

GCE Examinations
Advanced / Advanced Subsidiary
Core Mathematics C1
Paper 2

Time: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Answer **all** the questions.
- Give non-exact numerical answers correct to 3 significant figures, unless a different degree of accuracy is specified in the question or is clearly appropriate.
- **You are not permitted to use a calculator in this paper.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- **You are reminded of the need for clear presentation in your answers.**

1. Given $a > 0$, express $\frac{1}{(\sqrt{a})^{\frac{2}{3}}}$ in the form a^n , stating the value of n . [2]

2. Solve the simultaneous equations $y - x = 2$, $x^2 + 2y^2 = 19$. [4]

3. The coordinates of the points A and B are $(-5, 3)$ and $(5, -2)$ respectively. Find

i) the coordinates of the midpoint of AB , [1]

ii) the gradient of AB , [1]

iii) the length of AB . [1]

4. a) Solve, for x in terms of k , the inequality $x^2 + 4kx - 12k^2 > 0$,
where k is a positive constant. [3]

b) i) Solve the equation $x^2 + (3\sqrt{3})x - 30 = 0$,
giving each of your answers in the form $p\sqrt{3}$, where p is an integer. [3]

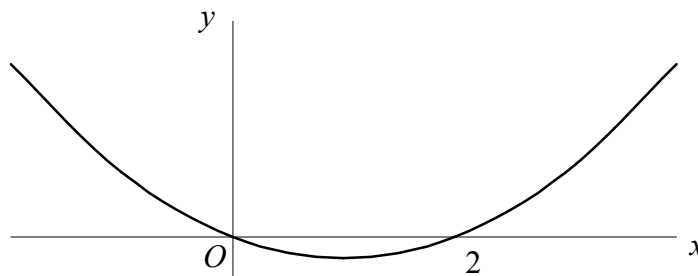
ii) Solve the equation $z^{\frac{2}{3}} + (3\sqrt{3})z^{\frac{1}{3}} - 30 = 0$,
giving each of your answers in the form $r\sqrt{3}$, where r is an integer. [3]

5. The graph shows $y = f(x)$. Sketch, on separate diagrams, the graphs of:

a) $y = f(x + 2)$

b) $y = f(-x)$

c) $y = f(2x)$.



[6]

6. A circle has equation $x^2 + y^2 + 4x - 2y = 21$.
- a) Find the co-ordinates of the centre of the circle and the radius. [3]
- b) Find the equation of the **tangent** to the circle $x^2 + y^2 + 4x - 2y = 21$ at the point $(3, 2)$. [4]
7. The equation of a curve is $y = 6x^2 - x^3$. Find the coordinates of the two stationary points on the curve, and determine the nature of each of these stationary points. [6]
- State the set of values of x for which $6x^2 - x^3$ is a decreasing function of x . [2]
- The gradient at the point M on the curve is 12. Find the equation of the tangent to the curve at M . [4]
8. The line given by $y = x + a$ intersects the curve with equation $y = 1 - \frac{4}{x}$ at one point only.
- Find the possible values of a . [4]

ANSWERS.

1. $a^{-\frac{1}{3}}; n = -\frac{1}{3}$.
2. $x = 1, y = 3$ or $x = -\frac{11}{3}, y = -\frac{5}{3}$.
3. i) $(0, -5)$ ii) $-\frac{1}{2}$ iii) $5\sqrt{5}$ units.
4. i) $x < -6k$ or $x > 2k$ b) i) $x = -5\sqrt{3}$ or $2\sqrt{3}$
ii) $z = -375\sqrt{3}$ or $24\sqrt{3}$.
5. a) {Translate -2 units along the x -axis}
b) {Reflect in the y -axis}
c) {Stretch, scale-factor $\times \frac{1}{2}$ along the x -axis}
6. a) $(-2, 1); \sqrt{26}$.
b) $y = 17 - 5x$.
7. $(0, 0)$ is a minimum point, $(4, 32)$ is a maximum point. $x < 0$ or $x > 4$. $y = 12x - 8$.
8. $a = -3$ or $a = 5$.