

Model Answers: **Sketching Straight Lines**

This worksheet has questions about sketching a straight line from a given equation of the form $y = mx + c$. Remember, do not use graph paper to help you make your sketch.

Sketching Straight Lines
study guide



1)

a) $m = -\frac{1}{2}$ $c = 3$

The equation $y = -\frac{1}{2}x + 3$
fits the pattern $y = m x + c$

By lining them up you can see that $m = -\frac{1}{2}$ and $c = 3$.

b) $m = -\frac{1}{2}$ $c = 0$

The equation $y = -\frac{1}{2}x + 0$
fits the pattern $y = m x + c$

By lining them up you can see that $m = -\frac{1}{2}$ and $c = 0$.

c) $m = 0$ $c = 6$

The equation $y = 0x + 6$
fits the pattern $y = mx + c$

By lining them up you can see that $m = 0$ and $c = 6$.

d) $m = 1$ $c = 0$

The equation $y = 1x + 0$
fits the pattern $y = mx + c$

By lining them up you can see that $m = 1$ and $c = 0$.

e) $m = 3$ $c = 0$

The equation $y = 3x + 0$

fits the pattern $y = mx + c$

By lining them up you can see that $m = 3$ and $c = 0$.

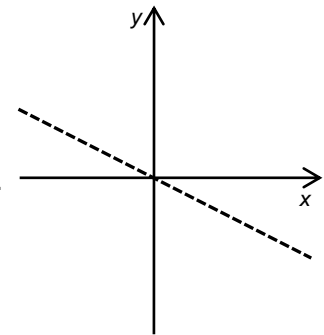
f) m and c are undefined

This is a special case. It *does not* fit the pattern $y = mx + c$ and yet it is a straight line. For more details you can read the study guide: [What is a Straight Line?](#)

2)

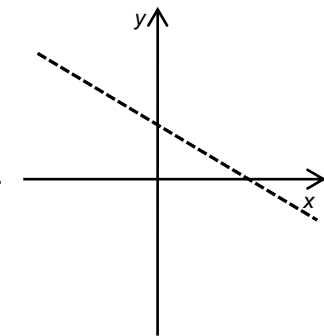
a) This is the graph of $y = -\frac{1}{2}x$

The line is sloping downwards and so the gradient is negative.
The line goes through the origin and so $c = 0$.



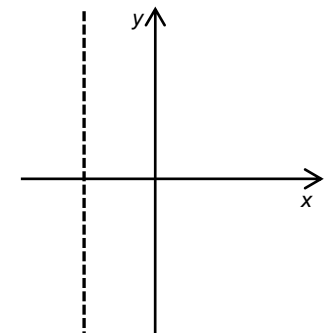
b) This is the graph of $y = -\frac{1}{2}x + 3$

The line is sloping downwards and so the gradient is negative.
The line intercepts the y-axis above the x-axis
and so c is a positive number.



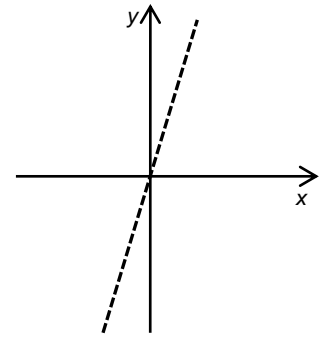
c) This is the graph of $x = -3$

The line has an undefined slope and it does not intercept the y-axis and so c is also undefined.
It gives the same negative value of x everywhere
and so it must be the special case of x is equal to a constant.



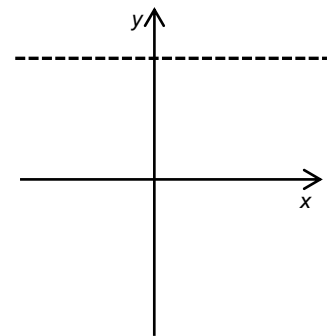
d) This is the graph of $y = 3x$

The line is sloping upwards and so the gradient is positive.
The line goes through the origin and so $c = 0$.
It has a steeper slope than the graph in f) and so it must have a larger value of m .



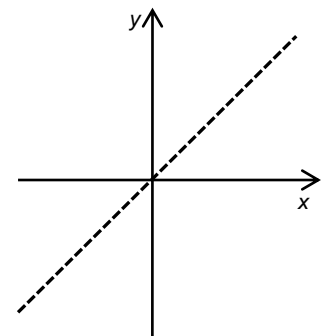
e) This is the graph of $y = 6$

The line is flat and so the gradient is 0.
The line intercepts the y -axis at a positive value and so c is a positive number.



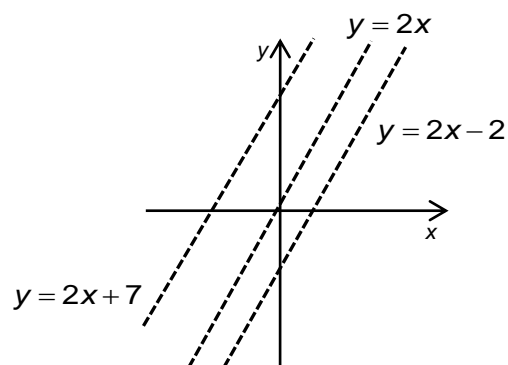
f) This is the graph of $y = x$

The line is sloping upwards and so the gradient is positive.
The line goes through the origin and so $c = 0$.
It has a shallower slope than d) and so it must have a smaller m .



3)

a)



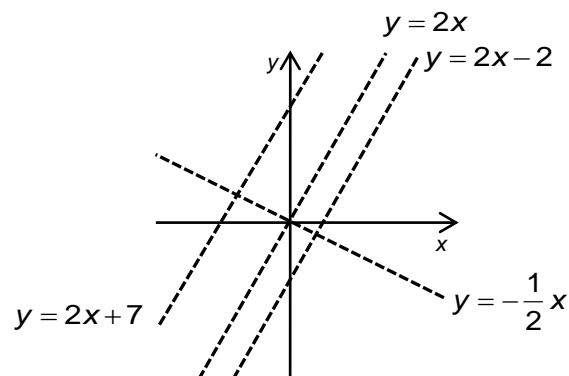
Each of the lines have the same slope, $m = 2$, which means they are parallel. As 2 is bigger than 1 each has an upwards slope steeper than 45° .

The graph of $y = 2x$ has a y -intercept of $c = 0$ and so it goes through the origin meaning it is the middle line.

The graph of $y = 2x + 7$ has a y -intercept $c = 7$ and so it intercepts the y -axis at $y = 7$ which means it is the leftmost line.

The graph of $y = 2x - 2$ has a y -intercept $c = -2$ and so it intercepts the y -axis at $y = -2$ which means it is the rightmost line.

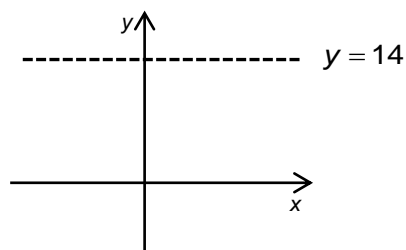
b)



The graph of $y = -\frac{1}{2}x$ has $m = -\frac{1}{2}$ which is less than 0 and so it slopes downwards. Also m is larger than -1 and so the slope is less steep than 45° . The y -intercept is $c = 0$ and so the line goes through the origin. This line is perpendicular (at right angles) to the other three lines.

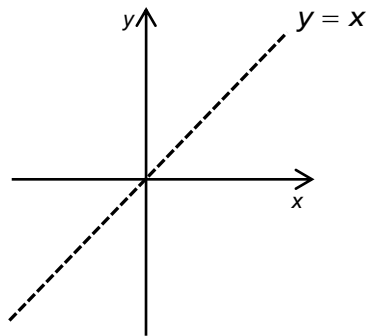
4) Many of these questions involve rearranging equations and so look at the study guide: [Rearranging Equations](#) if you are unsure about how to do this.

a)



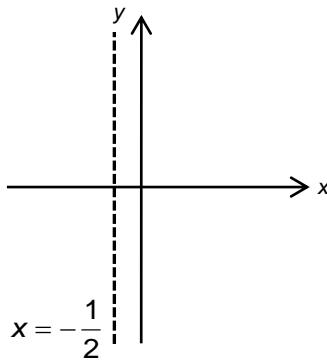
The equation can be re-written as $y = 14$ and so $m = 0$ and so the graph is horizontal. The y -intercept is $c = 14$ and so the graph intercepts the y -axis at $y = 14$.

b)



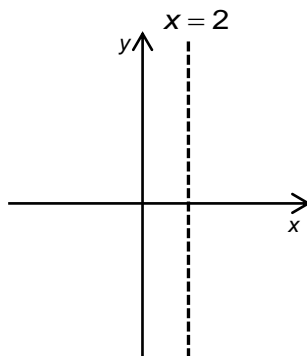
The equation can be re-written as $y = x$ and so $m = 1$ and so it has an upwards slope of 45° . The y-intercept $c = 0$ and so the line goes through the origin.

c)



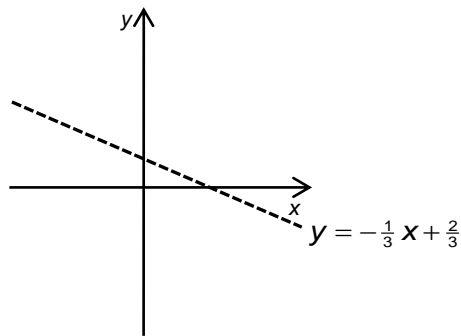
The equation has m and c undefined. The line has an undefined slope and does not intercept the y-axis. It gives the same negative value of x everywhere and so the graph must be the special case of x is equal to a constant.

d)



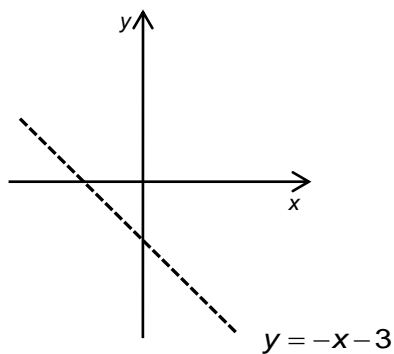
The equation can be re-written as $x = 2$. The equation has m and c undefined. The line has an undefined slope and it does not intercept the y axis. The graph gives the same positive value of x regardless of the value of y .

e)



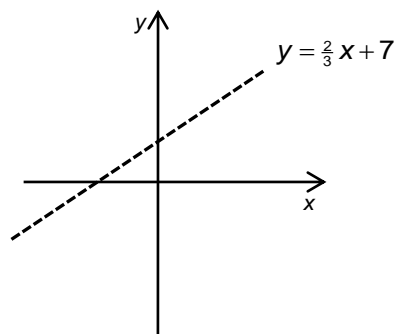
The equation can be re-written as $y = -\frac{1}{3}x + \frac{2}{3}$ and so $m = -\frac{1}{3}$ and so the graph has a downwards slope which is less steep than 45° . The y -intercept is $c = \frac{2}{3}$ and so the graph intercepts the y -axis at $y = \frac{2}{3}$.

f)



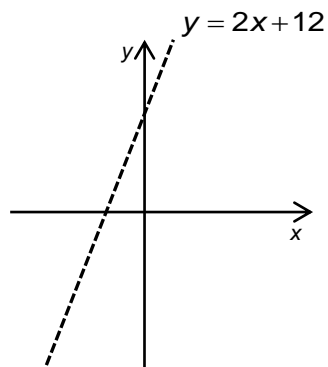
The equation can be re-written as $y = -x - 3$. Therefore $m = -1$ and so the graph has a downwards slope of -45° . The y -intercept is $c = -3$ and so the graph intercepts the y -axis at $y = -3$.

g)



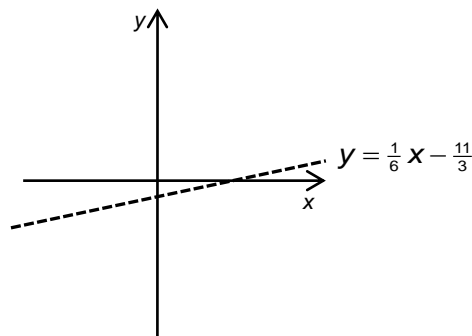
The equation can be re-written as $y = \frac{2}{3}x + 7$. So $m = \frac{2}{3}$ and the graph has an upwards slope slightly less than 45° . The y -intercept is $c = 7$ and so the graph intercepts the y -axis at $y = 7$.

h)



The equation can be re-written as $y = 2x + 12$. So $m = 2$ and the graph has an upwards slope greater than 45° . The y -intercept is $c = 12$ and so the line intercepts the y -axis at $y = 12$.

i)



The equation can be re-written as $y = \frac{1}{6}x - \frac{11}{3}$. So $m = \frac{1}{6}$ and the graph has an upwards slope less than 45° . The y -intercept $c = -\frac{11}{3}$ and so the line intercepts the y -axis at $y = -\frac{11}{3}$.



These model answers are one of a series on mathematics produced by the Learning Enhancement Team.

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