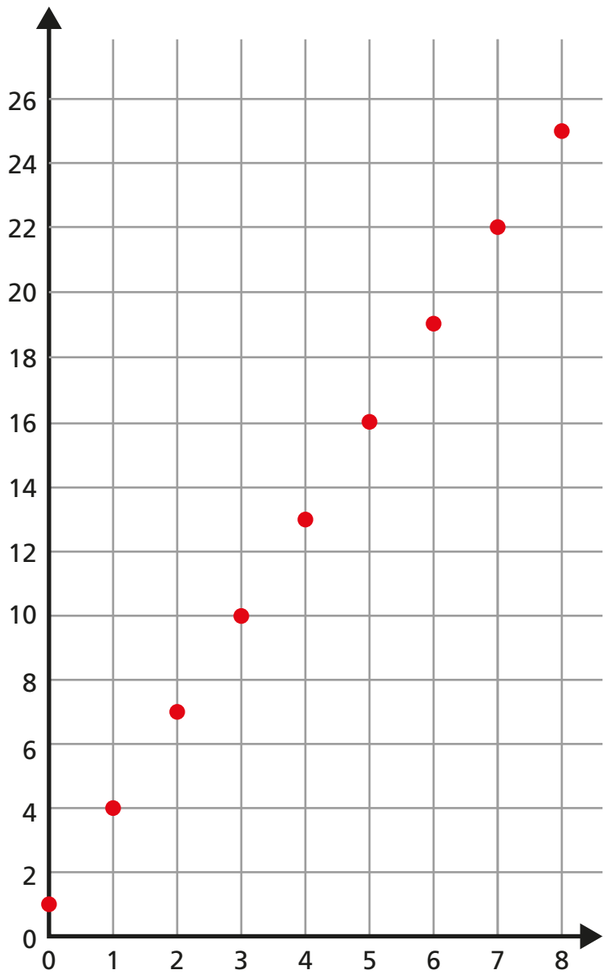
Represent functions graphically

1 Here is a graph for the sequence $3n + 1$



a) Use a graphing program to plot the line $y = 3x + 1$

b) What is the same about the graphs?

They have the same coordinates on them.

c) What is different about the graphs?

The points for a sequence don't join up because you can't have a decimal term.

2 Use a graphing program to plot each of the following pairs.

a) $y = 4x$ $y = 3x - 1$

What do you notice about the lines?

They are both straight lines sloping upwards.

b) $y = -4x$ $y = 6 - 5x$

What do you notice about the lines?

They are both straight lines sloping downwards.

c) $y = 3$ $y = -5$

What do you notice about the lines?

They are both horizontal.

3 Use a graphing program to plot these lines.

a) $y = \frac{x}{2} + 3$

b) $y = 0.5x + 3$

c) $y = \frac{x + 3}{2}$

d) $y = x^2 + 3$

What are the similarities and differences?

Explain how this links to linear and non-linear sequences.

a, b, c are straight lines (linear)
d is not (non-linear)

4 Compare the graphs of $y = x^3$ and $y = 3x$.

a) What are the similarities and differences?

b) Which graph is linear? $y = 3x$

c) Which graph is non-linear? $y = x^3$

5 Plot the graphs to compare the equations.

$y = 2x$ ☑	$y = x^2$ ☐	$y = x^2 + 2$ ☐	$y = x^2 - 2$ ☐
$y = 2x^2$ ☐	$y = 2^x$ ☐	$y = \frac{2}{x}$ ☐	

Tick the equations that show linear graphs.

6 How can you tell from an equation whether a graph is going to be linear?

The x is to the power of 1

7 Tick the equations that will produce a linear graph.

a) $y = 2x - 5$ ☑

b) $y = 5 - 2x$ ☑

c) $y = 2(x - 5)$ ☑

d) $y = x^2 + 5$ ☐

e) $y = 2x^2 + 5$ ☐

f) $y = 0.2x - 5$ ☑

g) $y = -5 - 0.2x$ ☑

h) $y = \frac{x}{2} + 5$ ☑

i) $y = \frac{1}{2}x + 5$ ☑

j) $y = 5 - \frac{1}{2}x$ ☑

k) $y = 2x$ ☑

l) $y = \frac{x}{2}$ ☑

m) $y = \frac{2}{x}$ ☐

n) $y = 2$ ☑

Check your answers with a graphing program.