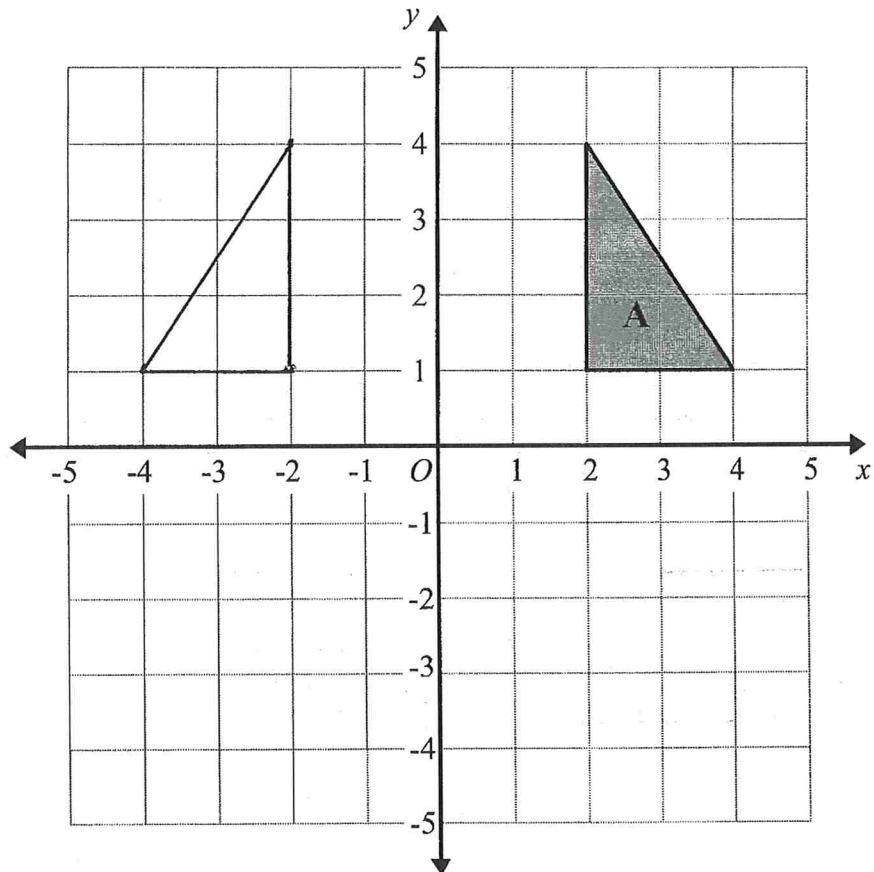


Reflect triangle **A** in the *y*-axis.

(Total for question 3 is 2 marks)

**4**
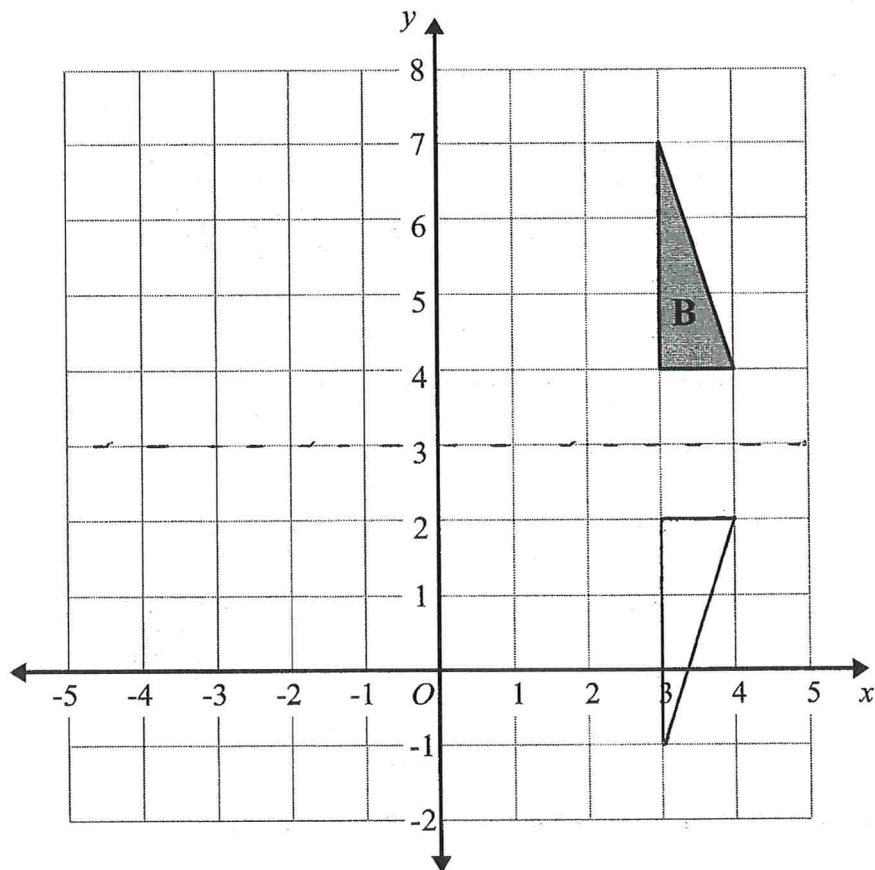


Reflect shape **B** in the line *y* = 3.

(Total for question 4 is 2 marks)

**5**
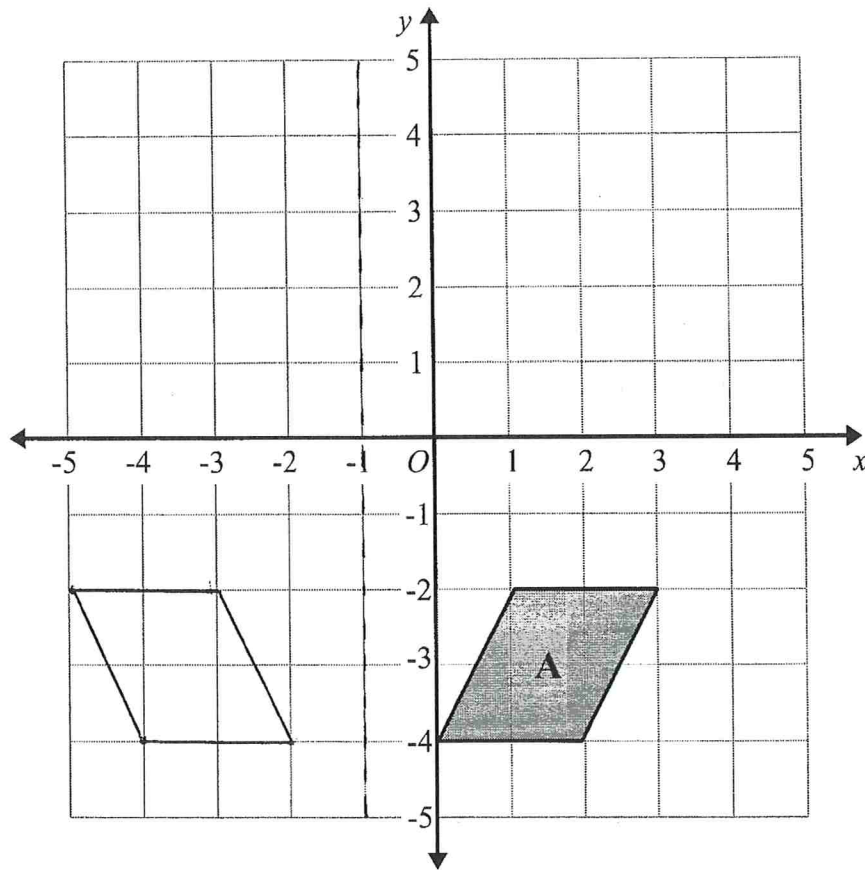


Reflect shape **A** in the line with equation $x = -1$

(Total for question 5 is 2 marks)
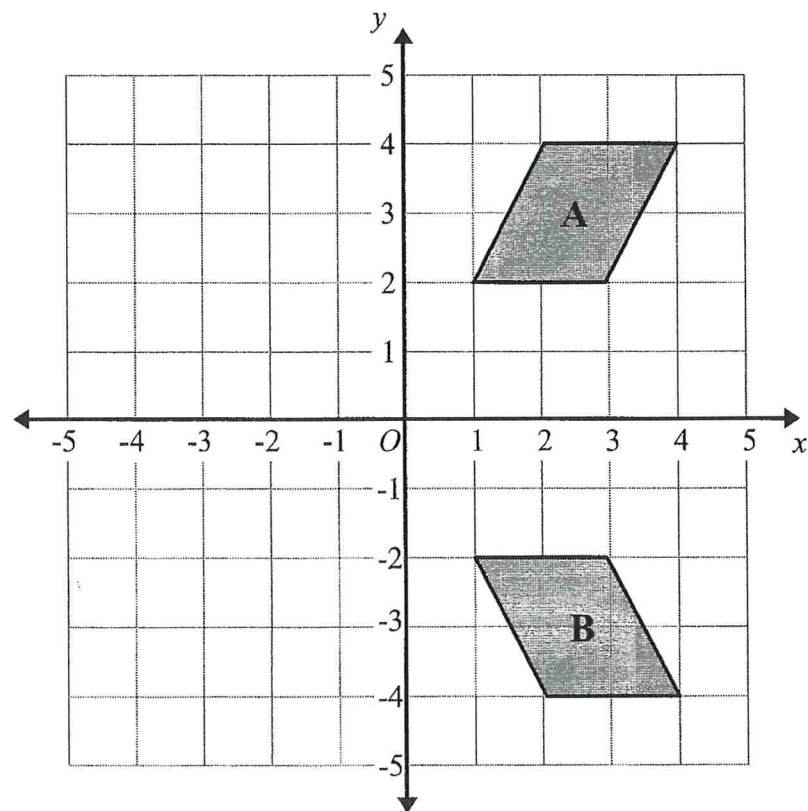
**6**



Describe fully the single transformation that maps shape **A** onto shape **B**.

Reflection in the x-axis

(Total for question 6 is 2 marks)

**7**
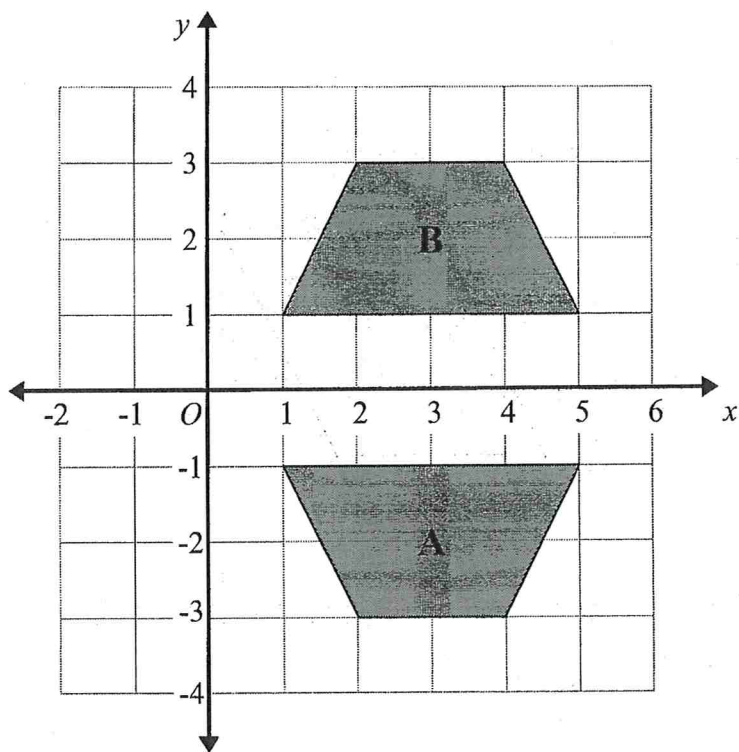


Describe fully the single transformation that maps shape **A** onto shape **B**.

*Reflection in the x-axis*

(Total for question 7 is 2 marks)

**8**
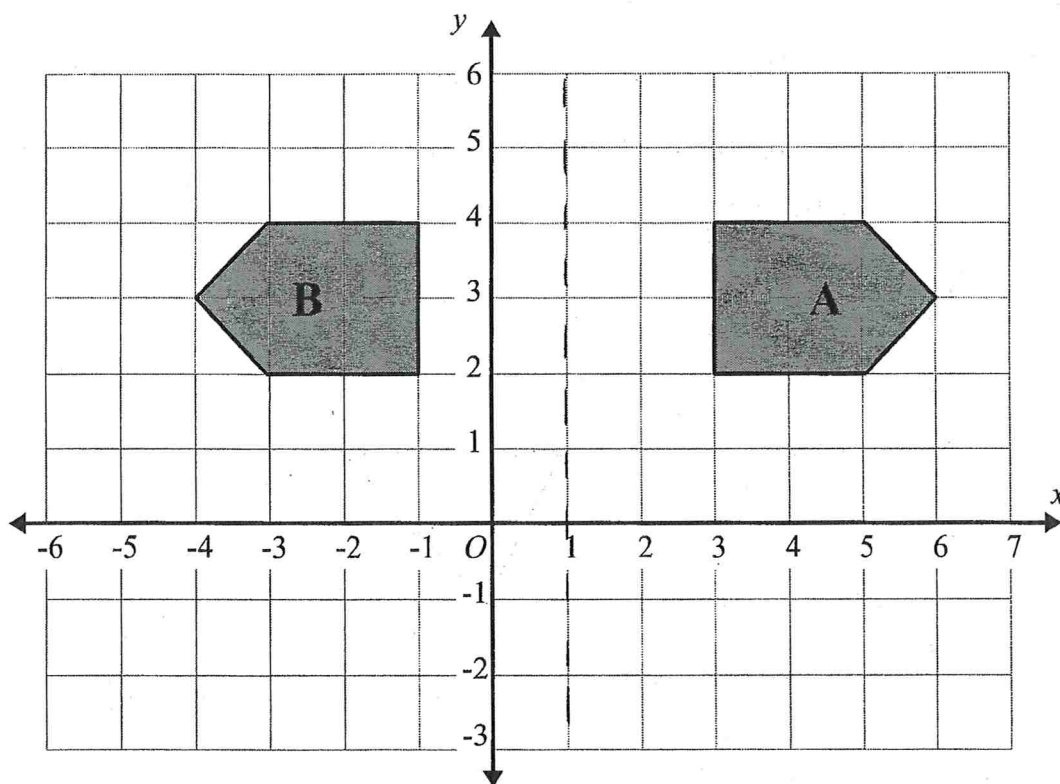


Describe fully the single transformation that maps shape **A** onto shape **B**.

*Reflection in the line x = 1*

(Total for question 8 is 2 marks)

**9**
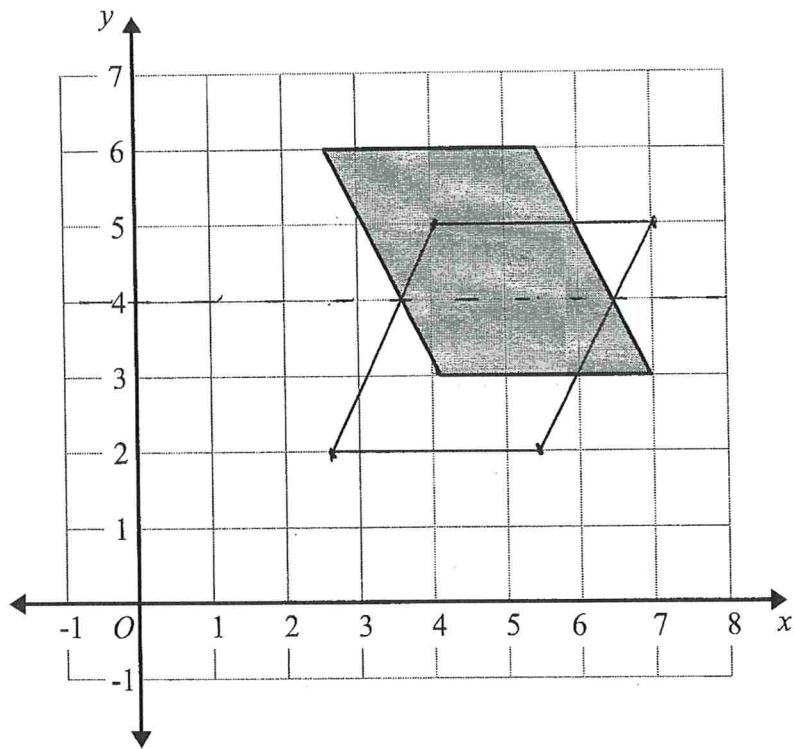


Reflect the shaded shape in the line $y = 4$

(Total for question 9 is 2 marks)

**10**
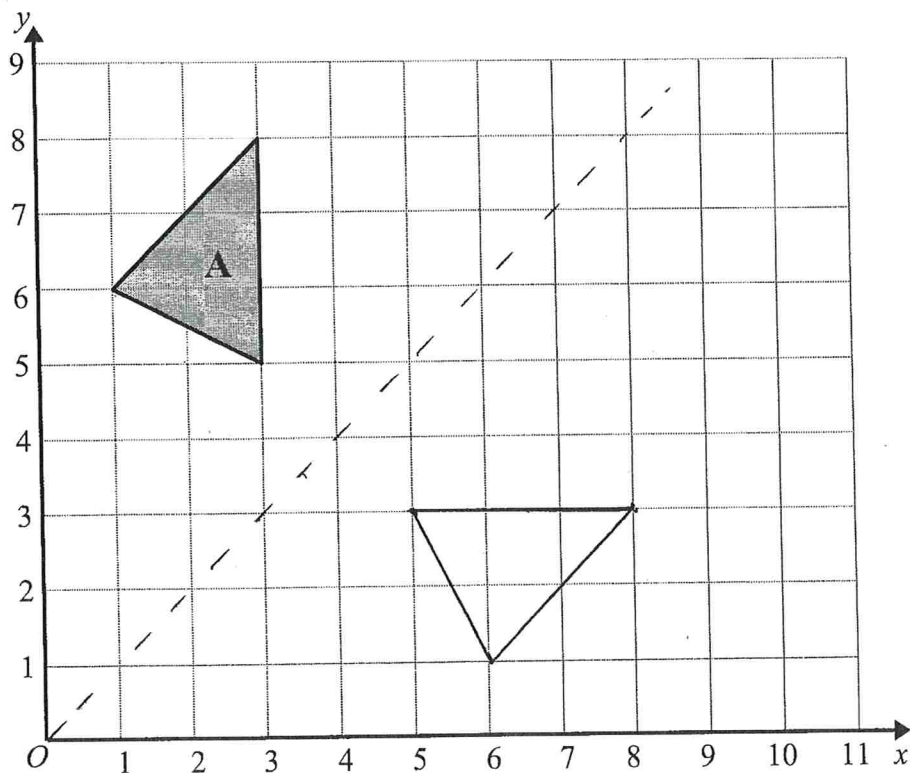


Reflect triangle **A** in the line $y = x$

(Total for question 10 is 2 marks)

**1** The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.
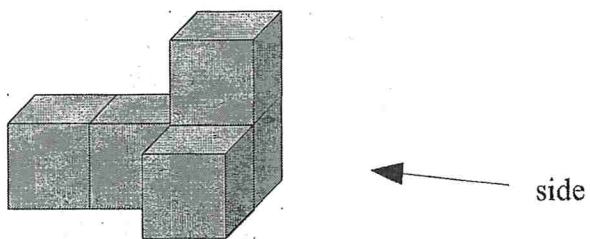
Plan          Front elevation          Side elevation

In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.

2cm

3cm

4cm
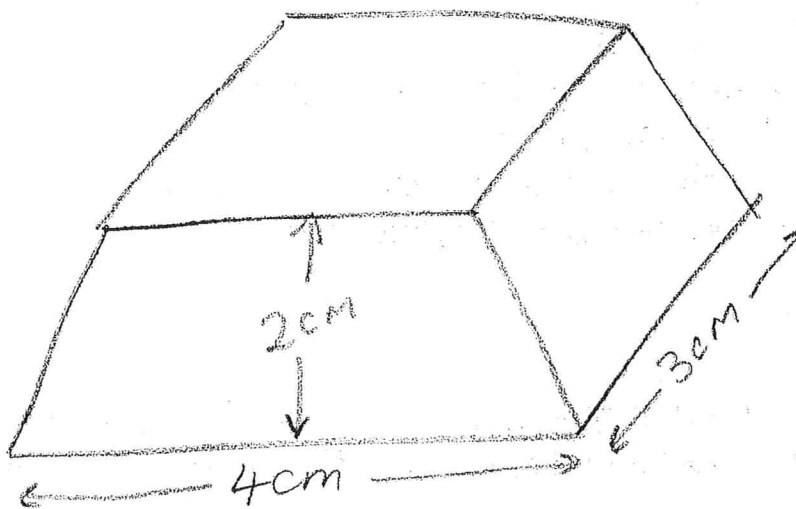
(Total for question 1 is 2 marks)

**2** The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.

Plan

Front elevation
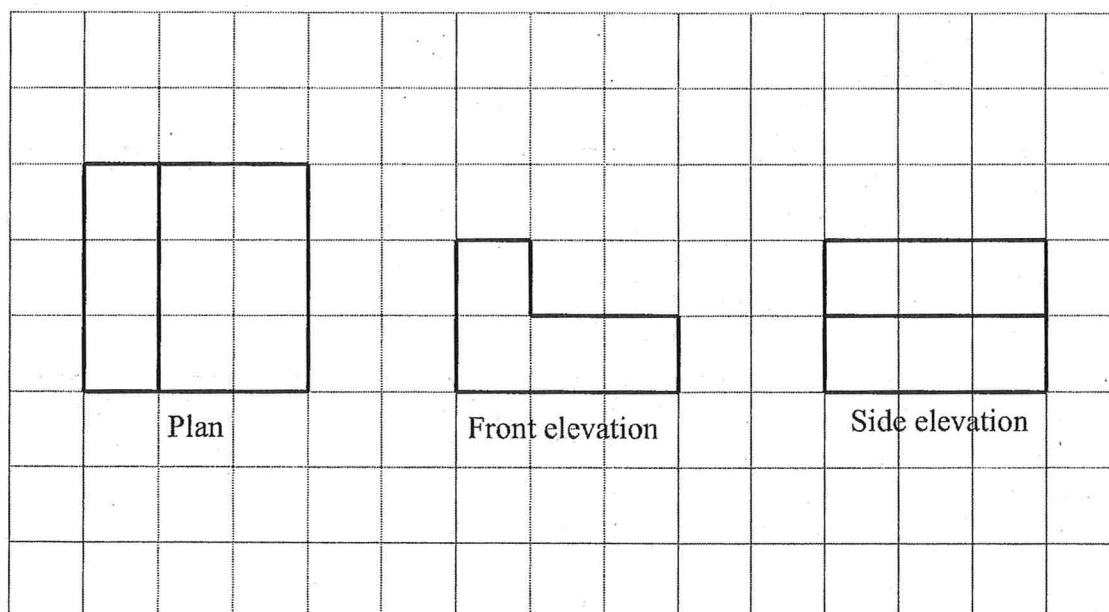
Side elevation

In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.
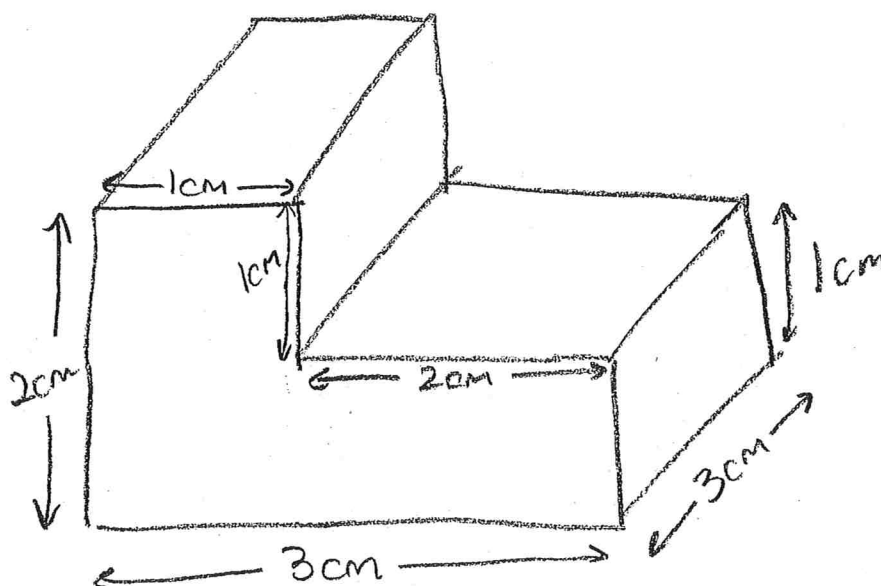


**(Total for question 2 is 2 marks)**

**3** The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.



Plan          Front elevation          Side elevation

In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.



3cm

4cm
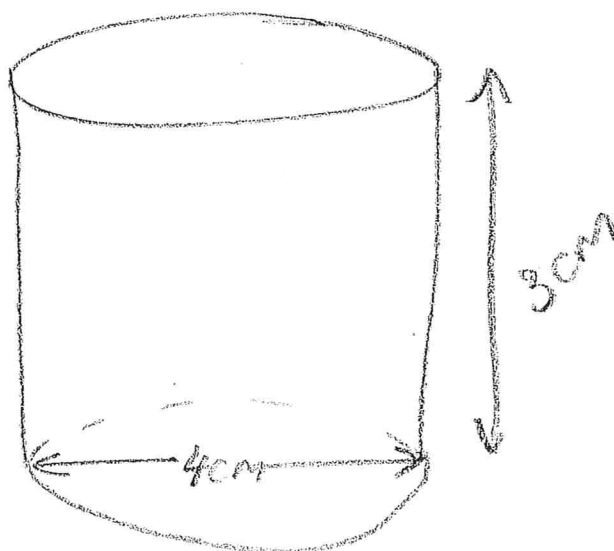
(Total for question 3 is 2 marks)

4    The diagram shows a solid made from centimetre cubes.



← side

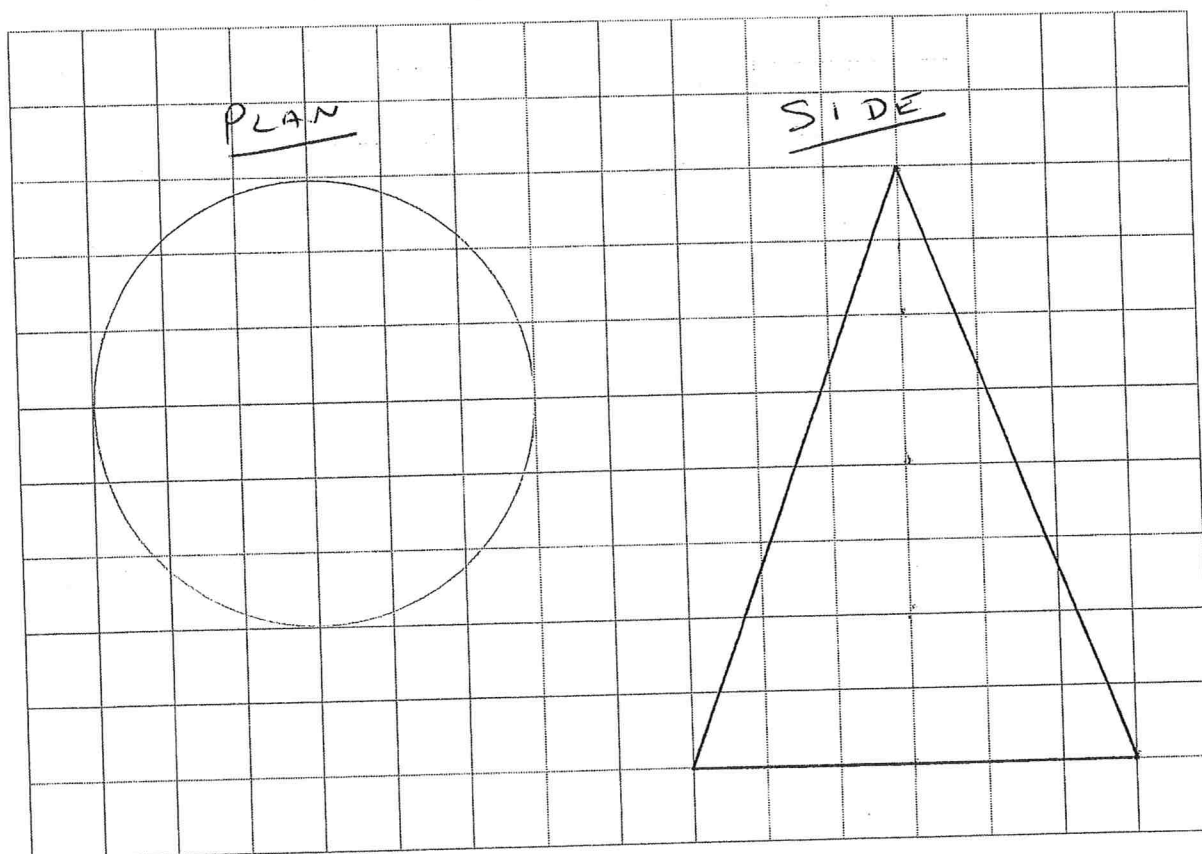On the centimetre grid below draw the plan and the side elevation for the solid.
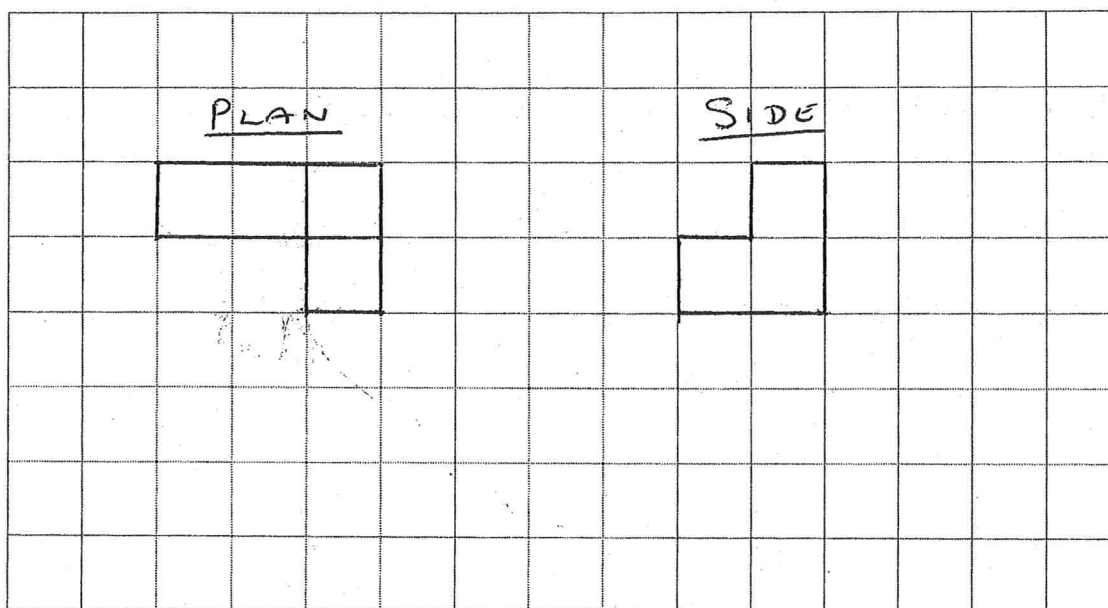
PLAN

SIDE

(Total for question 4 is 3 marks)

**5** The diagram shows a cone with radius 3 cm and perpendicular height of 8 cm

8 cm

3 cm
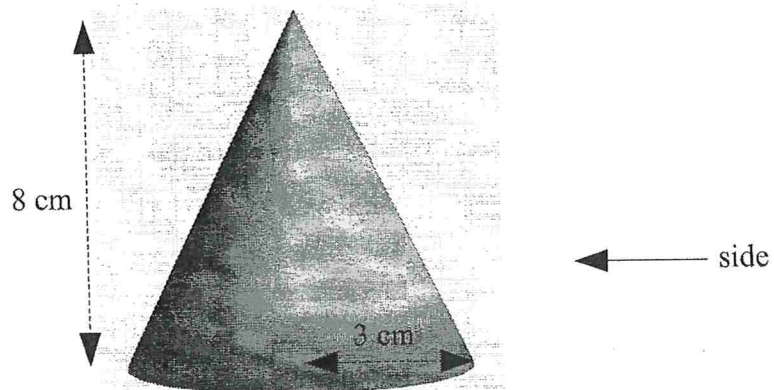
side

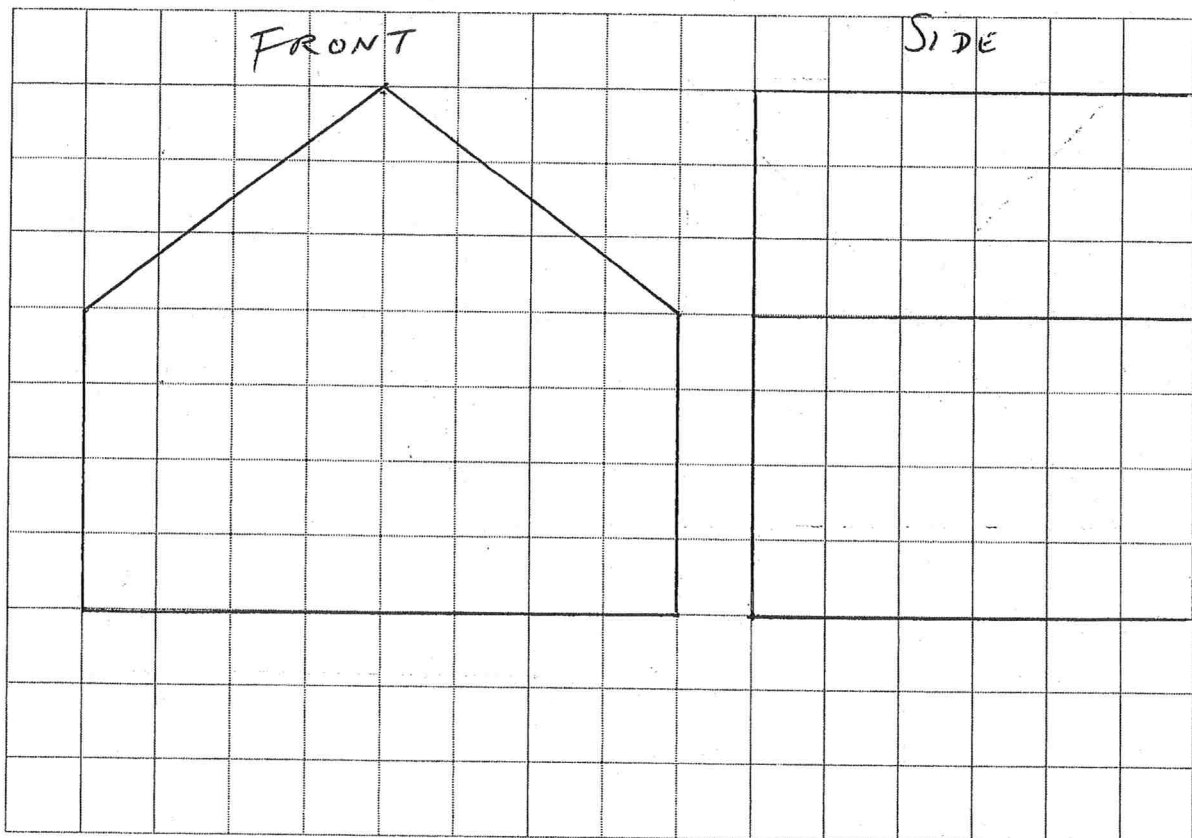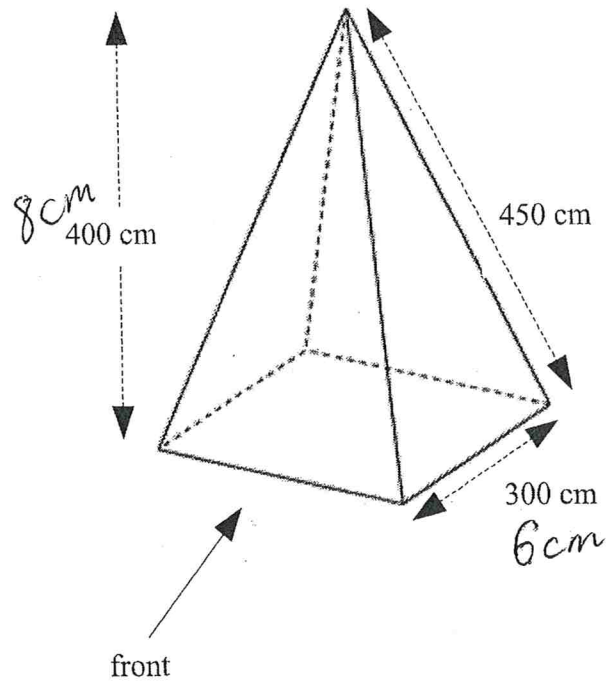On the centimetre grid below, draw the plan and the side elevation of the cone.

PLAN

SIDE

**(Total for question 5 is 3 marks)**

**6** The diagram shows a prism.



2.5 m    2.5 m

2 m  4cm

3.5 m  7cm

2 m 4cm

4 m  8cm

3 m  6cm
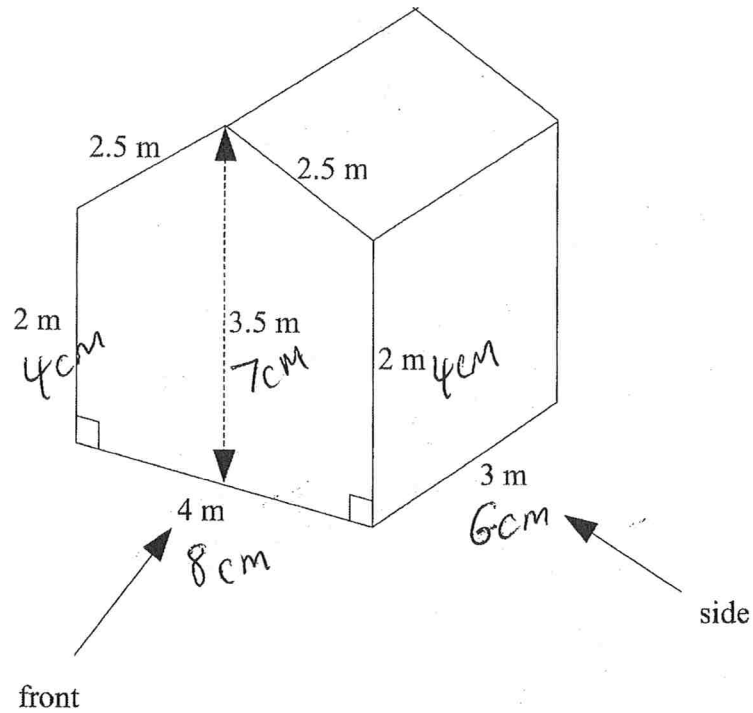
front

side

On the centimetre grid below, draw the front elevation and the side elevation of the prism.
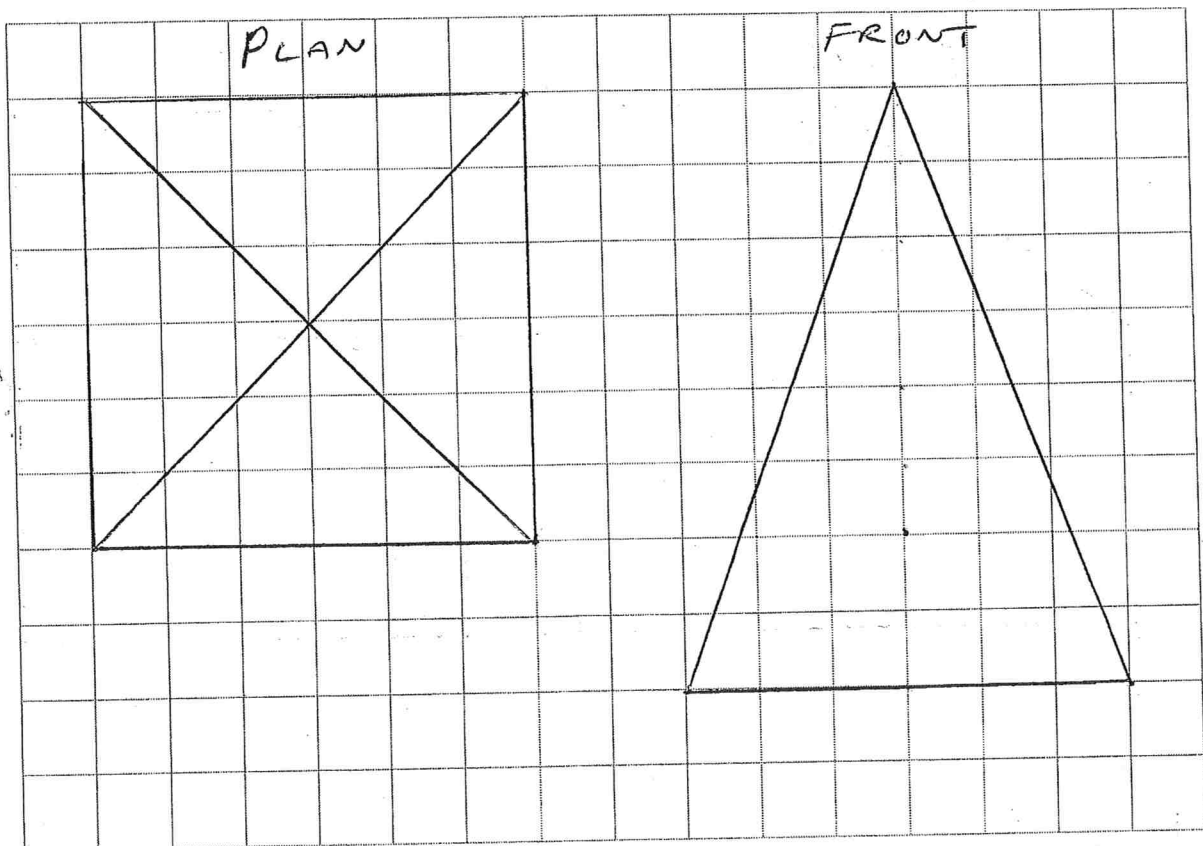Use a scale of 2 cm to 1 m.



FRONT

SIDE

**(Total for question 6 is 4 marks)**

**7** The diagram shows a square based pyramid with a perpendicular height of 400 cm.



8cm
400 cm

450 cm

300 cm
6cm

front

On the centimetre grid below, draw the plan and the front elevation of the pyramid.
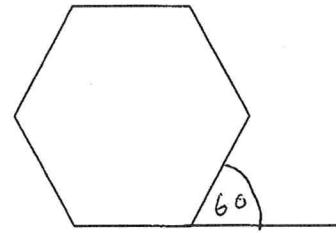Use a scale of 2 cm to 1 m.



PLAN

FRONT

**(Total for question 7 is 4 marks)**

**1** Work out the size of an exterior angle of a regular hexagon.

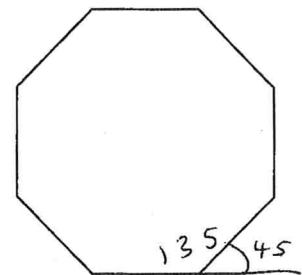(Exterior angles always add to 360°)

$$\frac{360}{6} = 60$$

60

**(Total for question 1 is 2 marks)**

**2** Work out the size of each interior angle in a regular octagon.

$$\frac{360}{8} = 45$$

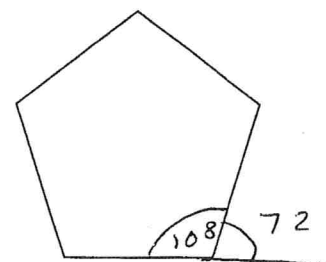$$180 - 45 = 135$$

(Interior angle + Exterior angle = 180)

135

**(Total for question 2 is 2 marks)**

**3** Work out the size of each interior angle in a regular pentagon

$$\frac{360}{5} = 72$$

$$180 - 72 = 108$$

108

**(Total for question 3 is 2 marks)**

**4**   The size of each exterior angle in a regular polygon is 20°.
Work out how many sides the polygon has.

$$\frac{360}{20} = \frac{36}{2} = 18$$

.............18.............

**(Total for question 4 is 2 marks)**

**5**   The size of each exterior angle in a regular polygon is 18°.
Work out how many sides the polygon has.

$$\frac{360}{18} = \frac{180}{9} = 20$$

.............20.............

**(Total for question 5 is 2 marks)**

**6**   The size of each interior angle in a regular polygon is 165°.
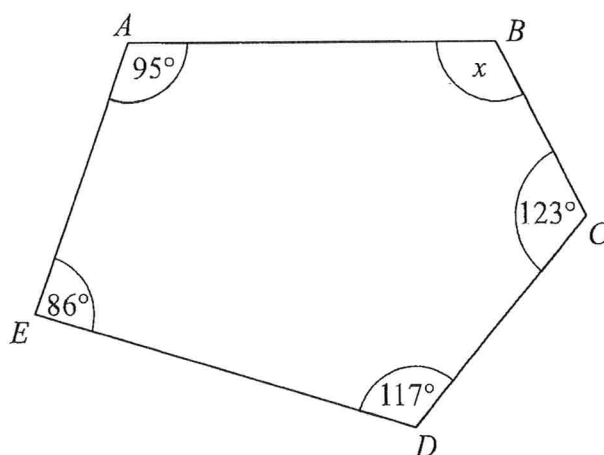Work out how many sides the polygon has.

$$180 - 165 = 15 \qquad (\text{Exterior angle} = 15°)$$

$$\frac{360}{15} = \frac{120}{5} = 24$$

.............24.............

**(Total for question 6 is 2 marks)**

**7**



$A$   95°

$B$   $x$

123° $C$

86° $E$

117° $D$

$ABCDE$ is a pentagon.

Work out the size of angle $ABC$.

$$\text{Angle sum} = (n-2) \times 180$$
$$= (5-2) \times 180$$
$$= 3 \times 180$$
$$= 540$$

$\left(\begin{array}{l}\text{Angles in a pentagon add} \\ \text{to } 540° \end{array}\right)$

$$
\begin{array}{r}
123 \\
117 \\
95 \\
+ \ 86 \\
\hline
421
\end{array}
$$

$540 - 421$
$= 119$

..................119..................°

**(Total for question 7 is 2 marks)**

---

**8**



$A$   129°

$B$   125°

$F$   144°

$x$   $C$

121° $E$

$2x$ $D$

$ABCDEF$ is a hexagon.

Angle $CDE = 2 \times$ Angle $BCD$

Work out the size of angle $CDE$.
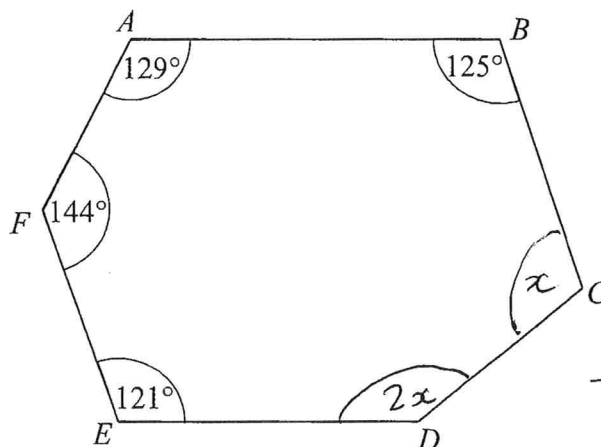
$$
\begin{array}{r}
129 \\
125 \\
144 \\
+ \ 121 \\
\hline
519
\end{array}
$$

$720 - 519 = 201$

$\begin{array}{r} 67 \\ 3\overline{)20^21} \end{array}$

$x = 67$

$2x = 2 \times 67$
$= 134$

Angles in a hexagon $= (6-2) \times 180$
$$= 4 \times 180$$
$$= 720°$$

..................134..................°

**(Total for question 8 is 3 marks)**

**9**
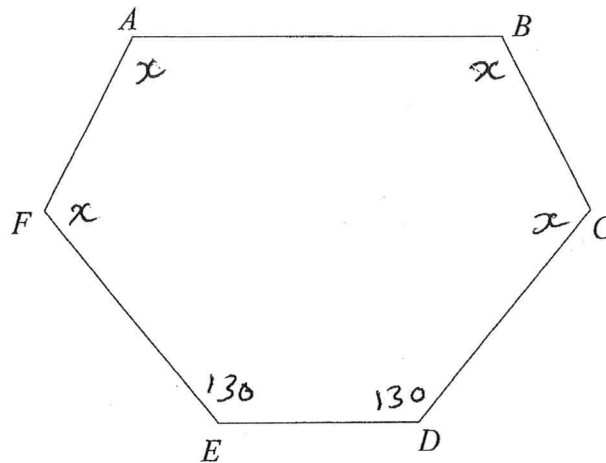


*ABCDEF* is a hexagon.

Angle *BAF* = Angle *ABC* = Angle *AFE* = Angle *BCD*.
Angle *DEF* = Angle *CDE* = 130°

Work out the size of angle *BAF*.
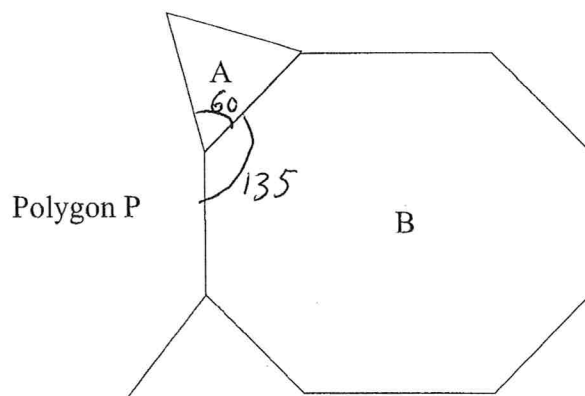You must show all your working.

Angles in a hexagon = $(6 - 2) \times 180$
$$= 720°$$

$720 - 130 - 130$
$720 - 260 = 460$

$$\frac{460}{4} = \underline{115°}$$

...............115..............°

**(Total for question 9 is 3 marks)**

**10**



Polygon P

Shape A is a regular triangle. Shape B is a regular octagon.

Another regular polygon, P, is shown on the diagram.

How many sides does polygon P have?

You must show your working.

Interior angle of A = 60°

Exterior angle of B = $\frac{360}{8}$ = 45°

Interior angle of B = 180 – 45

= 135°

Interior angle of P = 360 – 60 – 135

= 165°

Exterior angle of P = 180 – 165

= 15°

$\frac{360}{15}$ = $\frac{120}{5}$ = 24

.........24.........

**(Total for question 10 is 4 marks)**

**11**
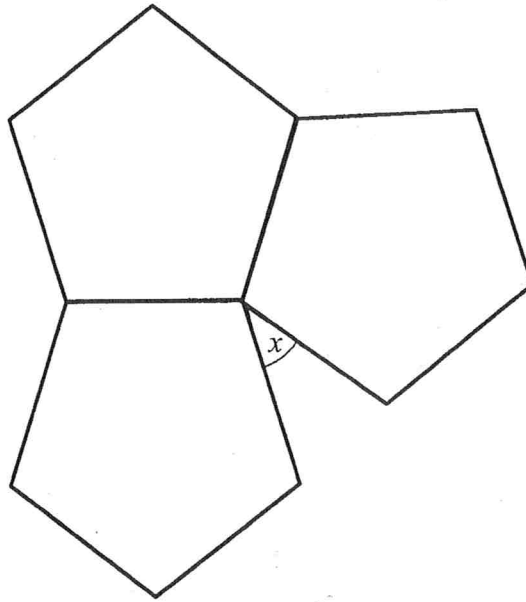


The diagram shows three regular pentagons meeting at a point.

Work out the size of the angle marked $x$.
You must show all your working.
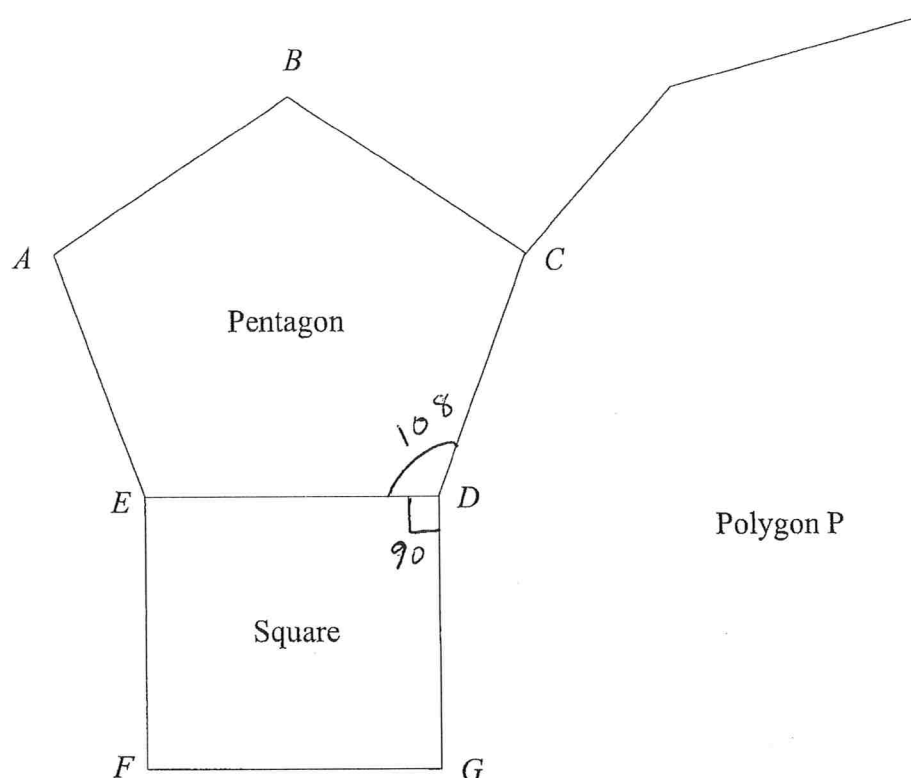
Exterior angle of pentagon = $\frac{360}{5} = 72$

Interior angle of pentagon = $180 - 72$
$= 108°$

$3 \times 108 = 324$

$360 - 324 = \underline{\underline{36}}$

..................3.6.................. °

(Total for question 11 is 3 marks)

B

A

Pentagon

108

E

D

90

Square

F

G

C

Polygon P

The diagram shows a regular pentagon, ABCDE, and a square, EDFG.

The lines CD and DG are both sides of another regular polgon, P.

How many sides does polygon P have?

You must show how you got your answer.

$$\text{Exterior angle of pentagon} = \frac{360}{5} = 72$$

$$\text{Interior angle of pentagon} = \cancel{36}$$
$$= 180 - 72$$
$$= 108$$

$$\text{Interior angle of } P = 360 - 90 - 108$$
$$= 162°$$

$$\text{Exterior angle of } P = 180 - 162$$
$$= 18$$

$$\frac{360}{18} = 20$$

20

**(Total for question 12 is 4 marks)**

A solid cylinder has a radius of 6 m and a height of 7 m.

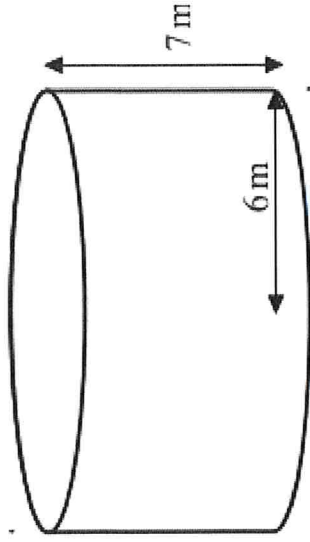Work out the volume. Give your answer in terms of $\pi$.

7 m

6 m

$$Volume = Area_{circle} \times height$$

$$= \pi r^2 \times 7$$

$$= \pi \times 6^2 \times 7$$

$$= 36\pi \times 7$$

$$= 252\pi \ m^3$$

A cylinder has a radius of 5 cm and a height of 12 cm.
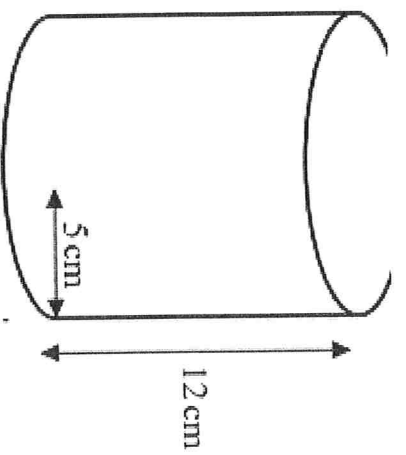
Work out the volume of the cylinder.
Give your answer in terms of π.

$V = $ Area circle $\times$ height

$V = \pi r^2 \times 12$

$V = \pi \times 5^2 \times 12$

$V = \pi \times 25 \times 12$

$V = 300\pi$

|  | 20 | 5 |
|---|---|---|
| 10 | 200 | 50 |
| 2 | 40 | 10 |

```
  200
   50
   40
   10
  ___
  300
```

$300\pi$ cm³

(Total for Question 1 is 3 marks)

1    Write down the exact value of sin (45)

$$\frac{\sqrt{2}}{2}$$

**(Total for Question 1 is 1 marks)**

2    Write down the exact value of cos (90°)

$0$

**(Total for Question 2 is 1 marks)**

3    Write down the exact value of tan (30)

$$\frac{1}{\sqrt{3}} \quad OR \quad \frac{\sqrt{3}}{3}$$

$$\frac{\sqrt{3}}{3}$$

**(Total for Question 3 is 1 marks)**

4    Write down the exact value of sin (30°)

$$\frac{1}{2}$$

**(Total for Question 4 is 1 marks)**

5    Write down the exact value of tan (45)

$$1$$

**(Total for Question 5 is 1 marks)**

6    Write down the exact value of cos (0°)

$$1$$

**(Total for Question 6 is 1 marks)**

7    Write down the exact value of sin (60)

$$\frac{\sqrt{3}}{2}$$

**(Total for Question 7 is 1 marks)**

|       | 0 | 30 | 45 | 60 | 90 |
|-------|---|----|----|----|----|
| sin   | 0 | 1  | 2  | 3  | 4  |
| cos   | 4 | 3  | 2  | 1  | 0  |

$$\sqrt{\phantom{x}} \Big/ 2$$

**8** Write down the exact value of sin (0)

$$0$$

(Total for Question 8 is 1 marks)

**9** Write down the exact value of cos (60°)

$$\frac{1}{2}$$

(Total for Question 9 is 1 marks)

**10** Write down the exact value of tan (0)

$$0$$

(Total for Question 10 is 1 marks)

**11** Write down the exact value of sin (90°)

$$1$$

(Total for Question 11 is 1 marks)

**12** Write down the exact value of cos (45)

$$\frac{\sqrt{2}}{2}$$

(Total for Question 12 is 1 marks)

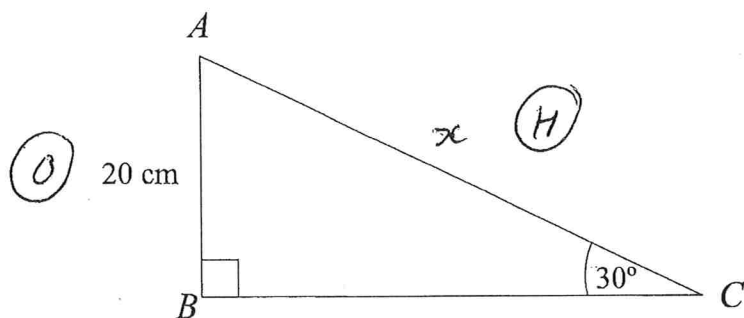**13** Write down the exact value of tan (60°)

$$\sqrt{3}$$

(Total for Question 13 is 1 marks)

**14** Write down the exact value of cos (30°)

$$\frac{\sqrt{3}}{2}$$

(Total for Question 14 is 1 marks)

**15**



Calculate the length $AC$.

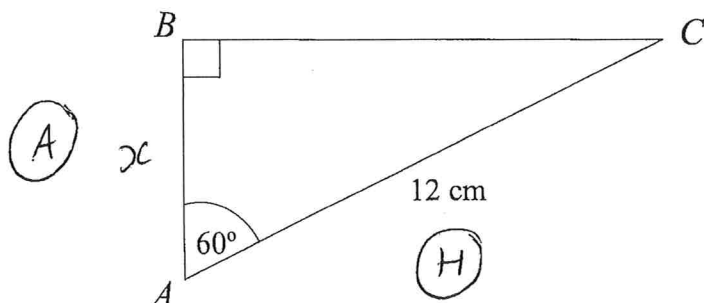$$\sin \theta = \frac{O}{H}$$

$$\sin 30 = \frac{20}{x}$$

$$\frac{1}{2} = \frac{20}{x}$$

$$x = 40 \ cm$$

.........40.........cm

**(Total for Question 15 is 3 marks)**

**16**



Calculate the length $AB$.

$$\cos \theta = \frac{A}{H}$$

$$\cos (60) = \frac{x}{12}$$

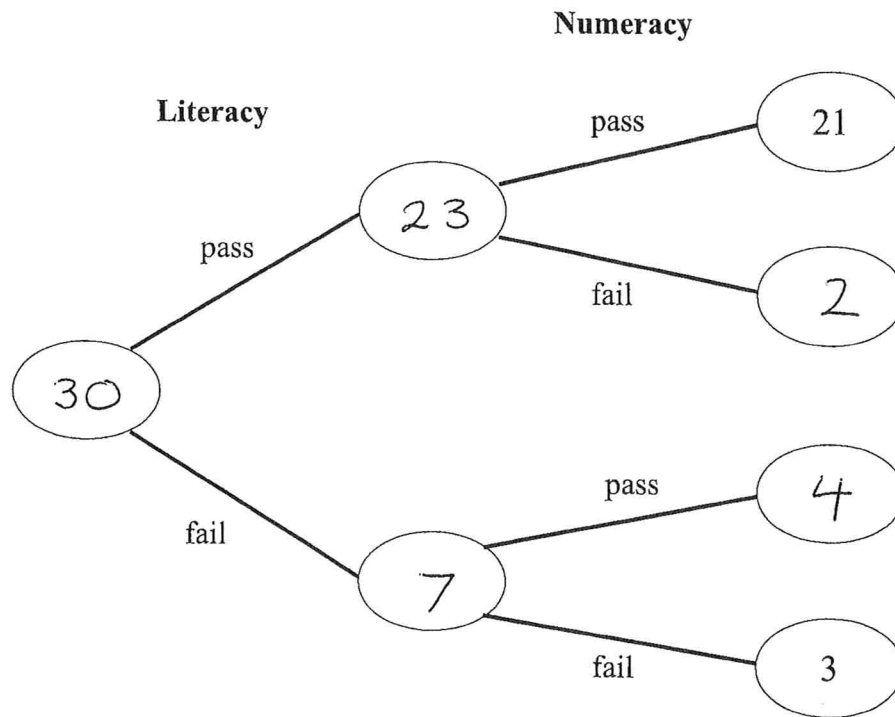$$\frac{1}{2} = \frac{x}{12}$$

$$x = 6 \ cm$$

.........6.........cm

**(Total for Question 16 is 3 marks)**

**1** 30 people took a literacy test and a numeracy test.

23 of the people passed the literacy test.

(a) Use this information to complete the frequency tree.

**Numeracy**

**Literacy**

```
                                          pass        ⟨ 21 ⟩
                        ⟨ 23 ⟩
              pass                        fail        ⟨ 2 ⟩

   ⟨ 30 ⟩
              fail                        pass        ⟨ 4 ⟩
                        ⟨ 7 ⟩
                                          fail        ⟨ 3 ⟩
```

(3)

(b) Write down the number of people that passed the numeracy test.

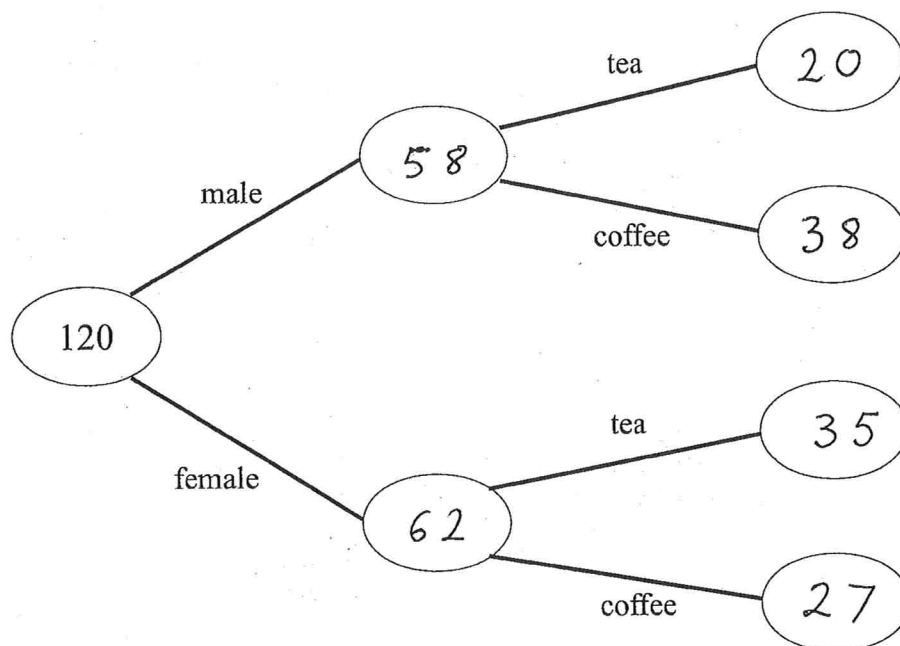$21 + 4$

25

(1)

**(Total for question 1 is 4 marks)**

**2** 120 people were asked if they prefer tea or coffee.

58 of the people were male.
35 of the females preferred tea.
65 of the people preferred coffee.

(a) Use this information to complete the frequency tree.



(3)

One of the 120 people is chosen at random.

(b) Write down the probability that this person is female and preferred tea.
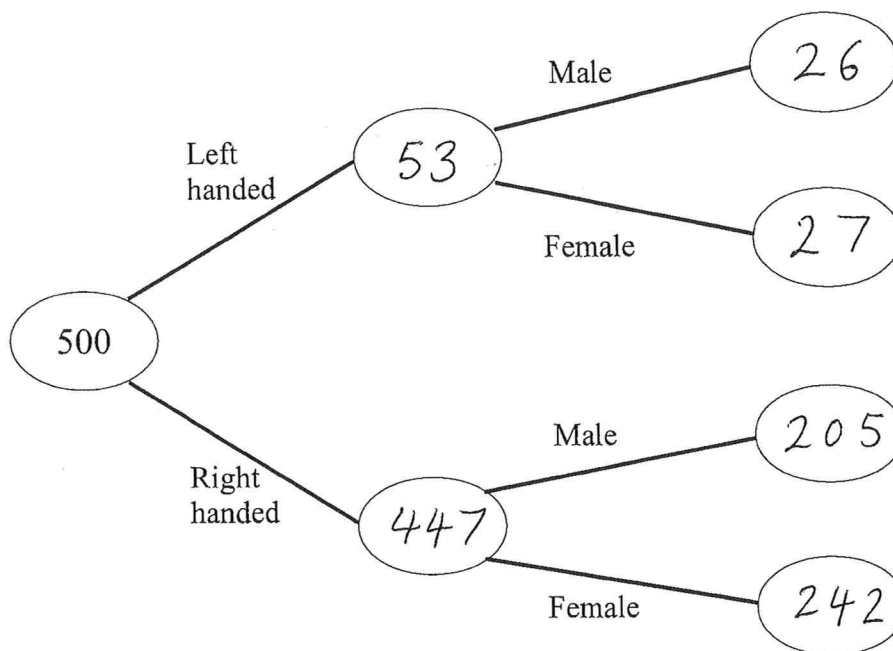
$$\frac{35}{120}$$

(1)

**(Total for question 2 is 4 marks)**

$$\left[ \text{OR} \quad \frac{7}{24} \right]$$

**3**  500 people were surveyed.
All of the people were either left handed or right handed.

53 of the people are left handed.
26 males are left handed.
231 of the people are male.

(a) Use this information to complete the frequency tree.



(3)

One of the **left handed** people is chosen at random.

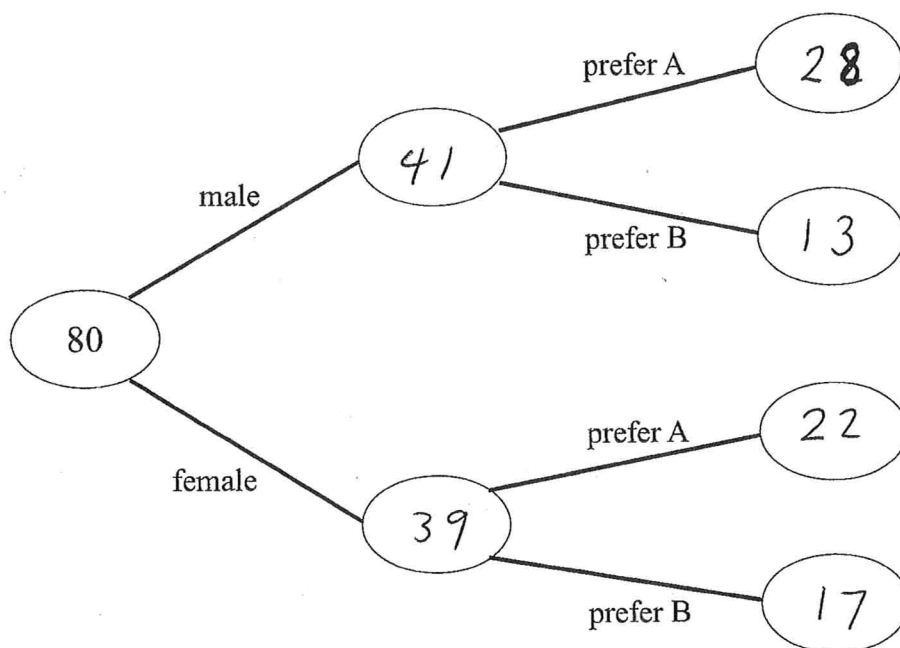(b) Write down the probability that this person is female.

$\dfrac{27}{53}$

(2)

**(Total for question 3 is 5 marks)**

4    Caleb makes a cola drink.
     He is doing a taste test.
     He asks 80 people if they prefer cola A or cola B.

     41 of the people asked were male.
     22 of the 50 people that prefer cola A are female.

     (a)  Use this information to complete the frequency tree.



                                                                                (3)

     One of the 80 people is chosen at random.

     (b)  Write down the probability that this person is male and preferred cola A.

                                                                    $\dfrac{28}{80}$
                                                                                (1)
                                    **(Total for question 4 is 4 marks)**

                                                    $\left( ok \quad \dfrac{7}{20} \right)$
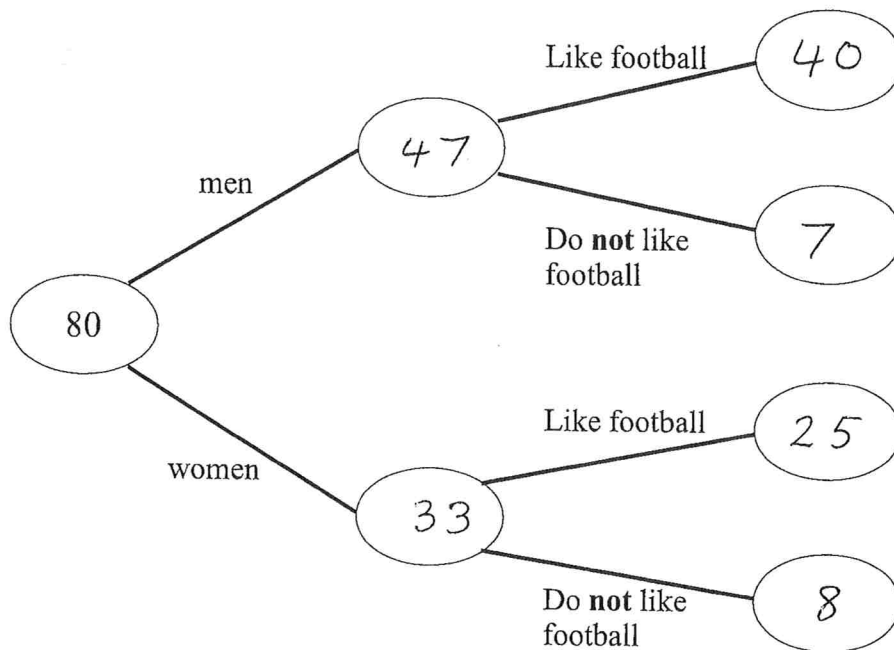
5    80 people were asked if they like football.

     47 of these people were men, the rest are women.
     7 of the men do **not** like football.
     65 of the 80 people like football.

     (a) Use this information to complete the frequency tree.



                                                    Like football        40

                               47

                 men
                                                    Do **not** like      7
                                                    football

           80

                 women
                               33                   Like football        25

                                                    Do **not** like      8
                                                    football

                                                                              (3)

     One of the people who do **not** like football is chosen at random.

     (b) Write down the probability that this person is a man.

             7 + 8 = 15    Do not like football

                                                                    7
                                                                    ──
                                                                    15
                                                    .......................
                                                                              (2)
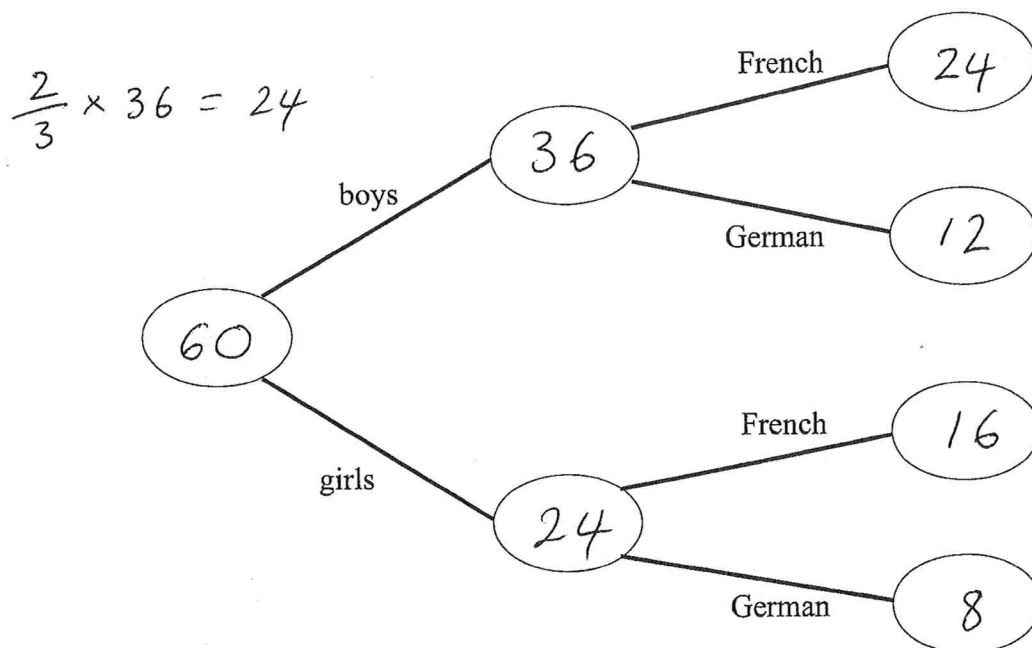                                           (Total for question 5 is 5 marks)

**6** 60 students study a language at a school.
Each student either studies French or German.

36 of the students are boys.

$\frac{2}{3}$ of the boys study French

40 students study French

Use this information to complete the frequency tree.

$\frac{2}{3} \times 36 = 24$
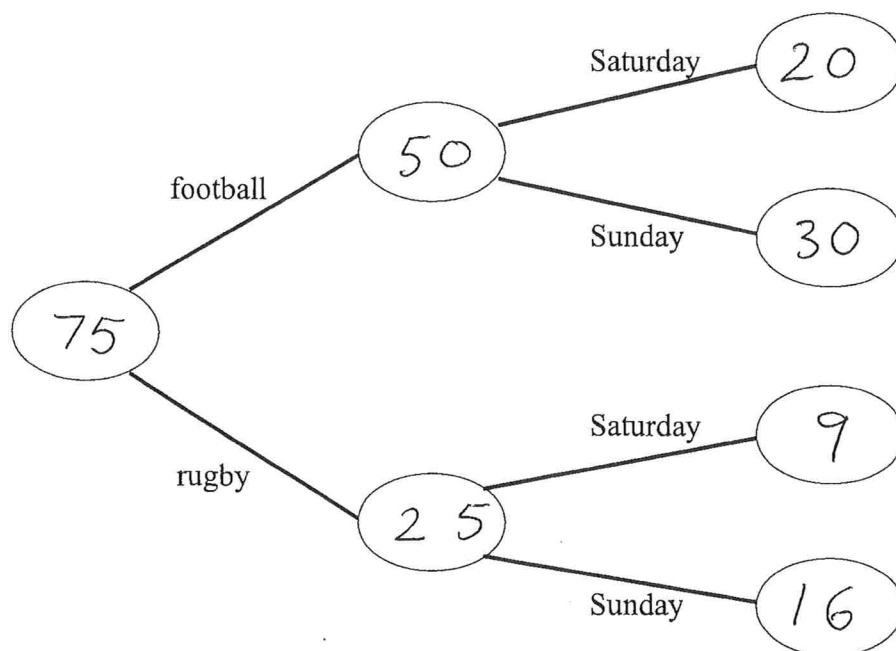


(Total for question 6 is 4 marks)

7   75 students either go to a football club or a rugby club at the weekend.
    Each student either goes to the club on Saturday or Sunday.

    50 of the students go to a football club.

    $\frac{3}{5}$ of the students that go to a football club go on Sunday.   $\frac{3}{5} \times 50 = 30$

46 students go to their club Sunday.

    Use this information to complete the frequency tree.



**(Total for question 7 is 4 marks)**

**1** The tally chart show information about the the number of ice creams sold by a shop last week.

| | Tally | Frequency |
|---|---|---|
| Monday |卌 卌 I | 11 |
| Tuesday | 卌 卌 II | 13 |
| Wednesday | 卌 IIII | 9 |
| Thursday | 卌 卌 I | 11 |
| Friday | 卌 IIII | 9 |

(a) Write down one thing that is wrong with the tally chart.

On Tuesday the frequency should be 12

(1)

The pictogram gives information about the number of chocolate bars sold by a shop last week.

| | |
|---|---|
| Monday | ◐ ◐ ◐ |
| Tuesday | ◐ ◐ ◐ ◐ |
| Wednesday | ◐ ◐ ◐ |
| Thursday | ◐ ◐ ◐ ◖ |
| Friday | ◐ ◐ |

Key:

◐ Represents 3 chocolate bars

(b) Write down one thing that is wrong with the tally chart.

On Thursday there are 10.5 chocolate bars
– they cannot sell half a chocolate bar

(1)

**(Total for question 1 is 2 marks)**

**1** Here is a bar chart showing the average maximum monthly temperature (°C) in Greenwich.
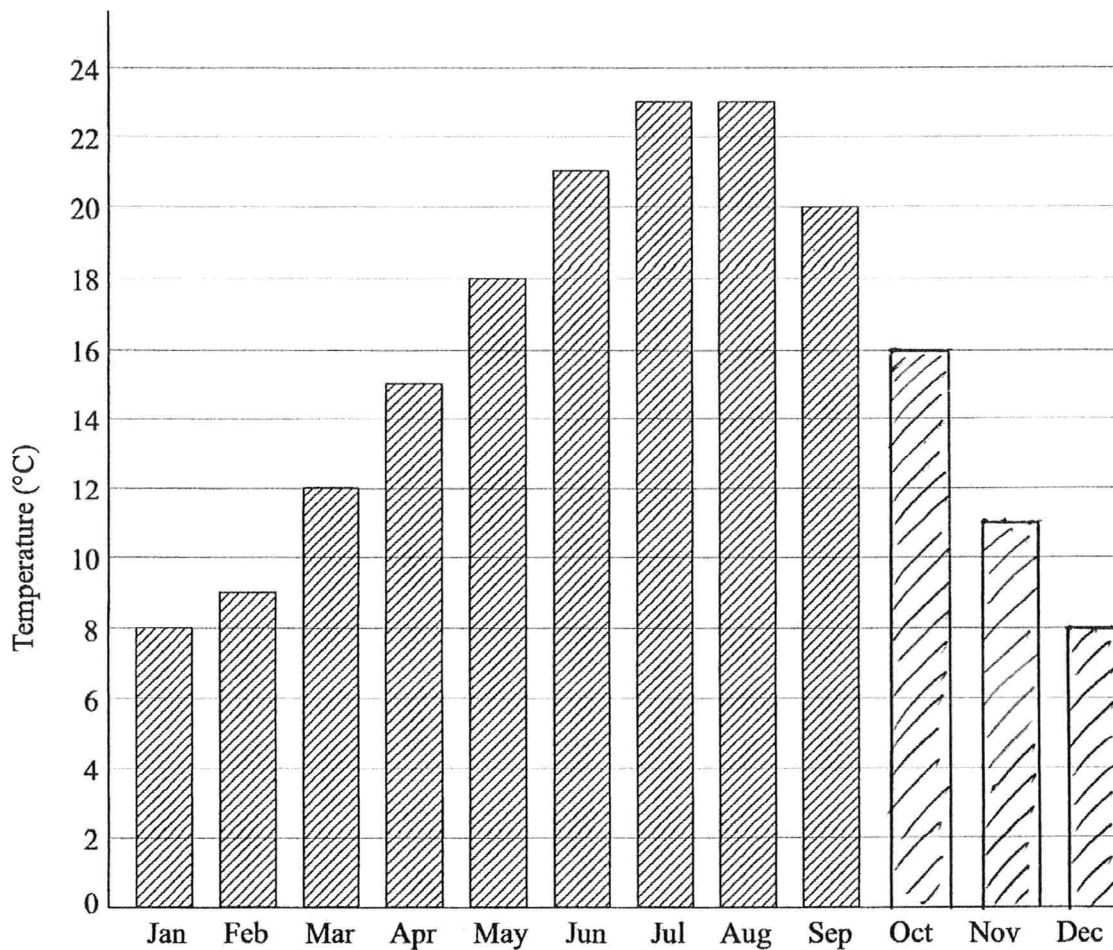


Here are the average monthly temperatures in October, November and December.

| | |
|---|---|
| October | 16°C |
| November | 11°C |
| December | 8°C |

(a) Complete the bar chart to show this information.

(2)

(b) In which two months were the highest average temperatures recorded?

............July............ and ...August...

(1)

(c) Work out the range of average monthly temperatures

$$23 - 8 = 15$$

............15............°C

(1)

(Total for question 1 is 4 marks)

**1** Here are the heights, in cm, of 15 plants.

35  41  47  32  45

40  52  33  55  41

29  38  42  48  38

Draw an ordered stem and leaf diagram to show this information.

```
2 | 9
3 | 2 3 5 8 8
4 | 0 1 1 2 5 7 8
5 | 2 5
```

Key: 2|9 = 29cm

**(Total for Question 1 is 3 marks)**

**2** Here are the times, in seconds, it took 20 people to run a race.

54  65  68  49  72  74  56  57  66  62

68  48  51  59  66  71  63  60  53  70

Draw an ordered stem and leaf diagram to show this information.

```
4 | 8 9
5 | 1 3 4 6 7 9
6 | 0 2 3 5 6 6 8 8
7 | 0 1 2 4
```

Key: 4|8 = 48 s

**(Total for Question 2 is 3 marks)**

**3** Here is a stem and leaf diagram showing the mass, in grams, of some apples.

| 15 | 6 | 6 | 7 | 9 | |
|----|---|---|---|---|---|
| 16 | 1 | 3 | 4 | 5 | 8 |
| 17 | 0 | 0 | 2 | 3 | 7 |
| 18 | 0 | 4 | 5 | | |

Key: $15|6 = 156$ grams

Work out the median mass.

_____168_____ g

(Total for Question 3 is 2 marks)

**4** Here are the heights, in cm, of 18 people.

190   168   186   186   158   190   165   184   185
183   154   189   153   183   159   167   177   162

Draw an ordered stem and leaf diagram to show this information.

| 15 | 4 | 3 | 4 | 8 | 9 | | |
|----|---|---|---|---|---|---|---|
| 16 | 2 | 5 | 7 | 8 | | | |
| 17 | 7 | | | | | | |
| 18 | 3 | 3 | 4 | 5 | 6 | 6 | 9 |
| 19 | 0 | 0 | | | | | |

Key: $15|3 = 153$ cm

(Total for Question 4 is 3 marks)

**5** Here are scores of 18 students in a test.

86   91   65   77   60   91
88   75   65   78   70   63
72   69   63   70   64   67

(a) Draw an ordered stem and leaf diagram to show this information.

$$
\begin{array}{c|ccccccc}
6 & 0 & 3 & 3 & 4 & 5 & 5 & 7 & 9 \\
\hline
7 & 0 & 0 & 2 & 5 & 7 & 8 \\
\hline
8 & 6 & 8 \\
\hline
9 & 1 & 1 \\
\end{array}
$$

Key: $6/0 = 60$

(3)

A student is selected at random

(b) Work out the probability that this student scored more than 80.

$$\frac{4}{18} \quad OR \quad \frac{2}{9}$$

$\dfrac{4}{18}$

(2)

**(Total for Question 5 is 5 marks)**

**6** Here is a stem and leaf diagram showing the ages of some footballers.

$$
\begin{array}{c|cccccccc}
1 & 7 & 9 \\
\hline
2 & 0 & 2 & 2 & 3 & 5 & 7 & 7 & 8 \\
\hline
3 & 0 & 1 & 3 & 3 \\
\end{array}
$$

Key: $1 \mid 7 = 17$ years old

(a) Work out the range.

$$33 - 17 = 16$$

$16$

(1)

(b) Work out the median age.

$$\frac{25 + 27}{2} = 26$$

$26$

(2)

**(Total for Question 6 is 3 marks)**

7    Here are the masses, in kg, of 15 objects.

2.9    3.5    2.1    3.8    3.7

1.6    3.1    2.4    2.9    1.5

3.5    4.4    1.8    1.8    2.3

Draw an ordered stem and leaf diagram to show this information.

1 | 5 6 8 8
2 | 1 3 4 9 9
3 | 1 5 5 7 8
4 | 4

Key: 1/5 = 1.5 kg

(3)

(b)  Work out the median mass.

2.9 kg

(2)

**(Total for Question 7 is 5 marks)**

**8** Here are the speeds, in mph, of 20 cars.

55   70   67   58   69   51   43   63   49   48
65   52   45   42   47   50   47   64   63   58

(a) Draw an ordered stem and leaf diagram to show this information.
You must include a key.    (3)

```
4 | 2 3 5 7 7 8 9
5 | 0 1 2 5 8 8
6 | 3 3 4 5 7 9
7 | 0
```

KEY

$4|2 = 42$ mph

(b) Work out the median speed.

$$\frac{52 + 55}{2} = \frac{107}{2}$$

_____53.5_____ mph    (2)

**(Total for Question 8 is 5 marks)**

**9** Here are the ages of a company's employees.

31  24  43  52  19  59  29

55  51  38  20  38  36  26

31  38  23  29  25  55  26

(a) Draw an ordered stem and leaf diagram to show this information.
You must include a key.

(3)

```
1 | 9
2 | 0 3 4 5 6 6 9 9
3 | 1 1 6 8 8 8
4 | 3
5 | 1 2 5 5 9
```

KEY

1/9 = 19 years old

One of the employees is selected at random
(b) Find the probability that they are younger than 30.

$$\frac{9}{21} = \frac{3}{7}$$

$\frac{9}{21}$

(2)

**(Total for Question 9 is 5 marks)**

**10**   Here are scores of some students in a test.

51   53   49   88   62

74   68   53   67   51

59   65   42   43   59

63   62   40   67   59

(a)   Draw an ordered stem and leaf diagram to show this information.   (3)
You must include a key.

```
4 | 0 2 3 9
5 | 1 1 3 3 9 9 9
6 | 2 2 3 5 7 7 8
7 | 4
8 | 8
```

KEY
4|0 = 40

(b) Work out the median score

59

(2)

Another student sits the test and scores 80.

Boris says: "This means the median will increase."

(c) Is Boris correct?
You must explain your answer.

No, the middle number will still be 59

(1)

**(Total for Question 10 is 6 marks)**