Sequences, Functions and Graphs (Higher)

THIRD SPACE LEARNING

Sequences

Calculate the missing terms in each sequence:

a) 7, -1, -9, ___, -25, ___, …

b) 1, 3, 6, 10, ___, ___, …

c) 2, 2, 4, 6, 10, 16, ___, ___, …

d) 256, ___ , ___ , 32, 16, …

e) 0.4, 0.65, 0.9, ___, 1.4, ___ , …

Function notation

Given that $f(x) = 2x + 3$ and $g(x) = 5 - 4x$,

a) Find $f(4)$

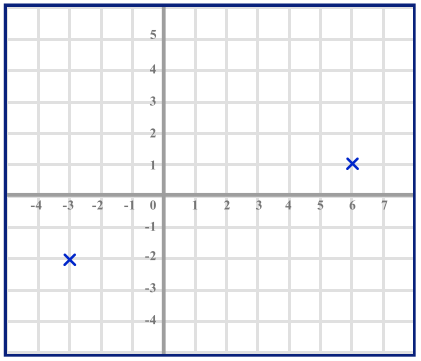
b) Find $g(3)$

c) Find $2f(5)$

d) Solve $f(x) = 0$

e) Solve $f(x) = g(x)$

Linear graphs

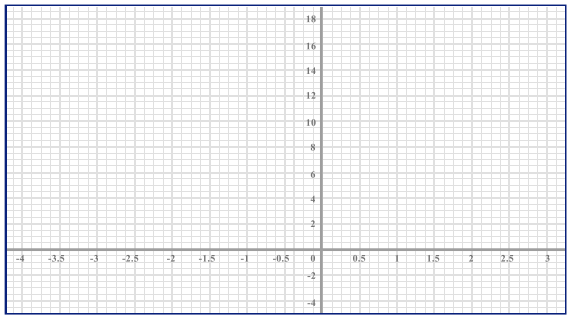


a) Write the coordinates of points A and B.

b) Find the coordinates of point C, the midpoint of AB.

c) In the form $y = mx + c$, find the equation of the line passing through A,B and C

Quadratic graphs



a) Plot the graph of $y = 2x^2 + 3x - 2$, labelling the x and y intercepts.

b) By writing $y = 2x^2 + 3x - 2$ in the form $y = a(x + b)^2 + c$ find the coordinates of the turning point.

Using the nth term

The nth term for a sequence is $3n + 7$.

a) Find the first five terms of the sequence

b) Find the 30th term of the sequence.

c) Is 212 in this sequence?

d) Which position does the term 76 hold in the sequence?

Inverse functions

Let $f(x) = 7 + 3x$, $g(x) = \frac{x-2}{7}$, and $h(x) = 3(2x - 5)$

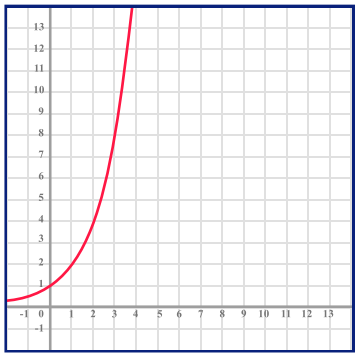
Find:

a) $f^{-1}(x)$

b) $g^{-1}(x)$

c) $h^{-1}(x)$

Exponential and reciprocal graphs

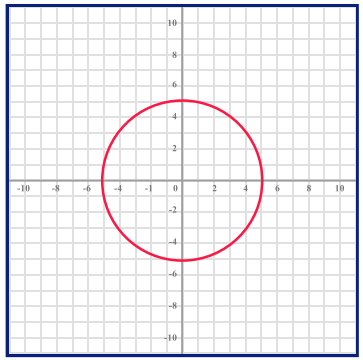


Shown above is the graph of $y = 2^x$.

a) Plot also the graph of $y = \frac{8}{x}$ for $x > 0$

b) Hence, solve the equation $2^x = \frac{8}{x}$ for $x > 0$

Circle graphs



a) Write the equation of the circle graph shown above.

b) Find the equation of the line that is a tangent to the circle at the point (3, 4), giving your answer in the form $ax + by + c = 0$.

Finding the nth term

Find the nth term rule for each sequence:

a) 11, 20, 29, 38, 47, ...

b) $\frac{1}{2}$, $1\frac{1}{4}$, 3, $3\frac{3}{4}$, $4\frac{1}{2}$, ...

c) 4, 1, -2, -5, -8, ...

d) 4, 7, 12, 19, 28, ...

e) 3, 10, 21, 36, 55, ...

Composite functions

Let $f(x) = 5x$, $g(x) = x^2$ and $h(x) = x - 3$

Find:

a) $f(x) - h(x)$

b) $gh(x)$

c) $hg(x)$

d) $gfh(x)$