

Year 9 Autumn 2

KEYWORDS:

- Gradient** A measure of how steep the straight line is (also known as slope). The bigger the gradient, the steeper the line.
- Y Intercept** Where a line crosses the y-axis of a graph
- Parallel lines** Two lines that are always the same distance apart and never meet
- Perpendicular line** Two lines which meet at a right angle (90 degrees)

- Horizontal Line** A straight line that goes from left to right across the graph
- Vertical Line** A straight line that goes from top to bottom of the graph
- Midpoint** The middle point on a straight line which is equidistant (the same distance) from each end point
- Equation of a line** $Y = mx + c$

Equation of a line

$$y = mx + c$$

m is the **gradient** of the line.

c is the **y-intercept**

For example, the line $y = 3x + 4$ has a gradient of **3** and crosses the y-axis at the point $(0, 4)$.

The line $y - 5x = 7$ is not in the form $y = mx + c$, so needs to be rearranged first to $y = 5x + 7$ then you can see this line has a gradient of **5** and crosses the y-axis at the point $(0, 7)$.

Videos 207-213

Gradient of a line

$$\text{Gradient} = \frac{\text{change in } y}{\text{change in } x}$$

Positive gradient

Negative gradient

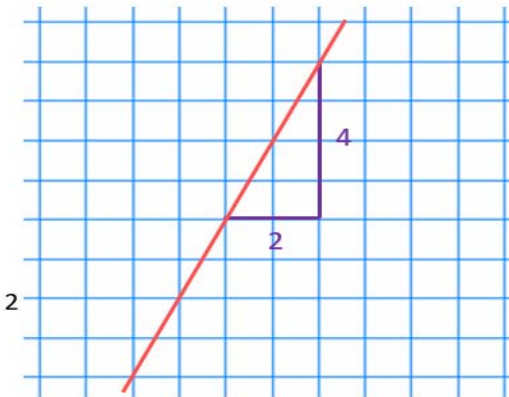
What is the gradient of this line?

Step 1: draw a triangle using the grid lines

Step 2: use the formula

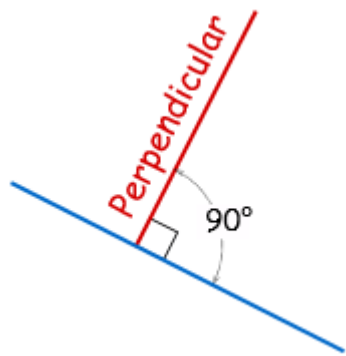
$$\text{Gradient} = \frac{\text{squares up}}{\text{squares across}}$$

Gradient of the red line = $4 \div 2 = 2$

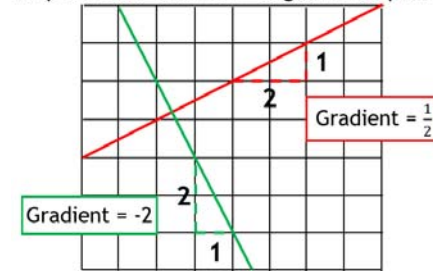


Videos 201-204

Parallel & Perpendicular Lines



Perpendicular Gradient - Negative Reciprocal



Find the equation of the line that is parallel to the line $y = 4x - 22$ that passes through the point $(3, 14)$

parallel

$$\begin{aligned} m &= 4 & y &= mx + c \\ x &= 3 & 14 &= 4 \times 3 + c \\ y &= 14 & 14 &= 12 + c \\ & & 14 - 12 &= c \\ & & 2 &= c \end{aligned}$$

Parallel lines have **gradients** that are **equal**

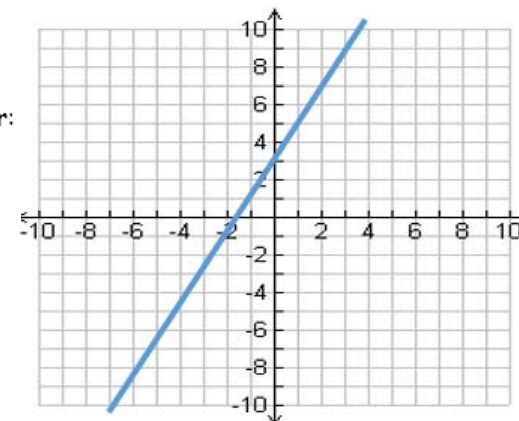
$$y = 4x + 2$$

Videos 214-216

Table of Values

Suppose we want to plot points for:

$$y = 2x + 3$$



We can use a table as follows:

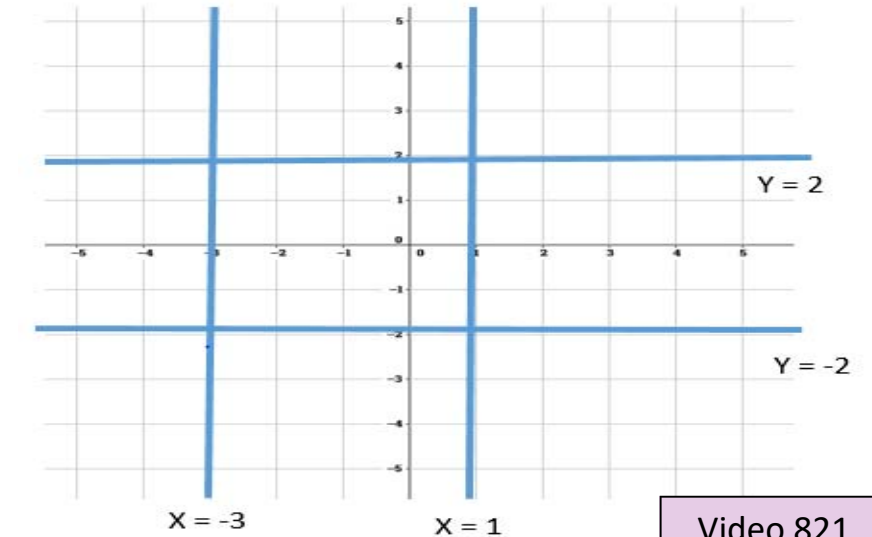
x	-3	-2	-1	0	1	2	3
2x	-6	-4	-2	0	2	4	6
Y = 2x + 3	-3	-1	1	3	5	7	9

\downarrow $(-3, -3)$ \downarrow $(-2, -1)$ \downarrow $(-1, 1)$ \downarrow $(0, 3)$ \downarrow $(1, 5)$ \downarrow $(2, 7)$ \downarrow $(3, 9)$

Video 206

Horizontal and Vertical Lines

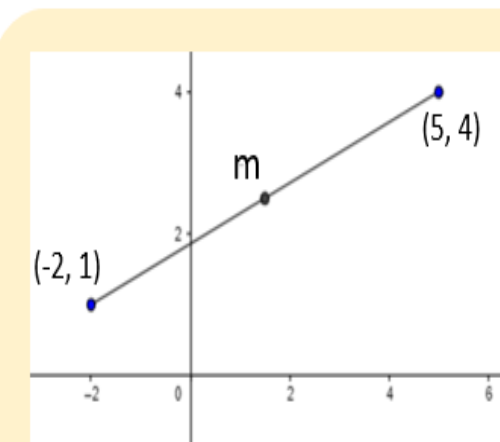
- Horizontal Lines (lines that go across) – always have the equation $y = ?$
- Vertical Lines (lines that go down) – always have the equation $x = ?$



Video 821

Midpoint of a Line

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



$$\begin{aligned} m &= \left(\frac{-2 + 5}{2}, \frac{1 + 4}{2} \right) \\ &= \left(\frac{3}{2}, \frac{5}{2} \right) \\ &= (1.5, 2.5) \end{aligned}$$

Video 200

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