Straight-Line Graphs

If you know it's a straight line, you only really need two points, but it's always a good idea to plot three — it's a bit of a safety net, really.

Q4 Complete this table of values for $y = 2x + 3$:

x	0	3	8
y			

Plot these points on graph paper and draw the graph of $y = 2x + 3$.
Use your graph to find:

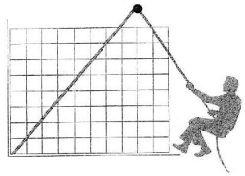
a) The value of y when $x = 5$
b) The value of y when $x = 2$
c) The value of x when $y = 11$
d) The value of x when $y = 17$

Q5 Complete this table of values for $y = \frac{1}{4}x - 3$:

x	-8	-4	8
y			

Plot these points on graph paper and draw the graph of $y = \frac{1}{4}x - 3$.
Use your graph to find:

a) The value of y when $x = 2$
b) The value of y when $x = 0$
c) The value of x when $y = -2$
d) The value of x when $y = -1.5$



Q6 The cost of electricity is calculated using the formula:
Total cost = Fixed charge + (cost per unit × number of units).
Customers can choose two different methods of payment:
Method A: Fixed charge £10, cost per unit 25p
Method B: Fixed charge £40, cost per unit 5p
Copy and complete this table:

Number of Units used	0	100	200	300
Cost using method A				
Cost using method B				

Plot these points on a graph (put the number of units on the horizontal axis, cost or the vertical axis):

a) Use your graph to find the total cost when 70 units are used for:
i) Method A
ii) Method B

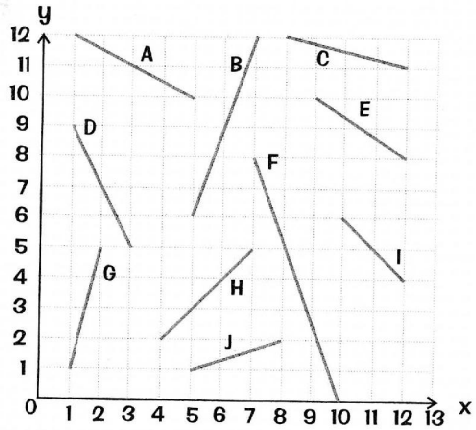
b) Miss Wright used 75 units. Which method should she use to minimize her bill, Method A or Method B?

c) Use your graph to work out how many units Miss Wright would have to use for both methods to cost the same amount.

Finding the Gradient

Q1 What is the gradient of:

a) line A
b) line B
c) line C
d) line D
e) line E
f) line F
g) line G
h) line H
i) line I
j) line J
k) a line parallel to A
l) a line parallel to B
m) a line perpendicular to C?



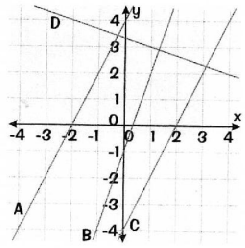
Uphill gradients are always positive, downhill always negative. Impressed? Hmmm....thought not. Can be a bit of an uphill battle, these.

Q2 What is the gradient of the lines joining the points:

a) (3, 5) and (5, 9)
b) (6, 3) and (10, 5)
c) (-6, 4) and (-3, 1)
d) (8, 2) and (4, 10)
e) (8, 5) and (6, 4)
f) (-3, -1) and (1, -4)?

Q3 Look at the graph on the right.

a) Which two lines have the same gradient?
b) Line D is perpendicular to line B.
The equation of line B is $y = 3x - 1$.
Find the gradient of line D.



Q4 Lauren works in a ski resort grading ski runs. A blue run has a gradient shallower than -0.2, a red is steeper than a blue, but has a gradient shallower than -0.25. Anything steeper is a black.
A run covers a horizontal distance of 1.75 km long and descends 400 meters.
What colour should Lauren grade it?

"y = mx + c"

Writing the equation of a line in the form y = mx + c gives you a nifty way of finding the gradient and y-intercept. Remember that — it'll save you loads of time. Anything for an easy life...

Q1 For each of the following lines, give the gradient and the coordinates of the point where the line cuts the y-axis.

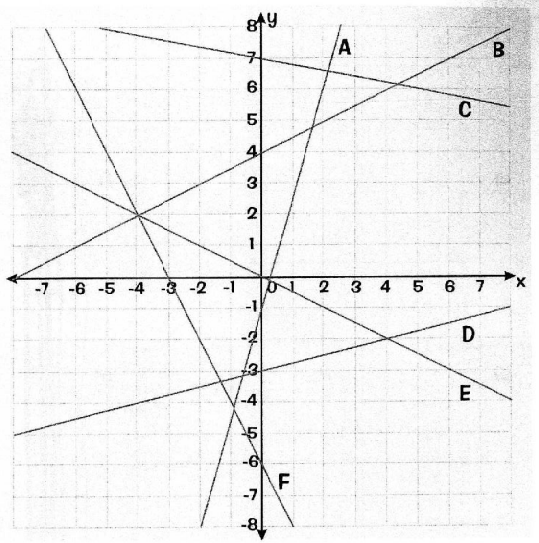
a) $y = 4x + 3$
b) $y = 3x - 2$
c) $y = 2x + 1$
d) $y = -3x + 3$
e) $y = 5x$
f) $y = -2x + 3$
g) $y = -6x - 4$
h) $y = x$
i) $y = -\frac{1}{2}x + 3$
j) $y = \frac{1}{4}x + 2$
k) $3y = 4x + 6$

I know these are a bit algebra-ish, but don't worry, they won't bite.

Q2 Find the equations of the following lines:

a) A
b) B
c) C
d) D
e) E
f) F

Yeah, OK, this sounds a bit scary, but just work out the gradient (m) and look at the y-intercept (c) and pop them back into "y = mx + c"... easy lemons.



Q3 Find the equation of the straight line which passes through:

a) (3, 7) and has a gradient of 1
b) (2, 8) and has a gradient of 3
c) (4, –4) and has a gradient of –1
d) (–1, 7) and has a gradient of –3.

Q4 Write down the equation of the line which passes through the points:

a) (2, 2) and (5, 5)
b) (1, 3) and (4, 12)
c) (1, 0) and (5, –12)
d) (–5, 6) and (–1, –2).

Q5 What is the value of x or y if:

a) the point $(x, 13)$ is on the line $y = 3x + 1$
b) the point $(x, -2)$ is on the line $y = \frac{1}{2}x - 6$
c) the point $(4, y)$ is on the line $y = 2x - 1$
d) the point $(-3, y)$ is on the line $y = -3x$?

Q6 Which of the following points lie on the line $y = 3x - 1$:
(7, 20), (6, 15), (5, 14)?