HIGHER MATHS
STRAIGHT LINE CHEAT SHEET

Master the Straight Line unit with this essential guide. Use these formulas and definitions to solve triangle geometry and reasoning problems with confidence.

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1 ESSENTIAL FORMULAS

Gradient from Two Points
$m = \frac{y_2 - y_1}{x_2 - x_1}$

Equation of a Line
$y - b = m(x - a)$

Gradient from Angle
$m = \tan \theta$

Midpoint Formula
$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

2 GRADIENT RELATIONSHIPS

Parallel Lines
Gradients are equal: $m_1 = m_2$

Perpendicular Lines
Product is -1: $m_1 \times m_2 = -1$ or $m_\perp = -\frac{1}{m}$

Collinearity
Three points are collinear if $m_{AB} = m_{BC}$ and they share a common point.

3 TRIANGLE GEOMETRY DEFINITIONS

MEDIAN
Vertex to midpoint of opposite side. Use Midpoint and vertex to find m.

ALTITUDE
Vertex to opposite side at $90°$. Use perpendicular gradient of opposite side.

PERPENDICULAR BISECTOR
Midpoint of a side at $90°$. Use Midpoint and perpendicular gradient.

4 EXAM TECHNIQUE & NOTATION

☐ **Perpendicular Check**
To prove lines are perpendicular, you **must** show that $m_1 \times m_2 = -1$.

☐ **Undefined Gradient**
Vertical lines ($x_1 = x_2$) have an undefined gradient; form is $x = k$.

☐ **Intersection**
Find where lines meet by solving their equations simultaneously.

🎓 SQA EXAM TIPS

- **Exact Values:** Always leave gradients as simplified fractions or surds; do not convert to decimals unless the question involves a calculator.

- **Show Working:** Always state the midpoint and gradient explicitly before substituting into $y - b = m(x - a)$.

- **Negative Gradients:** Be careful with the tangent of obtuse angles; remember that $m = \tan\theta$ is negative when $90° < \theta < 180°$.