Quadratics and polynomial graphs - Practice 4

Name: _____ Date: _____

10 questions | 49 marks | 65 minutes

Graphs, geometric dimensions and careful interpretation of restricted models.

A scientific calculator may be used.

1. Simplify and factorise. [4 marks]

(a) Expand $(3x+2)(x-4)$. [2 marks]

(b) Factorise $5x^2-20x+15$. [2 marks]

2. For $9x^2 + kx + 4 = 0$: [4 marks]

(a) Find k for a repeated real root. [2 marks]

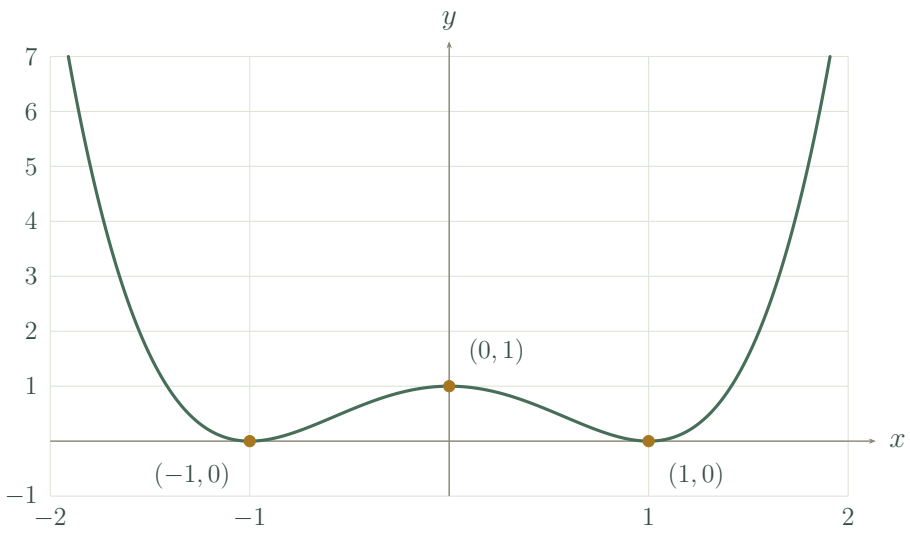
(b) Give the repeated root for each k. [2 marks]

3. Let $f(x) = -2x^2 + 8x + 3$. [5 marks]

(a) Find its vertex and maximum. [2 marks]

(b) Find both exact zeros. [3 marks]

4. The supplied graph is $y = (x^2 - 1)^2$. [6 marks]



(a) State its real zeros, their multiplicities and its range. [3 marks]

(b) Find all x where $y = 1$. [3 marks]

5. A quadratic has roots 0 and 6 and maximum value 18. [5 marks]

(a) Find its rule. [3 marks]

(b) Find the two x-values where $y = 10$. [2 marks]

6. An 8 m by 12 m rectangular garden is surrounded by a path of uniform width w metres. The path alone has area 96 square metres. [5 marks]

(a) Form an equation for w. [3 marks]

(b) Find the path width and outer dimensions. [2 marks]

7. A line $y = mx - 1$ is tangent to the parabola $y = x^2 - 4x + 3$. [5 marks]

(a) Write the equation whose roots are the intersection x-values. [2 marks]

(b) Find both possible values of m. [3 marks]

8. Let $p(x) = 2x^3 - 3x^2 - 8x + 12$. [5 marks]

(a) Factorise by grouping. [3 marks]

(b) State every root and the y-intercept of the graph. [2 marks]

9. Consider $f(x) = -(x+1)^2(x-2)(x-4)$. [5 marks]

(a) Describe how the graph meets the x-axis and its end behaviour. [3 marks]

(b) Find $f(0)$ and explain its sign using the factors. [2 marks]

10. A rectangle has perimeter 24 cm. Its width x is constrained by $0 < x \leq 4$. [5 marks]

(a) Write area in vertex form. [2 marks]

(b) Find the greatest allowed area and explain why it is not 36. [3 marks]