

Practice Test

All Topics

Year 9 Mathematics

Topics Included:

- Algebra
- Coordinate Geometry
- Trigonometry
- Deductive Geometry
- Financial Maths

Name:



VERTEX
MATHEMATICS

Section I

10 marks

Attempt Questions 1–10

Allow about 15 minutes for this section

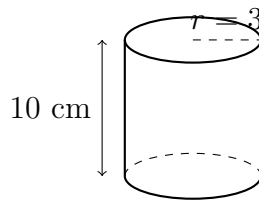
1 Factorise the expression $x^2 - 2x - 15$ completely.

- (A) $(x-5)(x+3)$ (B) $(x+5)(x-3)$ (C) $(x-15)(x+1)$ (D) $(x-5)(x-3)$

2 Simplify the expression $3\sqrt{2} + \sqrt{18}$.

- (A) $4\sqrt{2}$ (B) $6\sqrt{2}$ (C) $9\sqrt{2}$ (D) $3\sqrt{20}$

3 A cylinder has a radius of 3 cm and a height of 10 cm. What is its volume?



- (A) $30\pi \text{ cm}^3$ (B) $60\pi \text{ cm}^3$ (C) $90\pi \text{ cm}^3$ (D) $300\pi \text{ cm}^3$

4 Solve for x : $5(x-2) = 3x+4$.

- (A) $x = 3$ (B) $x = 7$ (C) $x = -3$ (D) $x = 1$

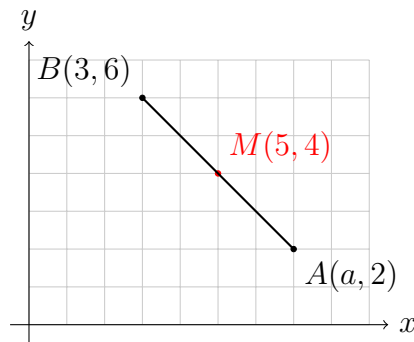
5 If $\cos \theta = \frac{5}{13}$ in a right-angled triangle, what is the value of $\tan \theta$?

- (A) $12/5$ (B) $5/12$ (C) $12/13$ (D) $13/5$

6 Which of the following describes a quadrilateral where the diagonals bisect each other at right angles?

- (A) Rectangle
(B) Parallelogram
(C) Rhombus
(D) Trapezium

- 7 The midpoint of the interval joining $A(a, 2)$ and $B(3, 6)$ is $M(5, 4)$. What is the value of a ?



- (A) 2 (B) 7 (C) 8 (D) 4
- 8 A car is purchased for \$20,000 and depreciates at 12% p.a. using the declining balance method. What is its value after 2 years?
- (A) \$15,200 (B) \$15,488 (C) \$17,600 (D) \$14,800
- 9 Which expression is equivalent to $\frac{2a^2}{b} \times \frac{b^3}{4a}$?
- (A) $\frac{ab^2}{2}$ (B) $\frac{a^2b^2}{2}$ (C) $2ab^2$ (D) $\frac{a}{2b}$
- 10 If $x^2 + y^2 = 25$ and $xy = 12$, what is the value of $(x + y)^2$?
- (A) 37 (B) 49 (C) 13 (D) 61

Section II

65 marks

Attempt Questions 11–20

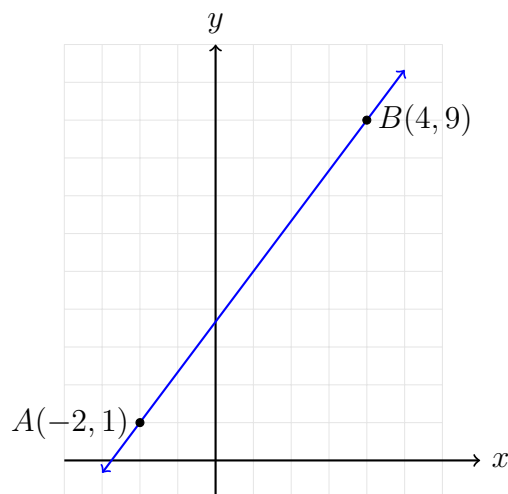
Allow about 75 minutes for this section

Question 11: Algebra and Indices (7 marks)

- (a) Expand and simplify $(2x - 3)(x + 4)$. 1
- (b) Factorise the following completely:
- (i) $4x^2 - 9$ 1
- (ii) $x^2 - 7x + 10$ 2
- (c) Simplify: $\left(\frac{8x^6}{y^3}\right)^{\frac{1}{3}}$. 3

Question 12: Coordinate Geometry (6 marks)

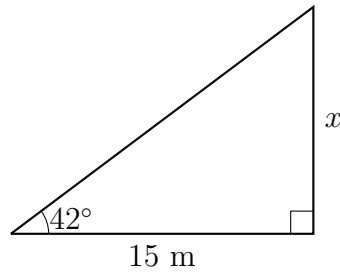
Consider the points $A(-2, 1)$ and $B(4, 9)$.



- (a) Find the gradient of the line AB . 1
- (b) Determine the equation of the line AB in gradient-intercept form. 2
- (c) Find the equation of the line perpendicular to AB that passes through the origin $(0, 0)$. 3

Question 13: Trigonometry and Bearings (8 marks)

- (a) Calculate the value of x in the triangle below, correct to 1 decimal place. 2



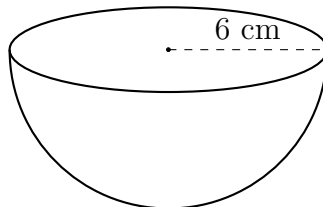
- (b) A hiker walks 5 km on a bearing of 060° from point A to point B .
- (i) How far East has the hiker travelled? 2
- (ii) If the hiker then walks 8 km on a bearing of 150° to point C , find the distance AC . 4

Question 14: Financial Mathematics (6 marks)

- (a) \$12,000 is invested at 4.5% p.a. simple interest for 42 months. Calculate the total interest earned. 3
- (b) A piece of machinery worth \$45,000 depreciates at 15% p.a. using the declining balance method. How many years (to 1 decimal place) will it take for the value to reach \$20,000? 3

Question 15: Measurement (7 marks)

- (a) A closed hemisphere has a radius of 6 cm.

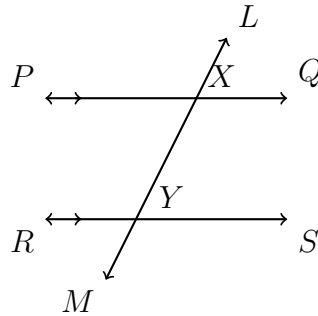


- (i) Find the volume of the hemisphere (to 2 decimal places). 2
- (ii) Find the total surface area of the hemisphere, including the circular base. 2
- (b) A rectangular prism has a surface area of 214 cm^2 . If the length is 5 cm and the width is 7 cm, find the height. 3

Question 16: Quadratic Equations (7 marks)

- (a) Solve $x^2 - 8x + 12 = 0$ by factorising. 2
- (b) Solve $x^2 + 6x - 2 = 0$ by completing the square, leaving your answer in exact form. 3
- (c) A ball is thrown with a height given by $H = -5t^2 + 20t + 2$. At what time t does the ball reach its maximum height? 2

Question 17: Geometric Reasoning (6 marks)



In the figure, $PQ \parallel RS$. The transversal LM intersects the lines at X and Y .

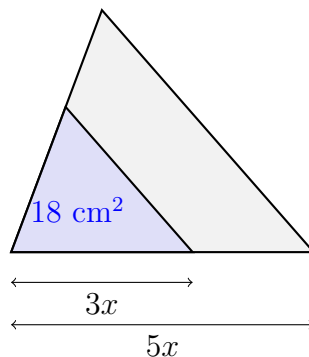
- (a) If $\angle PXY = (3x + 20)^\circ$ and $\angle RYX = (2x + 10)^\circ$, find the value of x . 3
- (b) Give a geometric reason for your answer to part (a). 1
- (c) Find the size of $\angle QXY$. 2

Question 18: Surds and Equations (7 marks)

- (a) Simplify $4\sqrt{3} \times 2\sqrt{6}$. 2
- (b) Rationalise the denominator of $\frac{3}{\sqrt{5} - 2}$. 2
- (c) Solve the following for x : $\frac{2x}{3} - \frac{x+1}{2} = 4$. 3

Question 19: Congruence and Similarity (7 marks)

- (a) Two triangles are similar with a side ratio of $3 : 5$, as shown in the overlaid diagram below. If the smaller triangle has an area of 18 cm^2 , find the area of the larger triangle. 3



- (b) In a rhombus $ABCD$, the diagonals AC and BD intersect at O . Prove that $\triangle AOB \cong \triangle COB$. 4

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