National 5 Mathematics

Sample Exam Paper

Instructions for candidates: 1. Answer all questions. 2. You may use a calculator. 3. Full credit will be given only to solutions which contain appropriate working. 4. Square-ruled paper is provided for rough working.

Question 1

Expand and simplify $(3x + 2)(x - 5)$.
(2 marks)

Question 2

Solve the equation $2x^2 - 5x - 3 = 0$.
(3 marks)

Question 3

The gradient of a line is 4 and it passes through the point (2, -3). Find the equation of the line in the form $y = mx + c$.
(3 marks)

Question 4

A circle has center (3, 2) and radius 4 units. Determine whether the point (6, 5) lies inside, on, or outside the circle.
(3 marks)

Question 5

The volume of a sphere is given by the formula $V = (4/3)\pi r^3$, where r is the radius. If the volume of a sphere is 288π cm³, calculate the radius of the sphere.
(3 marks)

MARKING SCHEME

Question 1 - Marking Scheme

Expand and simplify $(3x + 2)(x - 5)$.
• Correct expansion: $3x^2 - 15x + 2x - 10$ (1 mark) • Correct simplification: $3x^2 - 13x - 10$ (1 mark)

Question 2 - Marking Scheme

Solve the equation $2x^2 - 5x - 3 = 0$.
• Correct application of quadratic formula (1 mark) • Correct substitution of values (1 mark) • Correct answers: $x = 3$ or $x = -0.5$ (1 mark)

Question 3 - Marking Scheme

The gradient of a line is 4 and it passes through the point (2, -3). Find the equation of the line in the form $y = mx + c$.
• Correct substitution into $y = mx + c$ (1 mark) • Correct working to find c: $-3 = 4(2) + c$ (1 mark) • Correct final answer: $y = 4x - 11$ (1 mark)

Question 4 - Marking Scheme

A circle has center (3, 2) and radius 4 units. Determine whether the point (6, 5) lies inside, on, or outside the circle.
• Correct formula for distance: $d = \sqrt{(x_■-x_■)^2 + (y_■-y_■)^2}$ (1 mark) • Correct calculation: $d = \sqrt{(6-3)^2 + (5-2)^2} = \sqrt{9 + 9} = \sqrt{18} = 3\sqrt{2}$ (1 mark) • Correct conclusion: Since $3\sqrt{2} < 4$, the point lies inside the circle (1 mark)

Question 5 - Marking Scheme

The volume of a sphere is given by the formula $V = (4/3)\pi r^3$, where r is the radius. If the volume of a sphere is 288π cm³, calculate the radius of the sphere.
• Correct substitution: $288\pi = (4/3)\pi r^3$ (1 mark) • Correct rearrangement: $r^3 = 288 \times 3/4 = 216$ (1 mark) • Correct answer: $r = 6$ cm (1 mark)