

## The Properties of Linear Functions

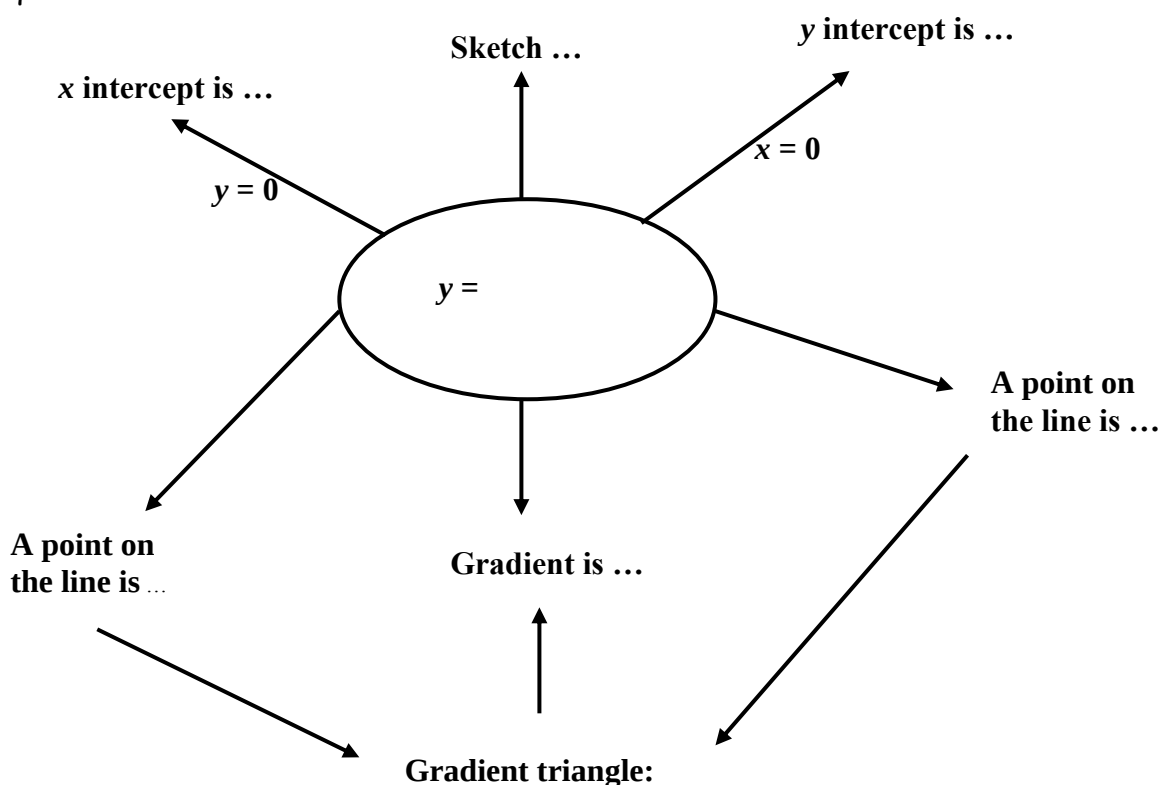
### Introduction

Write  $y = 2x + 1$  in the middle of the board. Ask students to contribute anything they know about the function. Students may suggest that the graph of the function produces a straight line, where the  $y$  intercept occurs, the value of the gradient of the graph of the function and some of the points through which the graph passes. Write everything on the board without explanation.

- Ask for an explanation for each property suggested.
- Ask students to explain how they know whether a point lies on the line.
- Use two of the suggested points to calculate the gradient of the line and compare with the equation of the function.
- Substitute the value  $x = 0$  into the function and solve for  $y$ . Link this to the value of the  $y$  intercept. It is important that students do not rely on finding the  $y$  intercept from the equation as not all equations are given in the form  $y =$
- Substitute the value  $y = 0$  to find the  $x$  intercept.

### Activity One

Working in pairs, give each group a different linear equation the form  $y = mx + c$ . Students are required to re-produce and complete the diagram below for their equation.



## Activity Two

Students are given an equation of the form  $ax + by = c$  (e.g.  $3x + 4y = 12$ ) and are required to complete the diagram again. It is important to generate discussion about the issues raised when completing the task. Extension ideas include using the general equation  $ax + by = c$  or  $ay = mx + c$

## Activity Three

Ask a series of questions, such as the examples given below, to reinforce and assess learning.

Rules:

- Students can answer on mini whiteboards
- Students score a point for a correct answer not given by anyone else in the class.
- Students score zero if their answer is matched by another student.
- Students lose a point for an incorrect answer.

Student's answers can lead to discussion of misconceptions.

Suggested questions:

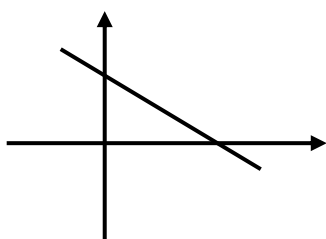
Give an example of an equation whose graph has a y intercept of 5.

Give an example of an equation whose graph has a x intercept of 2.

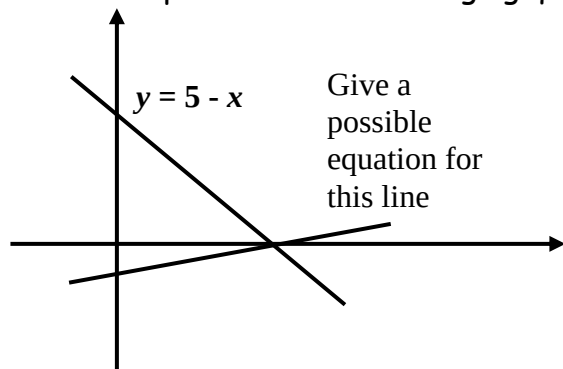
Give an example of an equation whose graph has a gradient of 4.

Give an example of an equation whose graph passes through the point (3, 5).

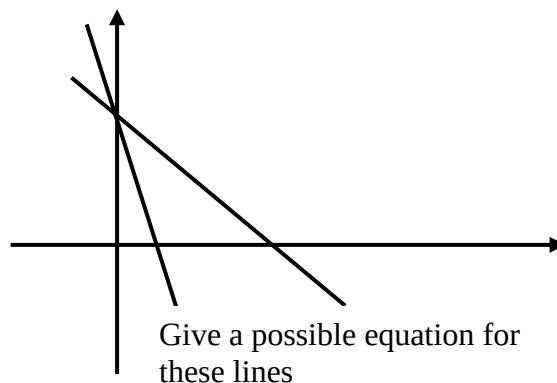
Give a possible equation that has the graph:



Examples of more challenging questions:



Give a possible equation for this line



Give a possible equation for these lines

#### Activity Four

Students are given the following diagram and set of equations and are asked to identify which line matches which equation and give reasons for their solution. The activity gives the opportunity to solve simultaneous equations and to find points of intersection. (Note: only one solution is an integer solution)

