

Sequences

Calculate the missing terms in each sequence:

- 7, -1, -9, -17, -25, -33, ...
- 1, 3, 6, 10, 15, 21, ...
- 2, 2, 4, 6, 10, 16, 26, 42, ...
- 256, 128, 64, 32, 16, ...
- 0.4, 0.65, 0.9, 1.15, 1.4, 1.65, ...

Using the n^{th} term

The n^{th} term for a sequence is $3n + 7$.

- Find the first five terms of the sequence
10, 13, 16, 19, 22
- Find the 30th term of the sequence.
97
- Is 212 in this sequence?
No
- Which position does the term 76 hold in the sequence?
23rd

Finding the n^{th} term

Find the n^{th} term rule for each sequence:

- 11, 20, 29, 38, 47, ... $9n + 2$
- $\frac{1}{2}, 1\frac{1}{4}, 3, 3\frac{3}{4}, 4\frac{1}{2}, \dots \frac{3}{4}n - \frac{1}{4}$
- 4, 1, -2, -5, -8, ... $7 - 3n$
- 4, 7, 12, 19, 28, ... $n^2 + 3$
- 3, 10, 21, 36, 55, ... $2n^2 + n$

Function notation

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

- Find $f(4) = 11$
- Find $g(3) = -7$
- Find $2f(5) = 26$
- Solve $f(x) = 0$ $x = -\frac{3}{2}$
- Solve $f(x) = g(x)$ $x = \frac{1}{3}$

Inverse functions

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

Find:

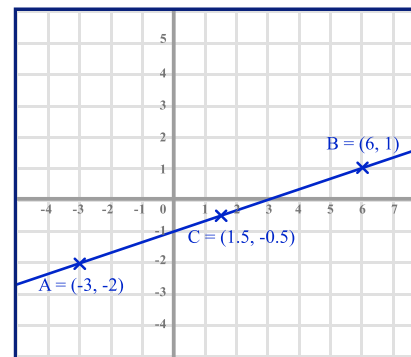
- $f^{-1}(x) = \frac{x-7}{3}$
- $g^{-1}(x) = 7x + 2$
- $h^{-1}(x) = \frac{1}{2}(\frac{x}{3} + 5)$ or $\frac{x+15}{6}$

Composite functions

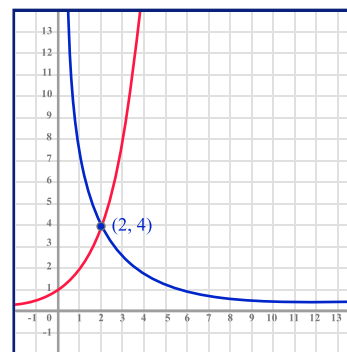
Let $f(x) = 5x$, $g(x) = x^2$ and $h(x) = x - 3$

Find:

- $f(x) - h(x) = 4x + 3$
- $gh(x) = x^2 - 6x + 9$
- $hg(x) = x^2 - 3$
- $gf h(x) = 25x^2 - 150x + 225$

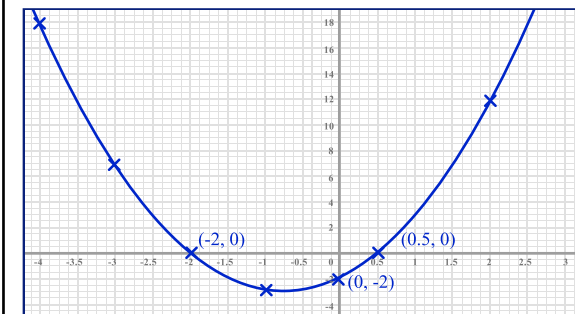
Linear graphs

- Write the coordinates of points A and B. $A(-3, -2)$ and $B(6, 1)$
- Find the coordinates of point C, the midpoint of AB. $C(1.5, -0.5)$
- In the form $y = mx + c$, find the equation of the line passing through A, B and C. $y = \frac{1}{3}x - 1$

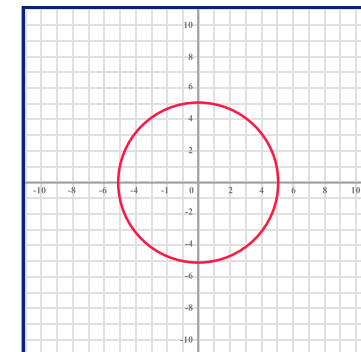
Exponential and reciprocal graphs

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

- Plot also the graph of $y = \frac{8}{x}$ for $x > 0$
See diagram
- Hence, solve the equation $2^x = \frac{8}{x}$ for $x > 0$
 $x = 2$

Quadratic graphs

- Plot the graph of $y = 2x^2 + 3x - 2$, labelling the x and y intercepts. See diagram
- By writing $y = 2x^2 + 3x - 2$ in the form $y = a(x + b)^2 + c$ find the coordinates of the turning point.
 $y = 2(x + \frac{3}{4})^2 - \frac{25}{8}$, vertex at $(-\frac{3}{4}, -\frac{25}{8})$

Circle graphs

- Write the equation of the circle graph shown above.
 $x^2 + y^2 = 25$
- Find the equation of the line that is a tangent to the circle at the point (3, 4), giving your answer in the form $ax + by + c = 0$.
 $3x + 4y - 25 = 0$