Quadratics and polynomial graphs - Practice 2

Name: _____ Date: _____

10 questions | 49 marks | 65 minutes

Error analysis, reconstruction, intersections and a box-volume application.

A scientific calculator may be used.

1. A student writes $(x-4)^2 = x^2 + 16$. [4 marks]

(a) Explain the error and give the correct expansion. [2 marks]

(b) Factorise $4x^2 - 12x + 9$. [2 marks]

2. A quadratic has roots -3 and 5 and passes through $(1, -16)$. [5 marks]

(a) Find a rule in factored form. [3 marks]

(b) State its axis and turning point. [2 marks]

3. Let $f(x) = x^2 + 6x + 2$. [4 marks]

(a) Find the minimum value by completing the square. [2 marks]

(b) Solve $f(x) = 0$ exactly. [2 marks]

4. The equation $x^2 + px + 4 = 0$ has two distinct real roots. [5 marks]

(a) Find the possible values of p. [3 marks]

(b) For $p = -5$, find both roots. [2 marks]

5. Compare $f(x) = x^2 - 2x - 3$ and $g(x) = -2(x-1)^2 + 8$. [5 marks]

(a) Find both vertices. [2 marks]

(b) Find their points of intersection. [3 marks]

6. For $y = 2(x+2)^2 + 3$: [4 marks]

(a) Find its y-intercept and state its range. [2 marks]

(b) Explain why there are no real x-intercepts. [2 marks]

7. A straight line $y = x + 1$ meets the parabola $y = x^2 - 3x + 1$. [5 marks]

(a) Find both intersection points. [3 marks]

(b) For which x is the parabola below the line? [2 marks]

8. A quadratic passes through $(0, 3)$, $(1, 0)$ and $(3, 0)$. [5 marks]

(a) Find its rule in expanded form. [3 marks]

(b) Find the vertex and explain its relation to the two roots. [2 marks]

9. Let $p(x) = x^3 + kx^2 - 4x - 4$ and suppose $x + 1$ is a factor. [5 marks]

(a) Find k. [2 marks]

(b) Factorise p completely and state all roots. [3 marks]

10. Squares of side x cm are cut from a 12 cm by 8 cm sheet, then the sides are folded into an open box. [7 marks]

(a) Form the volume rule and its physical domain. [2 marks]

(b) Find every cut size giving volume 64 cubic centimetres. You may use the known root $x = 2$. [5 marks]