

RADLEY

2026 Scholarship Examination Paper

MATHEMATICS II

February 2026

Time allowed – 1 hour

Show all working

Write on lined paper

Calculators may be used

1. (a) After Christmas, John finds that he weighs 105 kg. He goes on a diet with a target of losing 8% of his weight. What is his target weight?
- (b) Peter saved 23% more than his brother, Paul. Altogether they have saved £784.96. How much has Peter saved?
- (c) A car depreciates in value by 20% per year. It originally costs £30 000.
- (i) How much is it worth after one year?
- (ii) After how many years does its value fall below £5000?
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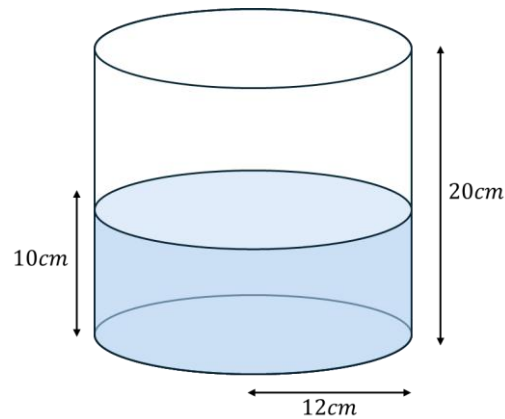
2. (a) By writing $25 = 5^2$, solve the equation $25^{x+1} = 5^{3-x}$

(b) Solve each of the following pairs of simultaneous equations:

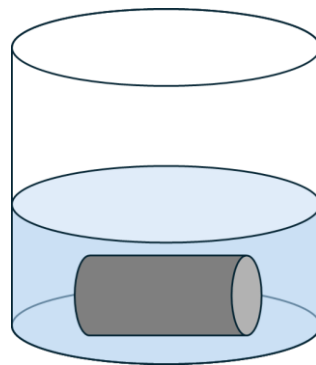
(i) $3^x \times 3^y = 81$
 $\frac{3^x}{3^y} = 27$

(ii) $16^x \times 2^y = 32$
 $64^x \times 4^y = 128$

3. A water container is in the shape of a cylinder of base radius 12 cm and height 20cm. Water is poured into the container to a depth of 10cm.

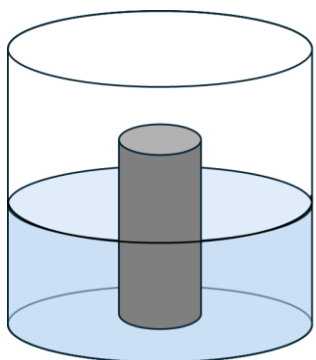


- (a) A heavy smaller cylinder of radius 6cm and length 15cm is lowered into the container, and rests at the bottom of the container as shown in the diagram below



By how much does the level of the water in the container rise?

- (b) If instead the smaller cylinder rests upright, as in the diagram below, by how much would the level of the water in the container rise?



4.

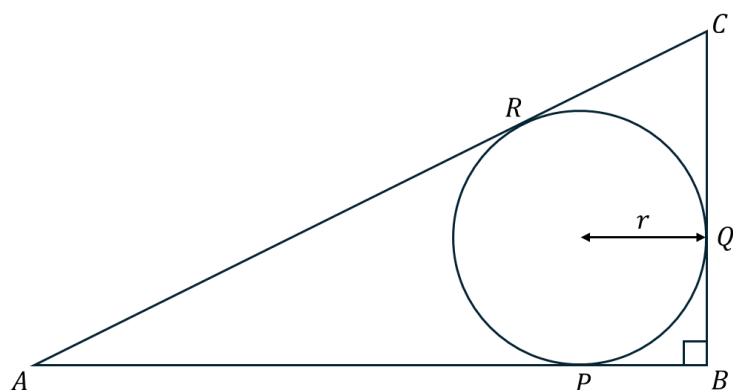
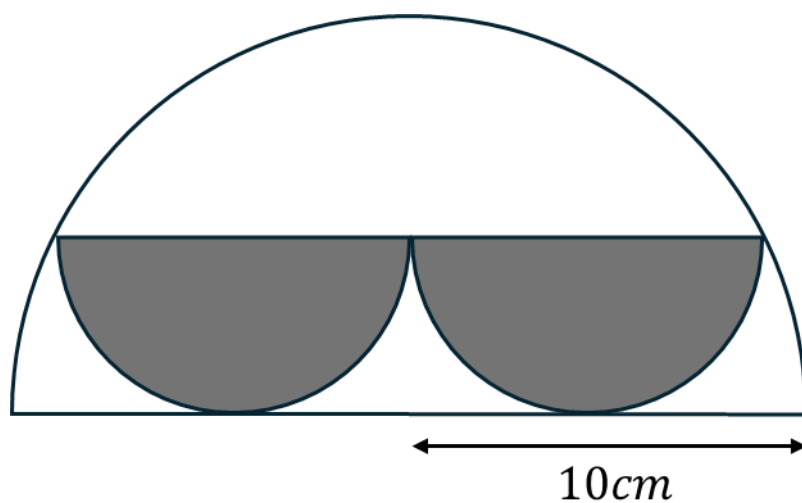


Figure 4

(a) The diagram above shows a right-angled triangle, ABC , with $AB = 4\text{cm}$ and $BC = 3\text{cm}$. A circle of radius $r\text{ cm}$ is drawn inside the triangle, touching AB at P , BC at Q , and CA at R .

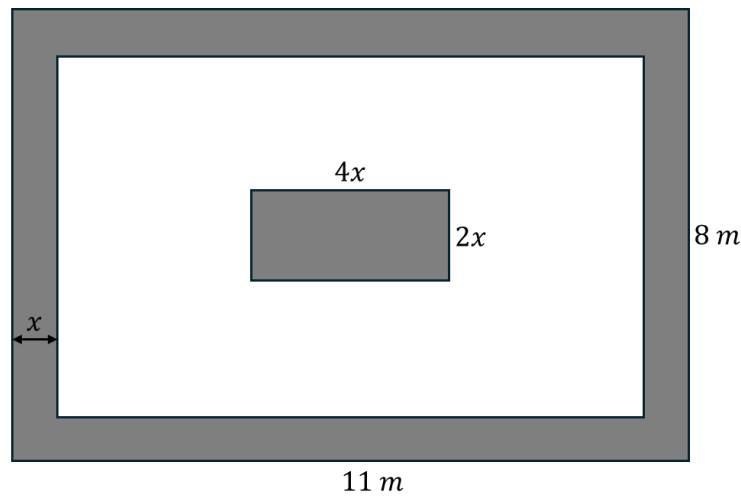
- (i) Write down an expression in terms of r for the length AP .
- (ii) Write down an expression in terms of r for the length AR .
- (iii) Write down an expression in terms of r for the length CR .
- (iv) By first calculating the length AC , calculate the radius of the circle.



(b) The diagram above shows a large semicircle of radius 10 cm . Two identical smaller semicircles fit snugly into the larger semicircle and are shaded in the diagram above.

Calculate the shaded area.

5.



The diagram shows a rectangular garden of length 11 metres and width 8 metres. Around the outside of the garden is a path of width x metres. In the middle of the garden is a rectangular pond of width $2x$ metres and length $4x$ metres. The area not occupied by path or pond is to be grassed. The grassed area is 22 m^2 .

- (a) Derive the equation $2x^2 + 19x - 33 = 0$.
 - (b) Hence find the value of x .
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6.



I have four cards numbered 2, 3, 4 and 5. I can arrange them to form different numbers. For example, if I put 3 beside 4, I get the number 34.



- (a) How many different numbers can I make using some, or all, of the cards?
- (b) How many of these numbers are even?
- (c) How many of these numbers are odd?
- (d) How many of these numbers are multiples of 5?
- (e) How many of these numbers are multiples of 3?