# Cubic Graph

T1

1. a. Show that x = 2 is a solution of the equation $x^3 - x - 6 = 0$.

$(2)^3 - 2 - 6 = 8 - 2 - 6 = 8 - 8 = 0$

b. The diagram opposite shows the graph of $y = x^3 - x - 6$.

i Write down the coordinates of point A. (2,0)

ii Use the graph to explain why there is only one solution to the equation. $x^3 - x - 6 = 0$.

The graph crosses the x axis only once.

2. a. Find the coordinates of point B. (0, -6)

b.

i What transformation changes the graph of $y = x^3 - x - 6$ into the graph of $y = x^3 - x$ ?

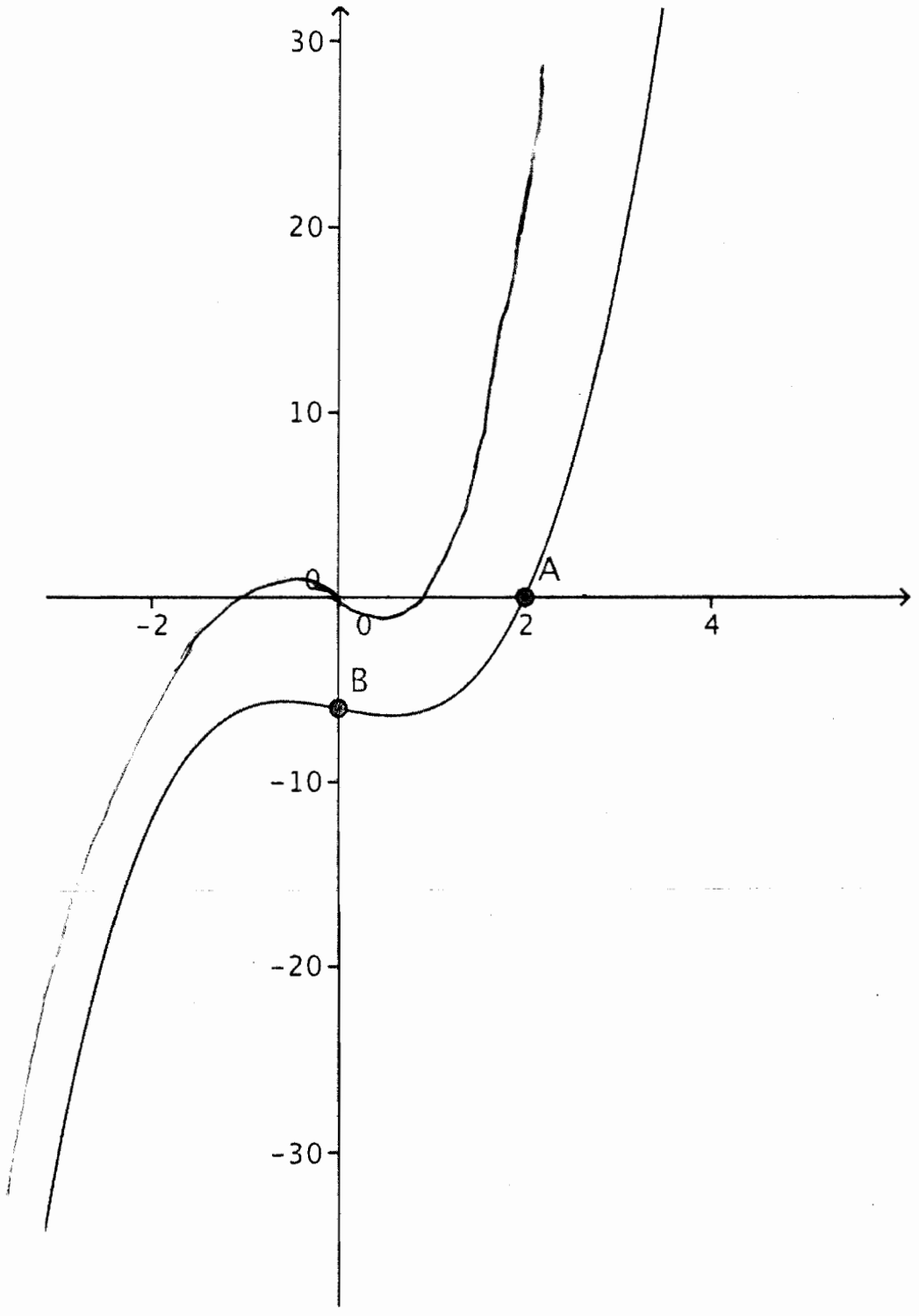
Translate 6 units up

ii Sketch the graph of $y = x^3 - x$ on the diagram.

iii What are the solutions of the equation $x^3 - x = 0$? 0, −1, 1

$x(x^2 - 1) = 0$ 0, 1, -1

$x(x+1)(x-1) = 0$



# Cubic Graph

T2

1. a. Show that x = 2 is a solution of the equation $x^3 - x - 6 = 0$.

$2^3 - 2 - 6 = 0$

$8 - 2 - 6 = 0$

$0 = 0$

b. The diagram opposite shows the graph of $y = x^3 - x - 6$.

i Write down the coordinates of point A. (2,0)

ii Use the graph to explain why there is only one solution to the equation. $x^3 - x - 6 = 0$.

The equation is not a parabola and only intersects the x-axis at one point, so there is only one solution

2. a. Find the coordinates of point B. (0, -6)

b.

i What transformation changes the graph of $y = x^3 - x(-6)$ into the graph of $y = x^3 - x(?)$

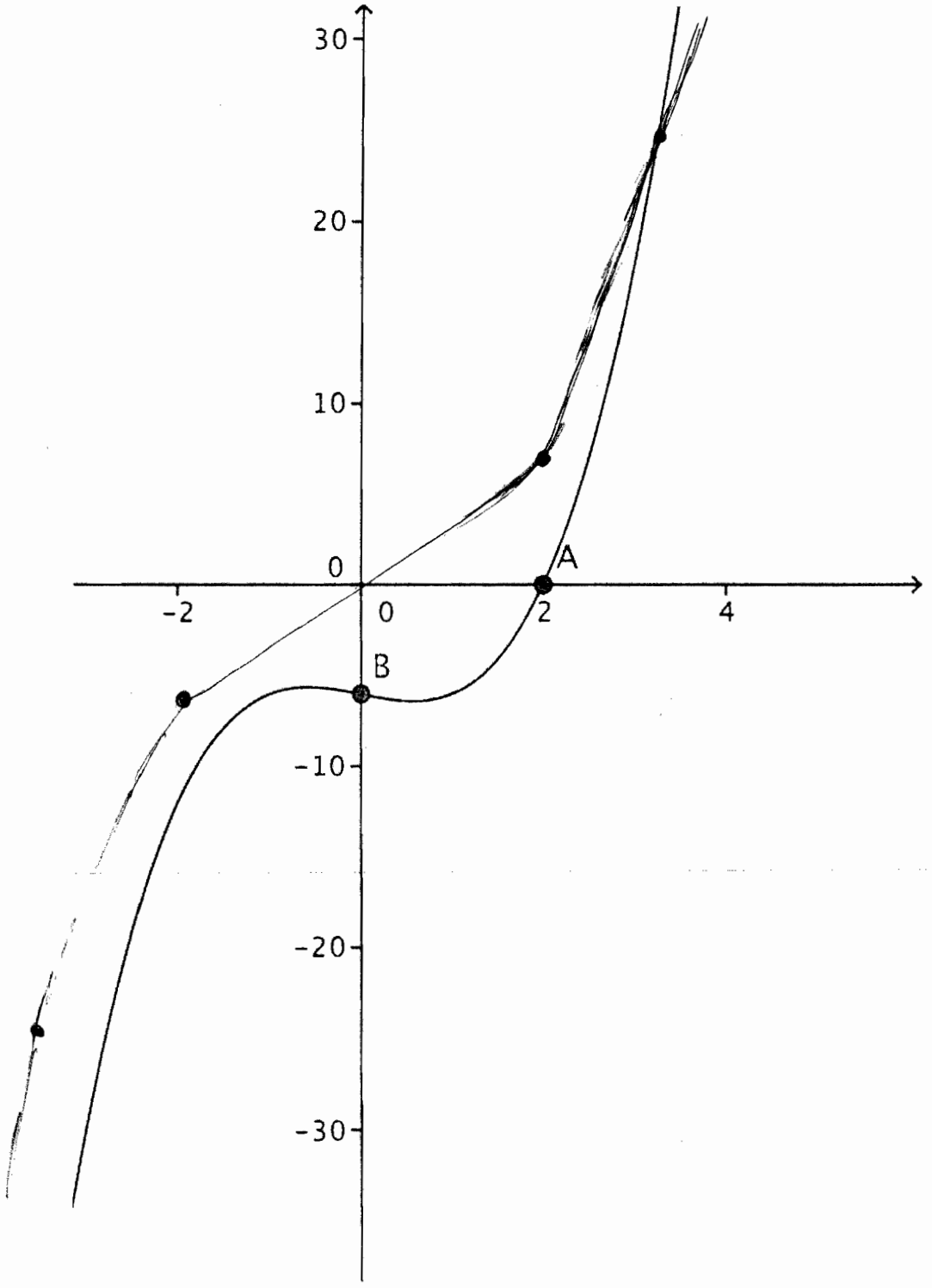
slide up 6

ii Sketch the graph of $y = x^3 - x$ on the diagram.

Iii What are the solutions of the equation $x^3 - x = 0$? x=0,

$1^3 - 1 = 0$ $0^3 - 0 = 0$ $(-1)^3 + 1$

$-1 + 1 = 0$



# Cubic Graph

**T3**

1. a. Show that x = 2 is a solution of the equation $x^3 - x - 6 = 0$.

$x^3 - x - 6$

$2^3 - 2 - 6 \stackrel{?}{=} 0$

$8 - 2 - 6 \stackrel{?}{=} 0 \quad 6 - 6 = 0 \quad 0 = 0$

b. The diagram opposite shows the graph of $y = x^3 - x - 6$.

i Write down the coordinates of point A. (2,0)

ii Use the graph to explain why there is only one solution to the equation. $x^3 - x - 6 = 0$.

The graph crosses the x axis onlyonce.

2. a. Find the coordinates of point B. (0,-6)

b.

i What transformation changes the graph of $y = x^3 - x - 6$ into the graph of $y = x^3 - x$ ?

It moves 6units up

ii Sketch the graph of $y = x^3 - x$ on the diagram.

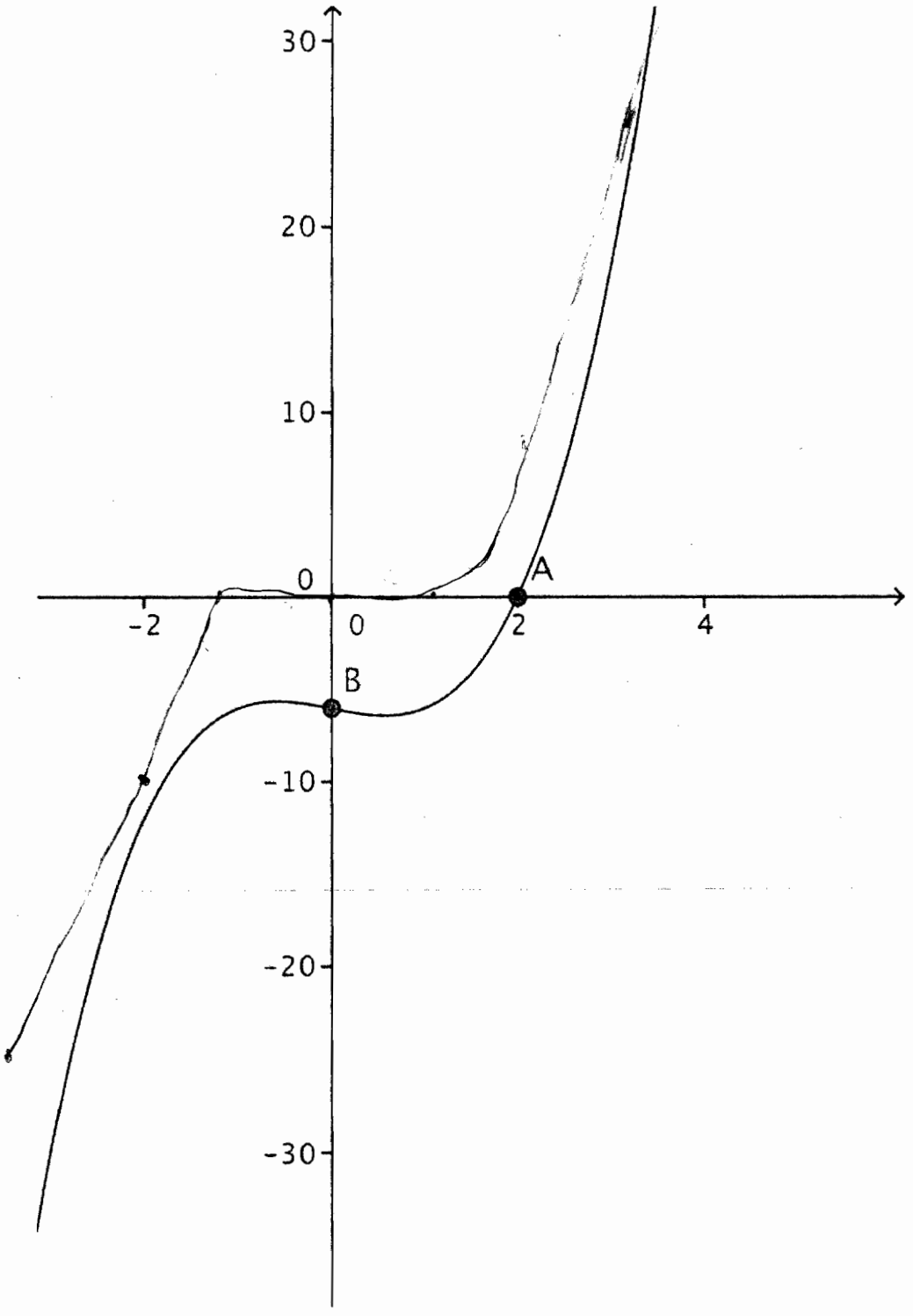
| x | y |
|---|---|
| 0 | 0 |
| 1 | 0 |
| -1 | 0 |

| x | y |
|---|---|
| 2 | 6 |
| -2 | -10 |
| 3 | 24 |
| -3 | -24 |

Iii What are the solutions of the equation $x^3 - x = 0$? 0, 1, -1

$x(x^2 - 1) = 0$

$x(x-1)(x+1) = 0$



# Cubic Graph

**T4**

1. a. Show that x = 2 is a solution of the equation $x^3 - x - 6 = 0$.

$(2)^3 - 2 - 6 = 0$

$8 - 2 - 6 = 0$

$6 - 6 = 0$

b. The diagram opposite shows the graph of $y = x^3 - x - 6$.

i Write down the coordinates of point A. (2,0)

ii Use the graph to explain why there is only one solution to the equation. $x^3 - x - 6 = 0$.

the line intercepts the x-axis only at one point, so there is only one solution, one 'x' value.

2. a. Find the coordinates of point B. $y = 0 - 0 - 6 = 0$ (0,-6)

b.

i What transformation changes the graph of $y = x^3 - x - 6$ into the graph of $y = x^3 - x$ ?

move the graph up by 6, all y values increase by 6, x values remain the same

ii Sketch the graph of $y = x^3 - x$ on the diagram.

$y = 8 - 2 = 6$

Iii What are the solutions of the equation $x^3 - x = 0$?

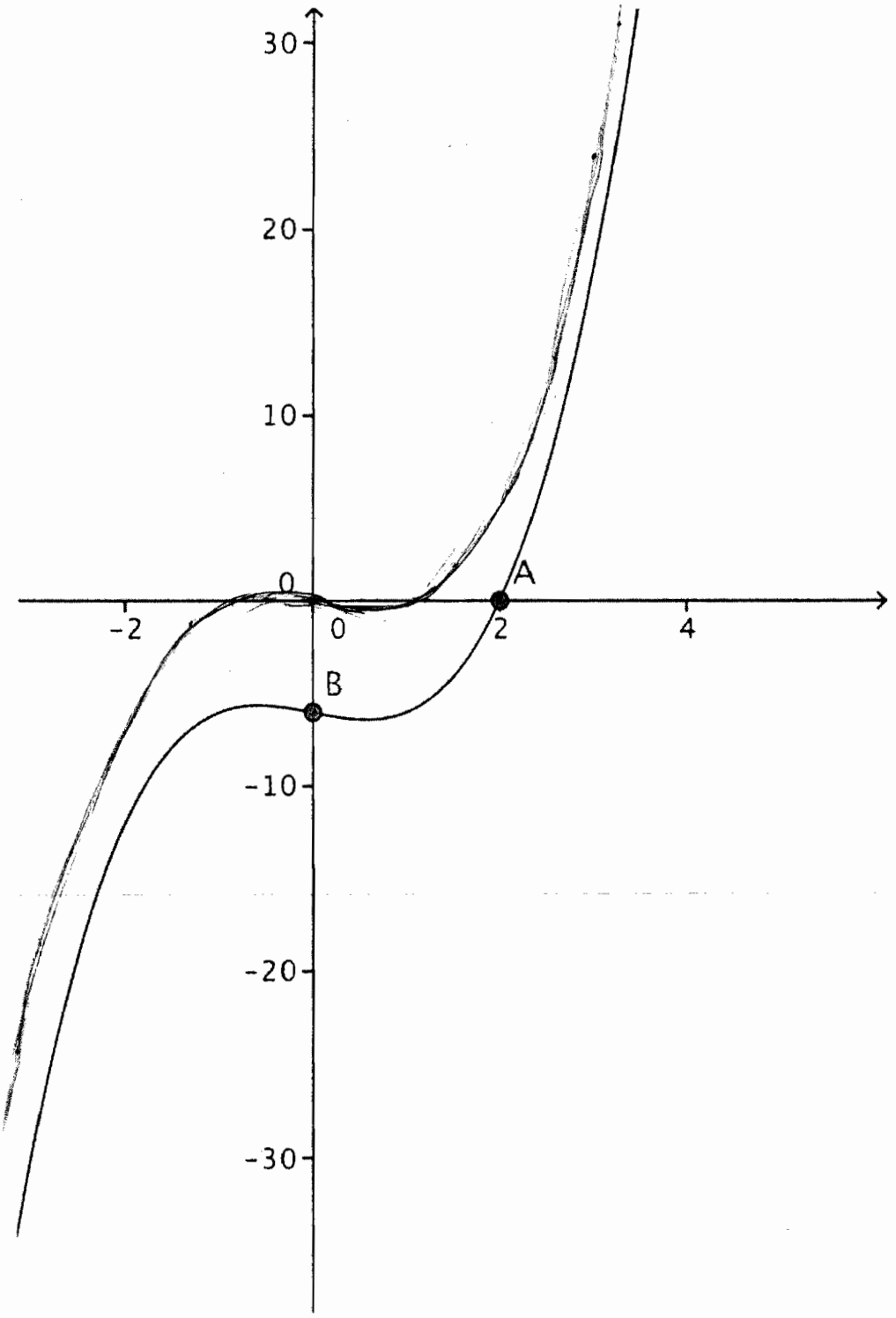
1, -1

$x(x^2 - 1) = 0$

$x^2 - 1 = 0$

$(x+1)(x+1)$

$x = 1$ or $-1$



# Cubic Graph

**T5**

1. a. Show that x = 2 is a solution of the equation $x^3 - x - 6 = 0$.

$2^3 - 2 - 6 = 0$
$8 - 2 - 6 = 0$
$6 - 6 = 0$
$0 = 0$ ✓

b. The diagram opposite shows the graph of $y = x^3 - x - 6$.

i Write down the coordinates of point A. (2,0)

ii Use the graph to explain why there is only one solution to the equation. $x^3 - x - 6 = 0$.

The line passes through the x-axis only in one location.

2. a. Find the coordinates of point B. $0^3 - 0 - 6 = y$, $-6 = y$ (0,-6)

b.

i What transformation changes the graph of $y = x^3 - x - 6$ into the graph of $y = x^3 - x$ ?

$y = x^3 - x - 6$ has been translated up 6 units.

ii Sketch the graph of $y = x^3 - x$ on the diagram.

(0,0) (-1,0)
(1,0) (-2,-6)
(2,6) (-3,-24)
(3,24) (-4,-60)
(4,60)

$\frac{6-0}{1-0} \quad \frac{0}{1}$

$\frac{6-0}{2-1} \quad \frac{6}{1} = 6$

Iii What are the solutions of the equation $x^3 - x = 0$? (-1,0), (0,0), (1,0)