Mathematics

Applying tranformation of functions on unknown graphs

Knowledge Check

a. Copy and complete the table of values for the function

$$y = x^3 + x^2 - 2$$

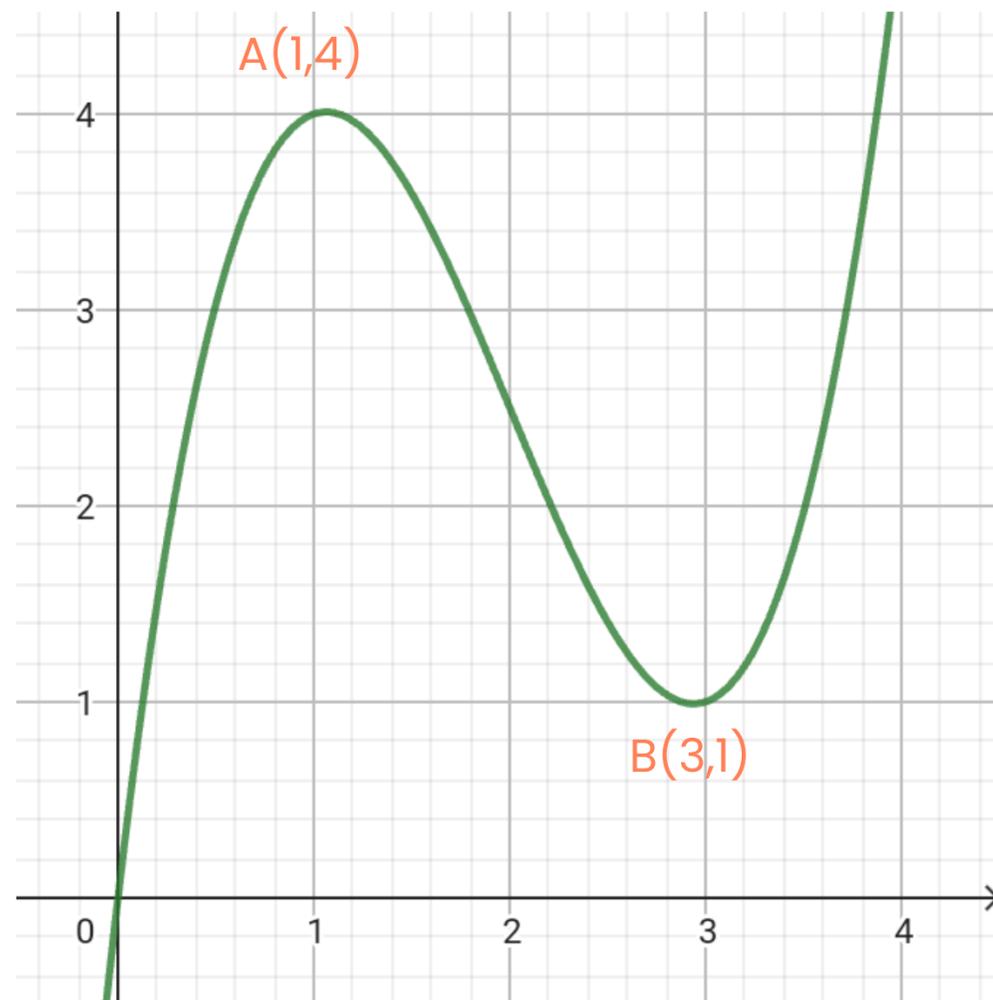| x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
y	-6	-3.125			-2	-1.625			

b. Use your table of values to draw the graph of

$$y = x^3 + x^2 - 2$$

Transforming functions

Transforming the function to $f(x+1)$:

The diagram shows a sketch of a curve $f(x)$ which passes through the origin. The points A(1 , 4) and B(3 , 1) lie on the curve.

A(1,4)

B(3,1)

A(0,4)

The graph is translated 1 unit towards $-x$-axis.

B(2,1)
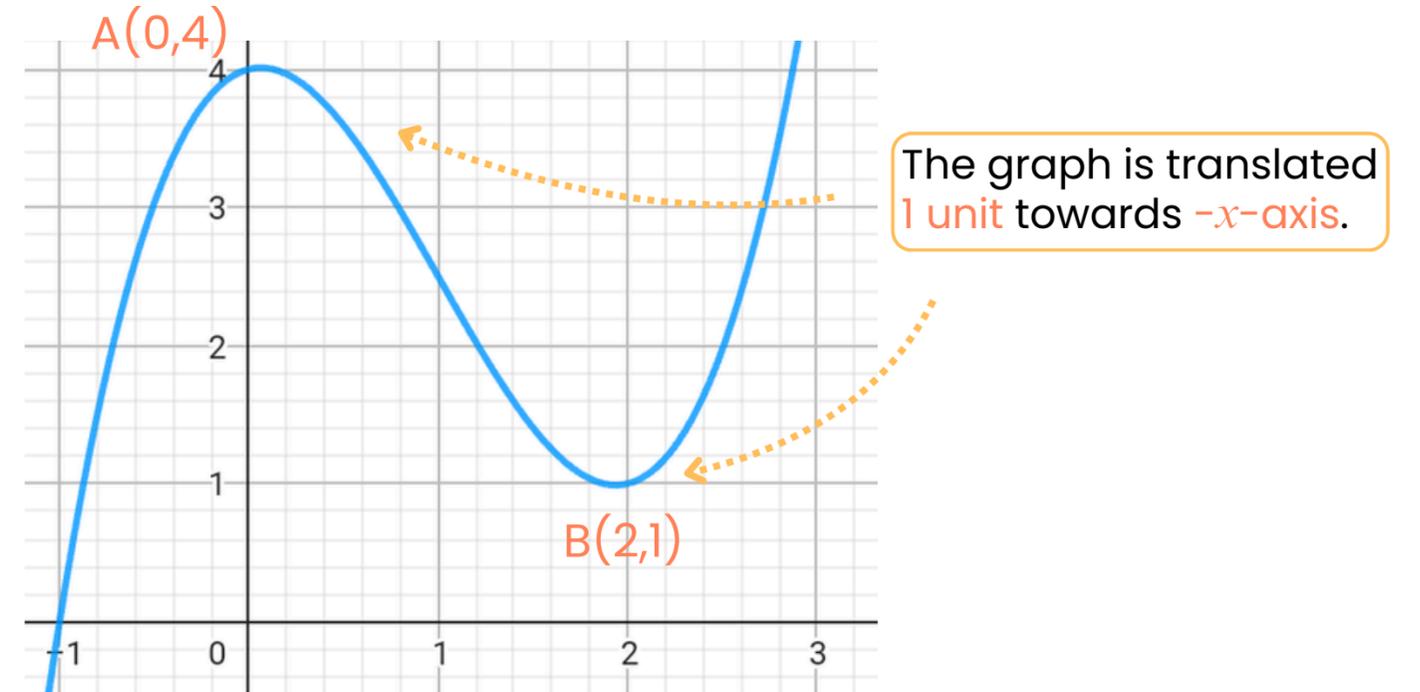
Table of coordinates:

Points	Original Coordinates	Transformed coordinates
A	(1 , 4)	(0 , 4)
B	(3 , 1)	(2 , 1)

Transforming the function to f(x – 1):

Transforming the function to f(x) – 4:

A(2,4)

The graph is translated 1 units towards +x-axis.

B(4,1)

A(1,0)

The graph is translated 4 units towards –y-axis.

B(3,–3)
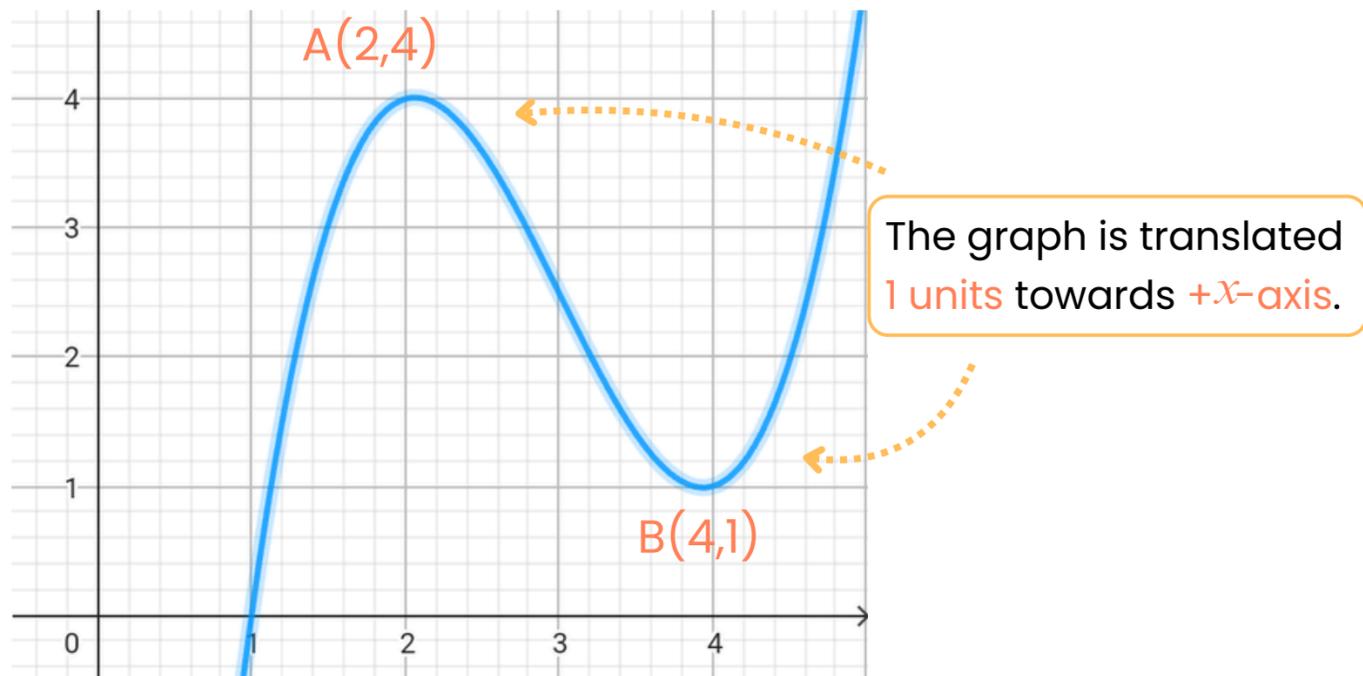
Table of coordinates:

Points	Original Coordinates	Transformed coordinates
A	(1 , 4)	(2 , 4)
B	(3 , 1)	(4 , 1)

Table of coordinates:
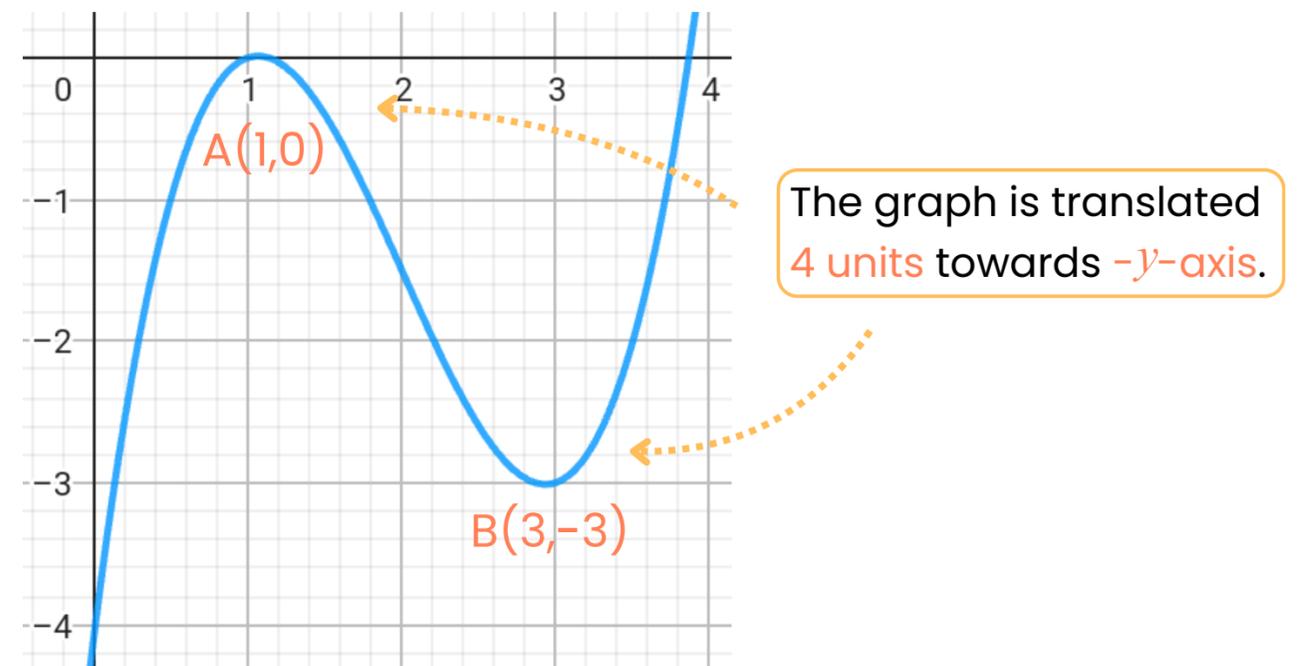
Points	Original Coordinates	Transformed coordinates
A	(1 , 4)	(1 , 0)
B	(3 , 1)	(3 , -3)

Transforming the function to $\frac{1}{2}f(x)$:

A(1,2)

B(3,0.5)

The y-coordinates became the half of original.
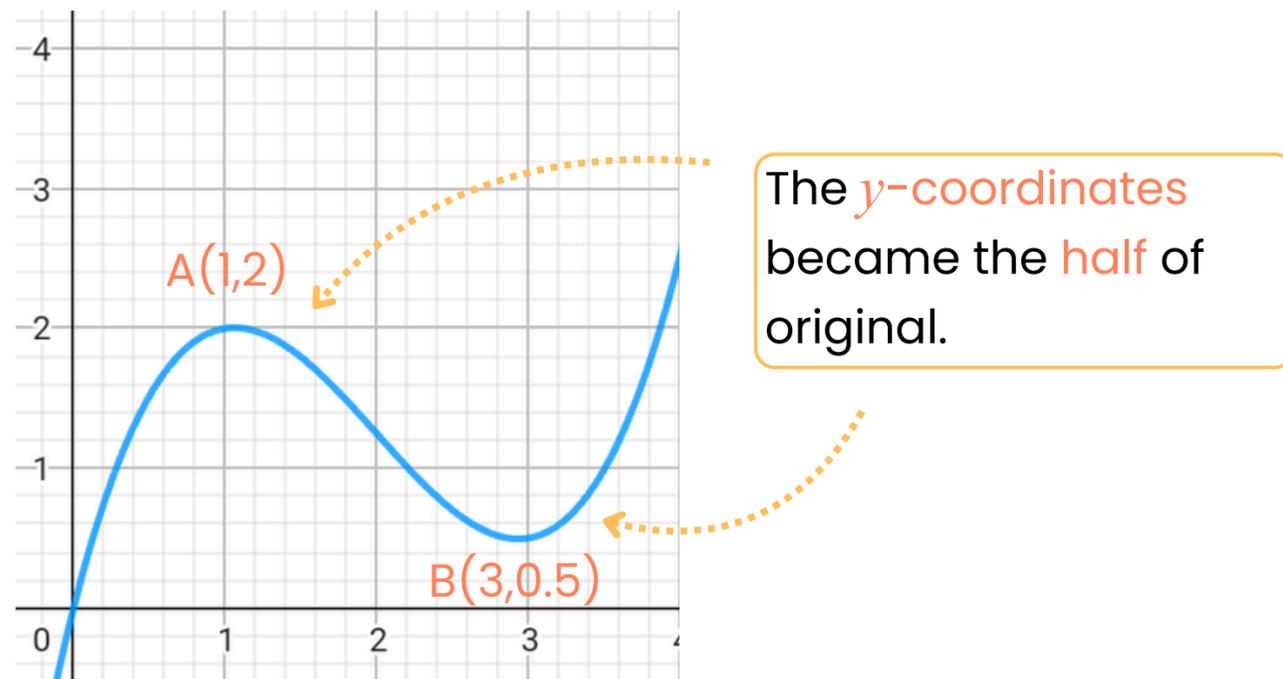
Table of coordinates:

Points	Original Coordinates	Transformed coordinates
A	$(1,4)$	$(1,2)$
B	$(3,1)$	$(3,0.5)$

Transforming the function to $f(x) + 1$:

A(1,5)

A(3,2)

The graph is translated 1 units towards $+y$-axis.
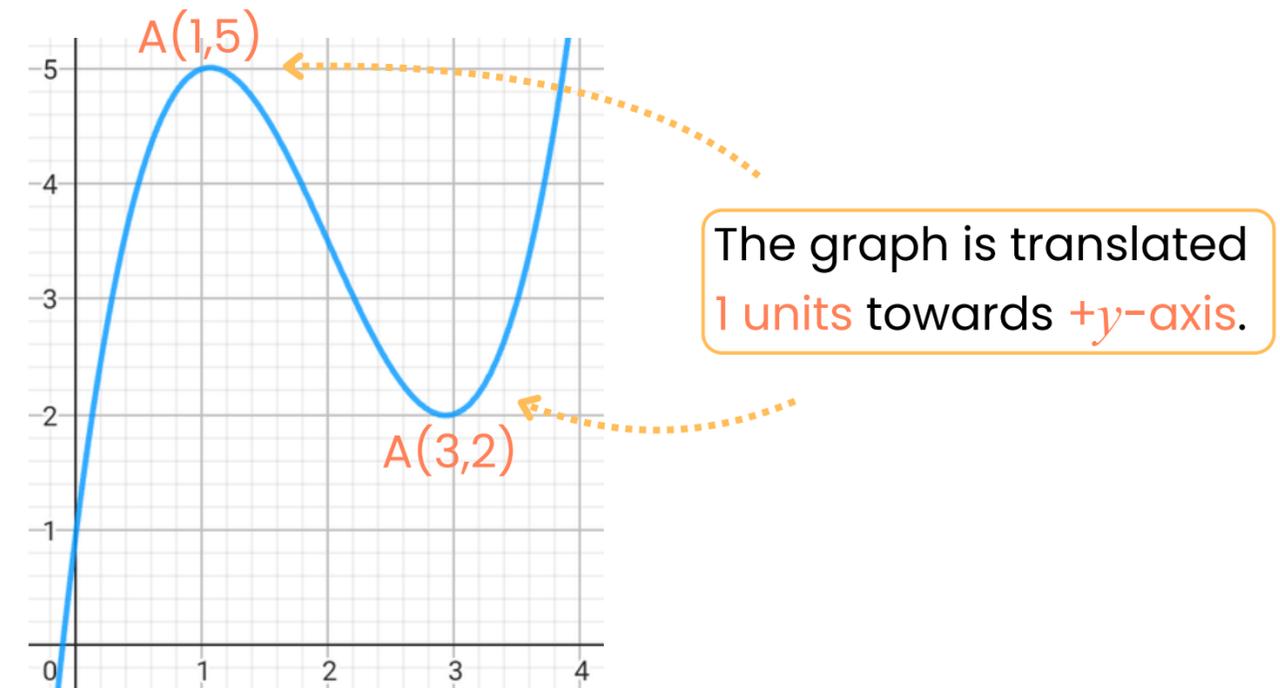
Table of coordinates:

Points	Original Coordinates	Transformed coordinates
A	$(1,4)$	$(1,5)$
B	$(3,1)$	$(3,2)$

1. The following diagram shows a sketch of the curve with equation $y = f(x)$. The points A$(0,2)$, B$(1,0)$, C$(4,4)$ and D$(6,0)$ lie on the curve.
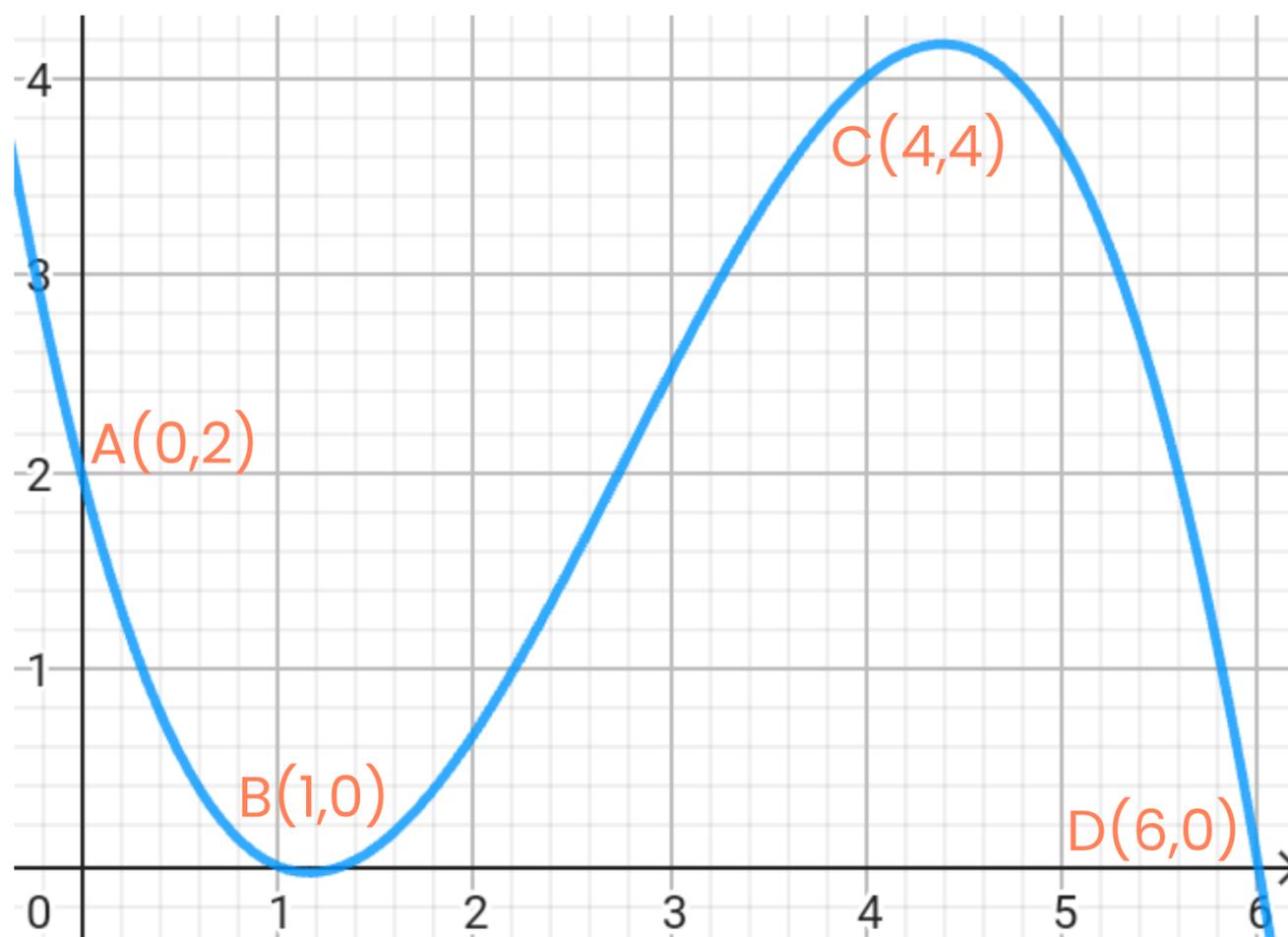
Sketch the following graphs and give the coordinates of points A, B, C and D after each transformation.

a. $f(x + 1)$

b. $f(x) - 4$

c. $f(x) + 4$

d. $f(2x)$

e. $3f(x)$

f. $f(\frac{1}{2}x)$

The point P$(2,1)$ lies on the graph with equation $y = f(x)$.

a. On the graph of $y = f(ax)$, the point P is transferred to the Q$(4,1)$.

Determine the value of a.

b. Write down the coordinates of points to which P maps under

transformation.

i. $f(x - 4)$ ii. $3f(x)$ iii. $\frac{1}{2}f(x) - 4$

Let's Recap!

1. What did we learn today?

2. What was your favorite part about today's lesson?

3. Was there anything that you found challenging?