

Name: \_\_\_\_\_

GCSE Higher  
Set B  
Non - Calculator Paper



Corbettmaths

**Equipment**

1. A blue or black ink ball-point pen.
2. A pencil.
3. An eraser.
4. A ruler.
5. A pair of compasses.
6. A protractor.

**Guidance**

1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

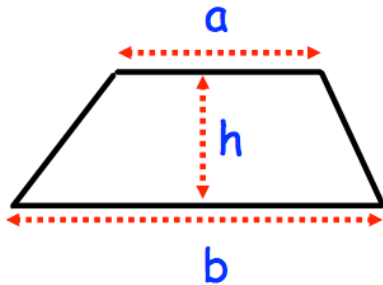
**Information**

1. The maximum mark for this paper is 100.
2. The marks for questions are shown in brackets
3. You may ask for more lined, graph or tracing paper.

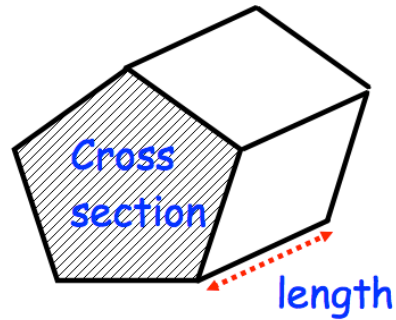
Question	Mark	Available
1		4
2		2
3		4
4		3
5		3
6		3
7		4
8		5
9		6
10		2
11		2
12		3
13		2
14		2
15		6
16		4
17		3
18		4
19		3
20		4
21		6
22		6
23		5
24		3
25		3
26		3
27		5
<b>Total</b>		<b>100</b>

Formulae: Higher Tier

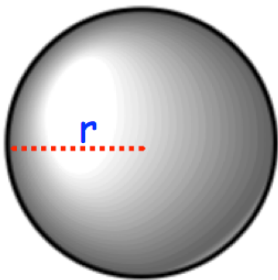
Area of a Trapezium =  $\frac{1}{2}(a + b)h$



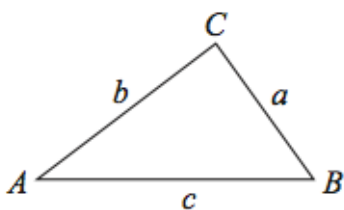
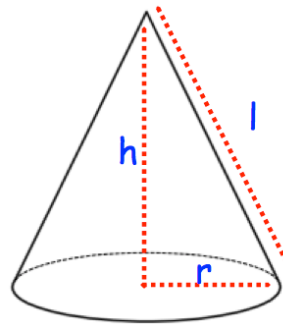
Volume of a prism = area of cross section x length



Volume of a sphere =  $\frac{4}{3}\pi r^3$   
 Surface area of a sphere =  $4\pi r^2$



Volume of a cone =  $\frac{1}{3}\pi r^2 h$   
 Curved surface area of a cone =  $\pi r l$



**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$

**The Quadratic Equation**  
 The solutions of  $ax^2 + bx + c = 0$   
 where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

1. Sarah has some chocolates.

24 are white chocolate.

16 are milk chocolate.

8 are dark chocolate.

(a) Write down the ratio of white chocolate to milk chocolate to dark chocolate.  
Give your ratio in its simplest form.

..... : ..... : .....  
**(2)**

Rachel has some apples and bananas.

The ratio of apples to bananas is 2 : 3

She has 14 apples.

(b) Work out how many bananas Rachel has.

.....  
**(2)**

---

2.

(a)  $a \times a \times a$

.....  
**(1)**

(b)  $2m^2 \times 4m$

.....  
**(1)**

3. A sequence of numbers is shown.

2      9      16      23      30      ...      ...

(a) Find an expression for the  $n$ th term of the sequence.

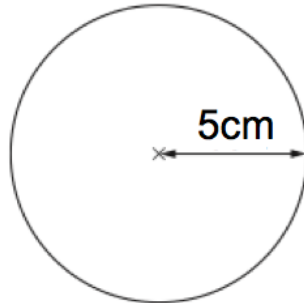
.....  
(2)

(b) Find the 100<sup>th</sup> term in the sequence.

.....  
(2)

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4. Shown is a circle with radius 5cm.



Work out the area of the circle.

State the units for your answer.

Give your answer in terms of  $\pi$

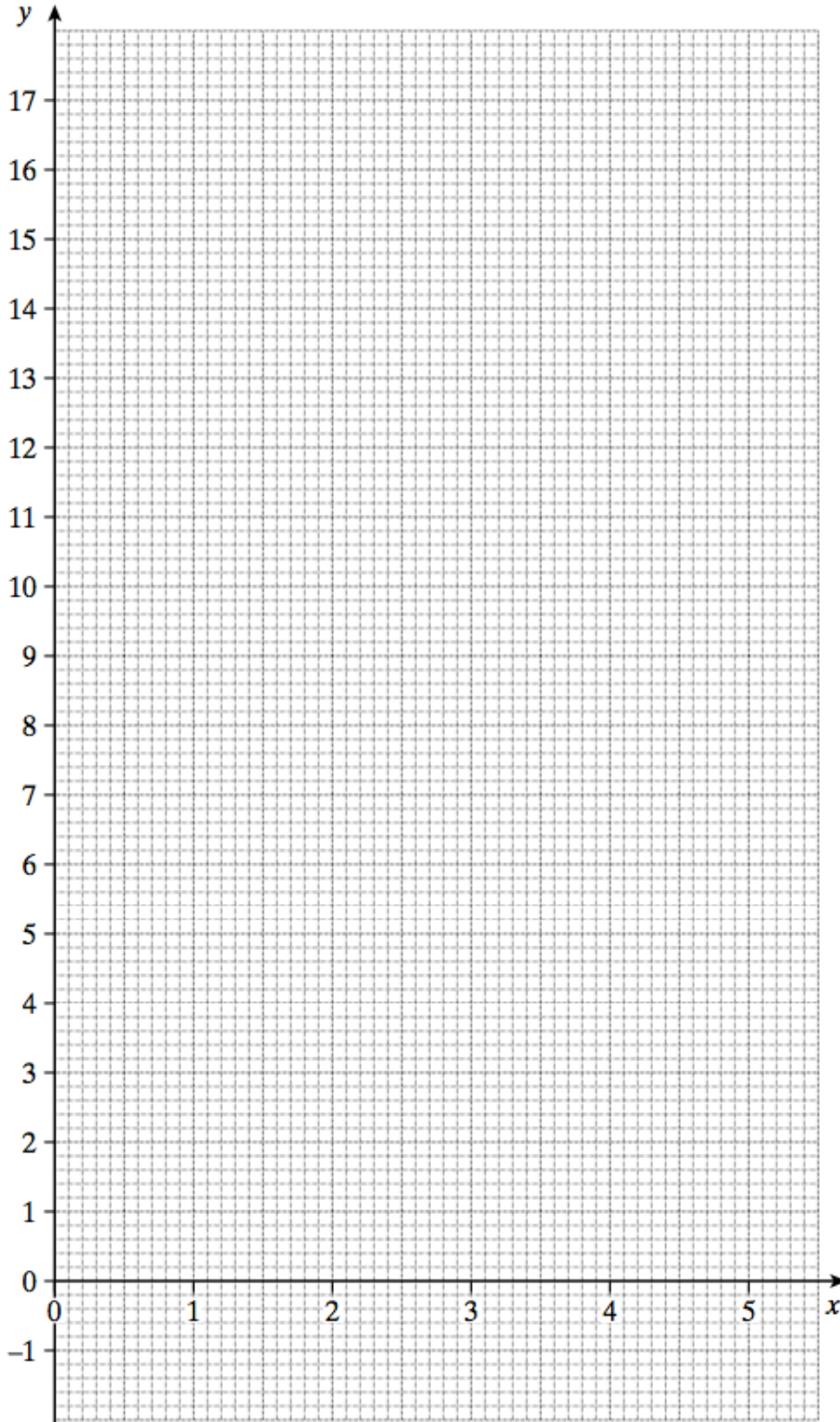
.....  
(3)

5. Heather drives 84 miles to attend a business conference.  
She then drives 84 miles on her return journey.  
Her company pays 43p per mile travelled.

Work out how much the company pays Heather.

£.....  
**(3)**

6. On the grid below draw the graph  $2x + y = 10$



(3)

7.

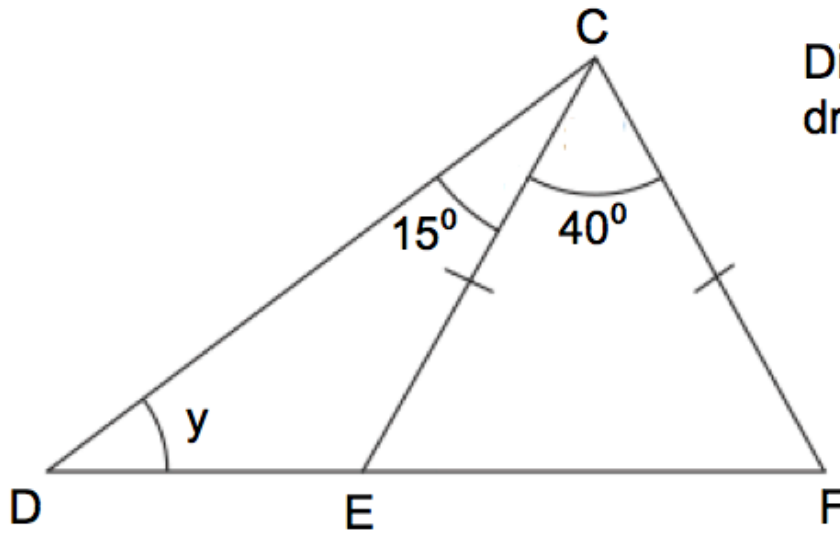


Diagram not  
drawn accurately

DEF is a straight line.

$CE = CF$ .

Angle ECF is  $40^\circ$ .

Angle DCE is  $15^\circ$ .

Find the size of the angle marked  $y$ .

.....<sup>o</sup>  
(4)

8. Helen plays darts.

Here are her scores.

55   23   48   29   41   47   36  
35   40   35   44   34   35

(a) Draw an ordered stem and leaf diagram to show her scores.

**(3)**

(b) Write down the mode.

.....  
**(1)**

(c) Work out the range.

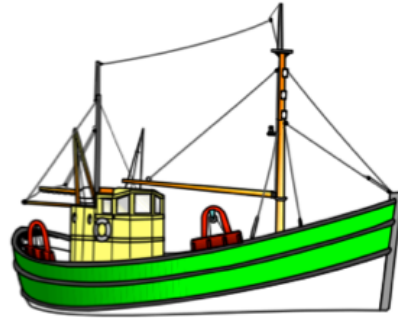
.....  
**(1)**



9. Theodore bought a boat.  
The total cost of the boat was £140,000 plus VAT at 17.5%.

He paid £8500 when he got the boat.  
He then paid the rest of the money in 20 equal monthly payments.

Work out the amount of each monthly payment.



£.....  
(6)

- 
10. Rearrange  $y = 2x + 1$  to make  $x$  the subject

$x = \dots\dots\dots$   
(2)

11.

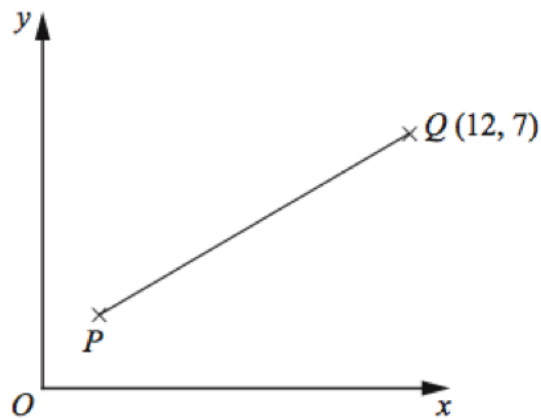


Diagram **NOT**  
accurately drawn

Q is the point with coordinates (12, 7)  
The midpoint of the line PQ has coordinates (7, 5.5)

Work out the coordinates of the point P.

.....  
(2)

12. (a) Factorise

$$c^3 + 2c$$

.....  
(1)

(b) Factorise completely

$$20a^2c + 30ac$$

.....  
(2)

13. Expand and simplify  $6(2y + 3) - 3(3y - 2)$

.....  
(2)

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14.

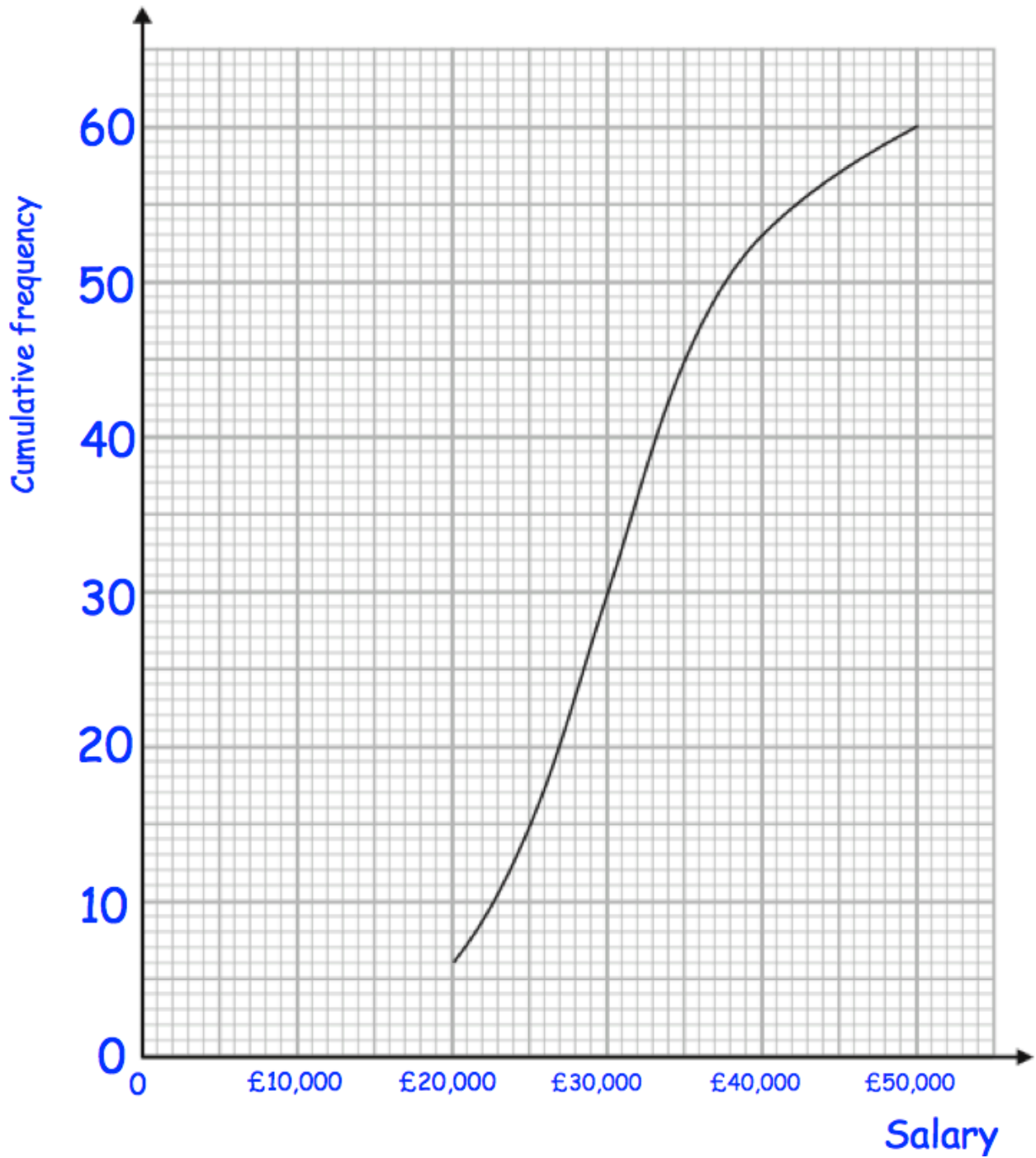


The line CD is drawn above.

Use ruler and compasses to construct the perpendicular bisector of CD.  
You **must** show clearly all your construction arcs.

(2)

15. A university surveyed 60 mathematics graduates on their starting salary. The cumulative frequency graph shows some information about the salaries.

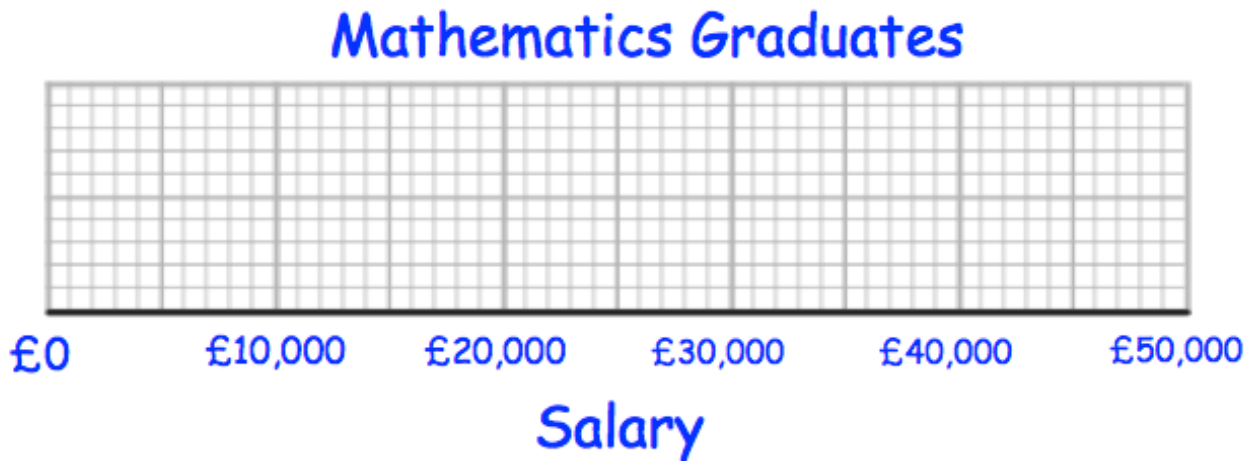


(a) Use the graph to find an estimate for the median salary.

£.....  
(1)

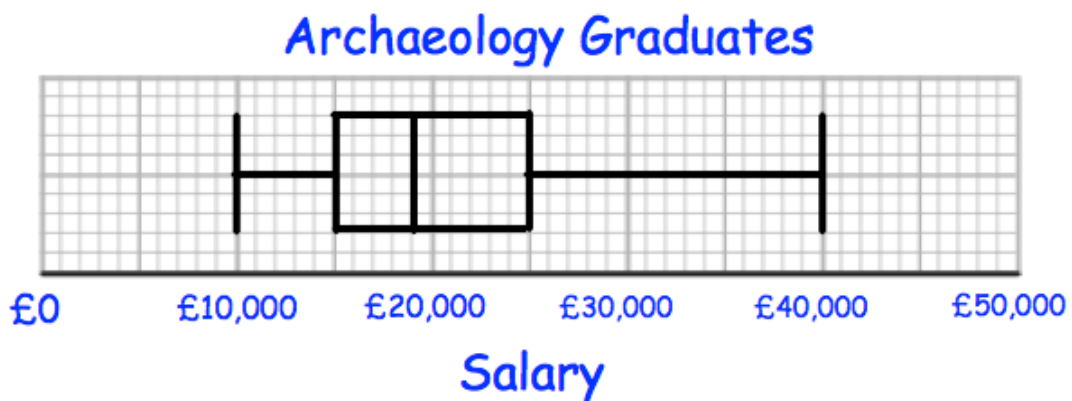
The 60 mathematics graduates  
 had a minimum salary of £16,000  
 and a maximum salary of £48,000.

(b) Use this information and the cumulative frequency curve to draw a box plot for the 60 mathematics graduates.



(3)

The university also surveyed 60 archaeology graduates.  
 The box plot below shows information about their salaries.



(c) Compare the distribution of the salaries of the mathematics graduates with the distribution of the salaries of the archaeology graduates.

.....

.....

.....

(2)

16. Solve the simultaneous equations

$$2x + 3y = 8$$

$$3x - y = 23$$

x = .....

y = .....

(4)

17. This table shows some expressions.

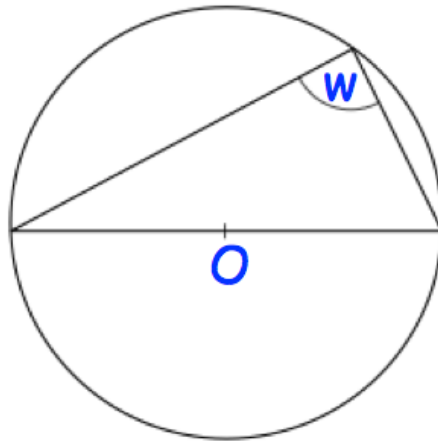
The letters l, m and n represent lengths.

Place a tick in the appropriate column for each expression to show whether the expression can be used to represent a length, an area, a volume or none of these.

<b>Expression</b>	<b>Length</b>	<b>Area</b>	<b>Volume</b>	<b>None of these</b>
abc				
$2a + 2b$				
$a^2 + c$				

(3)

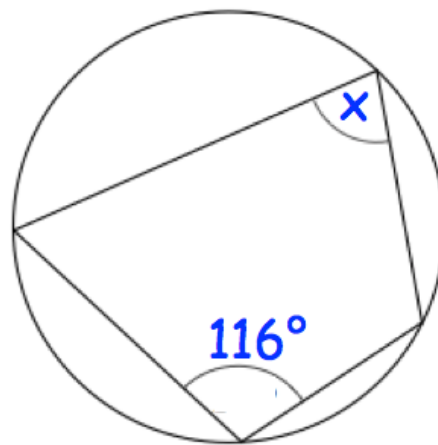
18. (a) In the diagram, O is the centre of the circle.



Write down the value of  $w$ .

.....<sup>o</sup>  
(1)

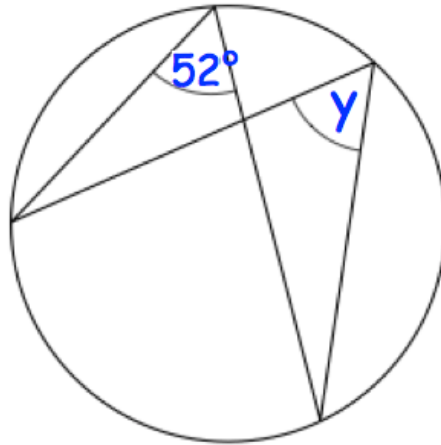
- (b)



Write down the value of  $x$ .

.....<sup>o</sup>  
(1)

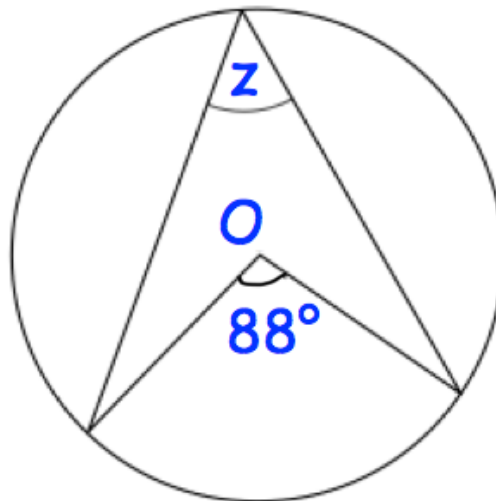
(c)



Write down the value of  $y$ .

.....<sup>o</sup>  
(1)

(d) In the diagram,  $O$  is the centre of the circle.



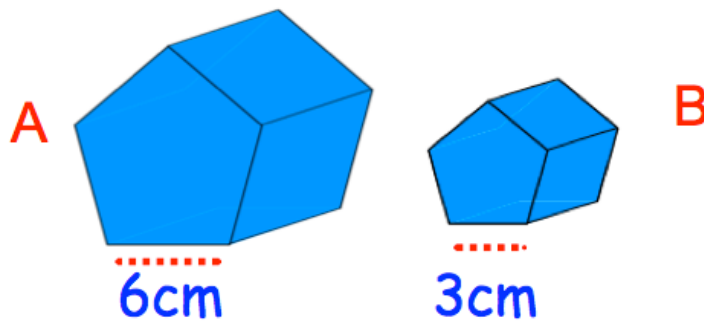
Write down the value of  $z$ .

.....<sup>o</sup>  
(1)



19.

$$\text{Volume} = 200\text{cm}^3$$



Not drawn accurately

Prism A and prism B are mathematically similar.  
Prism A has a volume of  $200\text{cm}^3$ .

Find the volume of prism B.

..... $\text{cm}^3$   
(3)

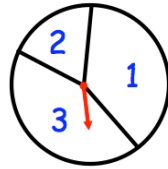
20. (a) Factorise  $x^2 - 6x - 27$

.....  
(2)

(b) Factorise  $x^2 - 36$

.....  
(2)

21. Shown is a spinner.



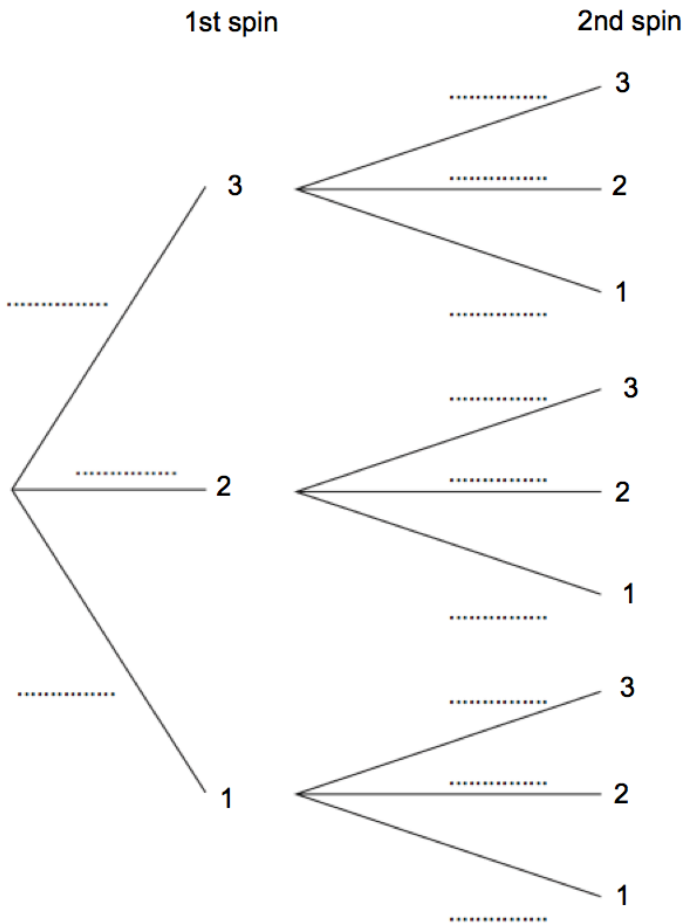
The probability of a 1 is  $2x$ .  
 The probability of a 2 is  $x$ .  
 The probability of a 3 is  $2x$ .

(a) Calculate the value of  $x$ .

.....  
**(2)**

The spinner is spun twice and the scores are added together.

(b) Work out the probability of the final score being 4.  
 You may use the tree diagram to help you.



.....  
**(4)**

22. The force,  $F$  newtons, exerted by a magnet on a metal object is inversely proportional to the square of the distance  $d$  cm.

When  $d = 2$  cm,  $F = 50$  N.

(a) Express  $F$  in terms of  $d$ .

$$F = \dots\dots\dots$$

**(3)**

(b) Find the force when the distance between the magnet and metal object is 10cm

$$F = \dots\dots\dots\text{N}$$

**(1)**

(c) Find the distance between the magnet and metal object when the force is 8N.

$$d = \dots\dots\dots\text{cm}$$

**(1)**

(d) Explain what happens to  $F$  when  $d$  is halved.

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

**(1)**

23. There are 300 students in years 7, 8, 9 and 10 in a school.

Year 7	Year 8	Year 9	Year 10
72	108	66	54

A stratified sample of 50 is planned.

Calculate the number of people that should be sampled from each year group.

Year 7 .....

Year 8 .....

Year 9 .....

Year 10 .....

**(3)**

(b) Describe a method to obtain a stratified sample of size 50 from the students in the school.

.....

.....

.....

.....

**(2)**

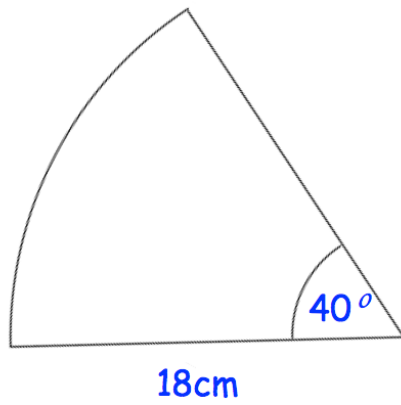
24. Simplify

$$\frac{x^2 + 8x}{x^2 + 10x + 16}$$

.....  
(3)

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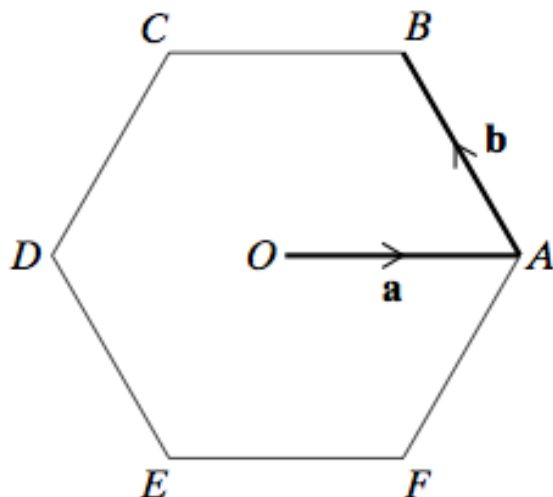
25.



Find the length of the arc, giving your answer in terms of  $\pi$ .

.....cm  
(3)

26.



ABCDEF is a regular hexagon.  
O is the centre of the hexagon.

$$\vec{OA} = \mathbf{a} \quad \vec{AB} = \mathbf{b}$$

(a) Express  $\vec{AC}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

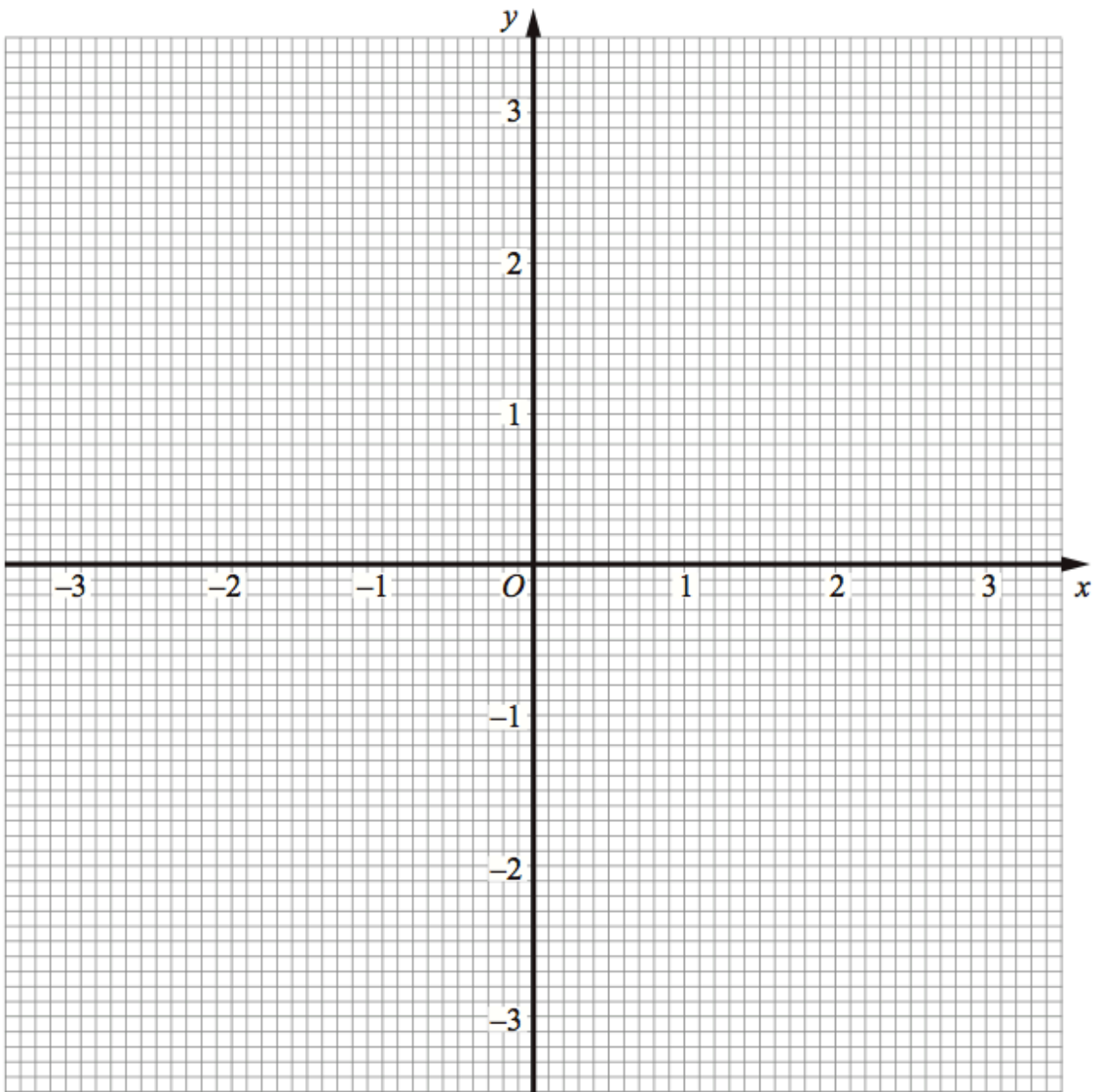
.....  
(1)

(b) Express  $\vec{BE}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

.....  
(2)

27.

(a) Draw the graph  $x^2 + y^2 = 4$



(2)

(b) By drawing the line  $x + y = -1$  on the grid, solve the equations

$$x + y = -1$$

$$x^2 + y^2 = 4$$

$$x = \dots\dots\dots, y = \dots\dots\dots$$

$$\text{or } x = \dots\dots\dots, y = \dots\dots\dots$$

(3)