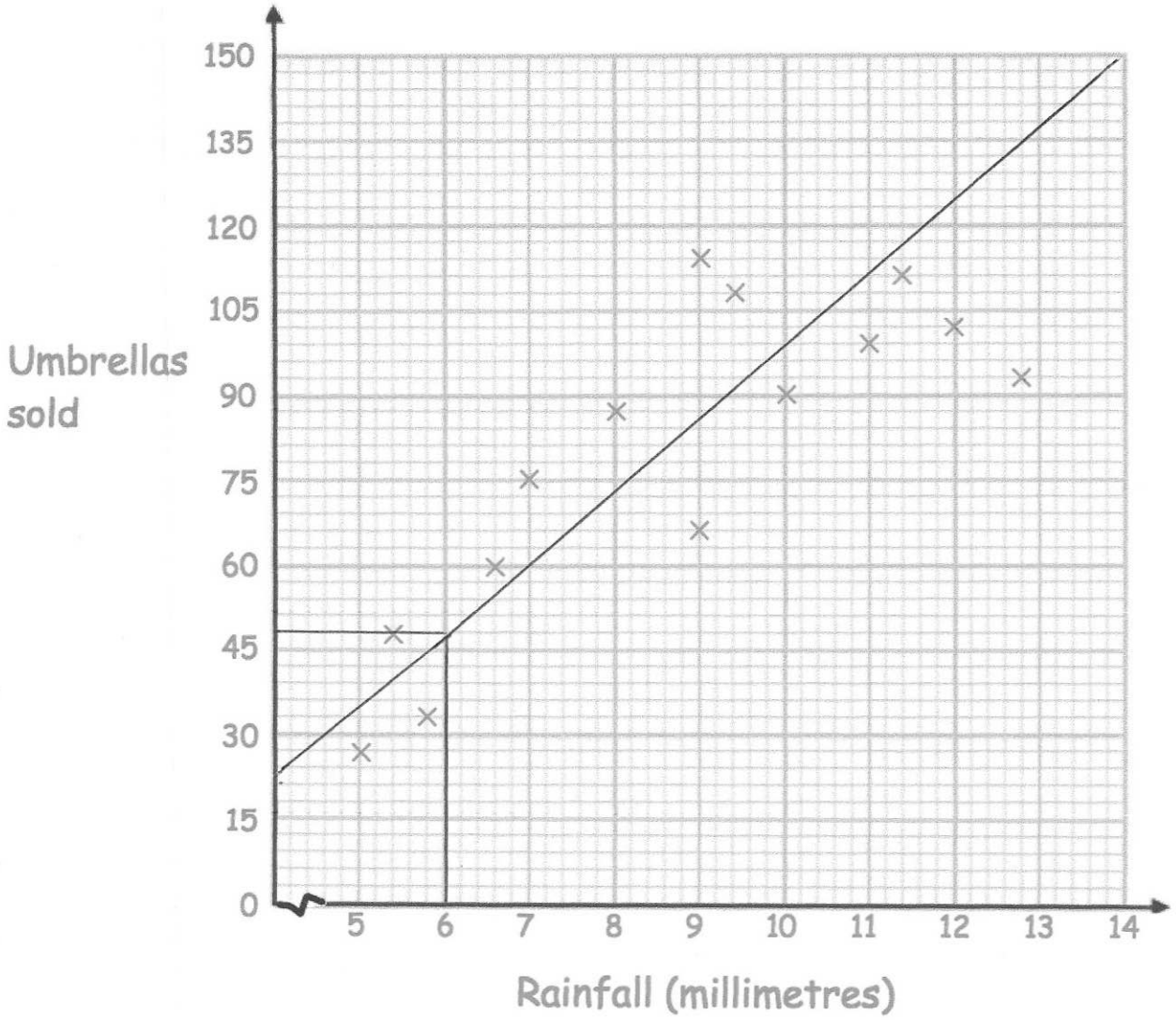
1 . A shop sells umbrellas.

The scatter graph shows information about the number of umbrellas sold each week and the rainfall that week, in millimetres.



(a) Describe the relationship between the rainfall and umbrellas sold.

As the rainfall increases, the number of umbrellas sold increases

(1)

(b) What is the greatest amount of rainfall in one week?

12.8 mm

(1)

In another week, there was 6mm of rain.

(c) Estimate the number of umbrellas sold.

may vary due to lines of best fit

48

(2)

(d) Explain why it may **not** be appropriate to use your line of best fit to estimate the number of umbrellas sold in a week with 25mm of rainfall.

It is beyond the range of the data

It is extrapolation therefore unreliable.

(1)

2 . (a) Write 5930000000 in standard form.

5.93×10^9

(1)

(b) Write 8.024×10^{-4} as an ordinary number.

0.0008024

(1)

(c) $c = 2 \times 10^6$ and $y = 6 \times 10^5$

$$w^2 = \frac{cy}{c - y}$$

Work out the value of w.
Give your answer in standard form correct to 2 significant figures.

$w^2 = \frac{12 \times 10^{11}}{1400000} = 857142.8571$

9.3×10^2

(3)

$w = 925.82..$

$w = 930$

3. Use your calculator to find

$$\sqrt{39.3^2 - 1.24^2}$$

(a) Give all the figures in your calculator display.

39.280043279

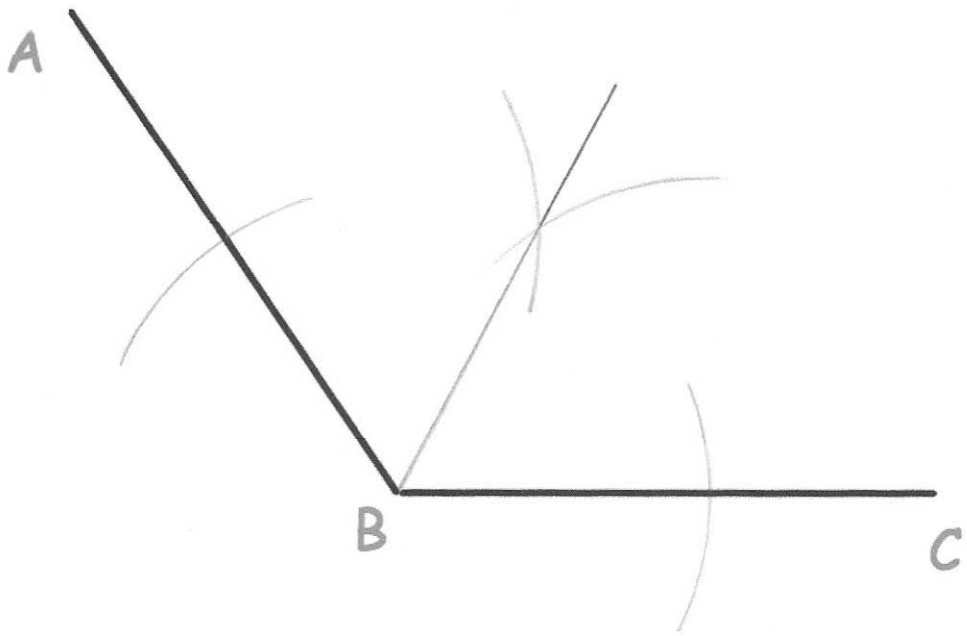
(1)

(b) Write your answer to 3 significant figures.

39.3

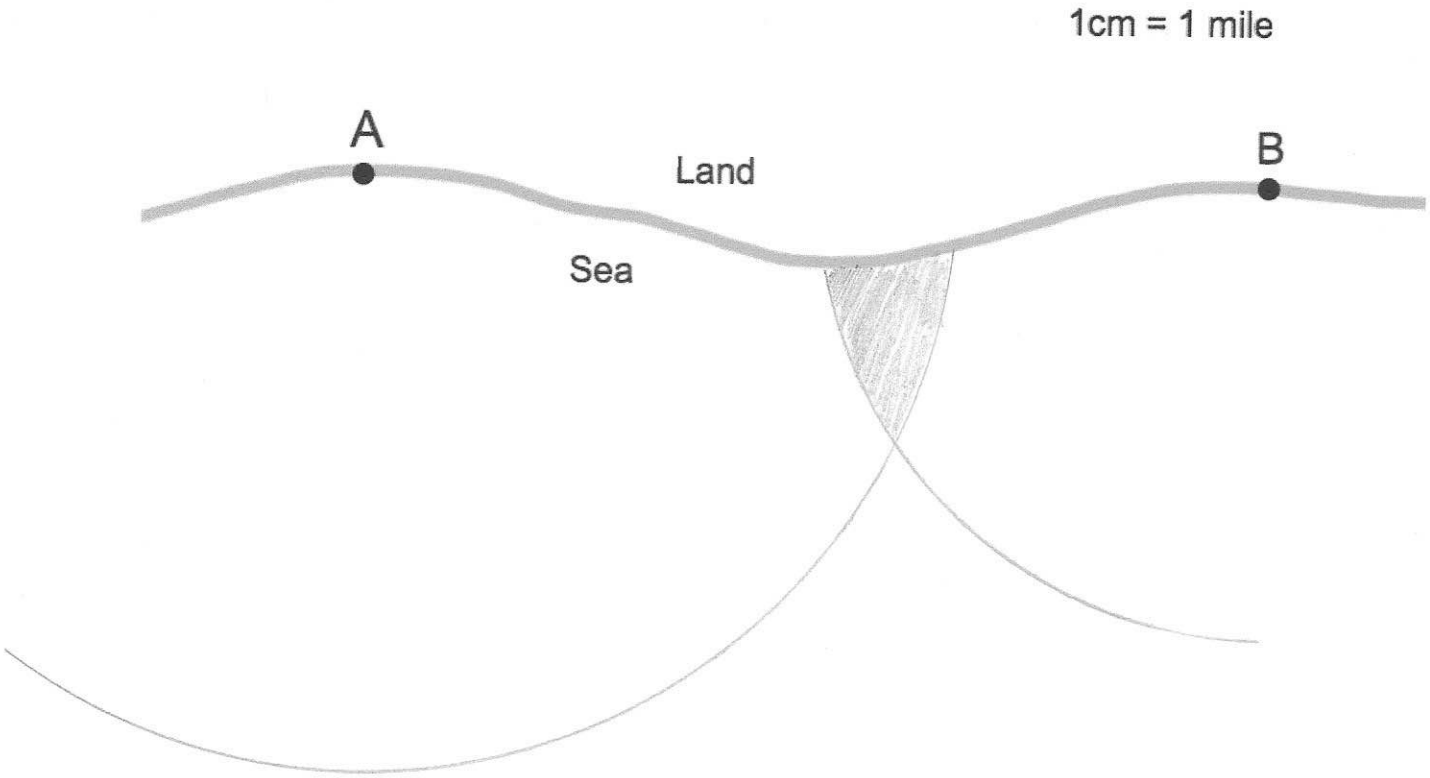
(1)

4 . Using ruler and compasses, construct the bisector of angle ABC.



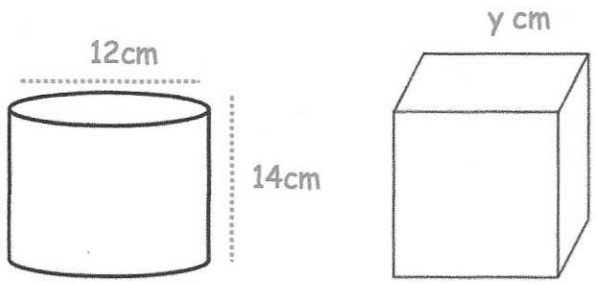
(2)

5. The diagram shows two lighthouses.
A boat is within than 8 miles of lighthouse A.
The same boat is within 6 miles of lighthouse B.
Shade the possible area in which the boat could be.



(2)

6.



Cylinder $V = \pi r^2 h$

$= \pi(6)^2(14)$

$= 1583.362697 cm^3$

cube $y \times y \times y = 1583.36...$

$\sqrt[3]{1583.36...} =$

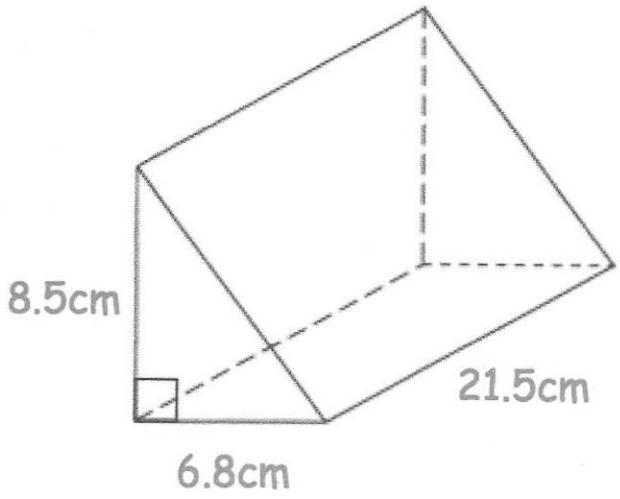
A cylinder has diameter 12cm and height 14cm.
A cube has side length y cm.
The cylinder and cube has the same volume.

Find y.

11.66 cm

(4)

7 . Shown below is a triangular prism.



Find the volume of the triangular prism.

$V = \frac{1}{2} \times (6.8) \times (8.5) \times (21.5)$

$= 621.35$

621.35 cm³

(3)

8

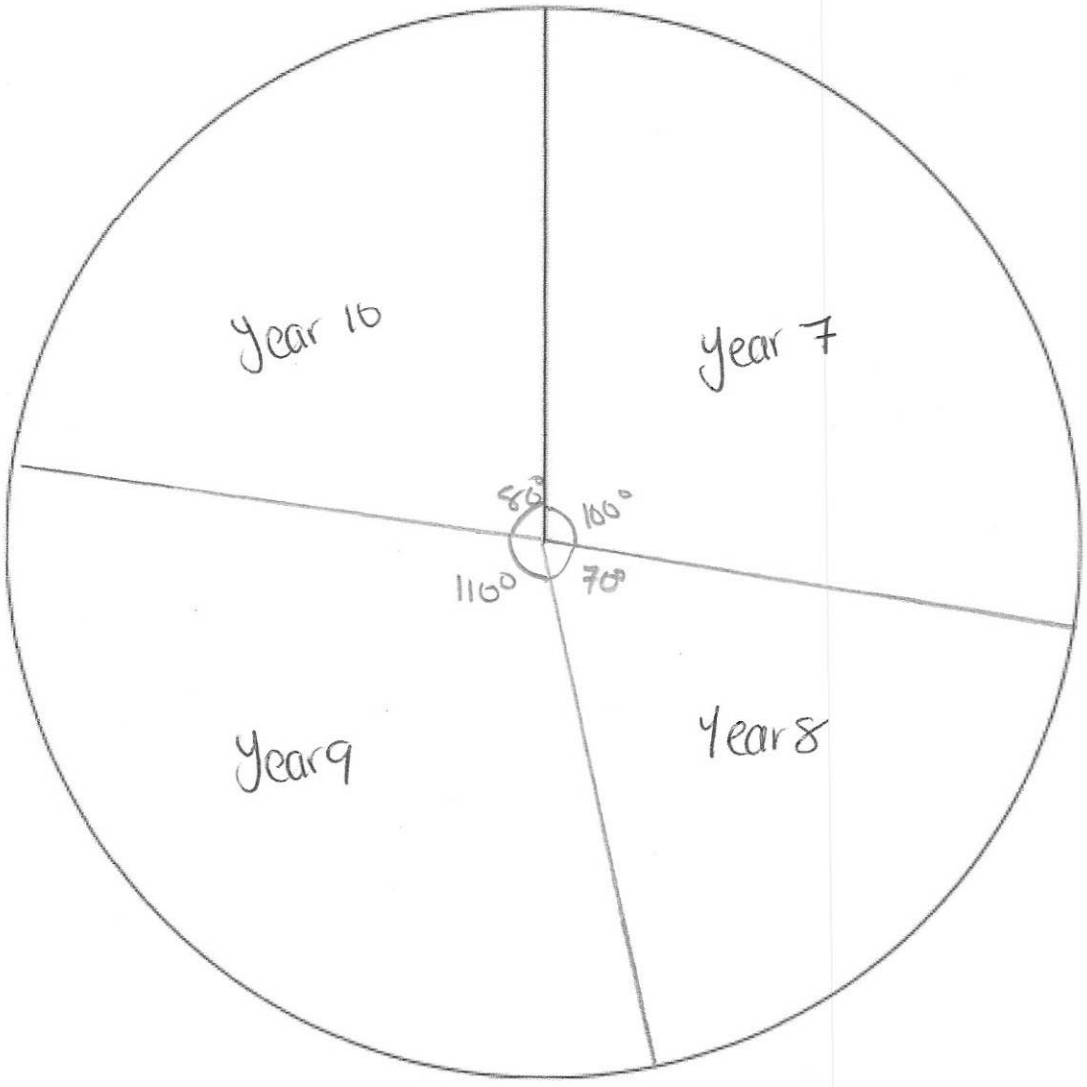
. The table gives information about the number of students in years 7 to 10.

Year	Frequency	Angle
7	200 ×0.5	100°
8	140 ×0.5	70°
9	220 ×0.5	110°
10	160 ×0.5	80°

720

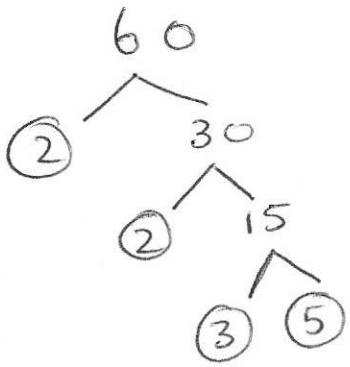
360 ÷ 720 = 0.5° per person

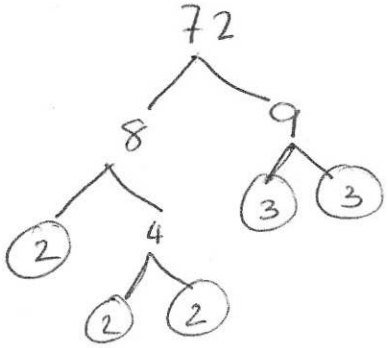
Draw an accurate pie chart to show this information.



(4)

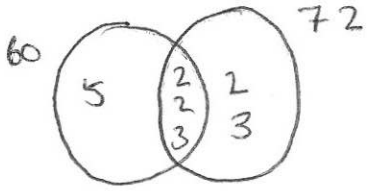
9 . Find the Lowest Common Multiple (LCM) of 60 and 72.





$72 = 2 \times 2 \times 2 \times 3 \times 3$

$60 = 2 \times 2 \times 3 \times 5$



$LCM = 5 \times 2 \times 2 \times 3 \times 2 \times 3 = 360$

360

(2)

10 . Make v the subject of the formula.

$$s = \frac{1}{2}(u+v)t$$

$\times 2$ $\times 2$

$2s = (u+v)t$

$\div t$ $\div t$

$\frac{2s}{t} = u+v$

$-u$ $-u$

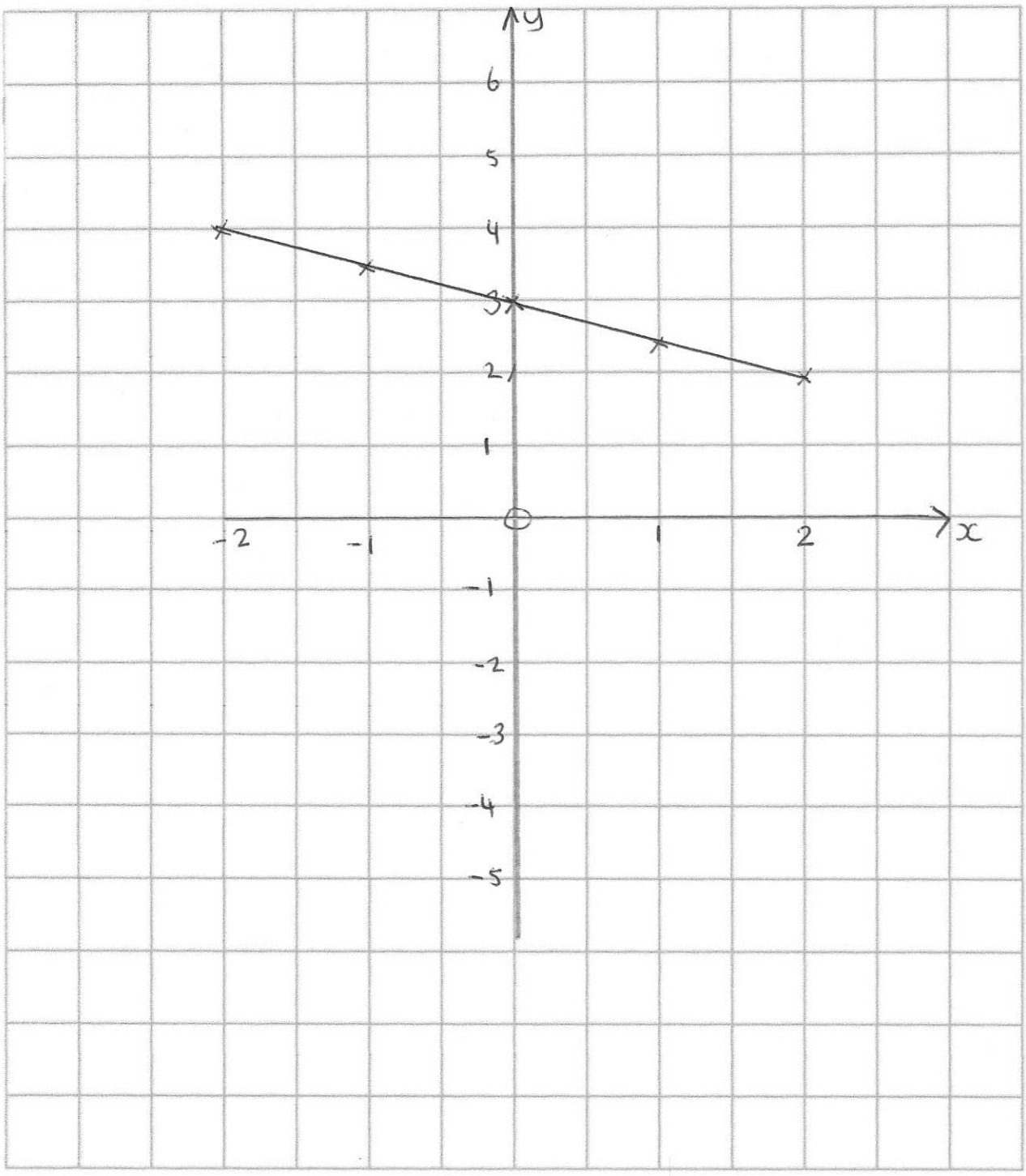
$\frac{2s}{t} - u = v$

v = $\frac{2s}{t} - u$

(3)

11 . On the grid, draw $x + 2y = 6$ for values of x from –2 to 2.

x	0	1	2	-1	-2
y	3	2·5	2	3·5	4



(4)

12. Solve the simultaneous equations

$5x + 2y = -34$ ①
$4x - 3y = -41$ ②

Do not use trial and improvement

$15x + 6y = -102$
$+ \quad 8x - 6y = -82$

$23x = -184$

$x = -8$

Sub $x = -8$ into eqn ①

$-40 + 2y = -34$

$2y = 6$

$y = 3$

Check $x = -8$ and $y = 3$ into equation.

$-32 - 9 = -41$

x = ..-8.. y = ..3..

(4)

13 . James has received two job offers.

A job in Milan which pays €55,000 a year.
A job in Boston which pays $64,000 a year.

The exchange rates were £1 = $1.42 and £1 = €1.25.

Which job offer has the highest salary?
Show working to explain your answer.

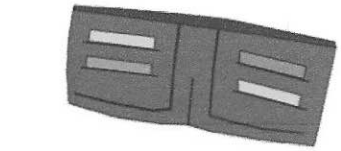
Milan 55000 ÷ 1·25 = £44 000

Boston 64 000 ÷ 1·42 = £45070·42

Boston - higher Salary

(3)

14. Terry goes to the Post Office to exchange money.



$ £ €

Exchange Rates

£1 : $1.55

£1 : €1.24

*Commission Charged

Terry changes $651 and €161.20 into pounds sterling.
The Post Office deducts their commission and gives Terry £528.

What is the percentage commission?

$651 → £420

€161.20 → £130

£550

$\frac{22}{550} \times 100 = 4$

4 %

(4)

15. Martyn has some money to invest and sees this advert.

Bank of Maths

Double your money in 15 years.

The average annual growth for your investment is 4.5%

Will Martyn double his money in 15 years by investing his money with "Bank of Maths?"
You **must** show your workings.

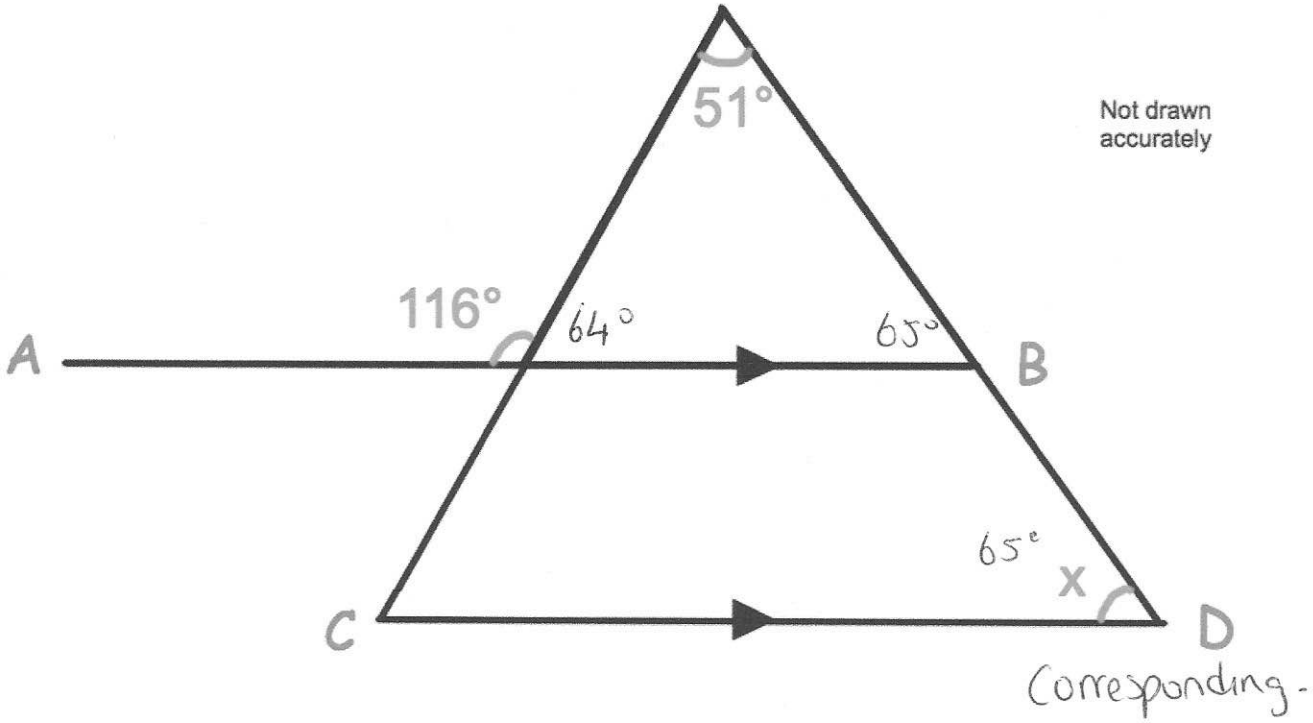
if Martyn had £100

$100 \times 1.045^{15} = £193.53$

He will not double his money in 15 years.

(4)

16 . In the diagram, AB is parallel to CD.



Work out the size of angle x.

You **must** show your workings.

$180 - 116 = 64$

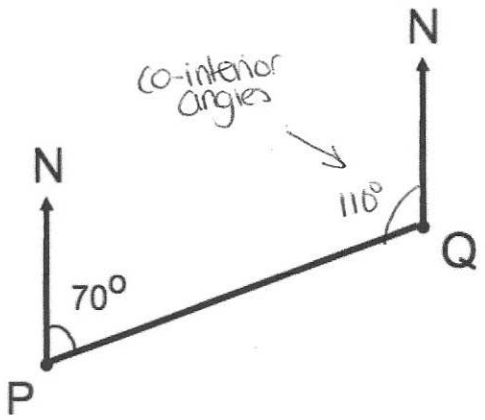
$51 + 64 = 115$

$180 - 115 = 65$

65 .....°

(4)

17 . The diagram shows the position of two airplanes, P and Q.



Not drawn accurately

The bearing of Q from P is 070°.

Calculate the bearing of P from Q.

360 - 110 = 250

250 .....°

(2)

14. The sum of the interior angles in a polygon is 7380^0.

Calculate the number of sides the polygon has.

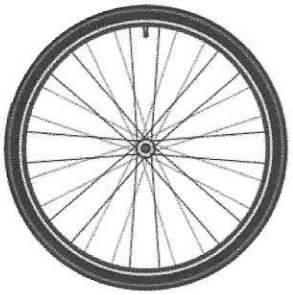
$(n-2) \times 180 = 7380$

$(n-2) = 41$

$n = 43$ Sides

(2)

19 . James has a bicycle.
Each wheel has diameter 45cm.



James cycles his bicycle in a straight line in the playground.
The front wheel makes 15 complete revolutions.

How far does the bicycle travel?
Give your answer in metres.

$\pi \times 45 = 141.37166\ldots$ cm

$141.371.. \times 15 = 2120.575..$ cm

$\div 100$

.....21.206.....m

(4)

20. In a sale the price of a sofa is reduced by 70%.
The sale price is £255

Work out the price before the sale.

30% = 255

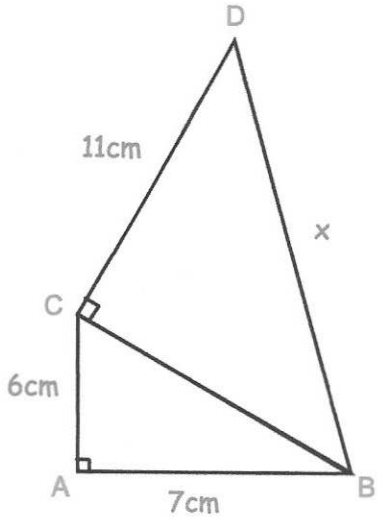
1% = 8.5

100% = 850

£ 850

(3)

21. Below are two triangles, ABC and BCD.



Find x

$6^2 + 7^2 = BC^2$

$BC^2 = 85$

$BC = 9.2195\ldots$

$9.2195\ldots^2 + 11^2 = BD^2$

$BD = \sqrt{206}$

.....14.35.....cm

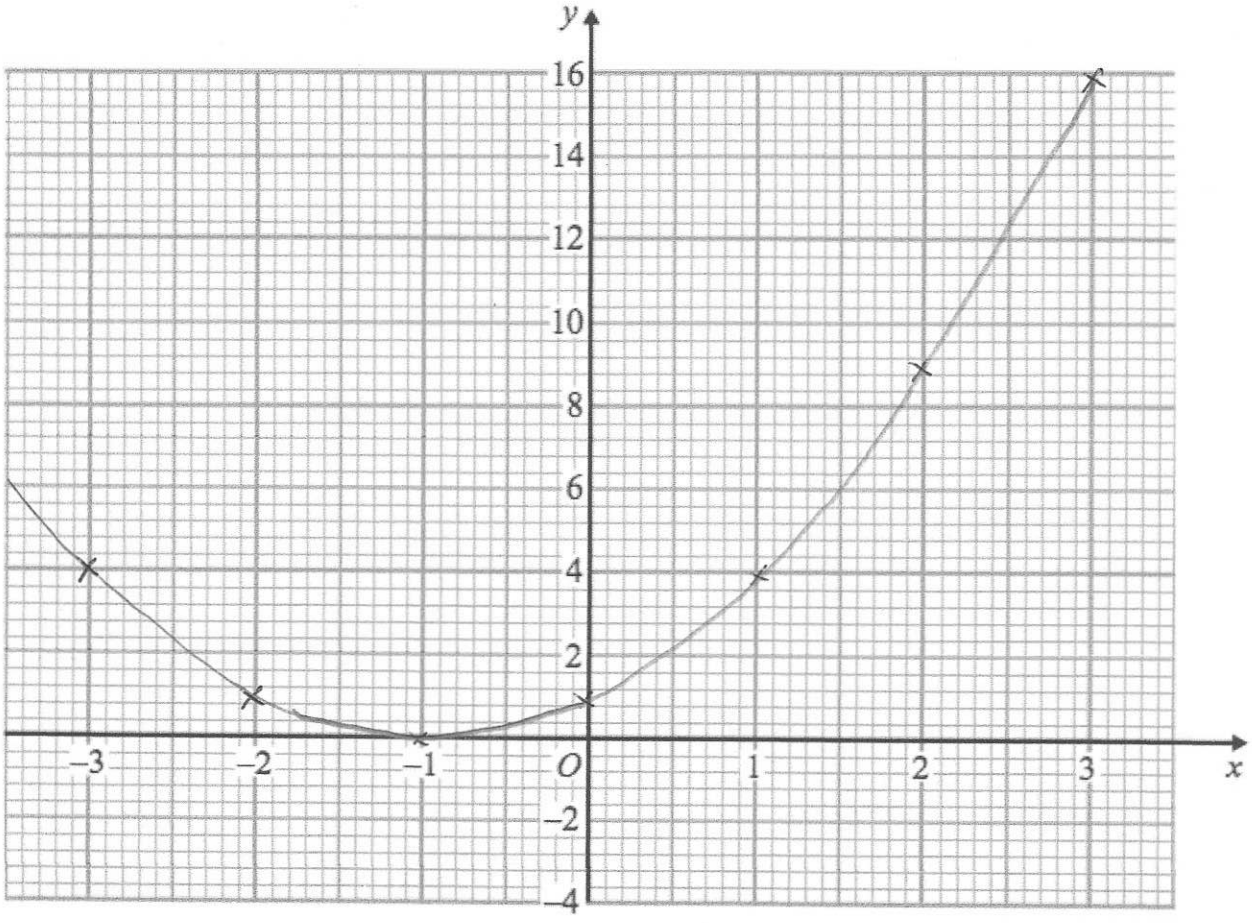
(4)

22. (a) Complete the table of values for $y = x^2 + 2x + 1$

x	-3	-2	-1	0	1	2	3
y	4	1	0	1	4	9	16

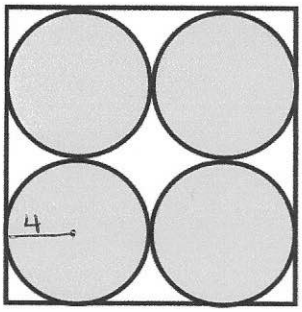
(2)

(b) On the grid, draw the graph of $y = x^2 + 2x + 1$ for the values of x from -3 to 3.



(2)

23. A logo is designed that has four pink circles within a white square.



16cm

The square has side length 16cm.

Find the area of the logo that is white.

$\pi \times 4^2 = 50.265...$

$50.265... \times 4 = 201.0619$

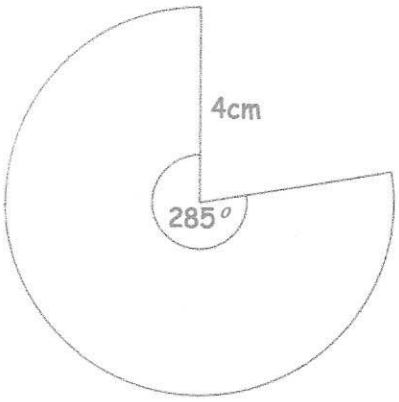
$16 \times 16 = 256$

$256 - 201.0619$

54.94 cm²

(5)

24.



Calculate the perimeter of the sector.

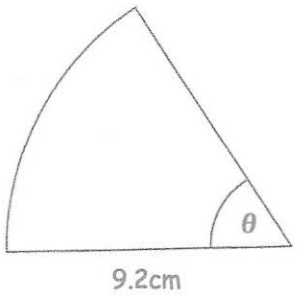
$\frac{285}{360} \times \pi \times 8 = 19.896...$

$19.896... + 4 + 4 = 27.896...$

27.897 .....cm

(3)

25 . Shown is a sector of a circle with radius 9.2cm.



The area of the sector is 38.4cm²

Find the size of angle θ
Give your answer to 2 significant figures.

$\frac{\theta}{360} \times \pi \times 9.2^2 = 38.4$

$\frac{\theta}{360} \times 9.2^2 = 12.22...$

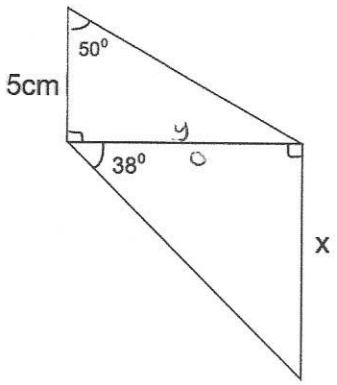
$\frac{\theta}{360} \times 84.64 = 12.22$

$\frac{\theta}{360} = 0.144...$

52 °

(3)

26. The diagram shows two right-angled triangles.



Calculate the value of x.

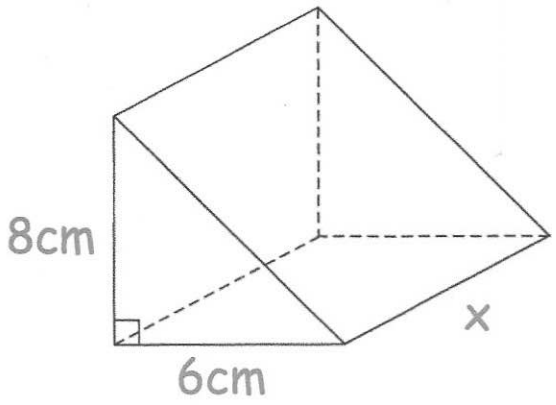
$y = \tan(50) \times 5 = 5.9587$

$x = \tan(38) \times 5.9587$

4.655 cm

(5)

27 . The diagram shows a solid triangular prism.



The prism is made from wood and has a mass of 643.8g
The density of wood is 1.85g/cm^3

Calculate the length of the prism.

$V = \frac{M}{d}$ $\frac{643.8}{1.85} = 348 cm^3$

$24 \times x = 348$

.....14.5.....cm

(4)

28 . Timothy weighs the mass of some oranges, in grams.

The table shows some information about his results.

Mass	Frequency	Midpoint	fx
$20 < m \leq 25$	12	22.5	270
$25 < m \leq 30$	24	27.5	600
$30 < m \leq 35$	17	32.5	552.5
$35 < m \leq 40$	15	37.5	562.5
$40 < m \leq 45$	+ 4	42.5	+ 170
	72		2215

Work out an estimate for the mean mass of an orange.

2215 ÷ 72

30.7638 grams

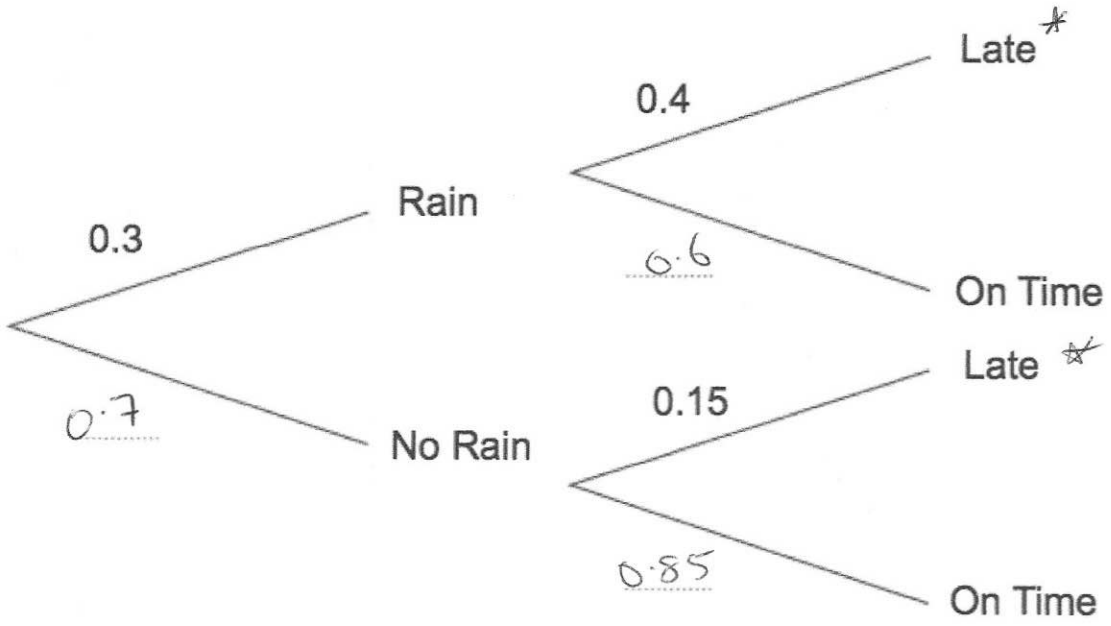
(4)

29 . In a small village, one bus arrives a day.

The probability of rain in the village is 0.3.

If it rains, the probability of a bus being late is 0.4.
If it does not rain, the probability of a bus being late is 0.15.

(a) Complete the tree diagram



(2)

(b) Work out the number of days the bus should be late over a period of 80 days.

$P(RL) = 0.3 \times 0.4 = 0.12$

$P(NRL) = 0.7 \times 0.15 = 0.105$

$P(\text{late}) = 0.225$

80×0.225

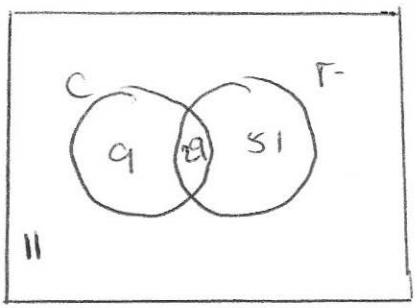
18 days

(3)

30. A group of friends have been surveyed.

38% have been to Canada.
80% have been to France.
11% have been to neither Canada or France.

(a) Find the percentage of the group that have been to Canada and France.



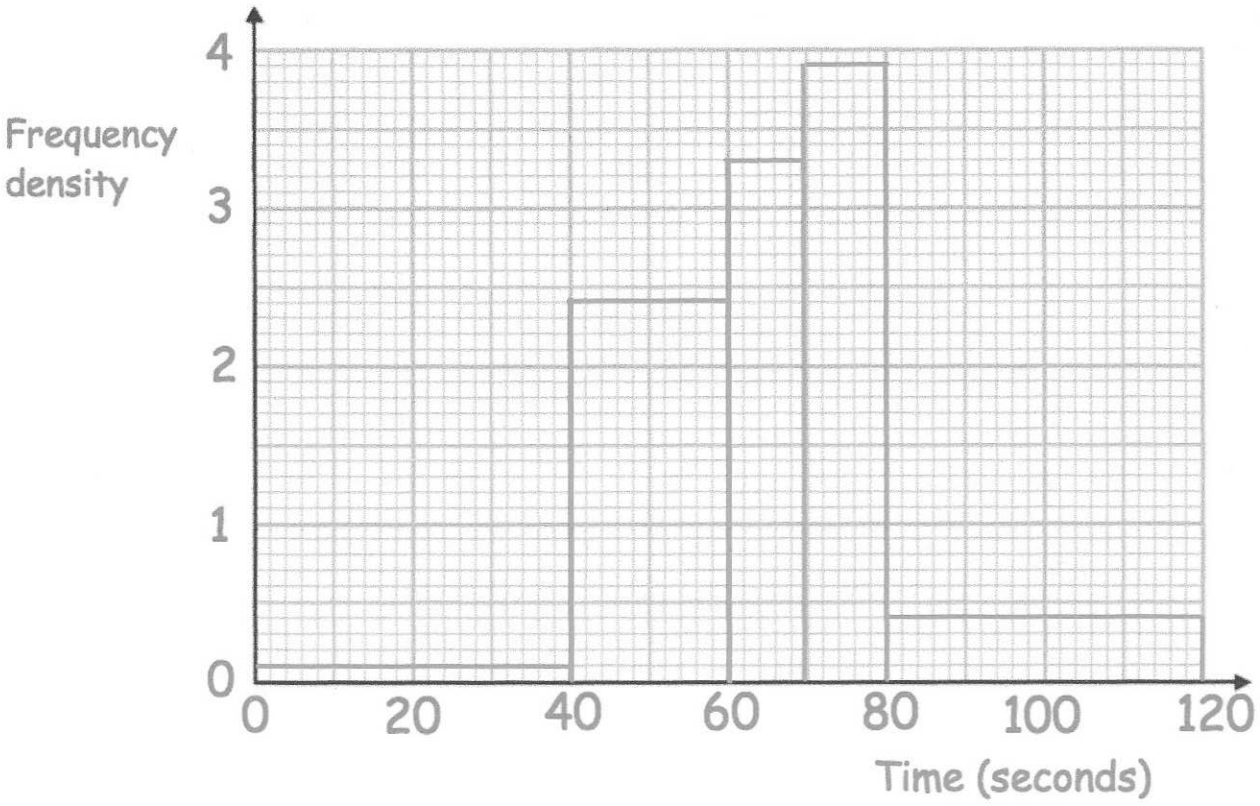
.....29.....%
(4)

One of the group, who has visited Canada is picked at random.

(b) Find the probability that they have been to France.

.....29/38.....
(2)

31 . The histograms shows information about the time taken by 140 students to complete a puzzle.



(a) Complete this frequency table.

Time, t seconds	Frequency
$0 < t \leq 40$	4
$40 < t \leq 60$	48
$60 < t \leq 70$	33
$70 < t \leq 80$	39
$80 < t \leq 120$	16

20x2.4

10.3.9

(2)

(b) Calculate an estimate of the median.

70th value

$60 + \frac{18}{33} \times 10$

65.455 seconds

(3)