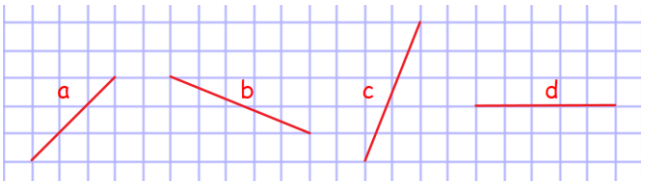
Revision Sheet 2: The Line

Q1. The Line Basics (2nd Year Line – Unit 2)

a) A(2, 3), B(-1, 5), C(3, -4), D(-2, -4), E(0, 4) are five points in the plane. Plot the five points on a coordinate diagram and then find the following:

i) The midpoint of [CE]
ii) The slope of [AB]
iii) |BC| in surd form
iv) The equation of the line through the points A and B.
v) Where the line AB crosses the y-axis
vi) The area of the triangle CDE

b) i) Write down the slopes of the lines shown in the diagram below:



ii) Write down the slope of a line that is parallel to b.

iii) Write down the slope of a line that is perpendicular to c.

Q2. The Line (A bit trickier!)

The equations of 3 lines are shown below. Answer the questions below.

p: $5x - 2y - 3 = 0$ q: $2x + 5y - 7 = 0$ r: $3x - 4y + 12 = 0$

a) Write down the slopes of the lines p, q and r.
b) Investigate if p is perpendicular to q or not.
c) Sketch the line r on a diagram.
d) Find the area of the triangle made by the line r, the x-axis and the y- axis.
e) Investigate if the point (6, -1) is on the line q or not.
f) Find the point of intersection of the lines p and q.
g) Find the equation of the line that is parallel to the line r, and is passing through the point of intersection of the lines p and q. Write your answer in the form $ax + by + c = 0$

Q3. Extra Challenge Questions and Problem Solving:

a) A(5, 2) and B(x, y) are two points. If (2, 4) is the midpoint of [AB], find the coordinates of B.
b) The points (-2, 3) and (6, 5) are the end points of a diameter of a circle. Find the coordinates of the centre of the circle.

c) If the slope of the line through the points (3, 2) and (8, k) is $\frac{3}{5}$, find the value of k.

d) Given the points A(3, 2), B(2, 3), C(-2, -1) and D(k, 5). Find the value of k if AB||CD.

e) Explain what the 'c' represents in the equation of a line that has been written in the form y = mx + c.

f) If the line x + 2y – 6 = 0 is parallel to the line 2x + ky – 5 = 0, find the value of the line k.

g) The slope of the line through (4, -2) and (1, k) is $\frac{1}{3}$. Find the value of k.

h) If the line 2x – 3y + 7 = 0 is perpendicular to the line 3x + ky – 4 = 0, find the value of k.

i) If (1, 4) is on the line 2x + y + p = 0, find the value of p.

j) If (1, t) lies on the line y = 2x + 3, find the value of t.

k) The line ax + y + 1 = 0 passes through the point of intersection of the lines x = 2 and the x-axis. Find the value of a.

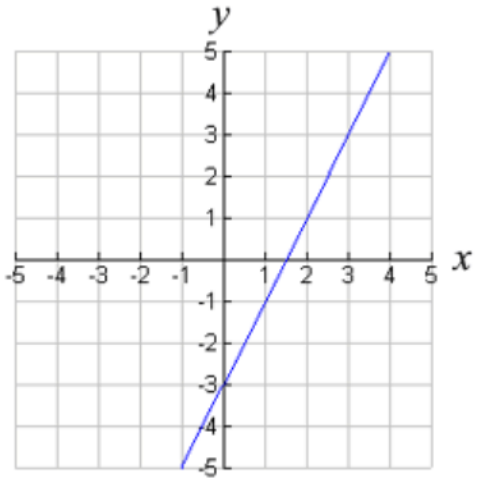
l) A graph of the line y = ax + b is shown on the right.

i) Find the values of a and b.

ii) Sketch the line y = 2x + 3 on the diagram on the right.

iii) Sketch a line with a slope of $-\frac{3}{2}$ onto the diagram also.

iv) Write down the equation of the line you've drawn in part (iii) in the form y = mx + c.



m) Explain what is meant by two lines that are "perpendicular" to each other.

Revision Sheet 2 Solutions:

Q1.

a) i) (1.5, 0) ii) $-\frac{2}{3}$ iii) $\sqrt{97}$ iv) 2x + 3y – 13 = 0

v) x = 0, x = $(0, \frac{13}{3})$ vi) Area = 20 units^2

b) i) Slope a = 1, Slope b = $-\frac{2}{5}$, Slope c = $\frac{5}{2}$, Slope d = 0

ii) Slope of parallel line to b = $-\frac{2}{5}$ iii) Slope of perpendicular line to c = $-\frac{2}{5}$

Q2.

a) slope p = $\frac{5}{2}$, slope q = $-\frac{2}{5}$, slope r = $\frac{3}{4}$ b) Yes it is. c) crosses axes at (-4, 0) and (0, 3)

d) Area = 6 units^2 e) Yes it is. f) (1, 1) g) 3x – 4y + 1 = 0

Q3.

a) (-1, 6) b) (2, 4) c) k = 5 d) k = -8 e) The y-axis intercept.

f) k = 4 g) k = -3 h) k = 2 i) p = -6 j) t = 5 k) a = $-\frac{1}{2}$

l) i) a = 2, b = -3 ii) Parallel line going through (0,3)

m) 2 lines that intersect each other at 90°