Surname	Group name	Date
First name(s)		

BUCKS COLLEGE GROUP ASSESSMENT

MATHEMATICS - Diagnostic Assessment

Calculator-Allowed

Time allowed:_____

ADDITIONAL MATERIALS

A formula sheet is provided.
A calculator will be required for this assessment.
A ruler and protractor may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Do not use gel pen or correction fluid.
You may use a pencil for diagrams only.
Write your name, group name and date in the spaces at the top of this page.
Answer all the questions in the spaces provided.
If you run out of space, use additional lined paper and clearly number the question(s).

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.
Unless stated, diagrams are not drawn to scale.
The number of marks is given in brackets at the end of each question or part-question.
You are reminded of the need for orderly, clear presentation in your answers.

For assessor use only

Question	Maximum Mark	Mark Awarded
1	8	
2	2	
3	8	
4	5	
5	6	
6	4	
7	3	
8	2	
9	2	
10	2	
11	3	
12	3	
13	4	
Total	**52**	

Total marks: 52

Formula sheet

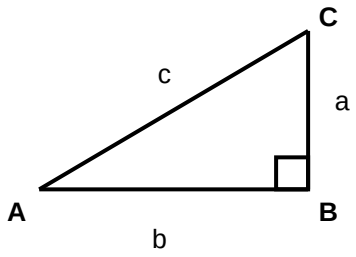
Use these formulae where appropriate. Diagrams are not drawn to scale.

Perimeter, area and volume

- Circumference of a circle: **$C = 2\pi r$** or **$C = \pi d$**
- Area of a circle: **$A = \pi r^2$**
- Arc length: **$L = (\theta/360) \times 2\pi r$**
- Area of a sector: **$A = (\theta/360) \times \pi r^2$**
- Volume of a prism: **V = area of cross-section × length**
- Volume of a pyramid: **V = (1/3) × base area × perpendicular height**
- Volume of a cone: **$V = (1/3) \times \pi r^2 h$**
- Surface area of a sphere: **$A = 4\pi r^2$**
- Volume of a sphere: **$V = (4/3)\pi r^3$**

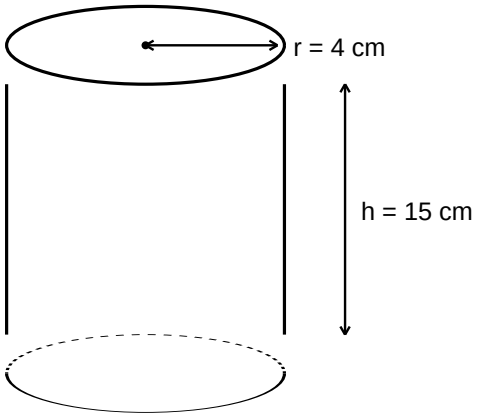
Pythagoras and trigonometry

- Pythagoras' theorem: **$a^2 + b^2 = c^2$**
- $\sin \theta$ = opposite / hypotenuse
- $\cos \theta$ = adjacent / hypotenuse
- $\tan \theta$ = opposite / adjacent



1. Tin: 3D shape, area and volume [8 marks]

The diagram shows a tin with radius 4 cm and height 15 cm.



(a) Name the 3D shape.

.....

[1]

(b) Work out the area of one circular face. Give your answer to **2 d.p.**

.....

.....

[2]

(c) Work out the volume of the tin. Give your answer to **2 d.p.**

.....

.....

[2]

.....

(d) Work out the total surface area of the tin, including the top and the bottom. Give your answer to **2 d.p.**

.....

.....

[2]

.....

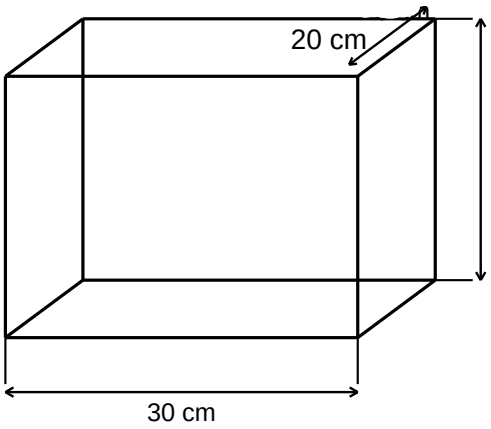
(e) A tin holds 0.75 litres. Is this tin large enough? Tick **Yes** or **No**.

☐ Yes ☐ No **[1]**

Working space:

2. Cuboid: volume and capacity [2 marks]

The diagram shows a cuboid-shaped tank.



(a) Work out the volume of the tank in cm^3.

.....

..... **[1]**

.....

(b) Work out the capacity of the tank in litres.

.....

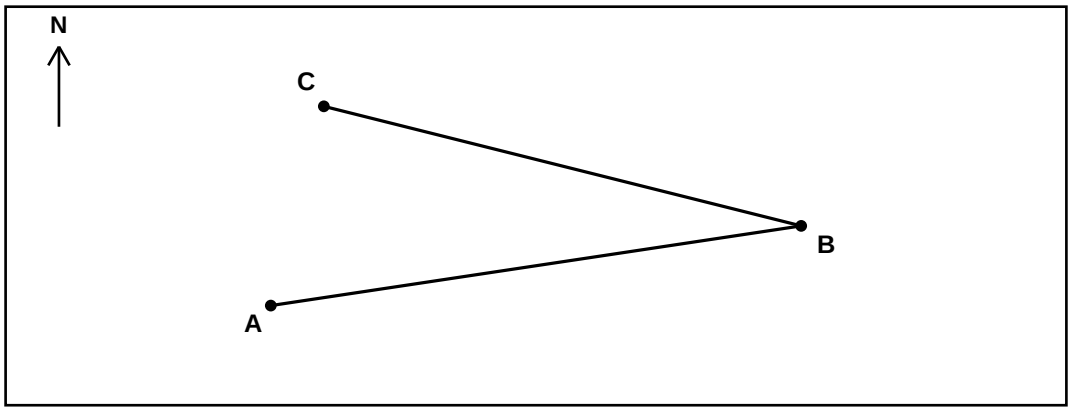
..... **[1]**

.....

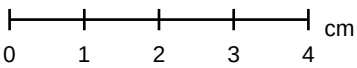
Working space:

3. Scale and bearings [8 marks]

The diagram shows part of a map.



Scale: 1 : 50 000



(a) Work out the real distance from A to B in km. **[2]**

(b) The real distance from B to C is 2.6 km. Work out the map distance in cm. **[2]**

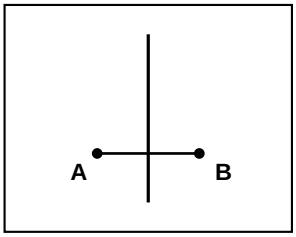
(c) Find the three-figure bearing of C from B. **[2]**

(d) A hiker walks from A to B then from B to C. Work out the total distance walked in km. **[2]**

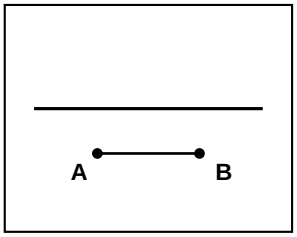
4. Construction and loci (multiple choice) [5 marks]

A and B are two points 8 cm apart.

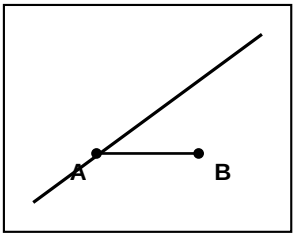
(a) Which diagram shows the correct construction of the perpendicular bisector of AB? Circle A, B, C or D. **[1]**



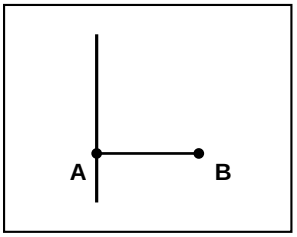
A



B

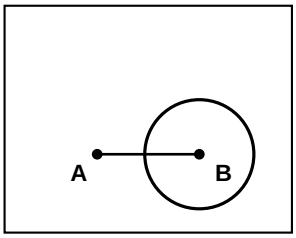


C

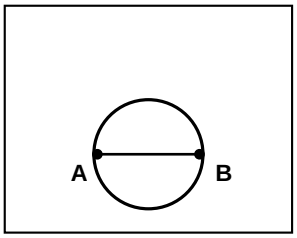


D

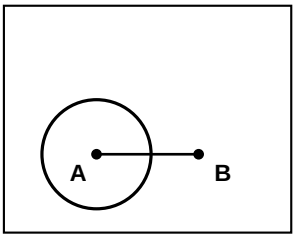
(b) Which diagram shows the locus of points 4 cm from A? Circle A, B, C or D. **[1]**



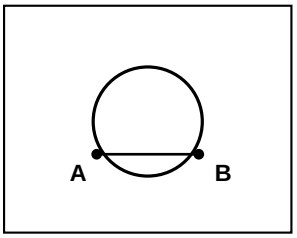
A



B

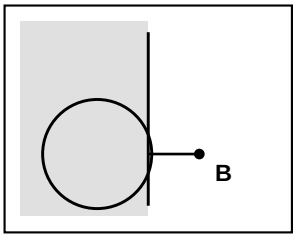


C

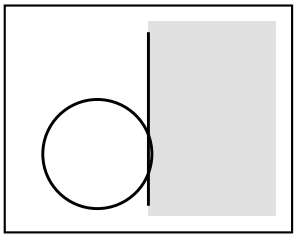


D

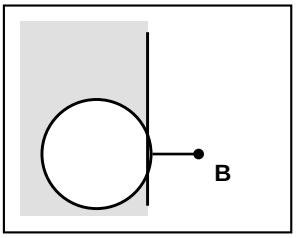
(c) Which diagram shows the region closer to A than B and at least 4 cm from A? Circle A, B, C or D. **[1]**



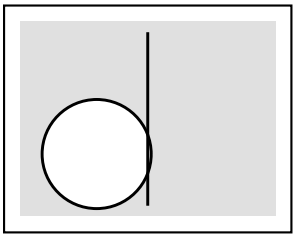
A



B



C



D

(d) The locus of points 5 cm from B is a: circle / line / rectangle / triangle **[1]**

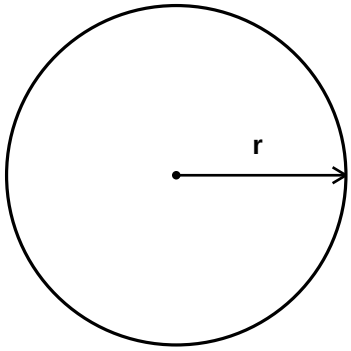
.....

(e) The locus of points equidistant from A and B is a: circle / perpendicular bisector / radius / chord **[1]**

.....

5. Circles: diameter, circumference and area [6 marks]

The diagram shows a circle with radius 4.2 m.



r = 4.2 m

(a) What is the diameter of the circle? **[1]**

.....

(b) Work out the circumference of the circle. Give your answer to **2 d.p.** **[2]**

.....

.....

.....

(c) Work out the area of the circle. Give your answer to **2 d.p.** **[3]**

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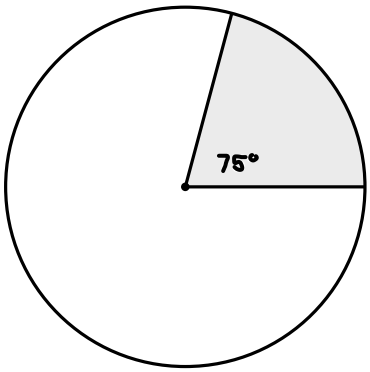
Working space:

6. Arc length and sector area [4 marks]

The diagram shows a sector of a circle with radius 12 cm and angle 75°.



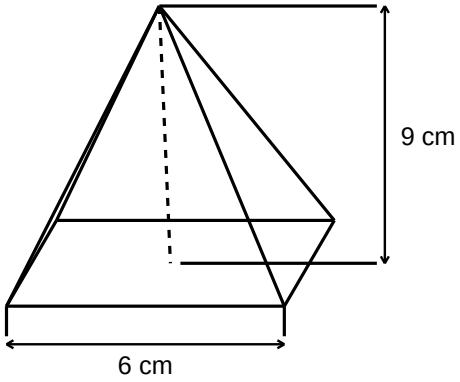
(a) Work out the arc length of the sector. Give your answer to **2 d.p.** **[2]**

(b) Work out the area of the sector. Give your answer to **2 d.p.** **[2]**

Working space:

7. Pyramid volume [3 marks]

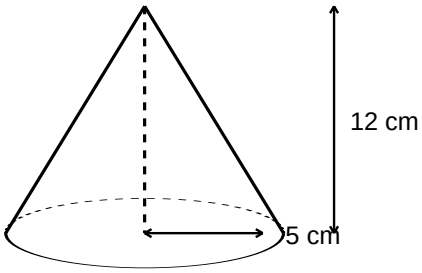
The diagram shows a square-based pyramid.



Work out the volume of the pyramid in cm³. Give your answer to **2 d.p.** **[3]**

8. Cone volume [2 marks]

The diagram shows a cone.

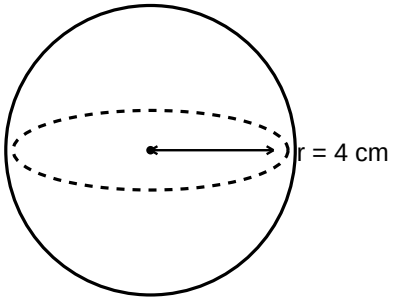


Work out the volume of the cone in cm³. Give your answer to **2 d.p.** **[2]**

Working space:

9. Sphere surface area [2 marks]

The diagram shows a sphere with radius 4 cm.



Work out the surface area of the sphere. Give your answer to **2 d.p.** **[2]**

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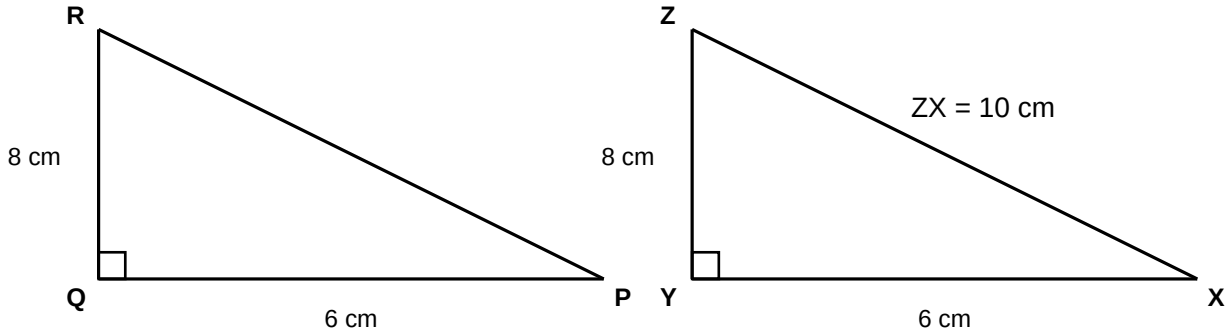
10. Congruent triangles [2 marks]

The triangles **PQR** and **XYZ** are congruent.



Work out the missing length **PR**. Give your answer to **2 d.p.** if needed. **[2]**

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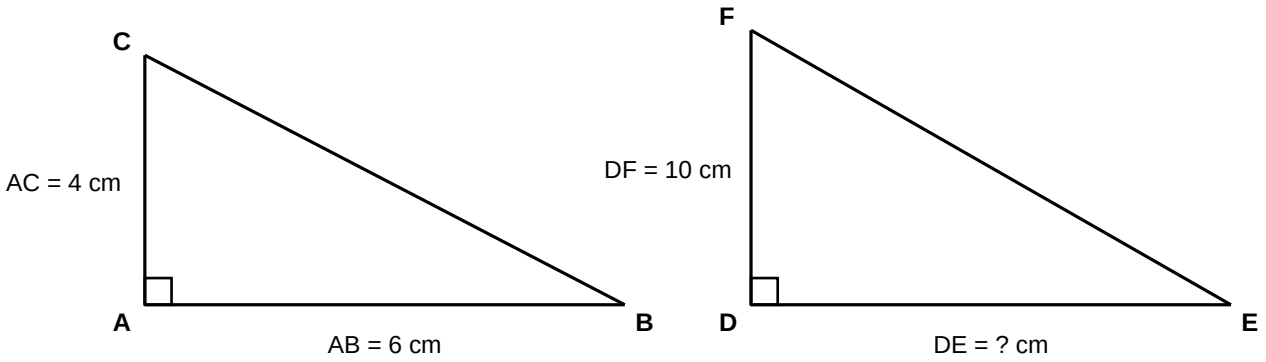
11. Similar triangles [3 marks]

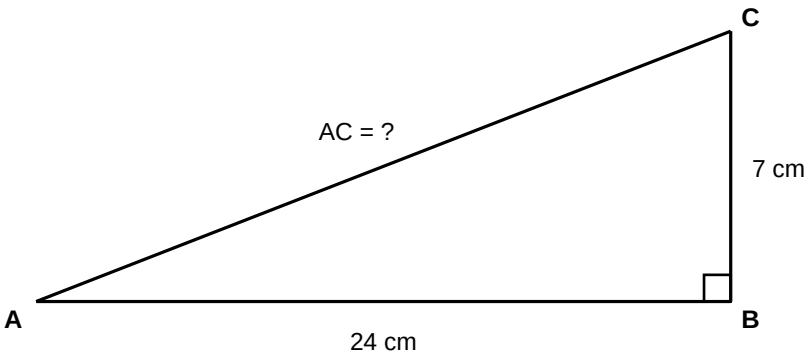
The triangles **ABC** and **DEF** are similar.



Work out the missing length **DE**. **[3]**

12. Pythagoras' theorem [3 marks]

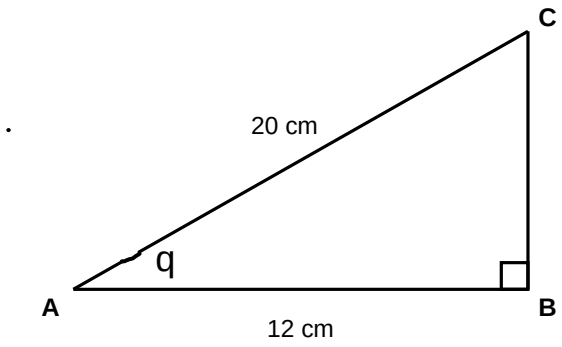
The diagram shows a right-angled triangle.

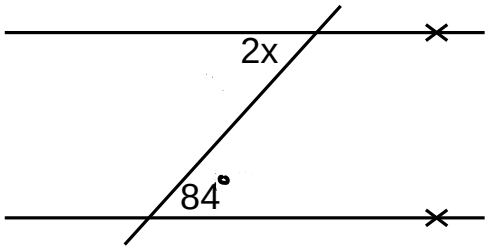


Work out the length **AC**. Give your answer to **2 d.p.** if needed. **[3]**

13. Trigonometry and parallel lines [4 marks]

Answer both parts.





(a) Work out angle **q**. Give your answer to the nearest degree. **[2]**

(b) The lines are parallel. Work out **x**. **[2]**

END OF PAPER