

GRADE 10 | 2024

Functions: Linear, Quadratic and Exponential

Mathematics

CAPS ALIGNED

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1. Linear Functions ($y = mx + c$)

- $m = \text{gradient} = \tan(\theta)$ (angle with positive x-axis)
- $c = y\text{-intercept}$
- x-intercept: set $y = 0$
- Parallel lines have equal gradients
- Perpendicular lines: $m_1 \times m_2 = -1$

2. Quadratic Functions ($y = a(x - p)^2 + q$)

- Turning point at (p, q)
- $a > 0$: minimum turning point (smile shape)
- $a < 0$: maximum turning point (frown shape)
- Axis of symmetry: $x = p$

FORMULA: Standard form: $y = ax^2 + bx + c$

Axis of symmetry: $x = -b/(2a)$

Turning point y-value: substitute $x = -b/(2a)$ back

3. Exponential Functions ($y = ab^x + q$)

- $b > 1$: exponential growth
- $0 < b < 1$: exponential decay
- $y = q$ is the horizontal asymptote
- y-intercept: set $x = 0$, $y = a + q$

4. Finding Equations from Graphs

For a linear graph, find m using gradient formula, then c from a known point. For quadratic, substitute the turning point for p and q , then use another point to find a .

EXAMPLE: Find equation

Parabola with turning point $(2, -3)$ passing through $(0, 5)$:

$$y = a(x-2)^2 - 3$$

$$\text{At } (0,5): 5 = a(0-2)^2 - 3 = 4a - 3$$

$$4a = 8, a = 2$$

$$y = 2(x-2)^2 - 3$$