Model answers: What is a Straight Line?

(a) $y = 2x + 7$ Yes, with a gradient of 2 and a *y*-intercept of 7.

The equation $y = 2x + 7$ fits the pattern $y = mx + c$ as you can see if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = 2x + 7$$

So the gradient $m = 2$ and the *y*-intercept $c = 7$.

(b) $y = 7x - 2$ Yes, with a gradient of 7 and a *y*-intercept of -2.

The equation $y = 7x - 2$ fits the pattern $y = mx + c$ as you can see if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = 7x - 2$$

So the gradient $m = 7$ and the *y*-intercept $c = -2$. It is common to think that the *y*-intercept in this case is 2, however you must remember to include the sign of the number when you are determining both the intercept and the gradient.

(c) $y = x^2 - 4$ Not a straight line

The equation $y = x^2 - 4$ is not a straight line as it has an x^2 term in it, this makes it a quadratic equation.

(d) $y = 2 - 7x$ Yes, with a gradient of -7 and a *y*-intercept of 2.

The equation $y = 2 - 7x$ fits the pattern $y = mx + c$, it might help you to see this by writing the *x*-term first like this $y = -7x + 2$. Now you can see the values of the gradient and *y*-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = -7x + 2$$

So the gradient $m = -7$ and the *y*-intercept $c = 2$.

(e) $y = \frac{1}{x} + 2$ No, due to the reciprocal $\frac{1}{x}$ term.

(f) $y = 2x$ Yes, with a gradient of 2 and a *y*-intercept of 0.

The equation $y = 2x$ fits the pattern $y = mx + c$, it might help you to see this by writing the equation as $y = 2x + 0$. Now you can see the values of the gradient and *y*-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = 2x + 0$$

So the gradient $m = 2$ and the *y*-intercept $c = 0$.

(g) $x = 0$ Yes, this is the *y*-axis which is a vertical line.

(h) $y^3 = 7x - 2$ No, due to the y^3 term.

(i) $\frac{y}{2} = 7$ Yes, this is a horizontal line with a gradient of 0 and *y*-intercept of 14.

The equation $\frac{y}{2} = 7$ fits the pattern $y = mx + c$, it might help you to see this multiplying both sides by 2 to find that $y = 14$. You can write this equation as $y = 0x + 14$ which can help you to see the values of the gradient and *y*-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = 0x + 14$$

So the gradient $m = 0$ and the *y*-intercept $c = 14$.

(j) $2x = 4 - 6y$ Yes with a gradient of $-\frac{1}{3}$ and *y*-intercept of $\frac{2}{3}$.

To see whether this equation represents a straight line or not you must rearrange it to make *y* the subject, only then can you compare it to $y = mx + c$ and decide. After rearranging the equation you get $y = -\frac{1}{3}x + \frac{2}{3}$. Now you can see the values of the gradient and *y*-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = -\frac{1}{3}x + \frac{2}{3}$$

So the gradient $m = -\frac{1}{3}$ and the *y*-intercept $c = \frac{2}{3}$.

(k) $x - 2 = 0$ Yes, this is the vertical line $x = 2$ which can be seen by adding 2 to each side of the equation.

(l) $y + x = 7$ Yes, with a gradient of -1 and *y*-intercept of 7.

To see whether this equation represents a straight line or not you must rearrange it to make *y* the subject, only then can you compare it to $y = mx + c$ and decide. After rearranging the equation you get $y = -x + 7$ Now you can see the values of the gradient and *y*-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = -x + 7$$

So the gradient $m = -1$ and the *y*-intercept $c = 7$. Note that $-x = -1 \times x$.

(m) $y^2 = 7x^2 - 2$ No, due both the y^2 and x^2 terms. Remember that you cannot take the square root of both sides to make the line $y = \sqrt{7}x - \sqrt{2}$

(n) $y - 7 = 2x + 5$ Yes, with a gradient of 2 and *y*-intercept of 12.

To see whether this equation represents a straight line or not you must rearrange it to make y the subject, only then can you compare it to $y = mx + c$ and decide. After rearranging the equation you get $y = 2x + 12$. Now you can see the values of the gradient and y-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = 2x + 12$$

So the gradient $m = 2$ and the y-intercept $c = 12$.

(o) $3y + 4 = \frac{x}{2} - 7$ Yes, with a gradient of $\frac{1}{6}$ and y-intercept of $-\frac{11}{3}$.

To see whether this equation represents a straight line or not you must rearrange it to make y the subject, only then can you compare it to $y = mx + c$ and decide. After rearranging the equation you get $y = \frac{1}{6}x - \frac{11}{3}$. Now you can see the values of the gradient and y-intercept if you line up the two equations underneath one another:

$$y = mx + c$$
$$y = \frac{1}{6}x - \frac{11}{3}$$

So the gradient $m = \frac{1}{6}$ and the y-intercept $c = -\frac{11}{3}$.

Want to know more?

If you have any questions about this topic or any other maths, you can make an appointment to see a Learning Enhancement Tutor for Maths and Stats in the Student Support Service.

Email: ask.let@uea.ac.uk

My UEA: Search “LET Maths”

Helpdesk See web site for details

Social Media @uealearn