

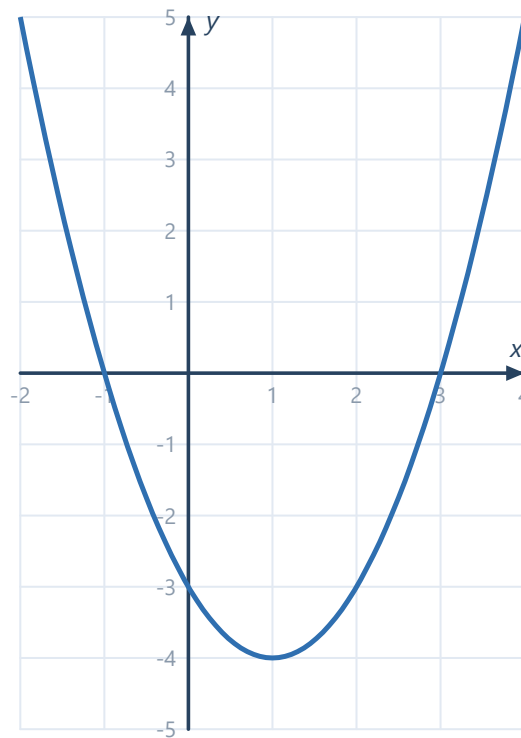
GCSE Maths: Solving equations using graphs (Higher): answers

GCSE Maths - Quadratic and Other Graphs - Higher - Lesson 13.3

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch13-quadratic-other-graphs/higher/solving-equations-using-graphs/

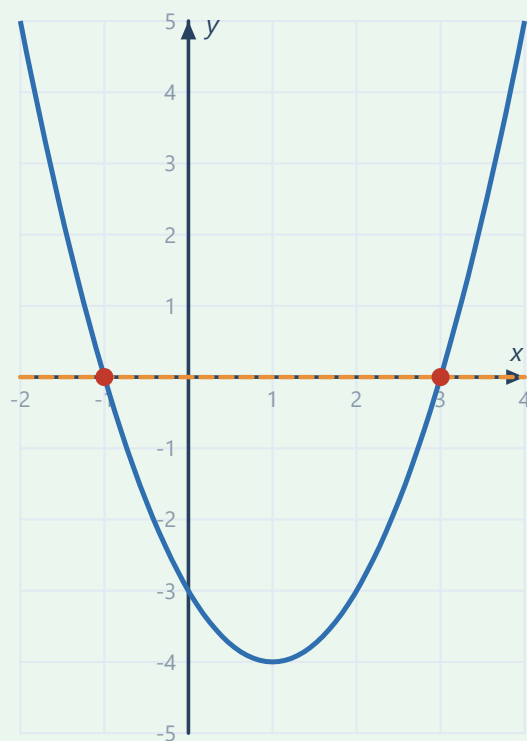
Exercise 13C Solving equations using graphs Non-calculator

- 1 Here is the graph of $y = x^2 - 2x - 3$. Use it to solve (a) $x^2 - 2x - 3 = 0$, (b) $x^2 - 2x - 3 = 5$, (c) $x^2 - 2x - 3 = -3$, (d) $x^2 - 2x - 3 = -4$.



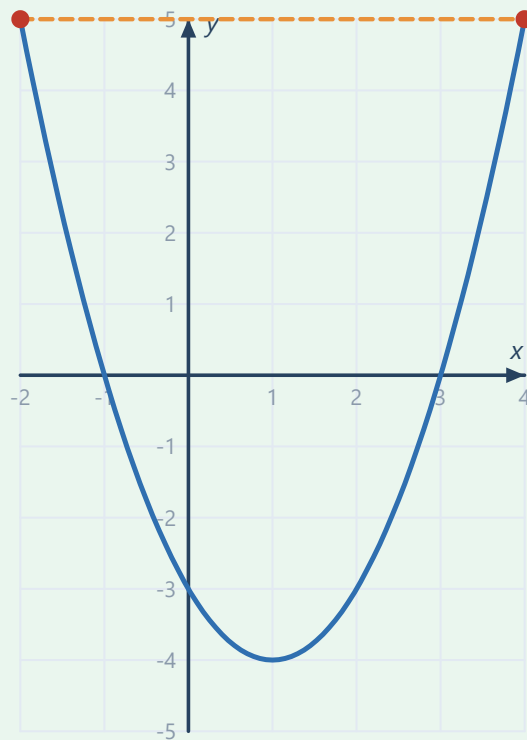
(a) $x^2 - 2x - 3 = 0$

Answer: $x = -1$ or 3



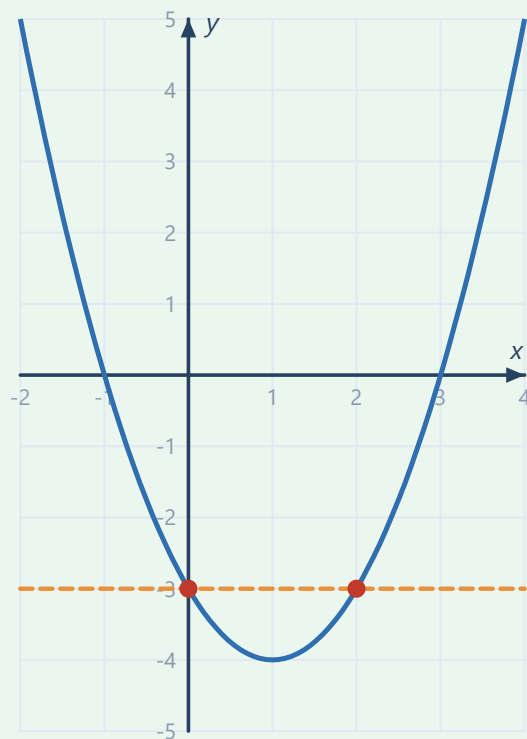
(b) $x^2 - 2x - 3 = 5$

Answer: $x = -2$ or 4



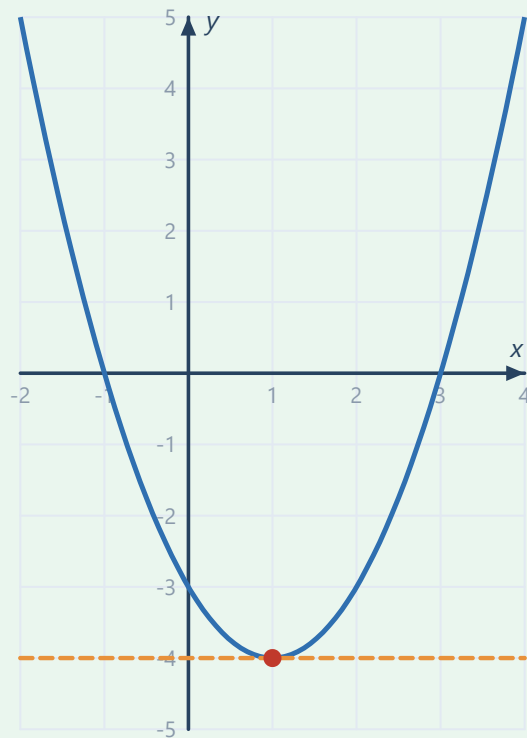
(c) $x^2 - 2x - 3 = -3$

Answer: $x = 0$ or 2

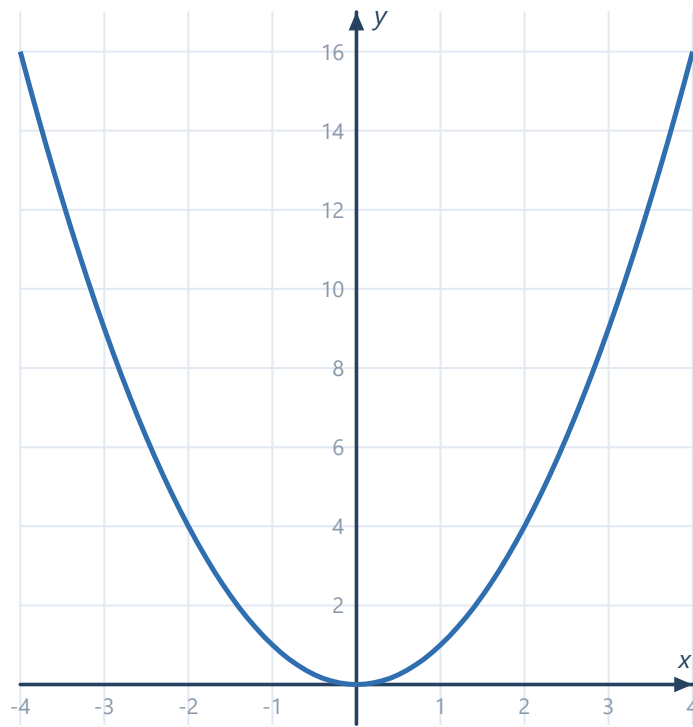


(d) $x^2 - 2x - 3 = -4$

Answer: $x = 1$

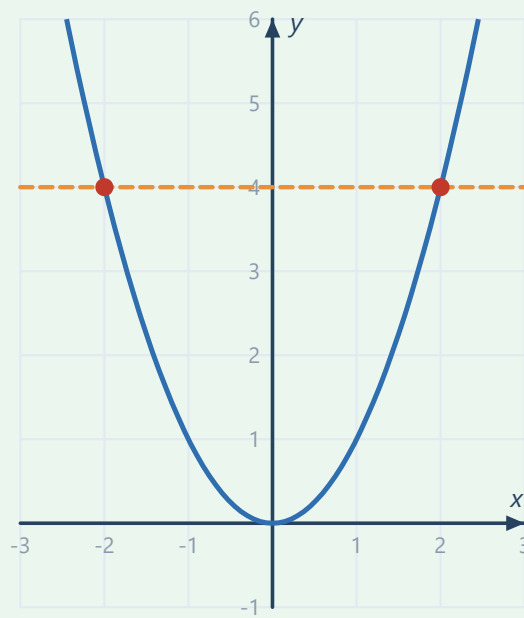


2 Here is the graph of $y = x^2$. Use it to solve each equation. Give any approximate answers to 1 decimal place.



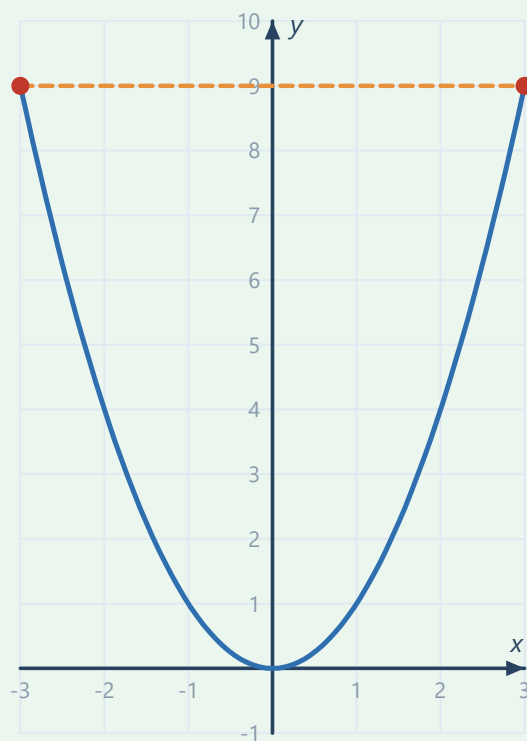
(a) $x^2 = 4$

Answer: $x = -2$ or 2



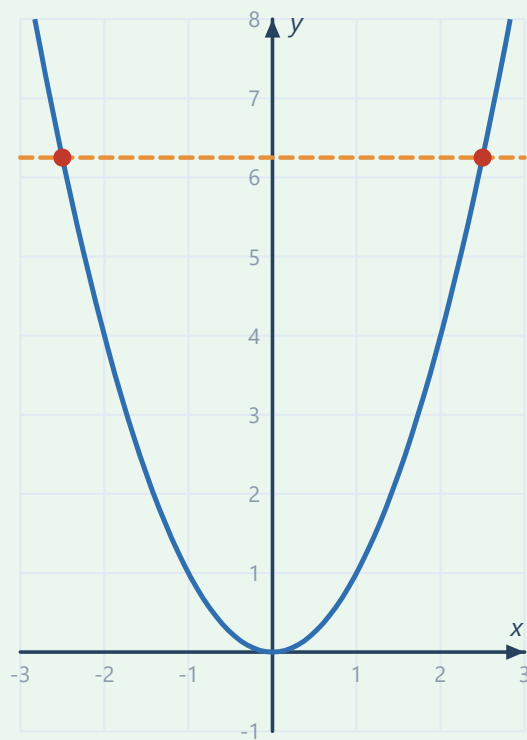
(b) $x^2 = 9$

Answer: $x = -3$ or 3



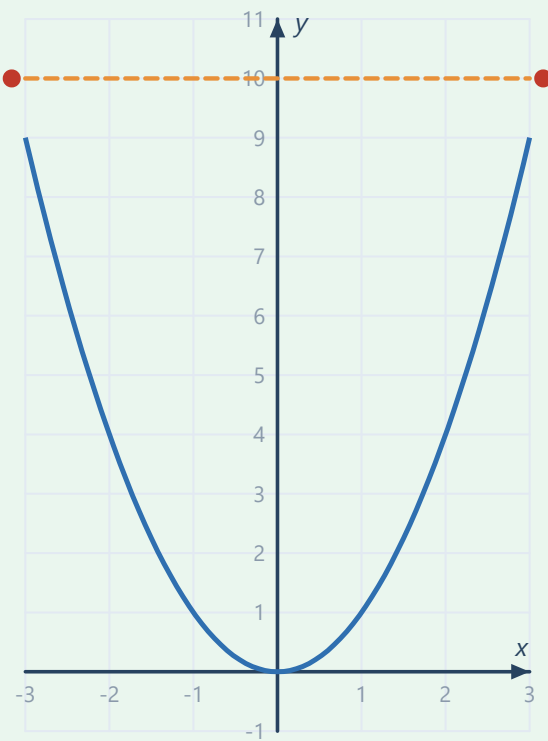
(c) $x^2 = 6.25$

Answer: $x = -2.5$ or 2.5

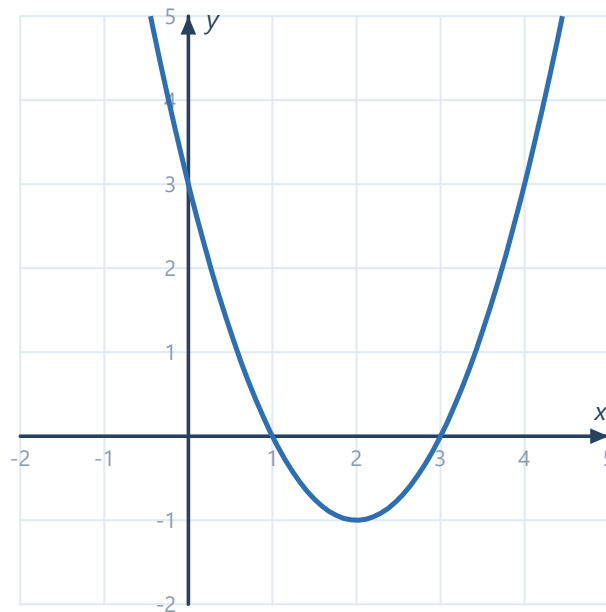


(d) $x^2 = 10$

Answer: $x \approx -3.2$ or 3.2 (accept answers within 0.1)

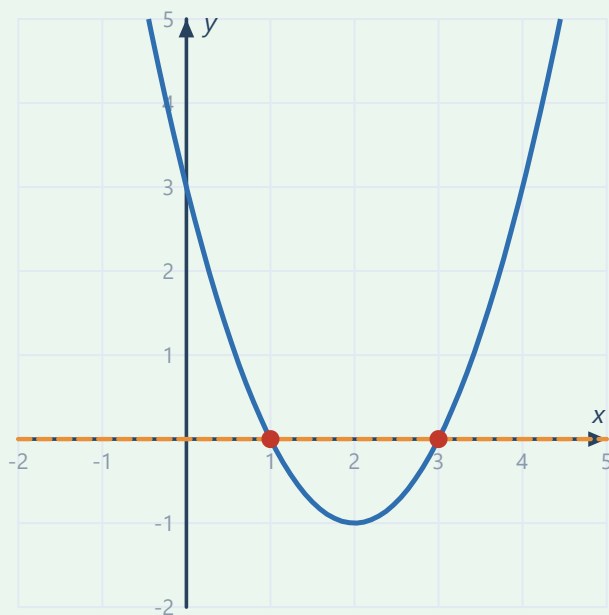


- 3 Here is the graph of $y = x^2 - 4x + 3$. Use it to solve (a) $x^2 - 4x + 3 = 0$, (b) $x^2 - 4x + 3 = 3$, (c) $x^2 - 4x + 3 = 8$, (d) $x^2 - 4x + 3 = -1$.



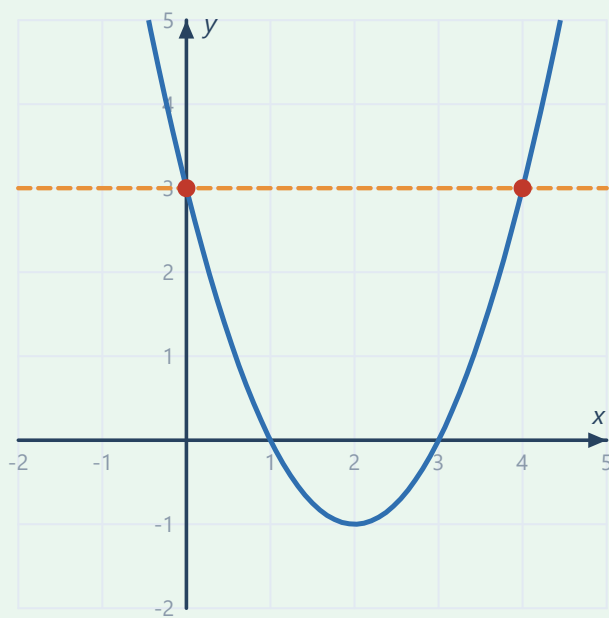
(a) $x^2 - 4x + 3 = 0$

Answer: $x = 1$ or 3



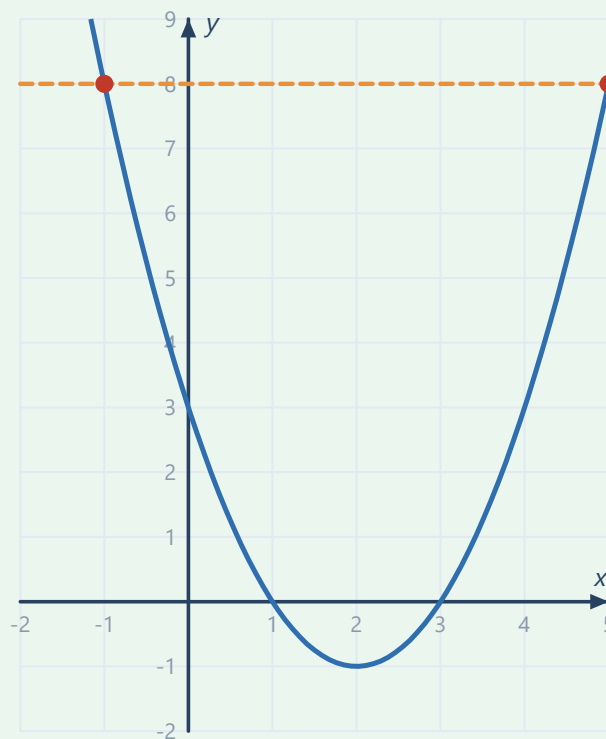
(b) $x^2 - 4x + 3 = 3$

Answer: $x = 0$ or 4



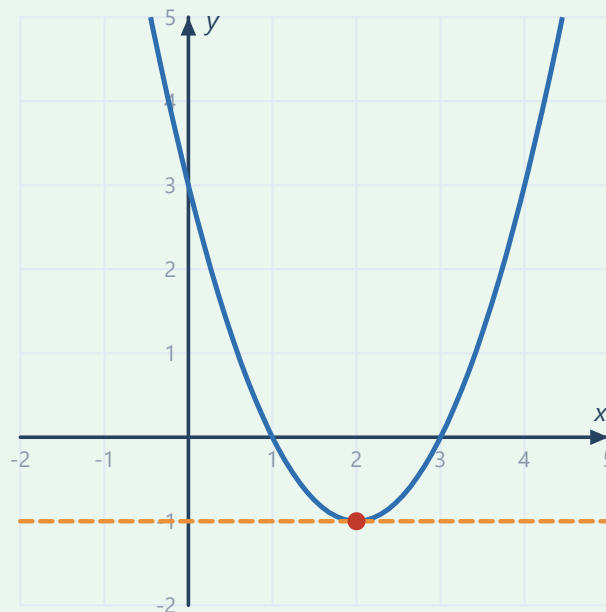
(c) $x^2 - 4x + 3 = 8$

Answer: $x = -1$ or 5

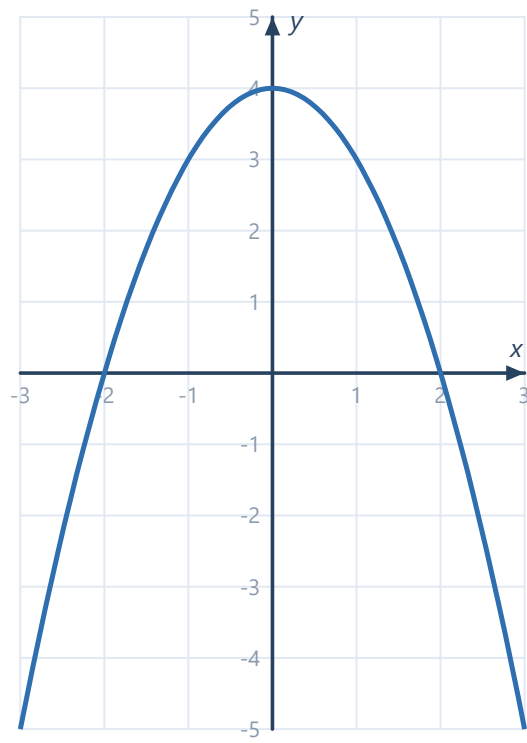


(d) $x^2 - 4x + 3 = -1$

Answer: $x = 2$

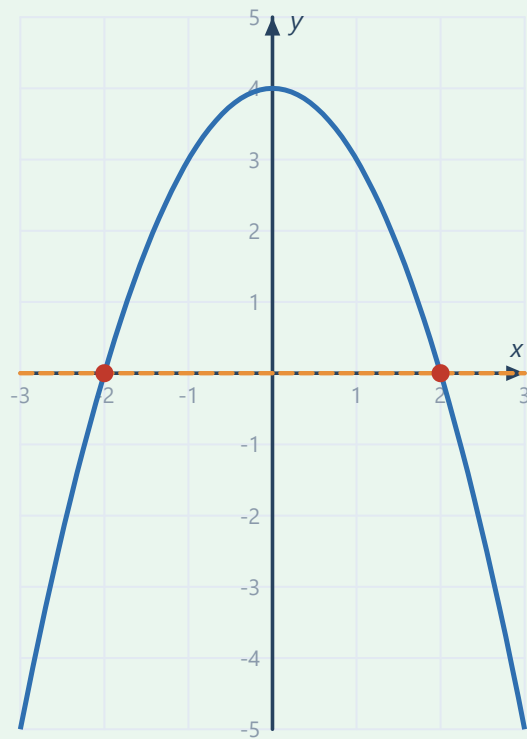


4 Here is the graph of $y = 4 - x^2$. Use it to solve (a) $4 - x^2 = 0$, (b) $4 - x^2 = 3$, (c) $4 - x^2 = -5$, (d) $4 - x^2 = 4$.



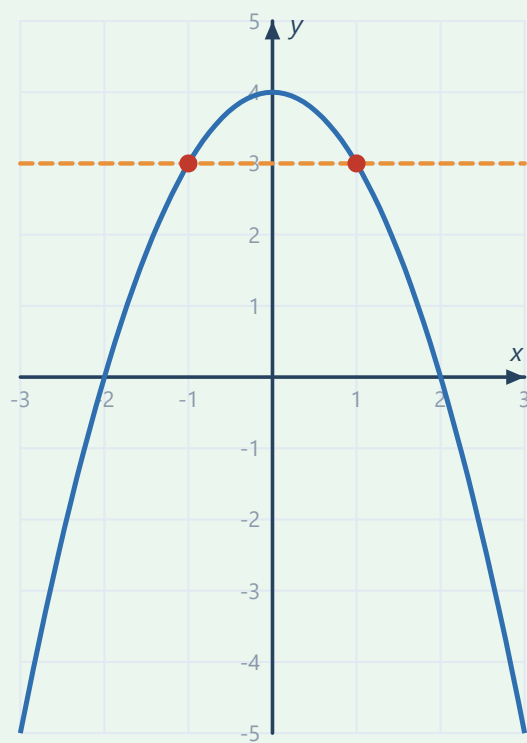
(a) $4 - x^2 = 0$

Answer: $x = -2$ or 2



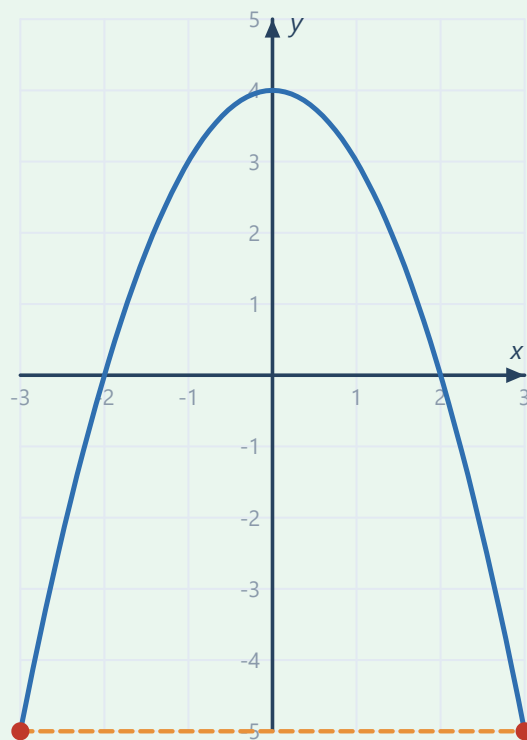
(b) $4 - x^2 = 3$

Answer: $x = -1$ or 1



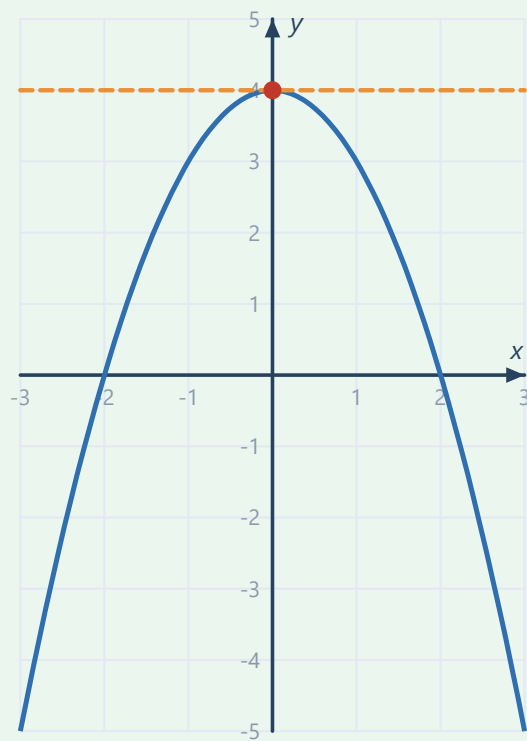
(c) $4 - x^2 = -5$

Answer: $x = -3$ or 3

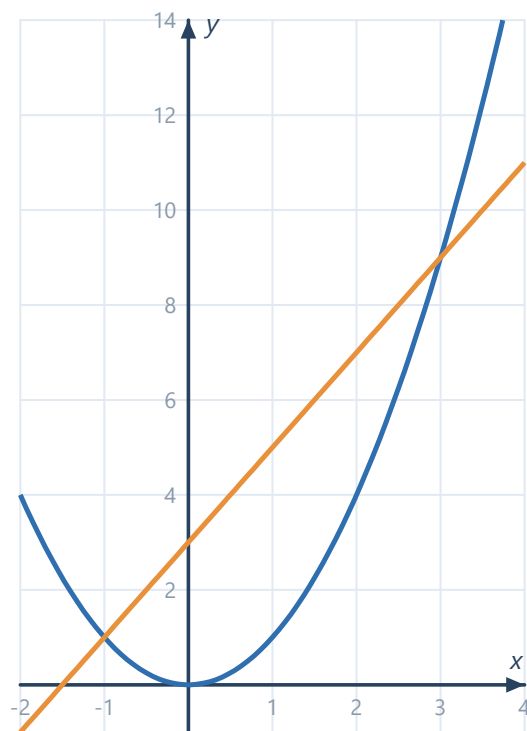


(d) $4 - x^2 = 4$

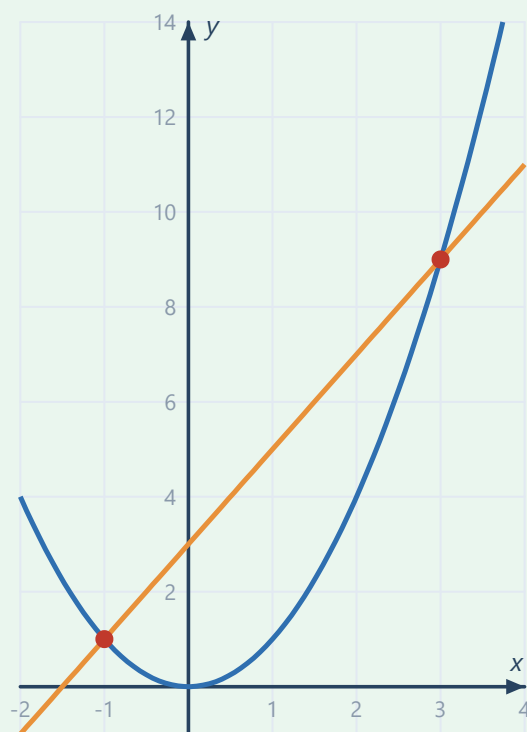
Answer: $x = 0$



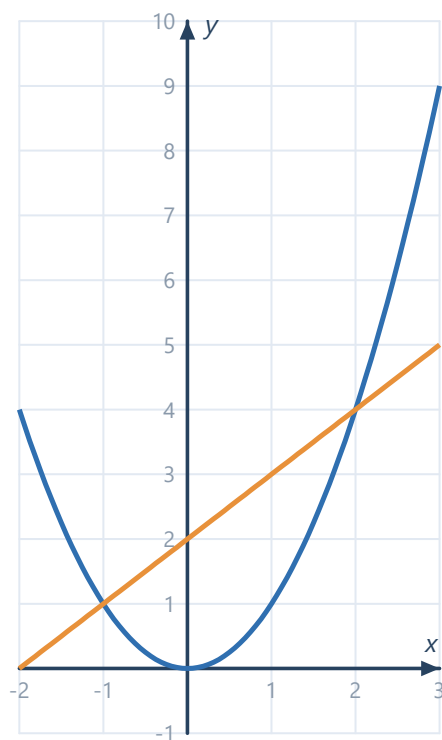
- 5 The graphs of $y = x^2$ and $y = 2x + 3$ are drawn on the grid. Use the graphs to solve $x^2 = 2x + 3$.



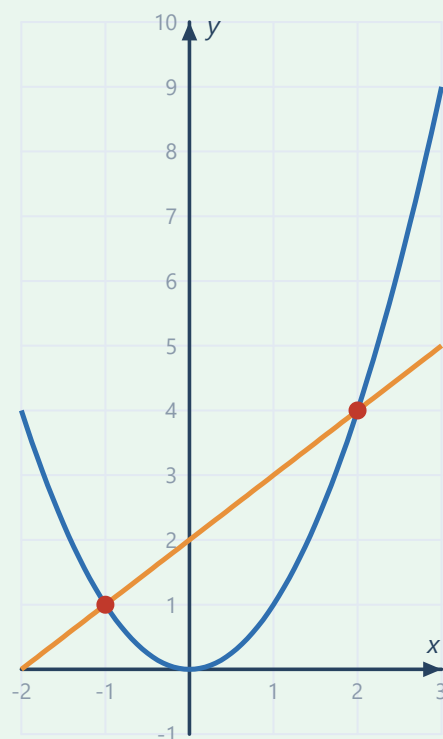
Answer: $x = -1$ or 3



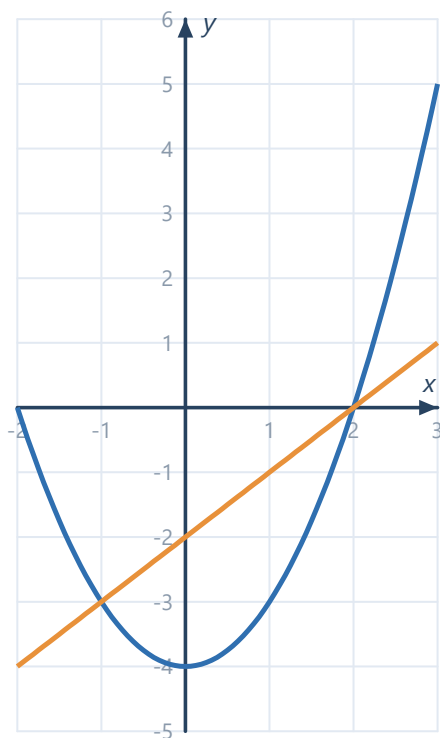
- 6 The graphs of $y = x^2$ and $y = x + 2$ are drawn on the grid. Use the graphs to solve $x^2 = x + 2$.



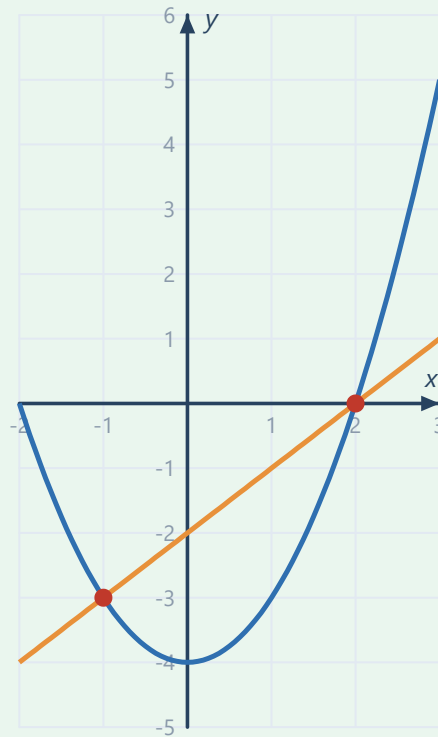
Answer: $x = -1$ or 2



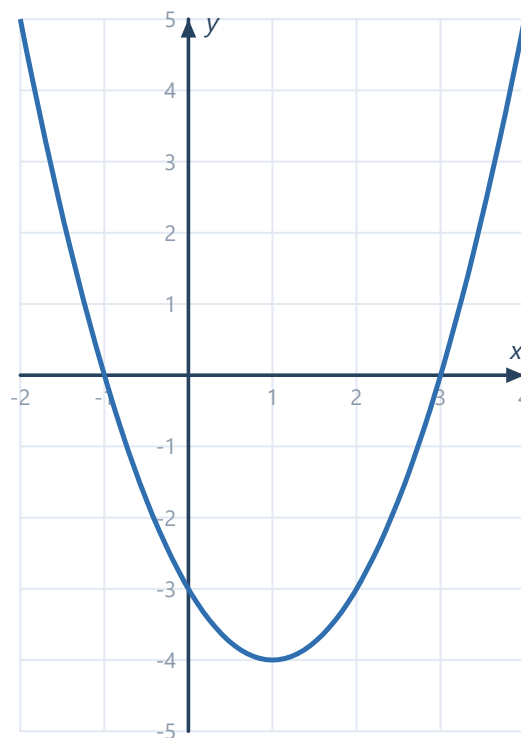
7 The graphs of $y = x^2 - 4$ and $y = x - 2$ are drawn on the grid. Use them to solve $x^2 - 4 = x - 2$.



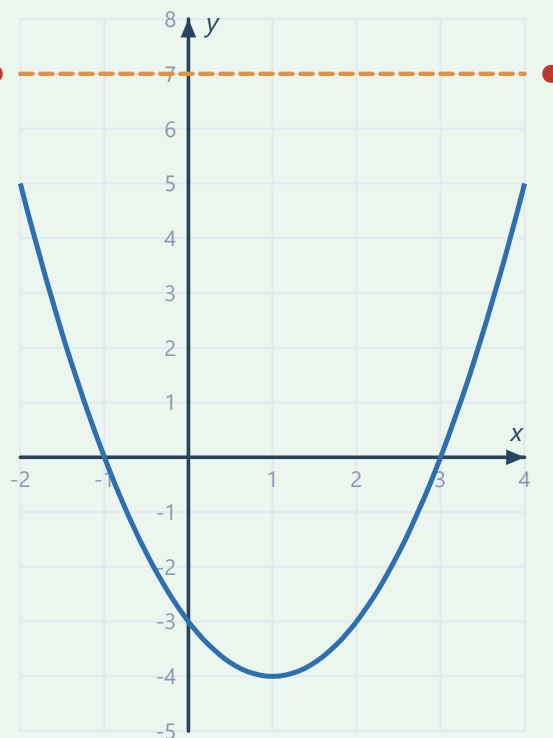
Answer: $x = -1$ or 2



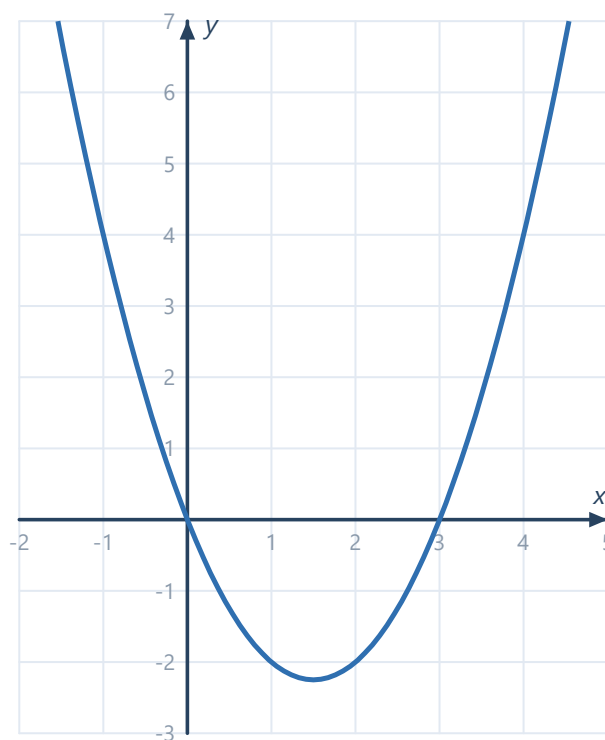
- 8 Use the graph of $y = x^2 - 2x - 3$ (drawn above) to find estimates of the solutions of $x^2 - 2x - 3 = 7$. Give your answers to 1 decimal place.



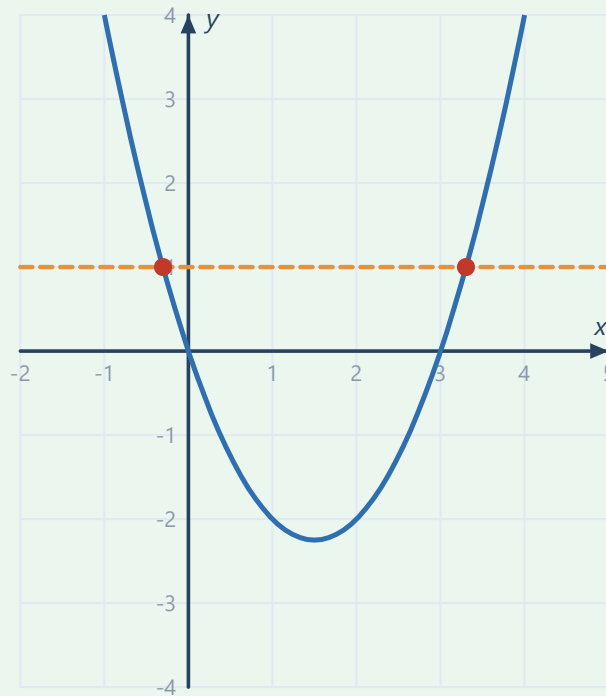
Answer: $x \approx -2.3$ or 4.3 (accept answers within 0.1)



- 9 Here is the graph of $y = x^2 - 3x$. Use it to find estimates of the solutions of $x^2 - 3x = 1$. Give your answers to 1 decimal place.



Answer: $x \approx -0.3$ or 3.3 (accept answers within 0.1)



- 10** Hana says: "The solutions of $x^2 - 2x - 3 = 0$ are the roots of the graph of $y = x^2 - 2x - 3$." Explain why she is right.

Answer: On the x-axis $y = 0$

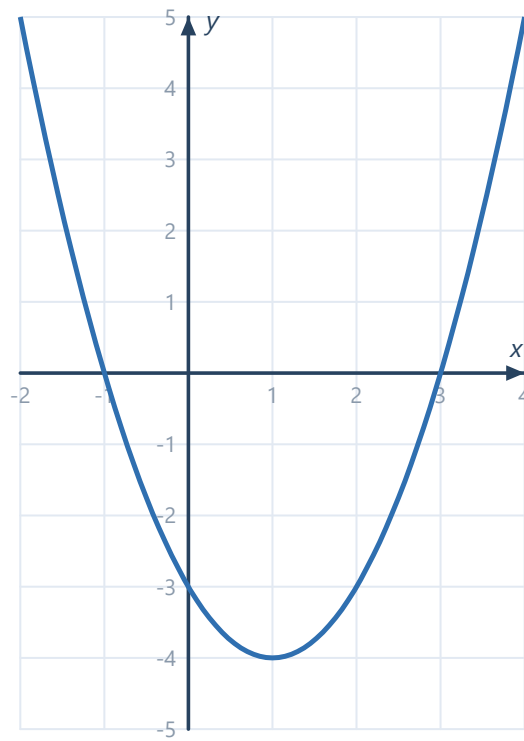
- 11** Emma solves $x^2 = 2x + 3$ by drawing both graphs. The graphs cross at $(-1, 1)$ and $(3, 9)$. Emma writes: "The solutions are 1 and 9." Explain her mistake and give the correct solutions.

Answer: $x = -1$ and $x = 3$

- 12** Use the graph of $y = x^2$ to explain why the equation $x^2 = -5$ has no solutions.

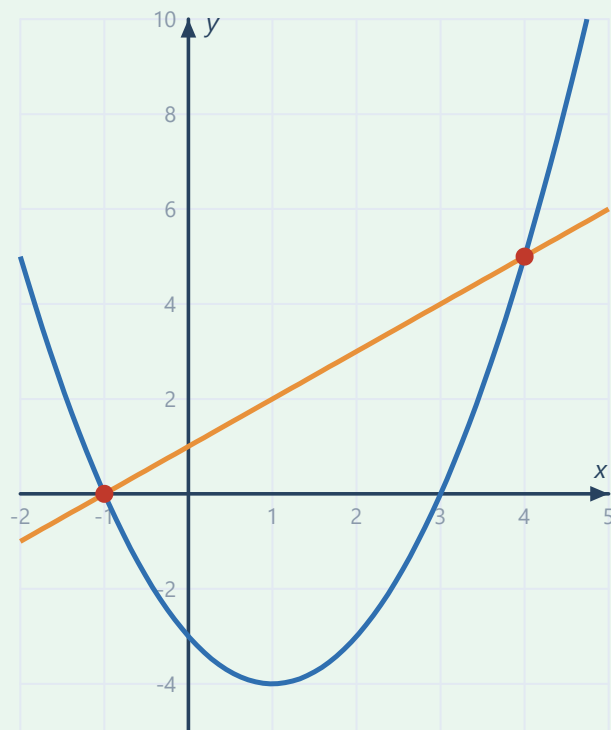
Answer: The curve is never below the x-axis

- 13** The graph of $y = x^2 - 2x - 3$ is drawn. By drawing a suitable straight line on the graph, solve each equation.



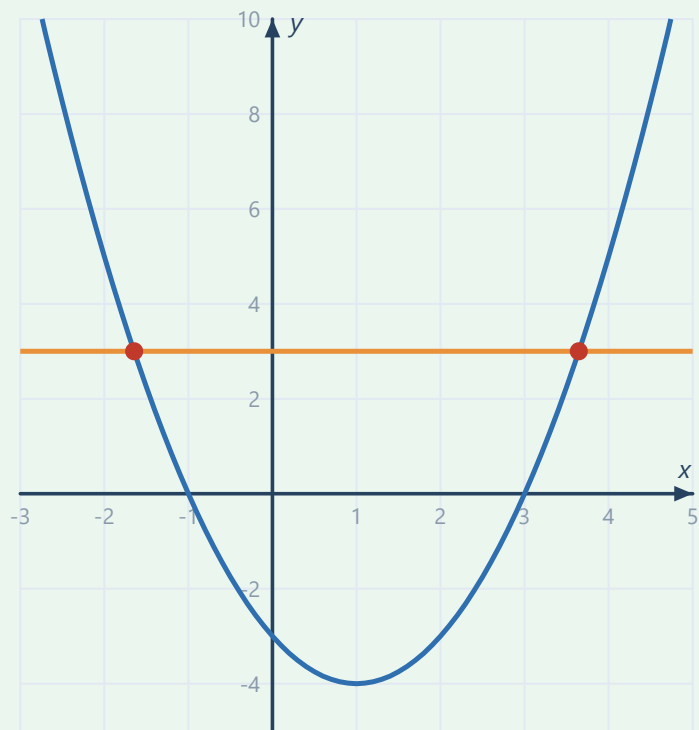
(a) $x^2 - 3x - 4 = 0$

Answer: $x = -1$ or 4



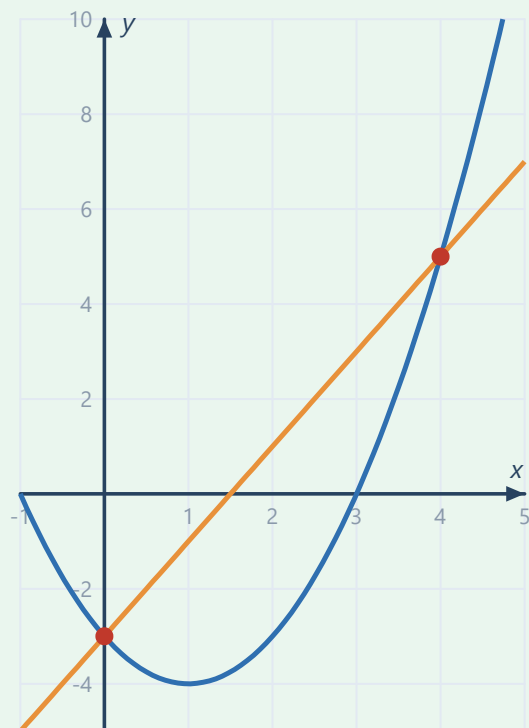
(b) $x^2 - 2x - 6 = 0$

Answer: $x \approx -1.6$ or 3.6 (accept answers within 0.1)

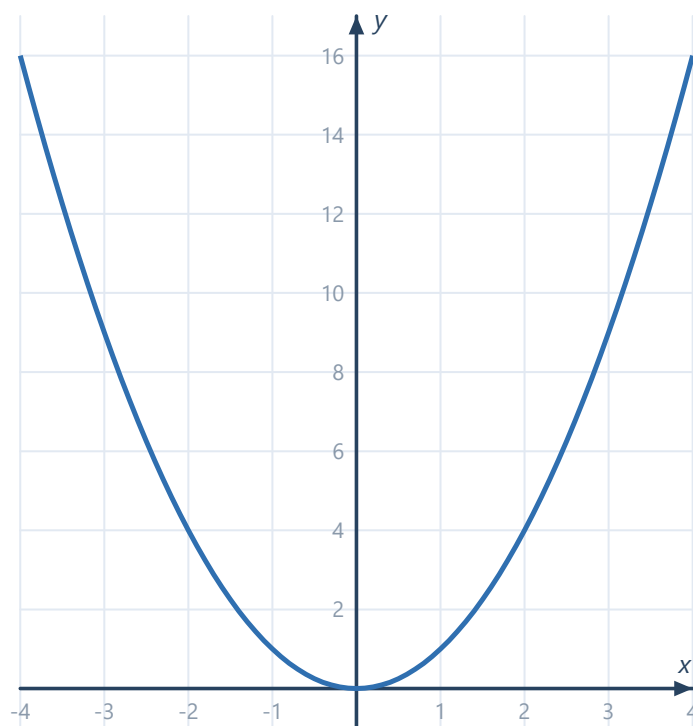


(c) $x^2 - 4x = 0$

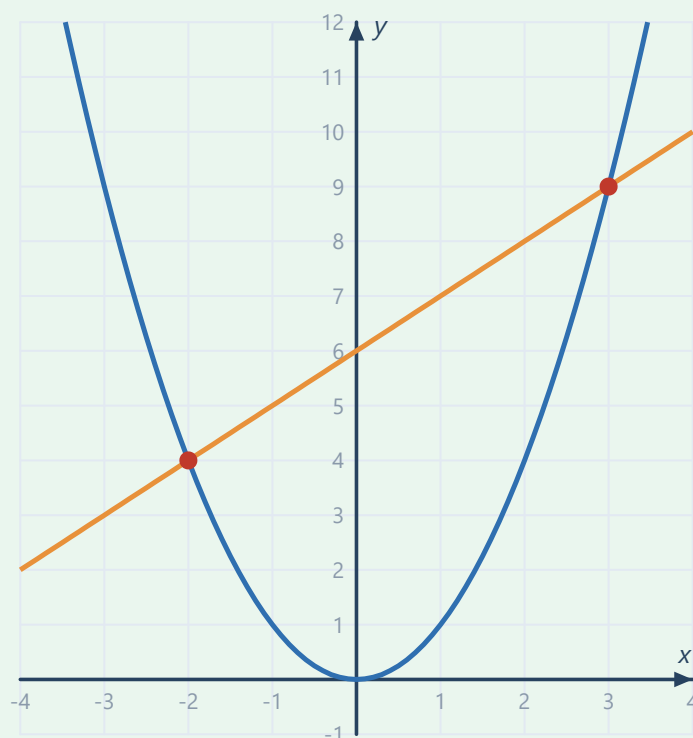
Answer: $x = 0$ or 4



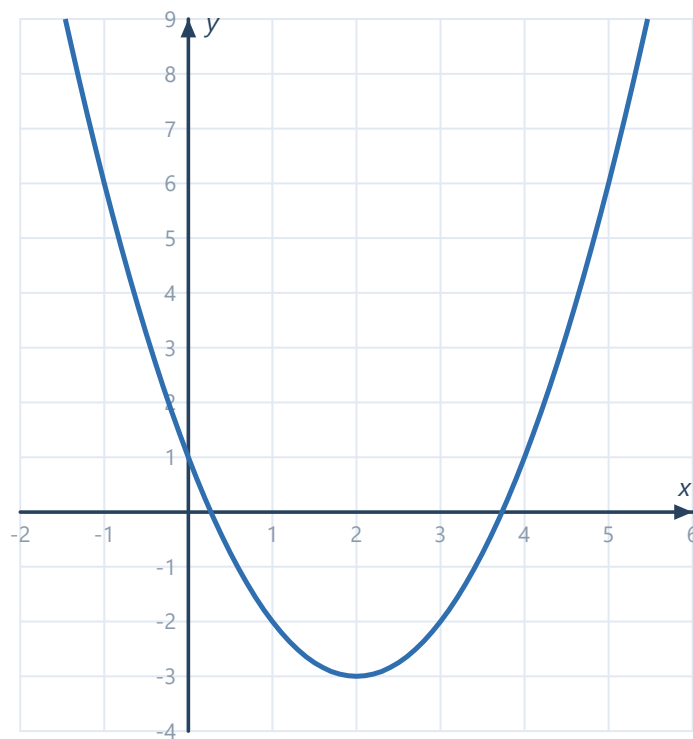
- 14** The graph of $y = x^2$ is drawn. Show how to use it to solve $x^2 - x - 6 = 0$. State the equation of the straight line you need to draw.



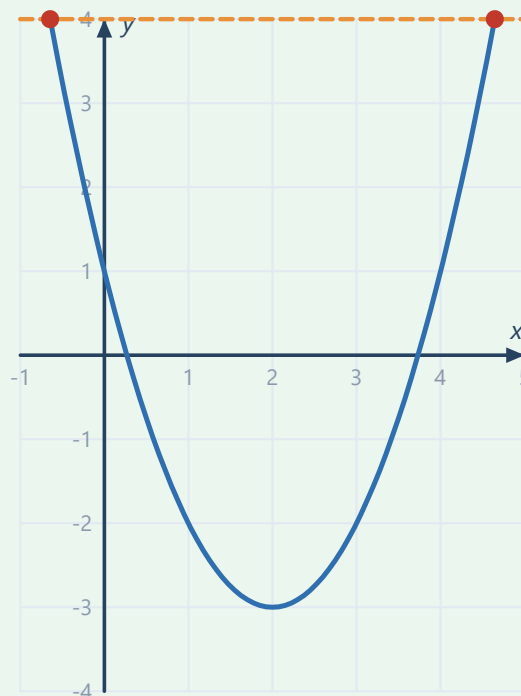
Answer: $x = -2$ or 3 (line $y = x + 6$)



- 15** The graph of $y = x^2 - 4x + 1$ is drawn. Use it to find estimates of the solutions of $x^2 - 4x + 1 = 4$. Give your answers to 1 decimal place.



Answer: $x \approx -0.6$ or 4.6 (accept answers within 0.1)



- 16** The graph of $y = x^2 - 2x - 3$ has its lowest point at $(1, -4)$. Write down the number of solutions of $x^2 - 2x - 3 = k$ when (a) $k = 2$, (b) $k = -4$, (c) $k = -6$. Explain how you know.

(a) $k = 2$

Answer: 2 solutions

(b) $k = -4$

Answer: 1 solution

(c) $k = -6$

Answer: No solutions