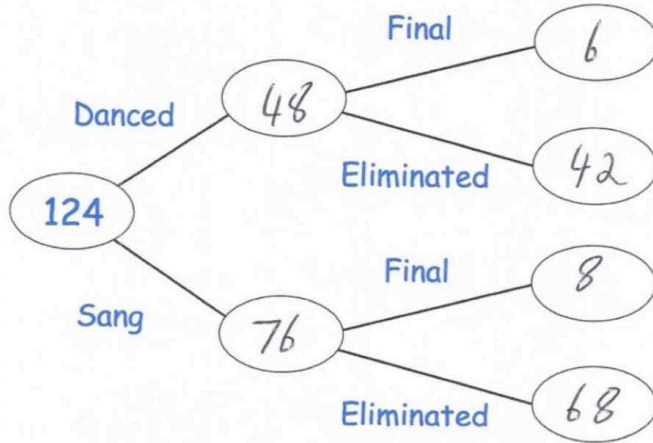


51. 124 people took part in a talent show.  
 Each person either sang or danced.  
 76 of the people were singers.  
 14 people made it through to the final and the rest were eliminated.  
 6 dancers made it through to the final.

Complete the frequency tree

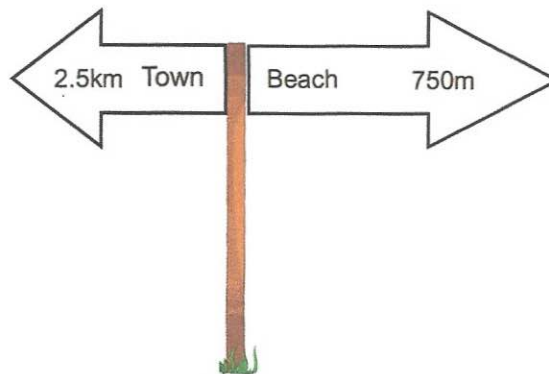


- b) What fraction of the singers made it through to the final?

$$\frac{8}{76} \quad (2)$$

(2)

- 52.

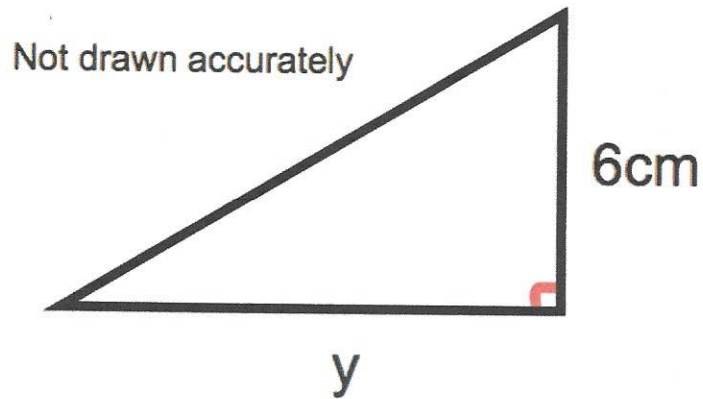


Work out the distance between the town and the beach.  
 State your units.

$$\begin{array}{r} 2500 \\ 750 \\ + \quad \\ \hline 3250 \end{array}$$

$$\underline{\underline{3250 \text{ m}}} \quad (3)$$

53. Shown below is a right-angled triangle.



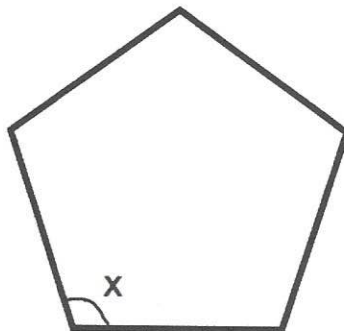
The area of the triangle is  $21\text{cm}^2$   
Calculate y, the length of the base.

$$21 \times 2 = 42$$

$$42 \div 6 = 7$$

.....7.....cm  
(2)

54. Shown below is a regular pentagon.

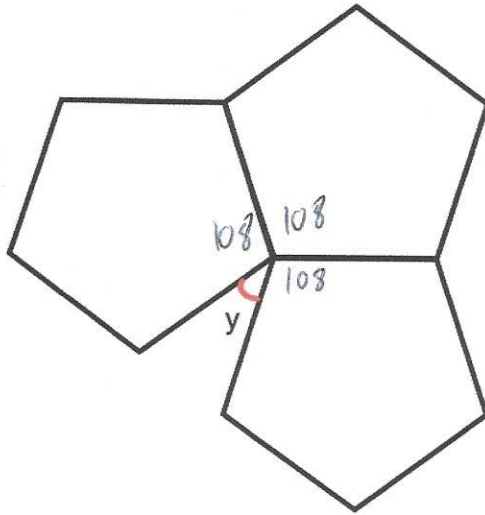


- (a) Find the size of each interior angle.

$$(5-2) \times 180 = 540$$

$$540 \div 5 = 108$$

x = .....108..... $^{\circ}$   
(2)



Three identical regular pentagons are joined as shown above.

(b) Work out the size of angle  $y$ .

$$\begin{array}{r}
 108 \\
 108 \\
 108 \\
 \hline
 324
 \end{array}
 \qquad
 \begin{array}{r}
 360 \\
 - 324 \\
 \hline
 36
 \end{array}$$

$y = \dots\dots\dots 36 \dots\dots\dots^\circ$   
(2)

55.

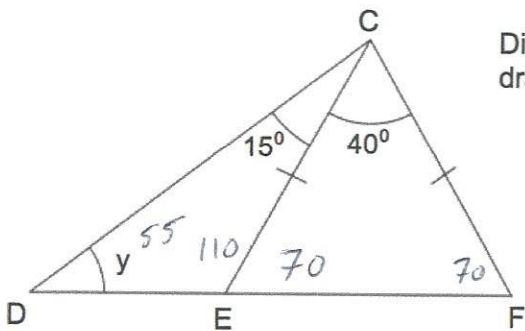


Diagram not drawn accurately

DEF is a straight line.  
 $CE = CF$ .  
 Angle ECF is  $40^\circ$ .  
 Angle DCE is  $15^\circ$ .

Find the size of the angle marked  $y$ .

$\dots\dots\dots 55 \dots\dots\dots^\circ$   
(4)

56. A car travels 240 kilometres in 3 hours 45 minutes

Calculate the average speed, in km/h, of the car.

$$s = \frac{d}{t}$$

$$240 \div 3.75$$

.....64 km/h  
(3)

57. The time for ten students to complete a race is below.

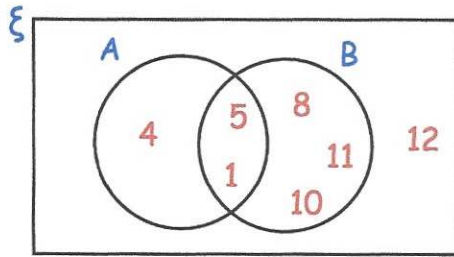
Time (t seconds)	Frequency	$fx$
20 < t ≤ 40    30	3	90
40 < t ≤ 60    50	5	250
60 < t ≤ 80    70	2	140
		+ 480

Work out an estimate for the mean time taken.

$$480 \div 10$$

.....48 seconds  
(4)

58. Here is a Venn diagram.



A number is chosen at random.

(a) Write down  $P(A \cap B)$

5, 1

$$\frac{2}{7}$$

.....

(2)

(b) Write down  $P(A \cup B)$

4, 5, 1, 8, 11, 10

$$\frac{6}{7}$$

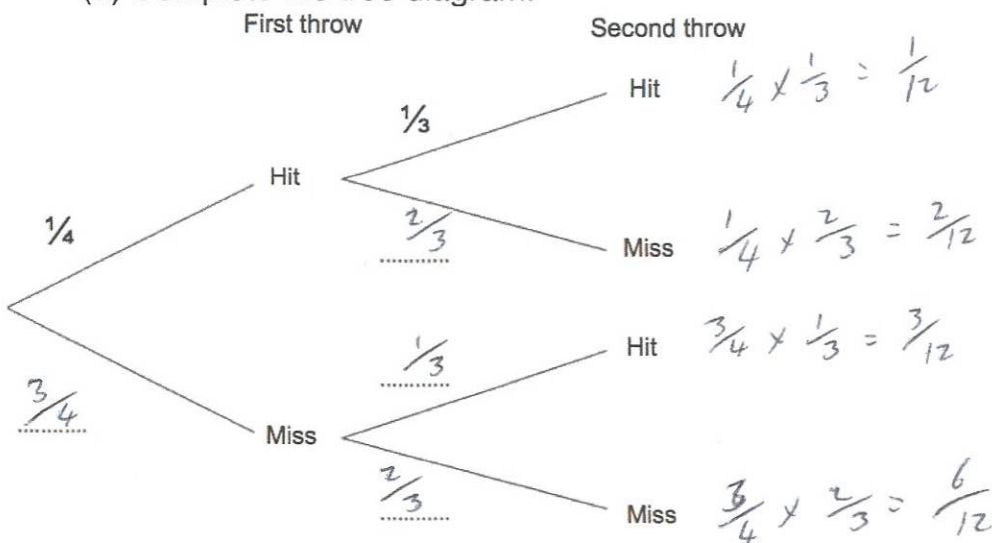
.....

(2)

59. Jennifer is playing darts.  
She throws two darts aiming for a Bullseye.

The probability Jennifer hits the Bullseye on her first throw is  $\frac{1}{4}$ .  
The probability she hits the Bullseye on her second throw  $\frac{1}{3}$ .

(a) Complete the tree diagram.



(b) Work out the probability Jennifer hits the Bullseye at least once.

$$\frac{1}{12} + \frac{2}{12} + \frac{3}{12} = \frac{6}{12}$$

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

.....

(2)

60. James is going on holiday in New York.  
James changes £400 into dollars (\$).

The exchange rate is £1 = \$1.38

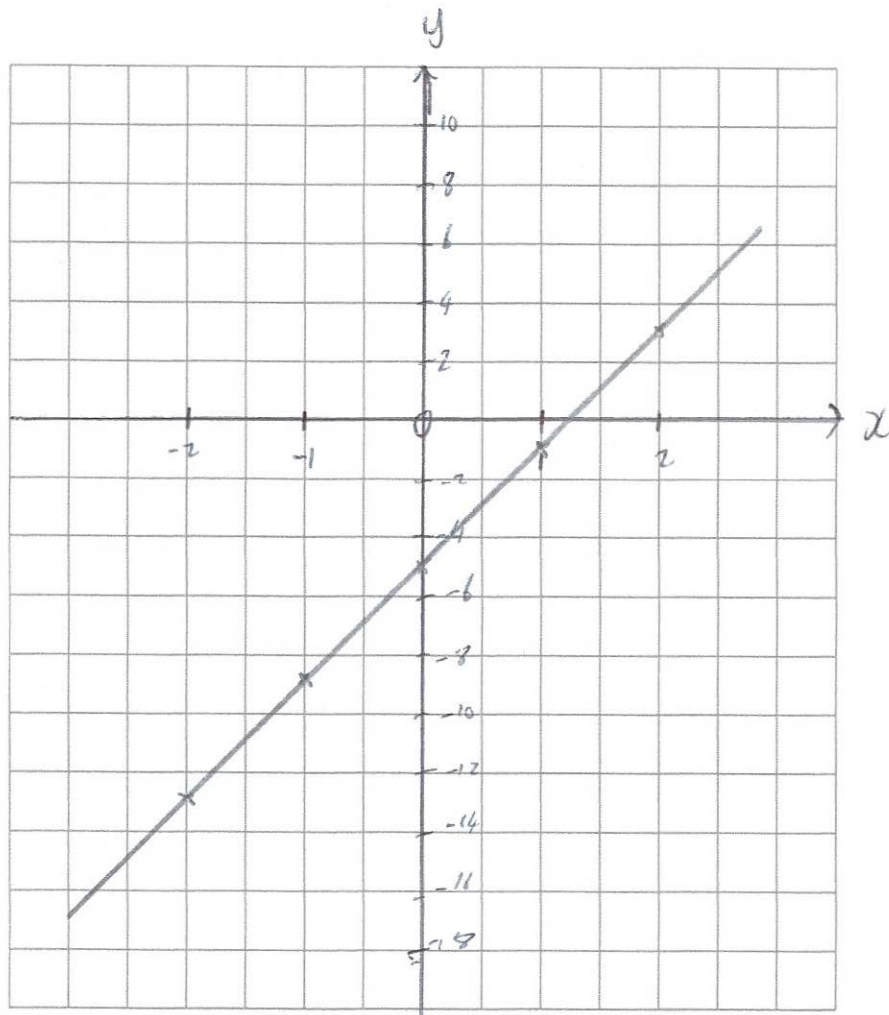
Work out how many dollars (\$) James will receive.

$$400 \times 1.38 = \$552$$

(2)

61. On the grid, draw  $y = 4x - 5$  for values of  $x$  from  $-2$  to  $2$ .

$x$	-2	-1	0	1	2
$y$	-13	-9	-5	-1	3



(4)

62. A fish tank sprung a leak and loses 20% of its water. There is now 240 litres of water in the fish tank.

How much water was in the fish tank before the leak?

$$80\% = 240$$

$$10\% = 30$$

$$100\% = 300$$

.....  
300  
.....  
(3)

63. A piece of carpet is 240cm long. Mr Jones cuts it into three pieces in the ratio 1 : 2 : 5

Work out the length of the longest piece of carpet.

$$1+2+5 = 8$$

$$240 \div 8 = 30$$

$$30 \times 5 = 150$$

.....  
150 cm  
.....  
(3)

64. Peter's weight decreases from 80kg to 64kg.

Calculate the percentage decrease in Peter's weight.

$$\frac{16}{80} = \frac{1}{5}$$

$$\frac{1}{5} \text{ of } 100 = 20$$

$$\frac{16}{80} \times 100 = 20\%$$

.....  
20  
.....  
%  
(2)

65. Work out

$$4^{-2}$$

.....  
 $\frac{1}{16}$   
.....  
(1)

66. Expand and simplify  $(w - 6)(w + 7)$

$$w^2 + 7w - 6w - 42$$

$$\underline{w^2 + w - 42}$$

(2)

67. Solve  $4y + 1 = 29 - 2y$

$$6y = 28$$

$$y = \frac{28}{6}$$

$$y = 4\frac{2}{3}$$

$$y = \underline{4\frac{2}{3}}$$

(2)

68. Work out the  $n$ th term for this sequence

12    22    32    42    52    ...    ...

$$\underline{10n + 2}$$

(2)

69. Factorise fully

$$9m^2 - 12mp$$

$$3m(3m - 4p)$$

$$\underline{3m(3m - 4p)}$$

(2)

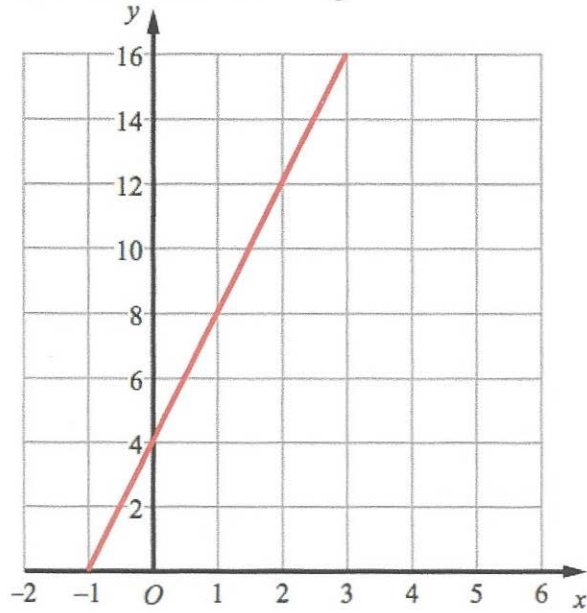
70. Factorise  $x^2 + 4x - 12$

$$(x + 6)(x - 2)$$

$$\underline{(x + 6)(x - 2)}$$

(2)

71. A straight line L is shown on the grid.



Work out the equation of line L

$$\underline{y = 4x + 4}$$

(3)

72. Solve the inequality  $4x + 6 \geq 8$

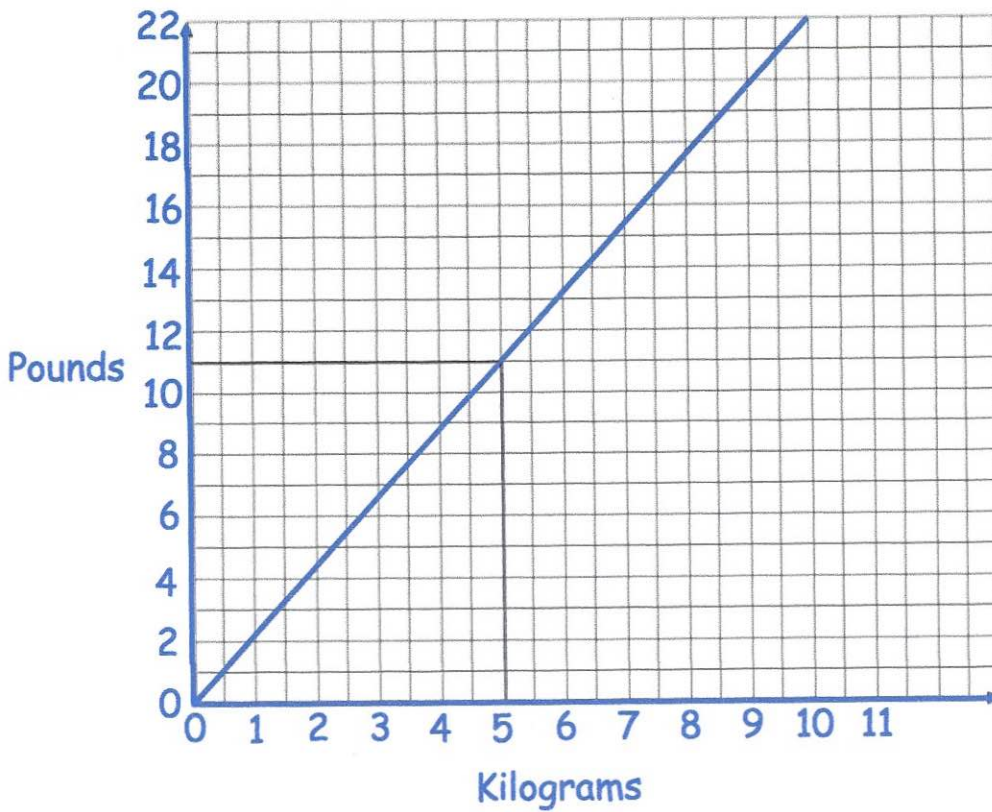
$$4x \geq -4$$

$$x \geq -1$$

$$\underline{x \geq -1}$$

(2)

73. Shown below is a conversion to change between kilograms and pounds.



(a) Using the graph, convert 5 kilograms to pounds.

..... 11 ..... pounds  
(1)

(b) Using the graph, convert 8 pounds to kilograms.

..... 3.6 ..... kilograms  
(1)

A piano weighs 150 kilograms.

(c) Change 150 kilograms to pounds.

$$\begin{aligned} 5 \text{ kg} &= 11 \text{ pounds} \\ 50 \text{ kg} &= 110 \text{ pounds} \\ 150 \text{ kg} &= 330 \text{ pounds} \end{aligned}$$

..... 330 ..... pounds  
(2)

74. Factorise  $x^2 - 121$

$$\frac{(x-11)(x+11)}{\dots\dots\dots}$$

(2)

75. Sebastian leaves £3000 in the bank for two years.  
It earns compound interest of 2% per year.

Calculate the total amount Sebastian has in the bank at the end of the two years.

	1 <sup>st</sup> year	2 <sup>nd</sup> year	
	1% = 30	1% = 30.6	
	2% = 60	2% = 61.2	
	£3060	£3121.20	£ 3121.20
			.....

(2)

76. Write the following numbers in standard form.

(a) 40000

$$\frac{4 \times 10^4}{\dots\dots\dots}$$

(1)

(b) 5600

$$\frac{5.6 \times 10^3}{\dots\dots\dots}$$

(1)

(c) 41200000

$$\frac{4.12 \times 10^7}{\dots\dots\dots}$$

(1)

(d) 0.00000008

$$\frac{8 \times 10^{-8}}{\dots\dots\dots}$$

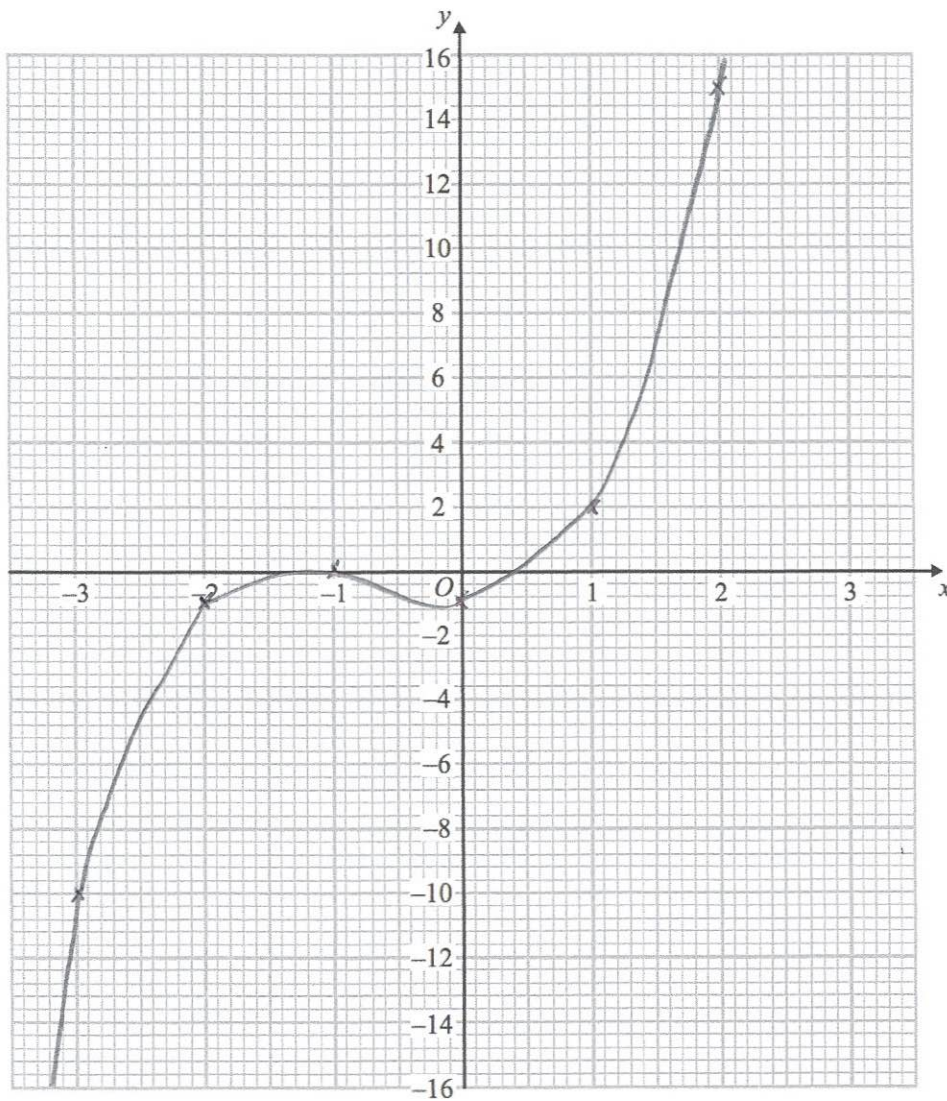
(1)

77. (a) Complete the table of values for  $y = x^3 + 2x^2 - 1$

$x$	-3	-2	-1	0	1	2
$y$	-10	-1	0	-1	2	15

(2)

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



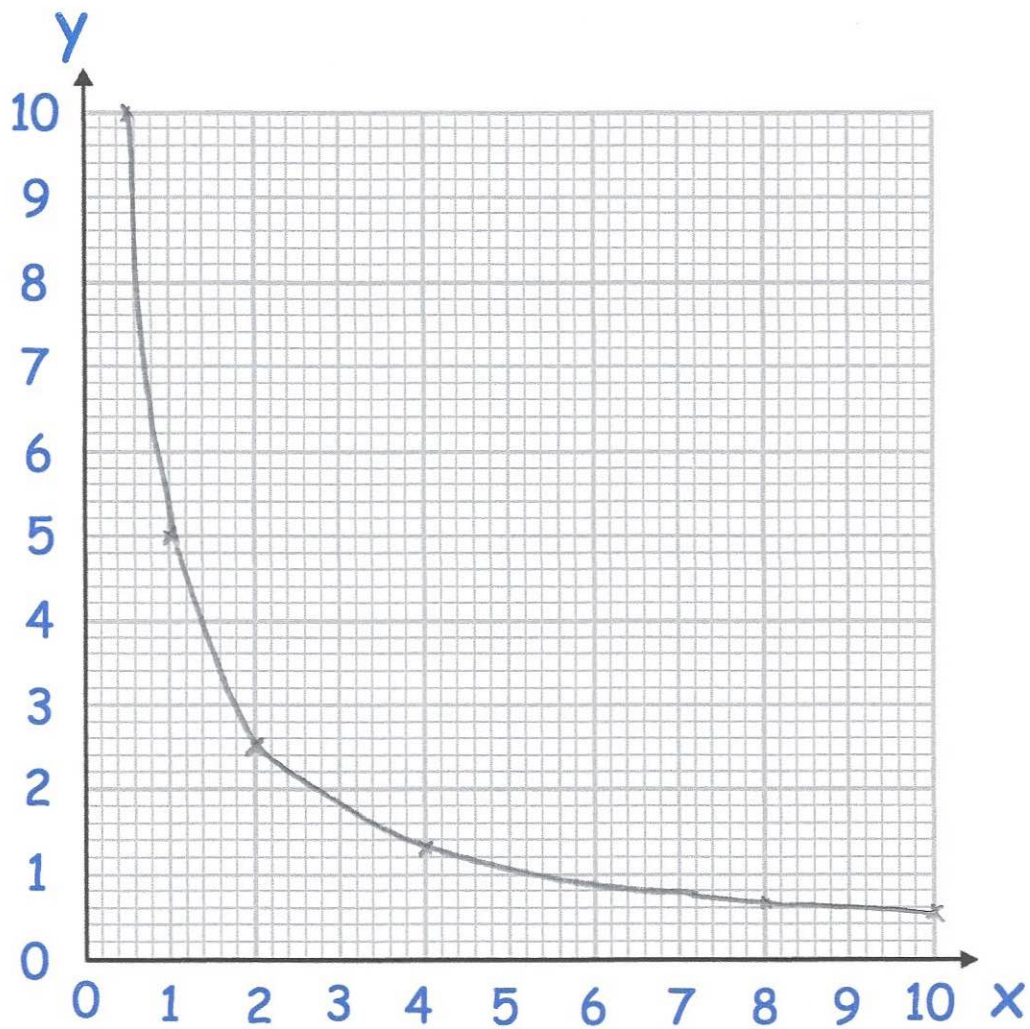
(2)

78. Complete the table of values for  $y = \frac{5}{x}$

$x$	0.5	1	2	4	8	10
$y$	10	5	2.5	1.25	0.625	0.5

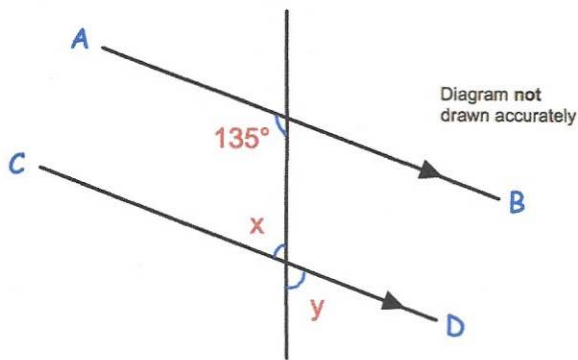
(2)

(b) On the grid, draw the graph of  $y = \frac{5}{x}$  for  $0.5 \leq x \leq 10$



(2)

79. In the diagram AB is parallel to CD.



- (a) Work out the size of the angle marked x.

45°

Give a reason for your answer.

Co-interior angles add up to 180°

(2)

- (b) Write down the value of y.

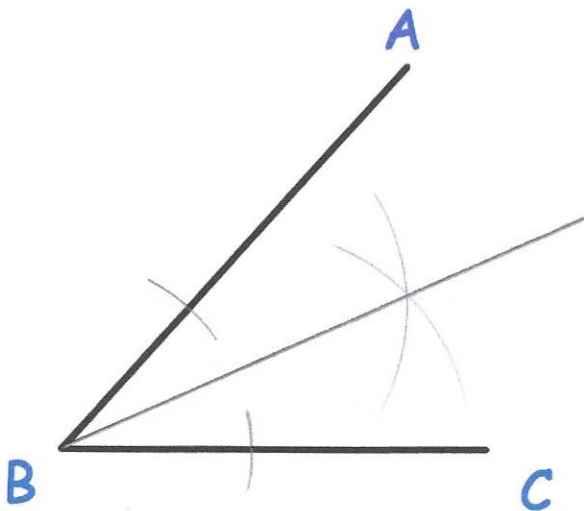
45°

Give a reason for your answer.

Vertically opposite angles are equal

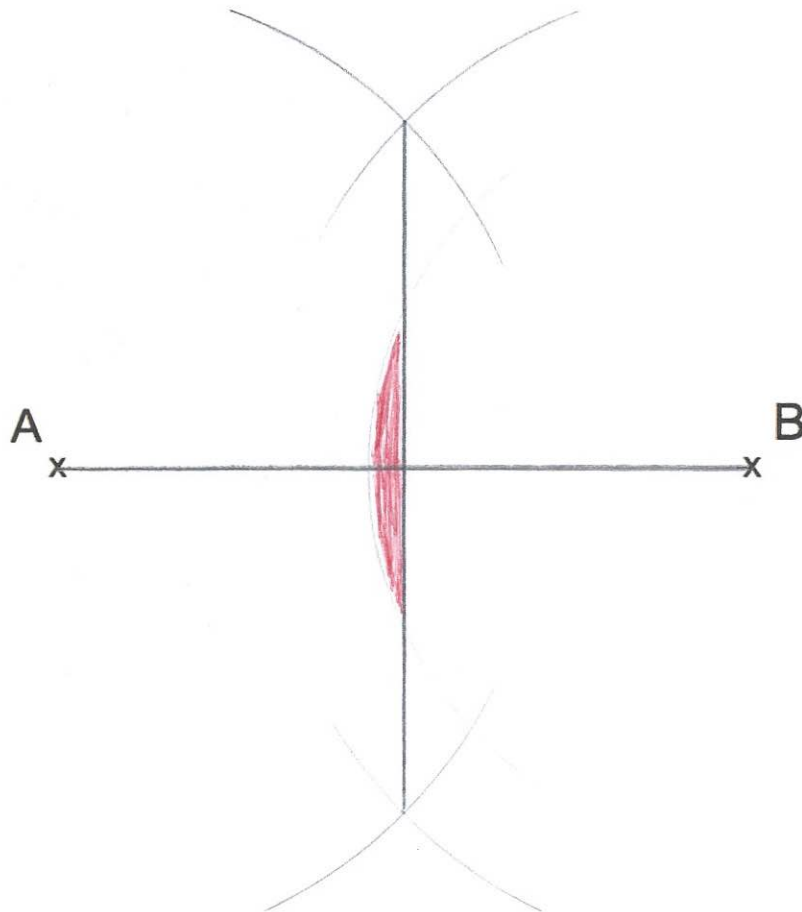
(2)

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



(2)

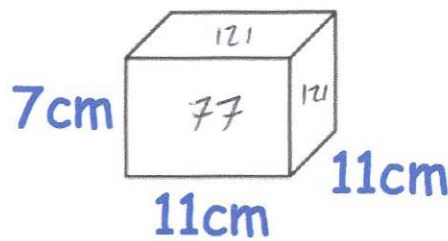
81. A and B are two points.



Shade the region which contains those points which are both closer to A than to B, and less than 5cm from B.

(2)

82.



$$\begin{array}{r}
 121 \\
 77 \\
 77 \\
 121 \\
 77 \\
 + 77 \\
 \hline
 550
 \end{array}$$

Work out the surface area of this cuboid.  
State the units of your answer.

$$550 \text{ cm}^2$$

(3)

83. What is the volume of a piece of metal that has a mass of 300g and density of 6g/cm<sup>3</sup>?

$$d = \frac{m}{v} \quad 300 \div 6$$

.....50.....cm<sup>3</sup>  
(2)

84.

Find the pressure exerted by a force of 240 newtons on an area of 30cm<sup>2</sup>. Give your answer in newtons/m<sup>2</sup>

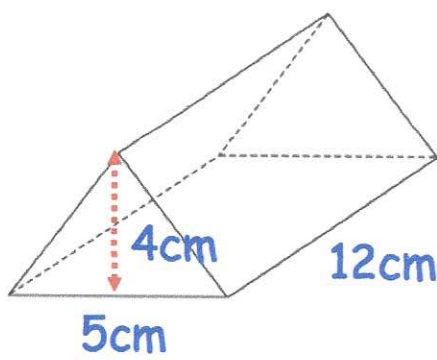
$$30 \text{ cm}^2 \xrightarrow{\div 10000} 0.003 \text{ m}^2$$

$$P = \frac{F}{A} \quad A = \frac{F}{P}$$

$$P = \frac{F}{A} = \frac{240}{0.003} = \frac{240000}{3}$$

.....80000 N/m<sup>2</sup>.....  
(3)

85. Shown below is a triangular prism.



Find the volume of the triangular prism.

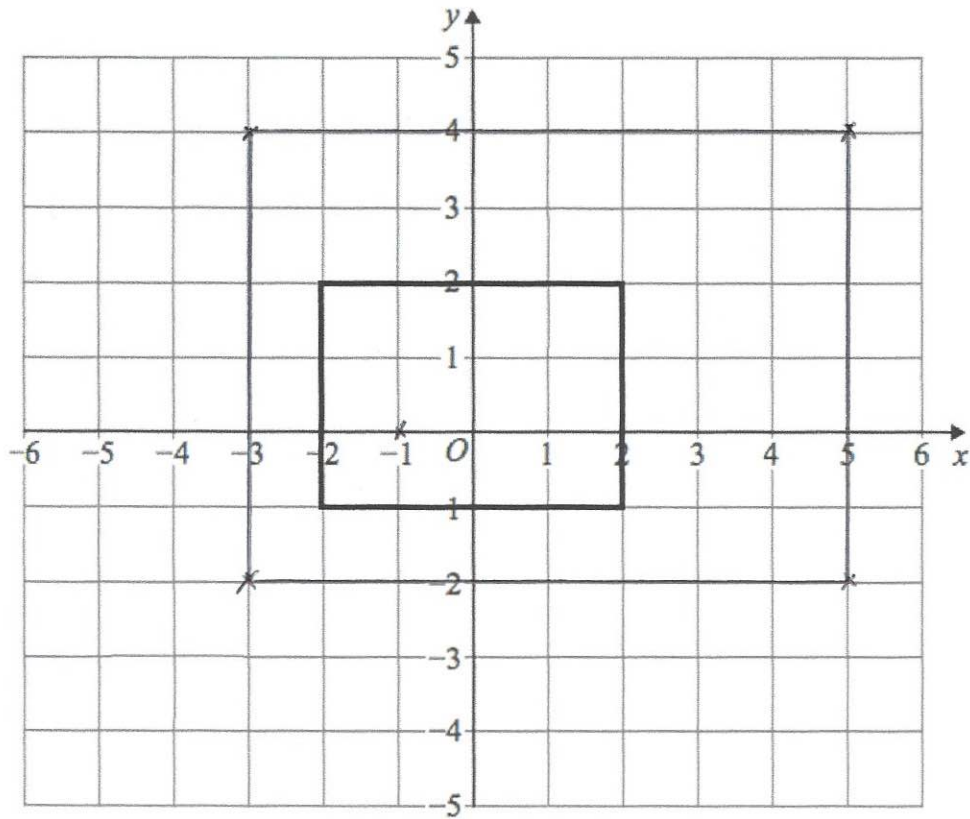
$$\frac{1}{2}(5 \times 4) = 10$$

$$10 \times 12$$

.....120.....cm<sup>3</sup>  
(3)

86.

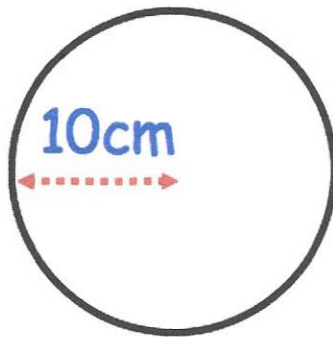
Shown below is a rectangle drawn on a coordinate grid.



Enlarge the rectangle by scale factor 2, using centre of enlargement  $(-1, 0)$ .

(3)

87. Shown below is a circle with radius 10cm.

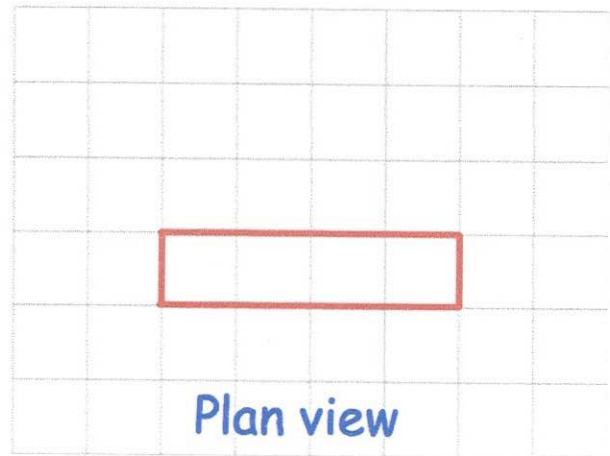
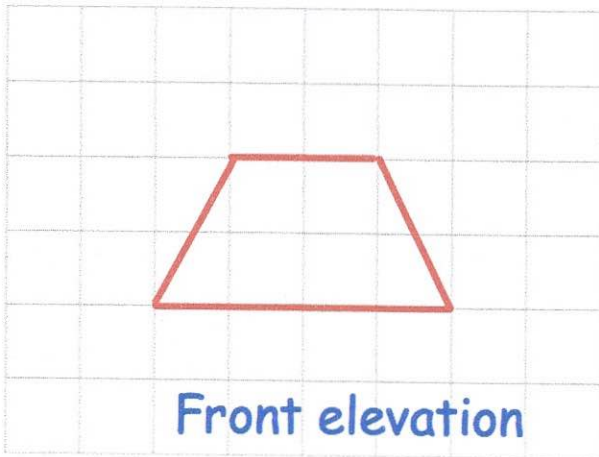


Work out the circumference of the circle.  
Give your answer in terms of  $\pi$ .

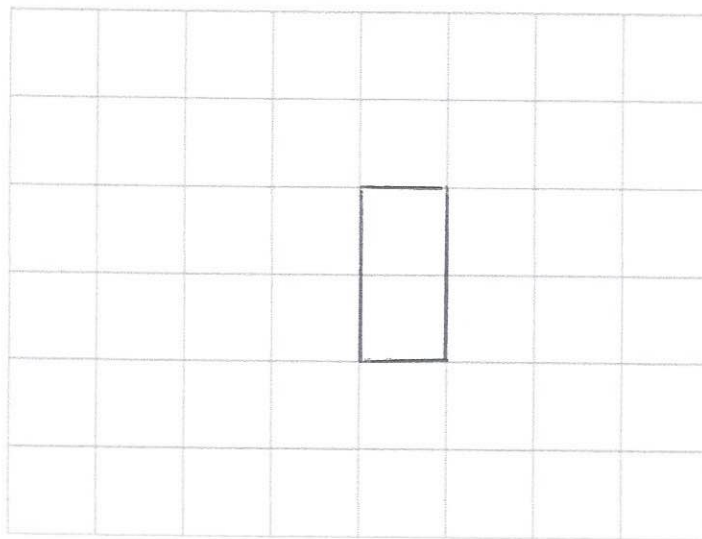
$$\begin{aligned} C &= \pi \times d \\ &= \pi \times 20 \end{aligned}$$

$$\begin{aligned} &20\pi \text{ cm} \\ &\text{.....cm} \\ &\text{(2)} \end{aligned}$$

88. Here are the front elevation and plan view of a solid shape.

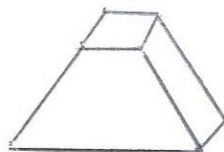


(a) On the grid, draw the side elevation.



(2)

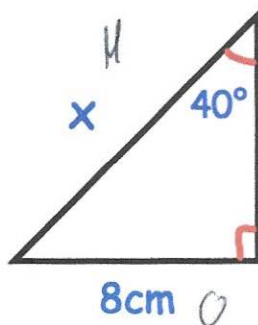
(b) Draw a sketch of the solid shape.



(2)



91. The diagram shows a right-angled triangle.



Calculate the length of x.

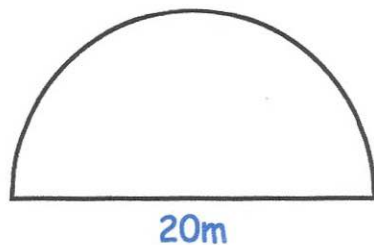
$$\sin 40^\circ$$

$$\frac{8}{\sin 40}$$

$$\dots\dots\dots 12.446 \text{ cm}$$

(3)

92. A semi-circle has diameter 20cm.



Calculate the perimeter of the semi-circle.

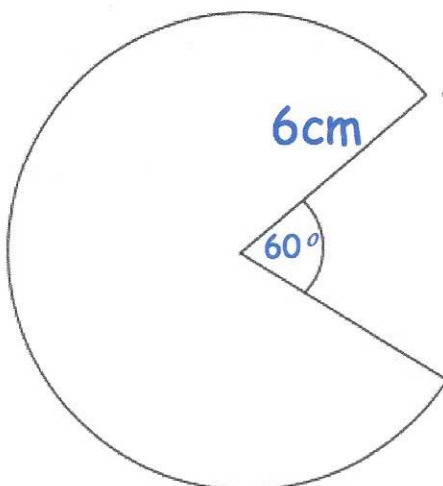
$$\frac{1}{2} (\pi \times 20) = 31.4\dots$$

$$20 + 31.4\dots$$

$$\dots\dots\dots 51.4 \text{ m}$$

(2)

93. Shown is a major sector of a circle.



Find the area of the major sector.

$$\frac{300}{360} \times \pi \times 6^2$$

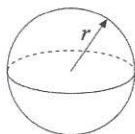
$$\frac{30}{36} \times \pi \times 36$$

$$\dots\dots\dots 30\pi \text{ cm}^2$$

or 94.247... (3)

94. Shown is a sphere with radius 6 cm.

Surface area of sphere =  $4\pi r^2$



Calculate the surface area of the sphere.

$$4\pi \times 6^2 = 144\pi$$

or

$$\dots\dots\dots 452.4 \text{ cm}^2$$

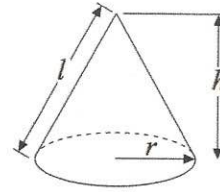
(3)

95. A cone has base diameter 18cm.  
The height of the cone is 20cm.

Calculate the volume of the cone.

Volume of cone =  $\frac{1}{3}\pi r^2 h$

Curved surface area of cone =  $\pi r l$



$$\frac{1}{3} \times \pi \times 9^2 \times 20$$

$$\frac{1}{3} \times \pi \times 81 \times 20$$

$$540\pi \text{ or } 1696.46 \text{ cm}^3$$

$$\dots\dots\dots 1696.46 \text{ cm}^3$$

(3)

96. Given

$$a = \begin{pmatrix} 6 \\ -4 \end{pmatrix} \quad b = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$$

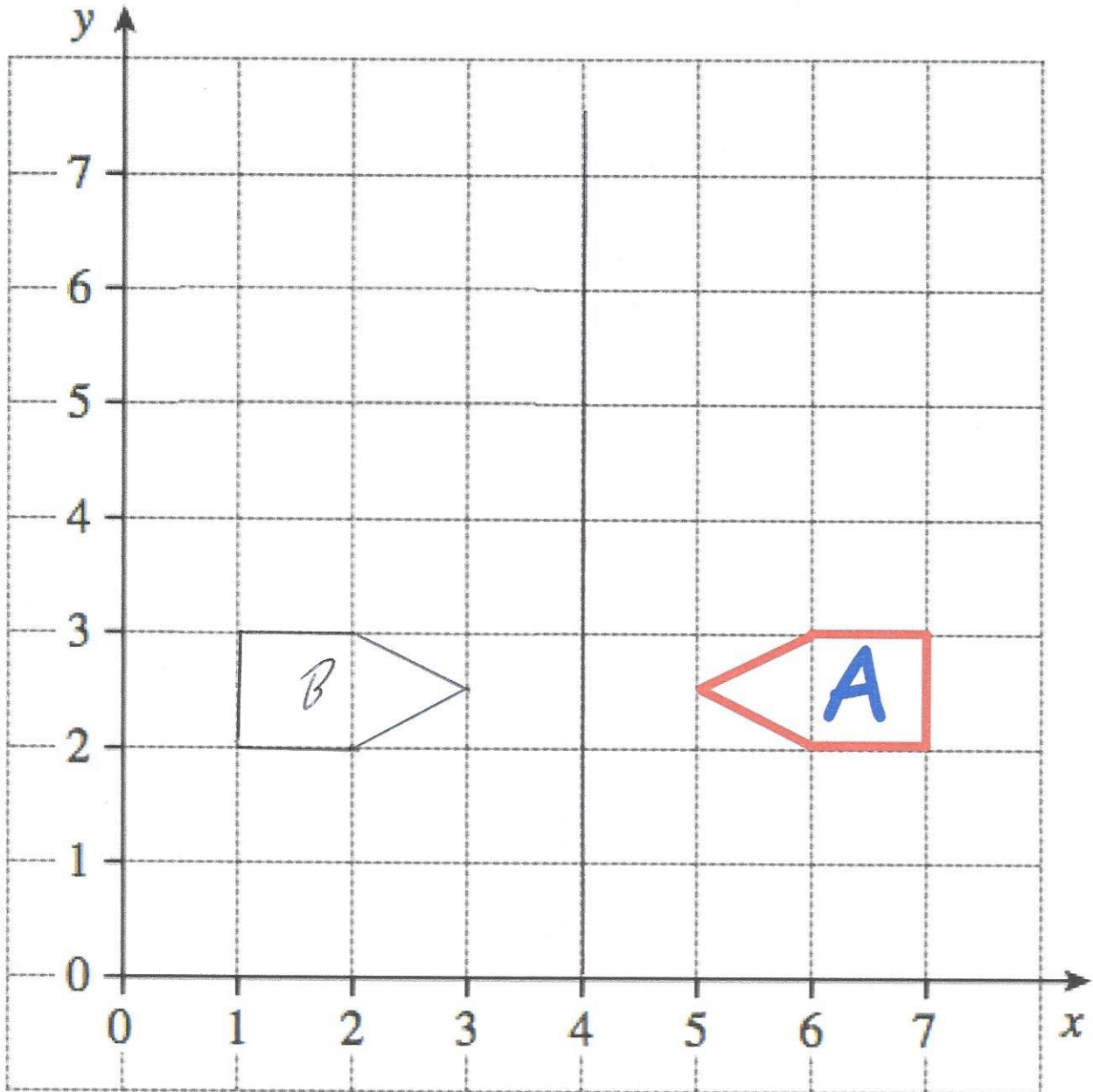
Work out  $2a + b$

$$\begin{pmatrix} 12 \\ -8 \end{pmatrix} + \begin{pmatrix} -2 \\ 1 \end{pmatrix} = \begin{pmatrix} 10 \\ -7 \end{pmatrix}$$

$$\dots\dots\dots \begin{pmatrix} 10 \\ -7 \end{pmatrix}$$

(3)

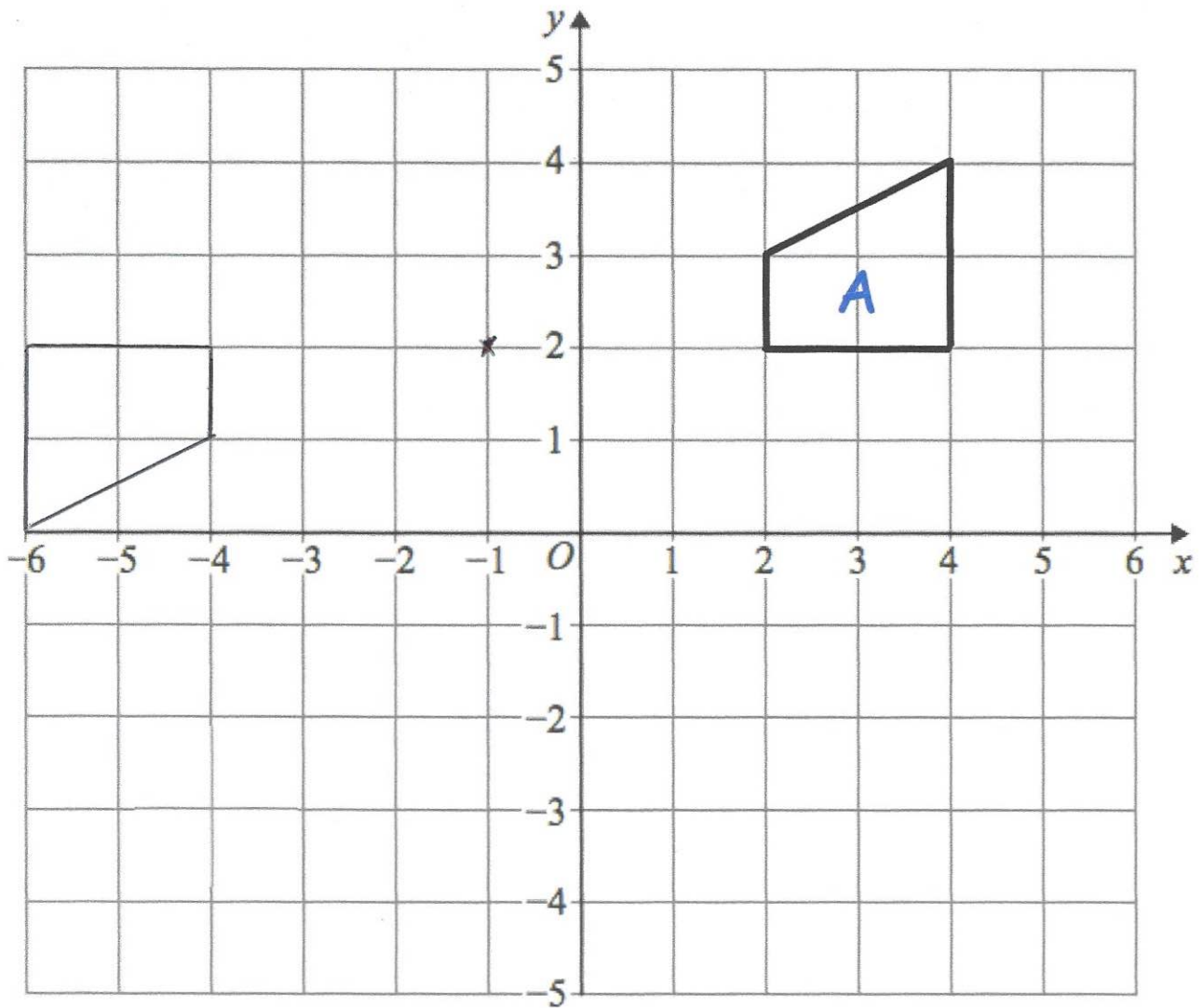
97.



Reflect shape A in the line  $x = 4$   
Label the new shape B.

(2)

98.



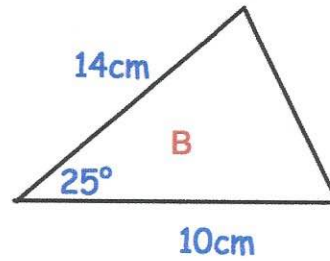
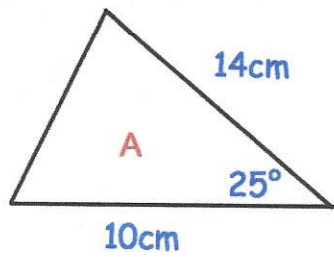
Rotate shape A  $180^\circ$  about centre  $(-1, 2)$

(3)

99.

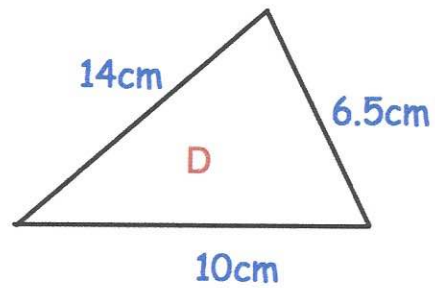
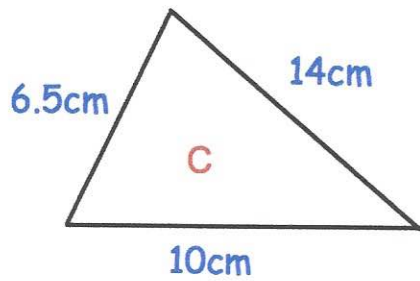
For each pair below, state the condition why they are congruent.

(a)



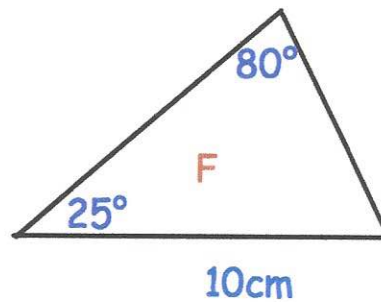
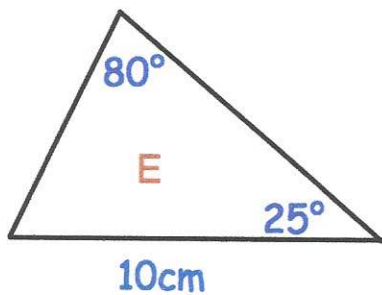
Condition: *SAS* .....  
(1)

(b)



Condition: *SSS* .....  
(1)

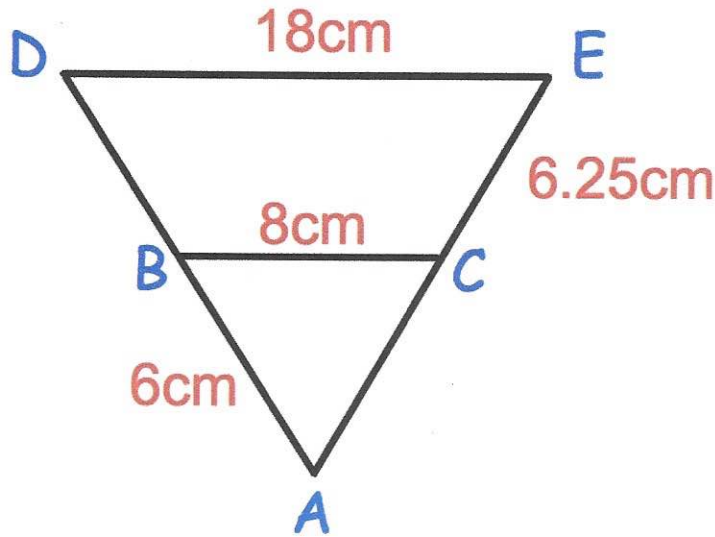
(c)



Condition: *ASA* .....  
(1)

100.

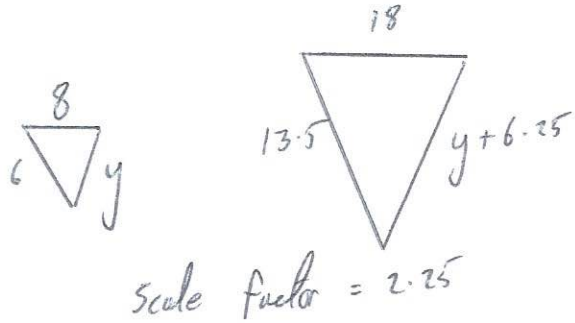
Not drawn accurately



$$\begin{array}{r} 02.25 \\ 6 \overline{) 13.50} \\ \underline{12} \phantom{00} \\ 15 \phantom{00} \\ \underline{12} \phantom{00} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

Triangle  $ABC$  is similar to triangle  $ADE$ .

- $AB = 6\text{cm}$
- $BC = 8\text{cm}$
- $CE = 6.25\text{cm}$
- $DE = 18\text{cm}$



(a) Work out the length of  $DB$ .

$$\begin{aligned} 6 \times 2.25 &= 13.5 \\ 13.5 - 6 &= 7.5 \end{aligned}$$

..... $7.5$ .....cm  
(3)

(b) Work out the length of  $AC$ .

$$\begin{aligned} 2.25 \times y &= y + 6.25 \\ 2.25y &= y + 6.25 \\ 1.25y &= 6.25 \\ y &= 5 \end{aligned}$$

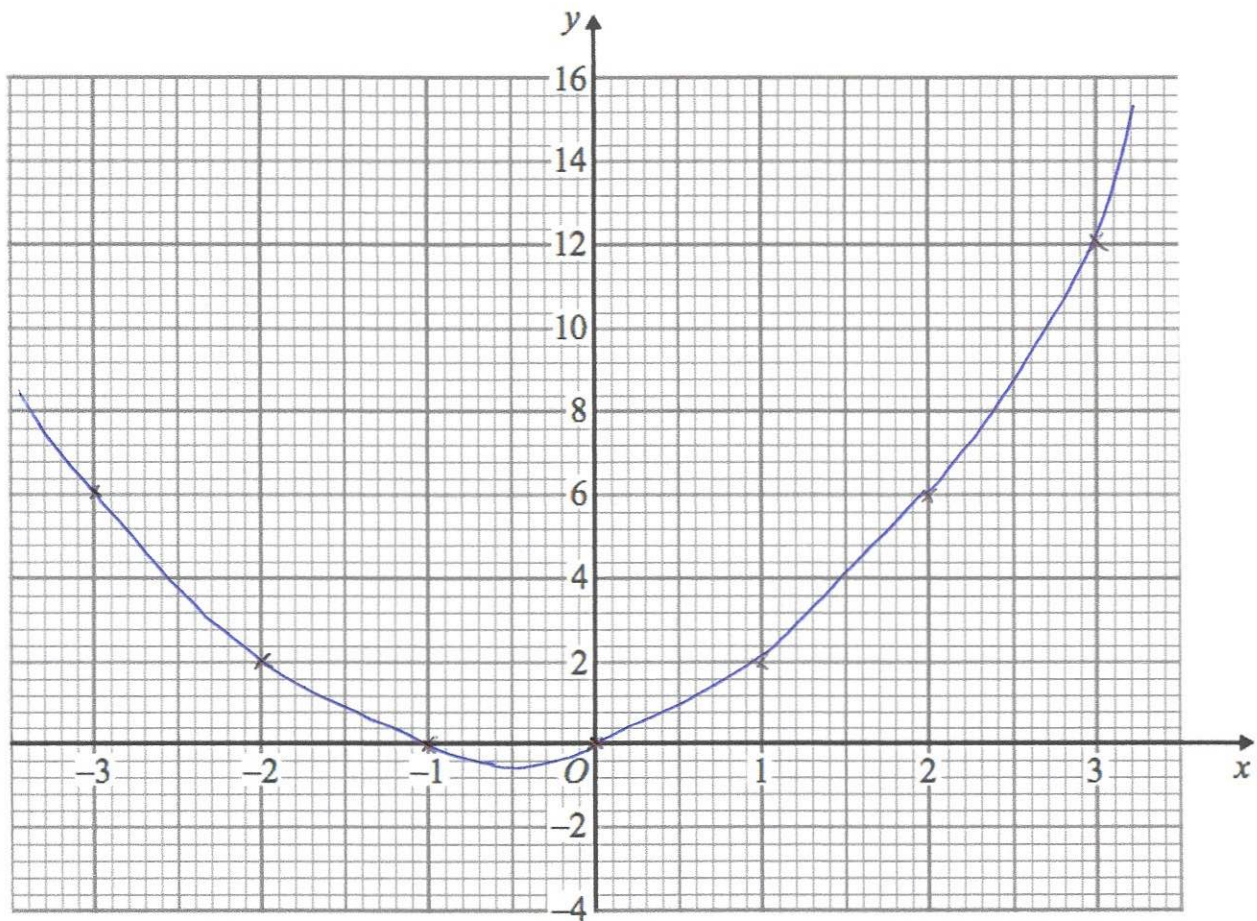
..... $5$ .....cm  
(3)

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

$x$	-3	-2	-1	0	1	2	3
$y$	6	2	0	0	2	6	12

(2)

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



(2)

102. Solve the simultaneous equations

$$\begin{aligned} 3x + 5y &= 1 & \times 3 \\ 2x - 3y &= 7 & \times 5 \end{aligned}$$

$$\begin{aligned} 6 + 5y &= 3 \\ y &= -1 \end{aligned}$$

Do not use trial and improvement

$$\begin{array}{r} 9x + 15y = 3 \\ 10x - 15y = 35 \\ \hline 19x = 38 \end{array}$$

$$x = 2$$

$$x = \dots\dots\dots 2 \dots\dots\dots y = \dots\dots\dots -1 \dots\dots\dots \quad (4)$$

103.

$$v = u + 10t$$

(a) Work out the value of  $v$  when  $u = 4$  and  $t = 3$

$$\begin{aligned} v &= 4 + 10 \times 3 \\ &= 4 + 30 \\ &= 34 \end{aligned}$$

$$v = \dots\dots\dots 34 \dots\dots\dots \quad (2)$$

(b) Make  $u$  the subject of the formula

$$v = u + 10t$$

$$\begin{aligned} v &= u + 10t \\ v - 10t &= u \end{aligned}$$

$$u = v - 10t$$

$$u = \dots\dots\dots \frac{v - 10t}{1} \dots\dots\dots \quad (2)$$

(c) Make  $t$  the subject of the formula

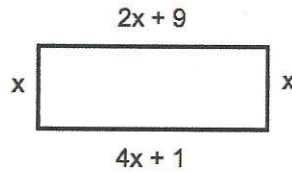
$$v = u + 10t$$

$$\begin{aligned} v &= u + 10t \\ v - u &= 10t \end{aligned}$$

$$t = \frac{v - u}{10}$$

$$t = \dots\dots\dots \frac{v - u}{10} \dots\dots\dots \quad (2)$$

104. A rectangle is shown below.



(a) Explain why  $4x + 1 = 2x + 9$

The opposite sides of a rectangle are the same length

(1)

(b) Find the size of  $x$ .

$$4x + 1 = 2x + 9$$

$$2x + 1 = 9$$

$$2x = 8$$

$$x = 4$$

$$x = 4 \text{ cm}$$

(2)

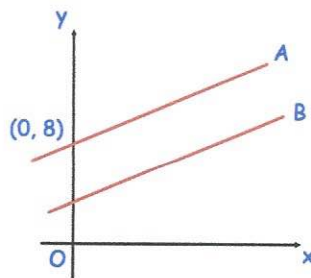
(c) Work out the area of the rectangle.

$$17 \times 4$$

$$68 \text{ cm}^2$$

(2)

105.



The lines A and B are parallel.

The line A passes through the point  $(0, 8)$

The line B has equation  $y = 3x + 1$

Write down the equation of line A

$$y = 3x + 8$$

(2)

106.

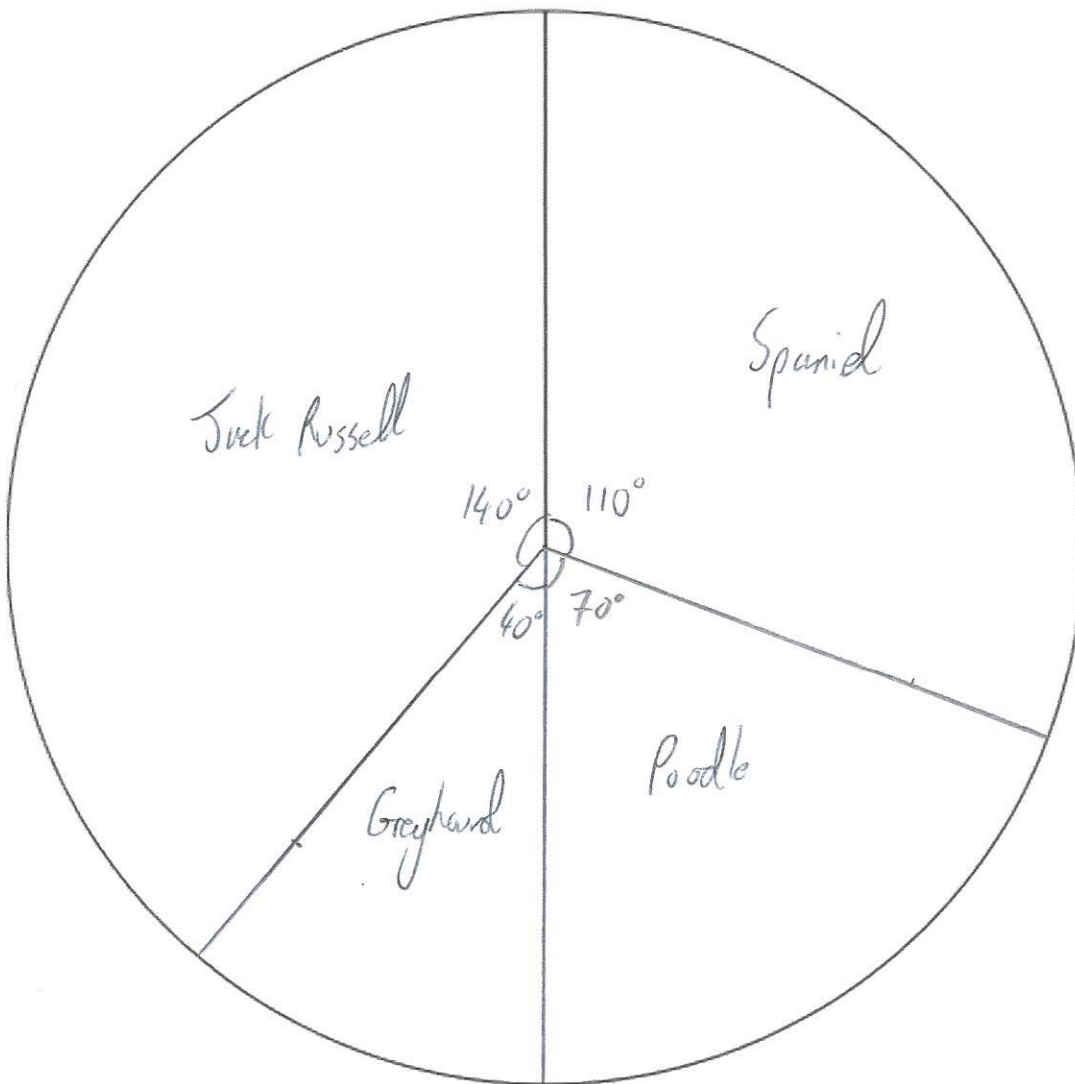
The table gives information about the dogs in a village

Breed	Frequency	Angle
Spaniel	11 $\times 10$	$110^\circ$
Poodle	7 $\times 10$	$70^\circ$
Greyhound	4 $\times 10$	$40^\circ$
Jack Russell	14 $\times 10$	$140^\circ$

36

$$360 \div 36 = 10^\circ$$

Draw an accurate pie chart to show this information.



(4)

107.

(a) Simplify

$$m^5 \times m^3$$

$$\frac{m^8}{\dots\dots\dots}$$

(1)

(b) Simplify

$$m^8 \div m^2$$

$$\frac{m^6}{\dots\dots\dots}$$

(1)

(c) Simplify

$$(m^3)^2$$

$$\frac{m^6}{\dots\dots\dots}$$

(1)

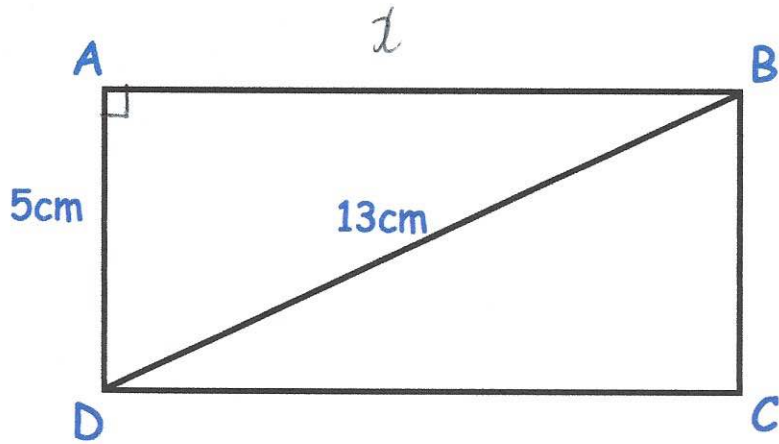
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108. Write down the exact value of  $\cos 60^\circ$

$$\frac{0.5}{\dots\dots\dots}$$

(1)

109. Below is rectangle, ABCD



AD = 5cm  
BD = 13cm

Calculate the perimeter of rectangle ABCD

$$5^2 + x^2 = 13^2$$

$$25 + x^2 = 169$$

$$x^2 = 144$$

$$x = 12$$

$$5 + 5 + 12 + 12 = 34$$

.....34.....cm  
(3)

---

110. A circle has an area of 64 cm<sup>2</sup>

Work out the radius of the circle.

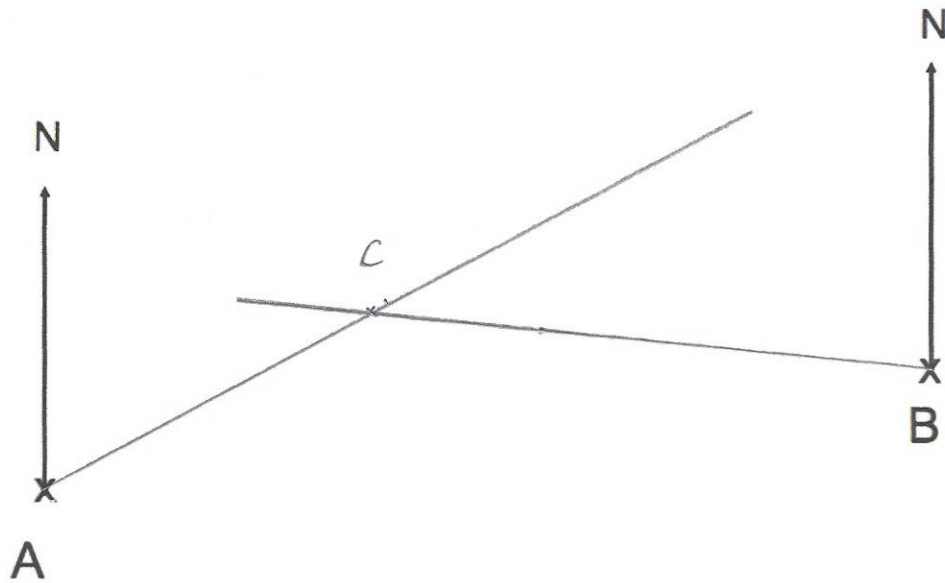
$$A = \pi r^2$$

$$64 \div \pi = 20.37...$$

$$\sqrt{20.37...} = 4.5135...$$

.....4.51.....cm  
(2)

111. The diagram shows the position of two people, A and B, who are on their Duke of Edinburgh expedition.

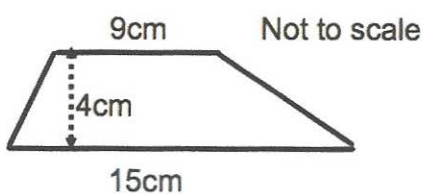


The bearing of person C from person A is  $062^\circ$   
 The bearing of person C from person B is  $275^\circ$

In the space above, mark the position of person C with a cross (x). Label it C.

(3)

112.



Calculate the area of the trapezium.

$$\frac{1}{2}(a+b)h$$

$$\frac{1}{2}(9+15) \times 4$$

$$\frac{1}{2}(24) \times 4$$

$$= 48$$

48  
 .....cm<sup>2</sup>  
 (2)



115. Calculate the value of

$$\sqrt[3]{(25.4 - 5.9)^2}$$

(a) Write down your full calculator display.

7.244744507  
.....  
(1)

(b) Give your answer to three significant figures.

7.24  
.....  
(1)

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116. Felicity has two boxes of counters, each with an equal ratio of black and white beads.

In box A, 54 of the beads are black and 36 are white.  
There are 162 white beads in box B.

How many beads are there in the two boxes in total?

Box A       $\begin{matrix} B & W \\ 54 & : & 36 \\ & 3 & : & 2 \end{matrix}$

Box B       $\boxed{\phantom{000}} : 162$   
              243

$$162 \div 2 = 81$$

$$81 \times 3 = 243$$

54  
36  
162  
243

495  
.....  
(4)