Question 1 **(Suggested maximum time: 5 minutes)**

(a) The following five numbers have a median of 6 and a range of 9.
They are given in increasing order.

$$2,\ 2,\ x,\ 7,\ y$$

Find the value of x and the value of y.

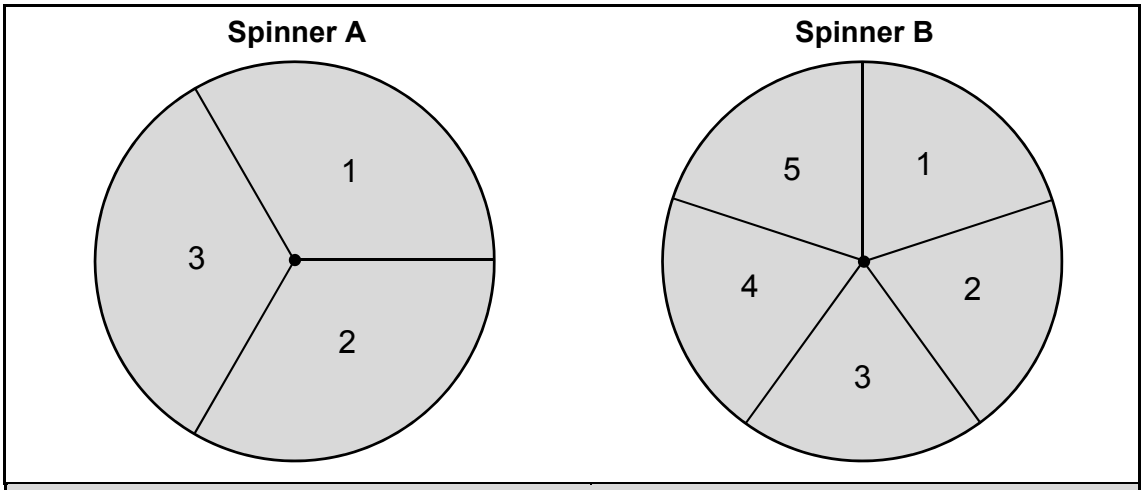
(b) The following six numbers have a median of 15, a mean of 18, and a range of 30.
They are given in increasing order.

$$a,\ 8,\ 14,\ b,\ 26,\ c$$

Find the value of a, the value of b, and the value of c.

Question 2 **(Suggested maximum time: 15 minutes)**

Paul is raising money for a charity in his school. He organises a fun day where one of the games is played using the spinners and the rules shown below.



RULES

PAY €1 to play the game (i.e. spin both spinners)

Get the **same number** on both spinners, and **GET €1 BACK**

Get a **sum of 8** on the two spinners, and **GET €8 BACK**

(a) Complete the **two-way table** below to show the **sum** of the numbers on the two spinners.

		Spinner B				
		1	2	3	4	5
Spinner A	1			**4**		
	2					
	3		**5**			

Each outcome in the two-way table is equally likely.

(b) Find the probability that you get **€8 back** if you play the game once.

(c) 320 students play the game.
Find the number of students you would expect to get exactly **€1 back**.

(d) After 320 students have played the game, 74 students have got exactly **€1 back**, and Paul has made a profit of €110 from the game.

Find the number of students who have got **€8 back**.

(e) Paul says that the probability of someone getting money back (€1 or €8) would **decrease** if he changed **Spinner B** so that it went from **1 to 6** instead of 1 to 5, and kept the rules the same.

Is Paul correct?

Make out a two-way table using the changed Spinner B, and use it to justify your answer fully.

Answer:

Justification:
(including
two-way table)

Question 3 **(Suggested maximum time: 25 minutes)**

Table 1 on the right shows the percentage of female members of parliament in each of the current 28 EU countries in 2005 and 2015. The figures are given in increasing order for each year.

(a) Find the value of the median and the upper quartile for the 2015 data. Fill your answers into the table below.

The lower quartile value is already filled in.

	Lower Quartile	Median	Upper Quartile
2015	**19·5%**		

(b) **Explain** what the value of the lower quartile of the 2015 data means, in this context.

Table 1	
% of female members of parliament	
2005	**2015**
9	10
9	13
11	13
12	14
12	16
12	18
13	19
13	20
16	20
17	23
17	23
19	24
20	24
20	26
21	26
21	28
22	29
22	31
22	31
23	31
33	36
34	37
35	37
36	37
37	39
37	41
38	42
45	44

(c) Fill in the grouped frequency table in **Table 2** below.

Table 2						
% of female members of parliament		0 – 9	10 – 19	20 – 29	30 – 39	40 – 49
Number of countries	**2005**					
	2015					

(d) Based on the data in **Table 2**, use **mid-interval values** to estimate the mean percentage of female members of parliament in **2005**. Give your answer correct to one decimal place.

(e) Using **mid-interval values** from **Table 2**, Tom estimates that the mean percentage of female members of parliament in 2015 is 27%.

Using the figures in **Table 1**, the **actual mean** percentage in 2015 is 26·86%.

(i) **Explain** why these two values are different.

(ii) Write the **error** in Tom's estimate of the mean as a **percentage** of the actual mean. Give your answer correct to two decimal places.

(f) Display the data **graphically** in a way that allows you to compare the data for the two years. Label your graph(s) clearly. Show any calculations that you make.

You may use the data from **Table 1** or **Table 2**. The tables are reprinted on the next page.

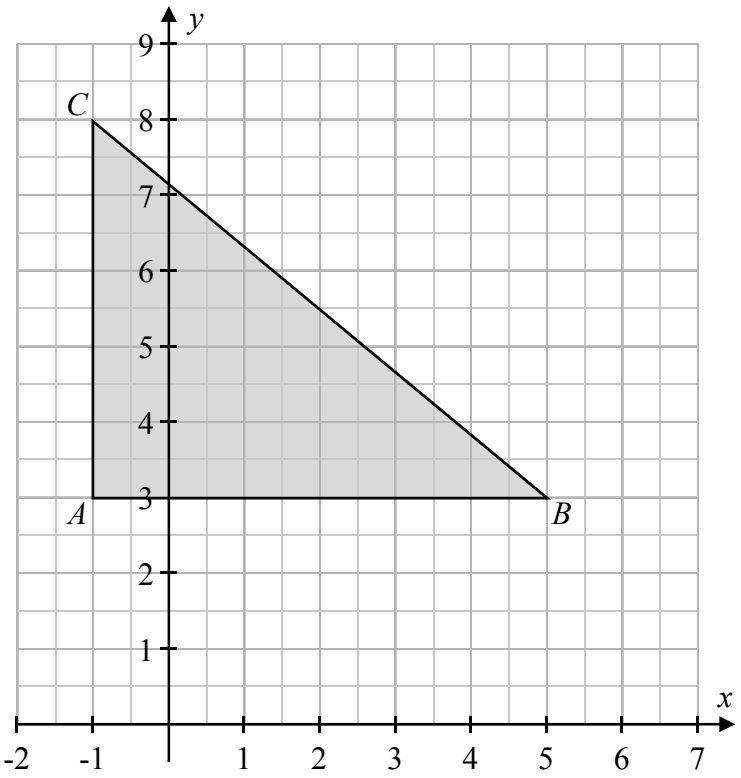
Table 2						
% of female members of parliament		0 – 9	10 – 19	20 – 29	30 – 39	40 – 49
Number of countries	**2005**					
	2015					

Space for extra work:

Table 1	
% of female members of parliament	
2005	**2015**
9	10
9	13
11	13
12	14
12	16
12	18
13	19
13	20
16	20
17	23
17	23
19	24
20	24
20	26
21	26
21	28
22	29
22	31
22	31
23	31
33	36
34	37
35	37
36	37
37	39
37	41
38	42
45	44

Question 4 **(Suggested maximum time: 20 minutes)**

The triangle ABC is shown on the co-ordinate grid below.



(a) Write down the co-ordinates of the points A, B, and C.

$A =$ (,) $B =$ (,) $C =$ (,)

(b) Find the equation of each of the lines AB, AC, and BC.

AB:

AC:

BC:

(c) Use trigonometry to find the measure of the angle ABC.
Give your answer in degrees, correct to two decimal places.

(d) **(i)** Find $|BC|$. Give your answer in surd form.

(ii) Hence, or otherwise, find the area of the circle that goes through the points A, B, and C.
Give your answer in terms of π.

(e) Find the equation of the line through the point A that is perpendicular to the line BC.

Question 5 **(Suggested maximum time: 10 minutes)**

(a) Is the point $(3, -5)$ on the line $5x + 3y + 6 = 0$? Justify your answer.

(b) Find the point of intersection of the following two lines.

$$3x + 2y = 7$$
$$y = -2x + 5$$

Question 6 **(Suggested maximum time: 5 minutes)**

Prove that the angles in any triangle add to 180°.

Diagram:

Given:

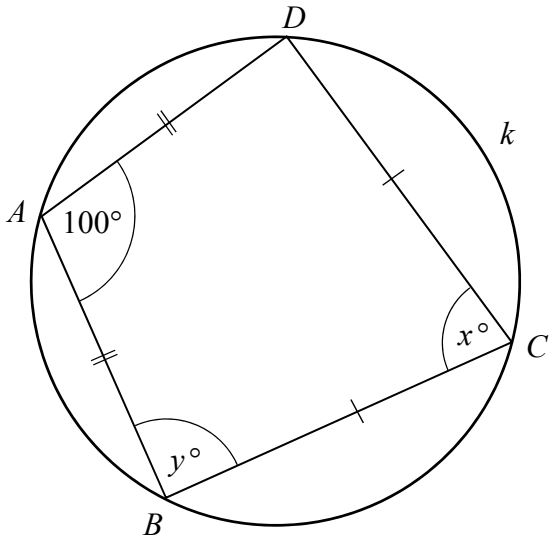
To Prove:

Construction:

Proof:

Question 7 **(Suggested maximum time: 5 minutes)**

The points A, B, C, and D are shown on the diagram. They are all on the circle k.
$|AB| = |AD|$ and $|BC| = |DC|$, as shown.
The sizes of some of the angles are marked.



(a) Calculate the value of x.

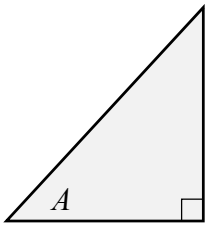
(b) Calculate the value of y. Show all of your working out.

Question 8 **(Suggested maximum time: 10 minutes)**

(a) **(i)** Write $2° 43' 5''$ in degrees in decimal form, correct to two decimal places.

(ii) Write $3{\cdot}14°$ in DMS (i.e. degrees, minutes, and seconds).

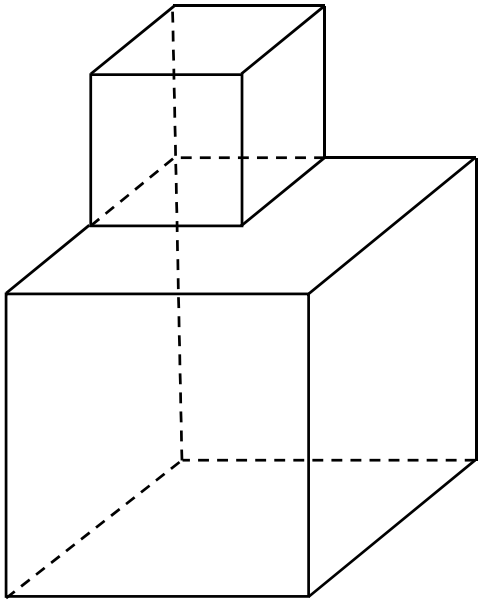
(b) The diagram shows a right-angled triangle, with the angle A marked.
Given that $\cos A = \sin A$, show that this triangle must be **isosceles**.



(c) A right-angled triangle has sides of length 7 cm, 24 cm, and 25 cm.
Find the size of the **smallest** angle in this triangle.
Give your answer correct to one decimal place.

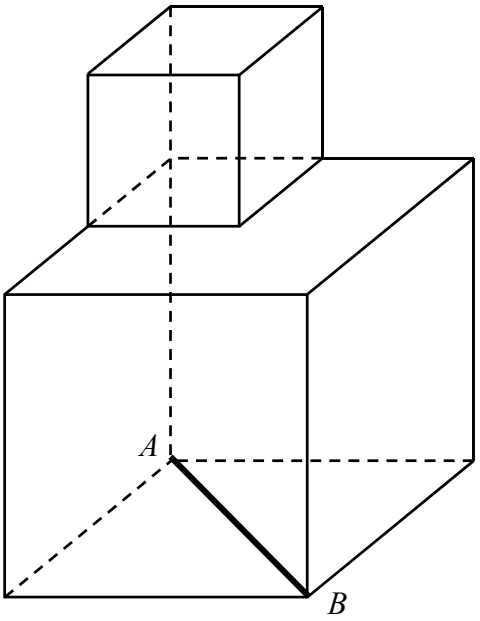
Question 9 **(Suggested maximum time: 10 minutes)**

A shape is made by placing a small cube on top of a larger one, as shown. The cubes have edges of length 1 unit and 2 units.



(a) Find the total surface area of this shape.

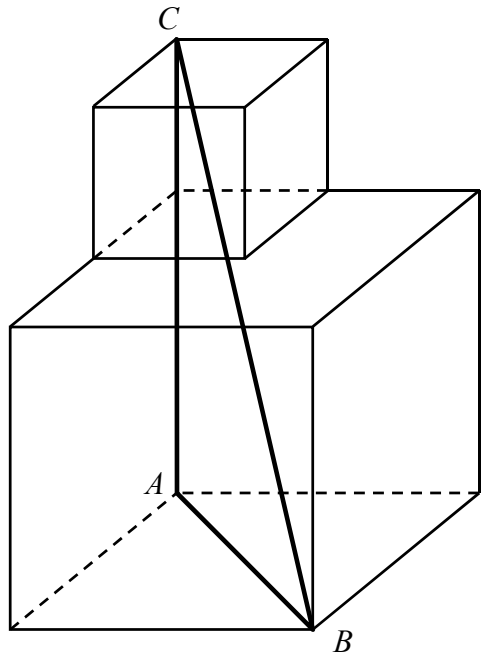
(b) The line segment $[AB]$ is a diagonal of the base of the shape, as shown.



(i) Find $|AB|$. Give your answer in surd form.

The right-angled triangle ABC is constructed inside this shape, as shown.

(ii) Find $|BC|$. Give your answer in surd form.



(iii) Find the length of the part of the line BC that is inside the larger cube.

Question 10 **(Suggested maximum time: 10 minutes)**

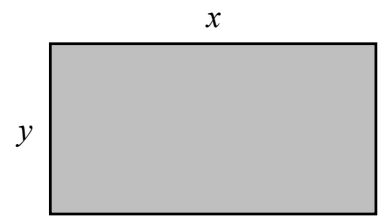
In this question, all lengths are in cm and all areas are in cm^2.

(a) The diagram shows a rectangle with sides of length 7 and y.
The value of the area of the rectangle is equal to the length of its perimeter.

Use this information to find the value of y.

(b) The diagram shows a rectangle with sides of length x and y, where $x > 2$.
The value of the area of the rectangle is equal to the length of its perimeter.

Use this information to write y in terms of x.



Question 11 **(Suggested maximum time: 5 minutes)**

Fiona finds the volumes of five different cylinders.
Each of them has a height of K centimetres.

(a) Complete the table below to show the volume of each of the five cylinders.
Give each answer in terms of π and K.

Radius of cylinder (cm)	**Height** of cylinder (cm)	**Volume** of cylinder (cm^3)
1	K	
2	K	
3	K	$9\pi K$
4	K	
5	K	

(b) Is the sequence of volumes in the table linear, quadratic, exponential, or none of these?
Justify your answer fully.

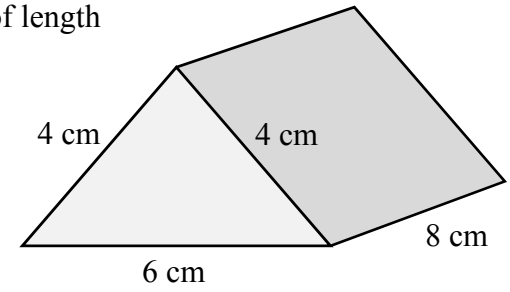
Answer:

Justification:

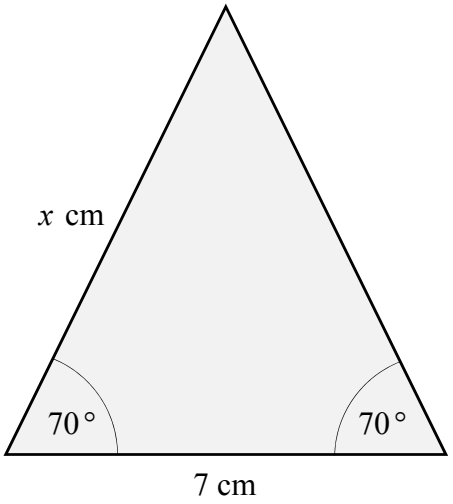
Question 12 **(Suggested maximum time: 20 minutes)**

(a) A packet of sweets is in the shape of a closed triangular-based prism.
It has a height of 8 cm and a triangular base with sides of length 4 cm, 4 cm, and 6 cm.

Construct an accurate **net** of the prism.
Show all of your construction lines clearly.



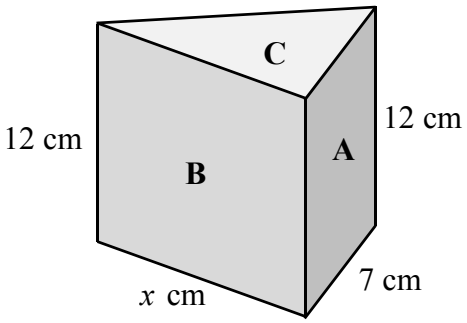
(b) A different triangular-based prism has the base shown in the diagram on the right.



(i) Use trigonometry to find the length of the side marked x cm.

Give your answer correct to two decimal places.

This prism is shown in the diagram on the right.
It has a height of 12 cm.
Three of its faces are labelled **A**, **B**, and **C**.



(ii) Find the area of each of the faces labelled **A**, **B**, and **C** in the diagram.
Give each answer correct to the nearest cm^2.

A:

B:

C: