Cubic Graph

T1

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

$(2)^3 - 2 - 6 = 8 - 2 - 6 = 8 - 8 = 0$ ✓ 1

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

i Write down the coordinates of point A. $(2, 0)$ ✓ 1

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. ✓ 1

2. a. Find the coordinates of point B. $(0, -6)$ ✓ 1

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 ✓ 2

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

2

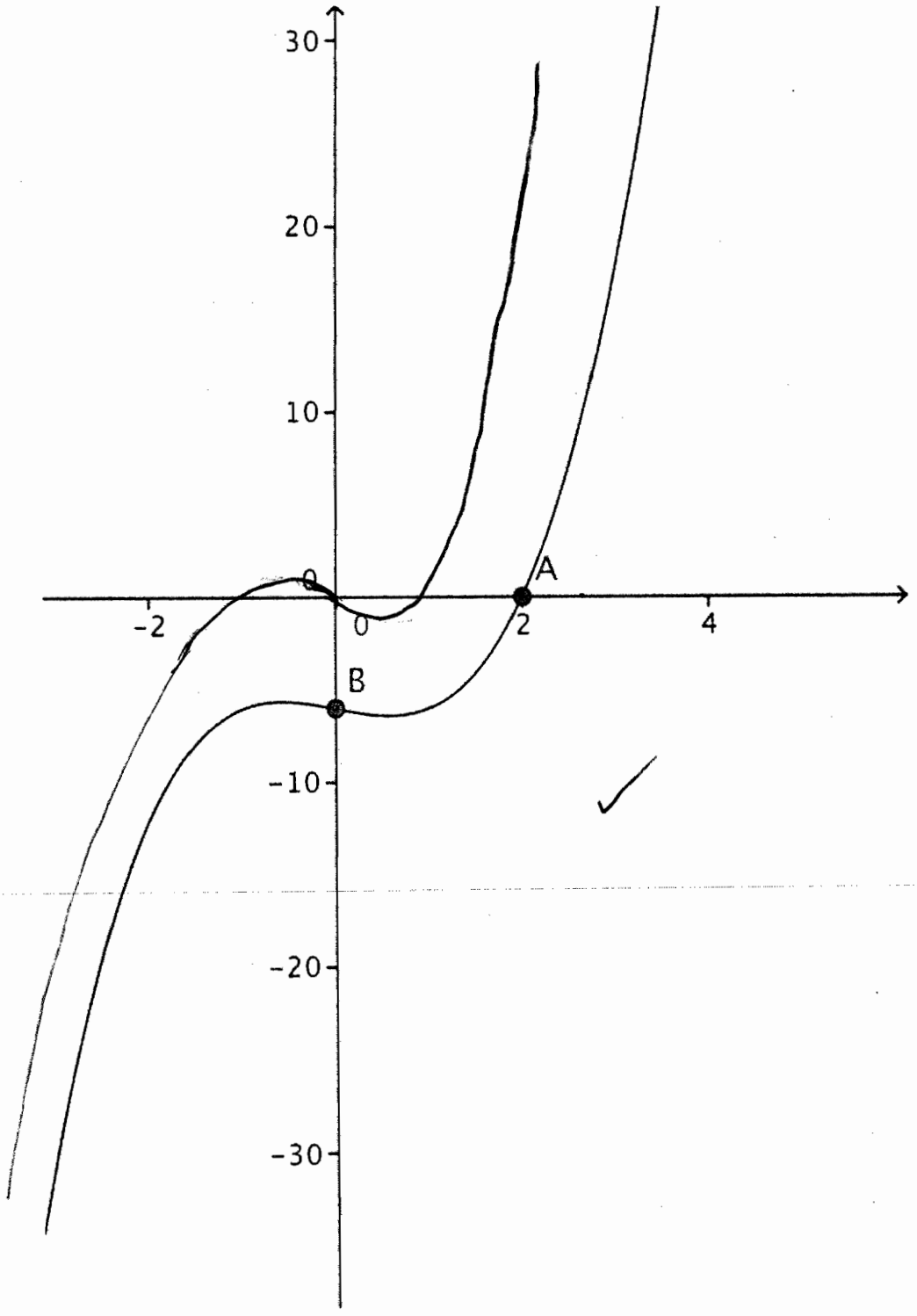
iii What are the solutions of the equation $x^3 - x = 0$?

$0, -1, 1$ ✓ 2

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

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

T1



CCR 8

10

Cubic Graph

T2

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

$2^3 - 2 - 6 = 0$

$8 - 2 - 6 = 0$

$0 = 0$ ✓ 1

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

i Write down the coordinates of point A. (2, 0) ✓ 1

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. ✓ 1

2. a. Find the coordinates of point B. (0, -6) ✓ 1

b.

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

slide up 6 2

ii Sketch the graph of $y = x^3 - x$ on the diagram. 0

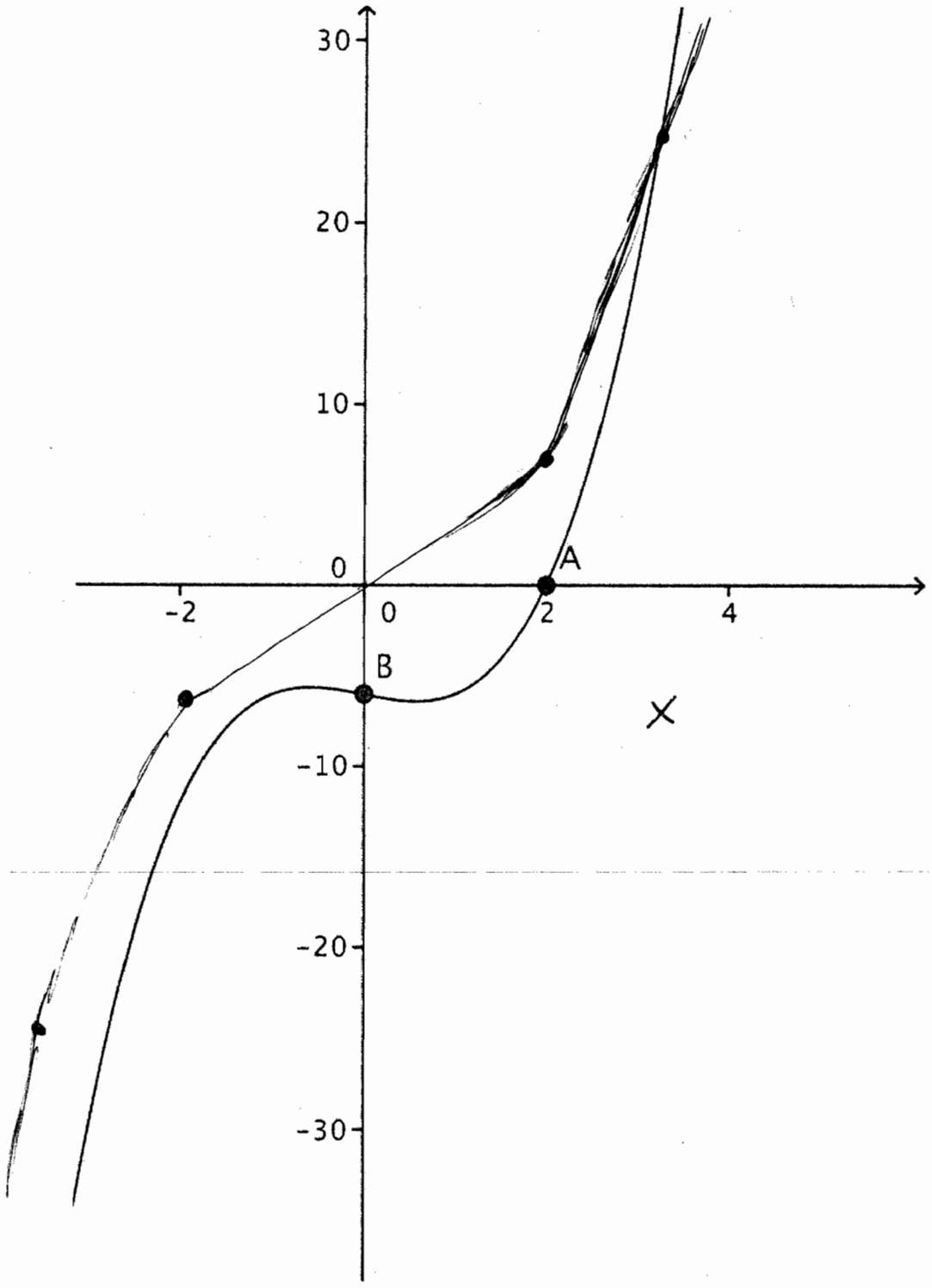
Iii What are the solutions of the equation $x^3 - x = 0$?

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

$-1 + 1 = 0$

x = 0, 2

T2



8

Cubic Graph

T3

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

$x^3 - x - 6$

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

$8 - 2 - 6 \stackrel{?}{=} 0 \quad 6 - 6 = 0 \quad 0 = 0$ ✓ 1

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

i Write down the coordinates of point A. (2,0) ✓ 1

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. ✓ 1

2. a. Find the coordinates of point B. (0,-6) ✓ 1

b.

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

It moves 6 units up ✓ 2

ii Sketch the graph of $y = x^3 - x$ on the diagram. (1)

x	y
0	0
1	0
-1	0

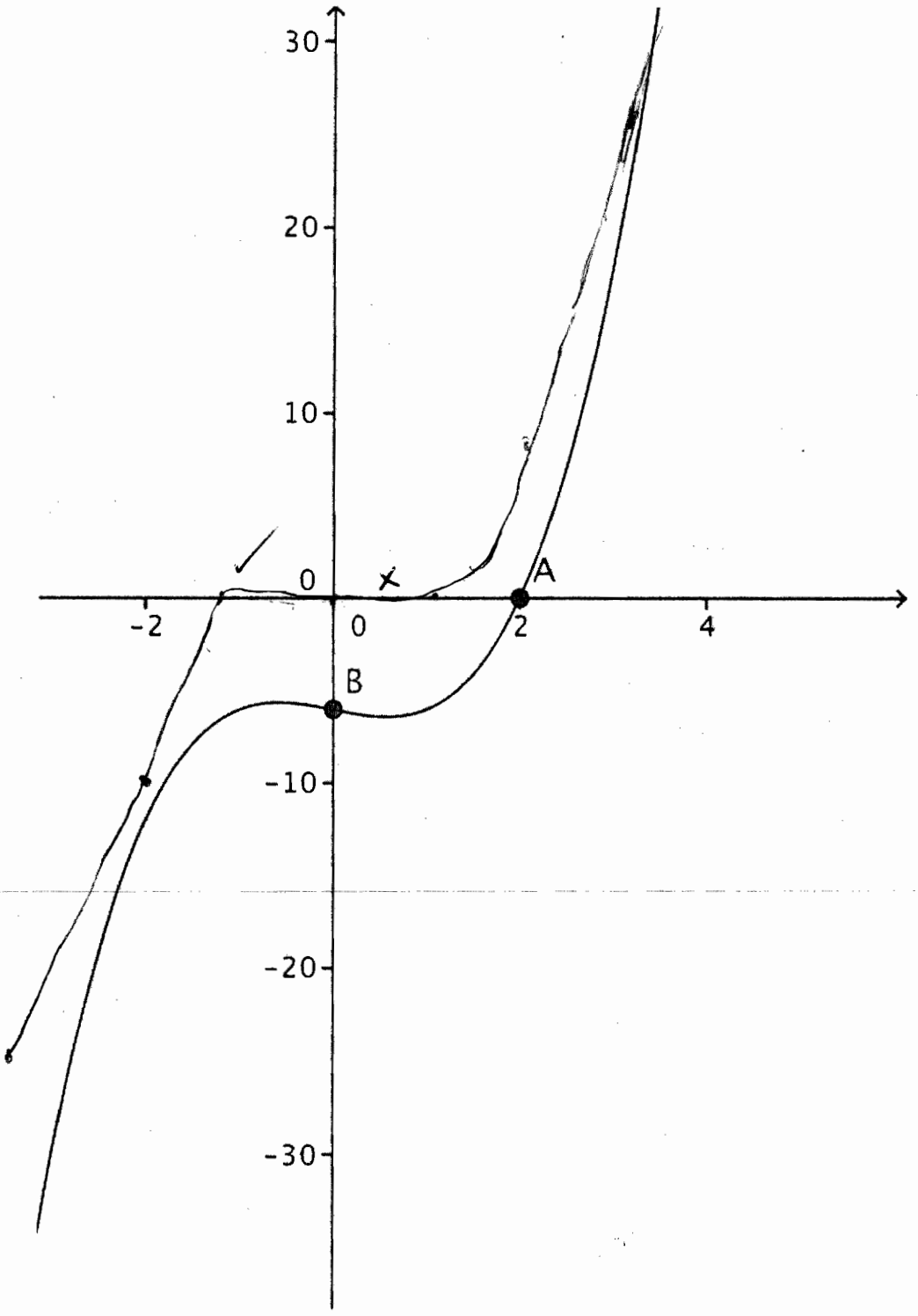
x	y
2	6
-2	-6
3	24
-3	-24

Iii What are the solutions of the equation $x^3 - x = 0$? 0, 1, -1 ✓ 2

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

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

T3



9

Cubic Graph

T4

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

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

$8 - 2 - 6 = 0$

$6 - 6 = 0$ ✓ 1

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

i Write down the coordinates of point A. (2,0) ✓ 1

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. ✓ 1

2. a. Find the coordinates of point B. $y = 0 - 0 - 6 = 0$ (0,-6) ✓ 1

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 ✓ 2

ii Sketch the graph of $y = x^3 - x$ on the diagram. 2

$y = 8 - 2 = 6$

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

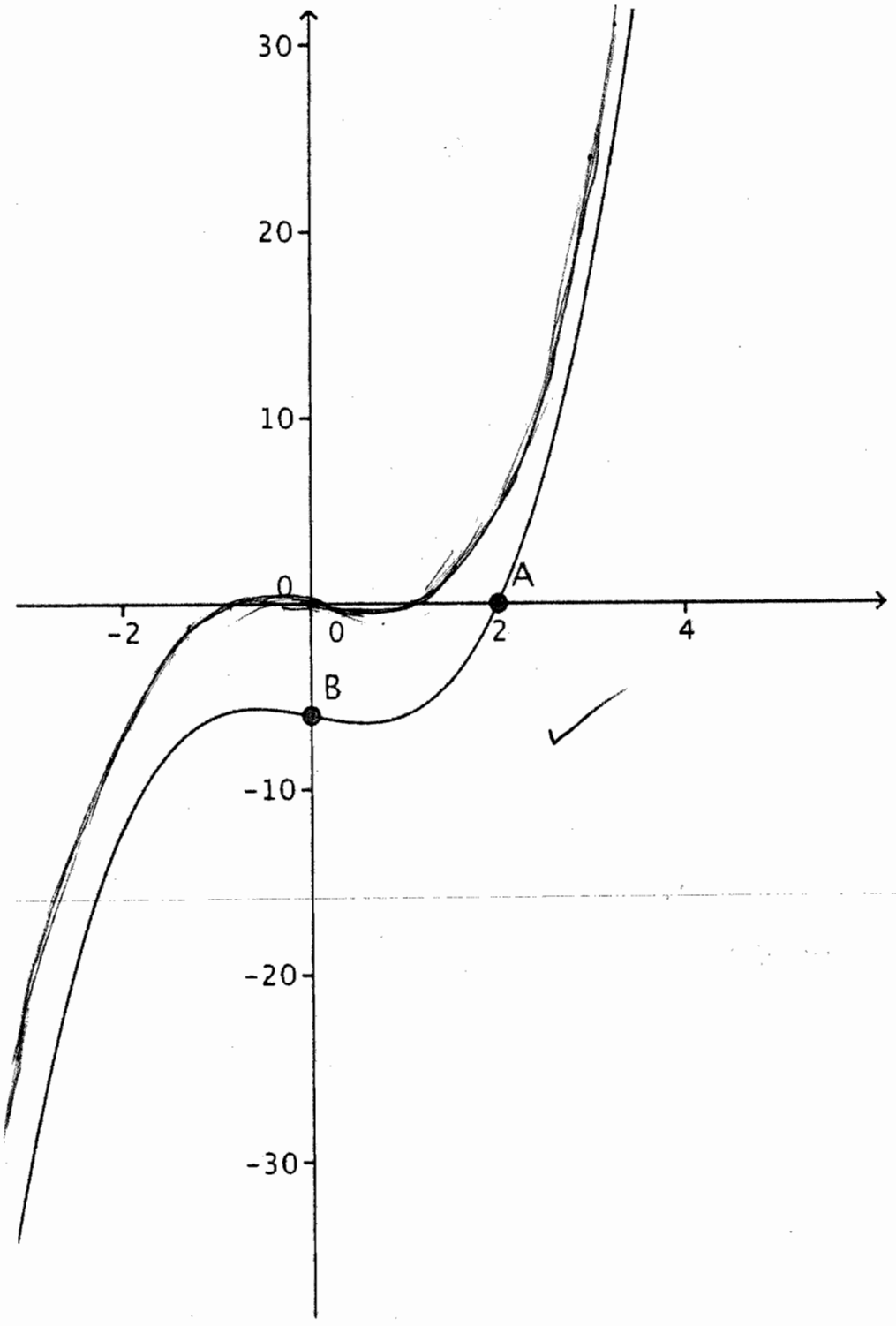
$x(x^2 - 1) = 0$

$x^2 - 1 = 0$

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

$x = 1$ or -1

T4



CCR 8

9

Cubic Graph

T5

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

$2^3 - 2 - 6 = 0$
$8 - 2 - 6 = 0$
$6 - 6 = 0$
$0 = 0$ ✓ ✓ 1

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

i Write down the coordinates of point A. (2,0) ✓ 1

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. ✓ 1

$0^3 - 0 - 6 = y$
$-6 = y$

2. a. Find the coordinates of point B. (0,-6) ✓ 1

b.

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

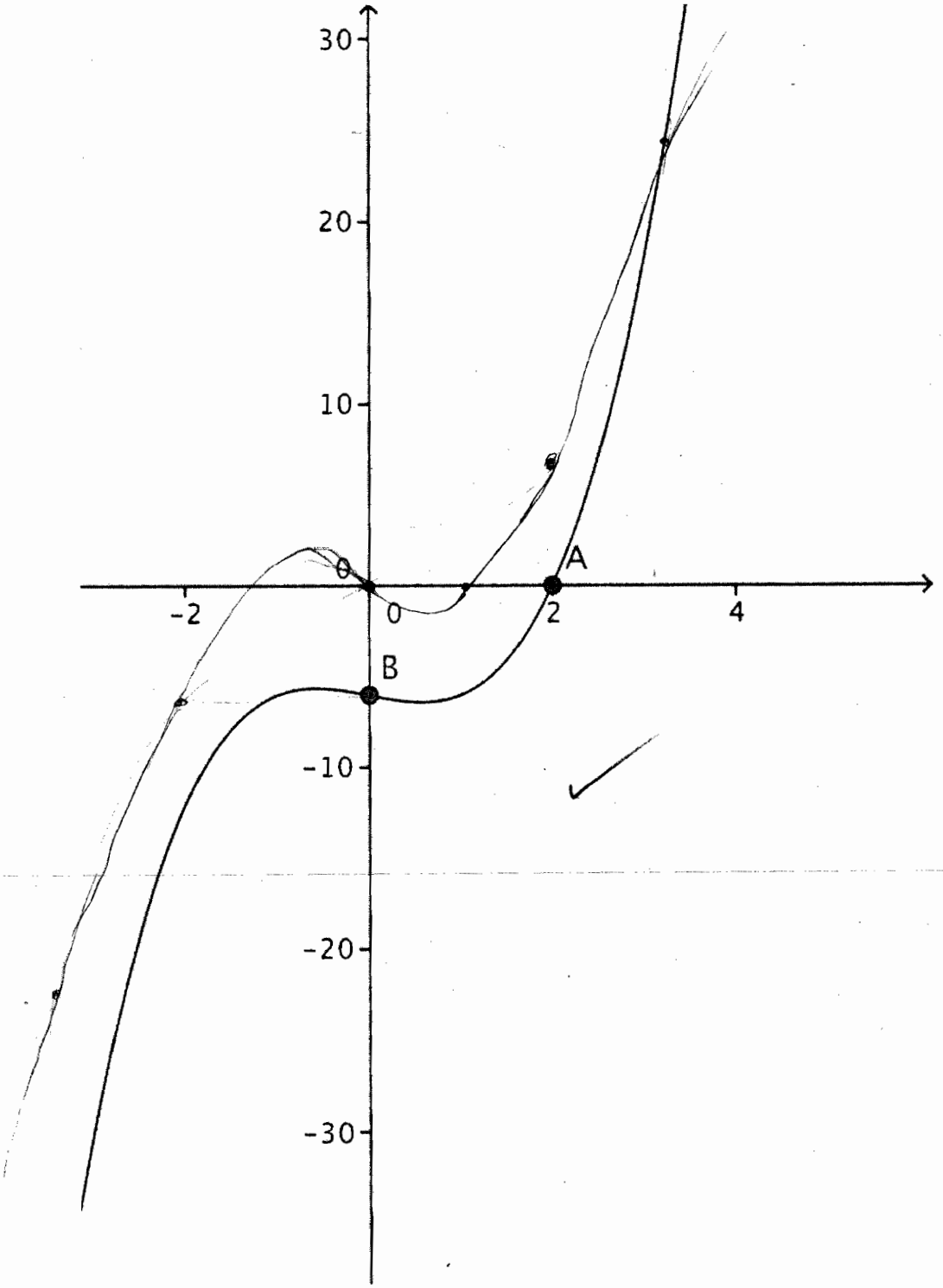
$y = x^3 - x - 6$ has been translated up 6 units. ✓ 2

ii Sketch the graph of $y = x^3 - x$ on the diagram. 2

(0,0) (-1,0) $\frac{6-0}{1-0}$ $\frac{6}{1}$
(1,0) (-2,-6)
(2,6) (-3,-24) $\frac{6-0}{2-1}$ $\frac{6}{1} = 6$
(3,24) (-4,-60)
(4,60)

Iii What are the solutions of the equation $x^3 - x = 0$? ✓ (-1,0), (0,0), (1,0) 2

T5



CCR 8

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