Parallel/perpendicular lines as a natural school extension

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

1. Are $y = 2x + 5$ and $y = 2x - 7$ parallel? Explain. [2 marks]

Both are in $y = mx + c$ form.

Their gradients are equal and their intercepts differ.

Answer: Yes; they are distinct lines with equal gradient 2.

2. Find the gradient of a line perpendicular to $y = -\frac{2}{3}x + 1$. [2 marks]

Take the negative reciprocal of $-\frac{2}{3}$.

$(-\frac{2}{3})(\frac{3}{2}) = -1$.

Answer: $\frac{3}{2}$

3. Find the line parallel to $y = -3x + 8$ through $(2, 1)$. [3 marks]

Use gradient -3: $1 = -6 + c$.

Thus $c = 7$.

Answer: $y = -3x + 7$

4. Find the line perpendicular to $y = 2x - 5$ through $(4, 0)$. [3 marks]

The perpendicular gradient is $-\frac{1}{2}$.

$0 = -(\frac{1}{2})(4) + c$ gives $c = 2$.

Answer: $y = -\frac{1}{2}x + 2$

5. Find a line through $(3, 7)$ perpendicular to $y = 4$. [2 marks]

$y = 4$ is horizontal.

A perpendicular line is vertical and must pass through $x = 3$.

Answer: $x = 3$

6. Show that $3x + 2y = 6$ and $2x - 3y = 9$ meet at right angles. [3 marks]

Rearrange: $y = -\frac{3}{2}x + 3$ and $y = \frac{2}{3}x - 3$.

Multiply the gradients: $(-\frac{3}{2})(\frac{2}{3}) = -1$.

Answer: Their gradients are $-\frac{3}{2}$ and $\frac{2}{3}$, whose product is -1.