 Investigating linear graphs

Your investigation

Task 1 – Linear vs non-linear

Use graphing software or a table of values to draw each of the following graphs. Next to each, place a ✔if it is a straight line, or a 🗙 if it is anything else.

TIP: You may find it easier if you draw each graph on a fresh screen or page. This will save cluttering up your screen.



Look back at the equations you marked as producing straight lines. Try and write a sentence to describe how you can tell whether an equation will produce a straight line or not.

Task 2 – Exploring linear graphs

Draw the graph . This is the most basic straight line. You should keep this graph as a reference for every graph you draw below. You can use a table of values, a pen or pencil and a ruler or you can use an online graphing tool like DESMOS or Geogebra.

Changing the positive coefficient of

The coefficient of x is the number immediately before x. In the first question it is a 2. Draw each of the following graphs, considering how each compares to .

Changing the negative coefficient of

The coefficient of x is the number immediately before x. In the first question it is a -1 and in the second it is -2. Draw each of the following graphs, considering how each compares to .



Adding a constant

Investigate what happens when you add or subtract a constant (number). In the first question it is and in the second it is . Draw each of the following graphs, considering how each compares to .

Mixed questions

Draw each of the following graphs. Before you draw them try to think about how each graph will compare to . For example, will it be steeper or flatter? Will it be sloping in a different direction? Will it be shifted up or down?

Generalising your findings

When the rule is in the form , can you write down what and will do to the graph. Remember to think about what happens if they are a negative number or a fraction.

Task 2 – Exploring special linear graphs

What about these straight lines? Try graphing these now. You can use a table of values, a pen or pencil and a ruler or you can use an online graphing tool like DESMOS or Geogebra.

Write a sentence to help you predict what the graph will look like, just by looking at the rule.

Outcomes

* MA5.1-1WM uses appropriate terminology, diagrams and symbols in mathematical contexts
* MA5.1-3WM provides reasoning to support conclusions that are appropriate to the context
* MA5.1-6NA determines the midpoint, gradient and length of an interval, and graphs linear relationships
* MA5.2-1WM selects appropriate notations and conventions to communicate mathematical ideas and solutions
* MA5.2-3WM constructs arguments to prove and justify results
* MA5.2-9NA uses the gradient-intercept form to interpret and graph linear relationships
* MA5.3-8NA uses formulas to find midpoint, gradient and distance on the Cartesian plane, and applies standard forms of the equation of a straight line