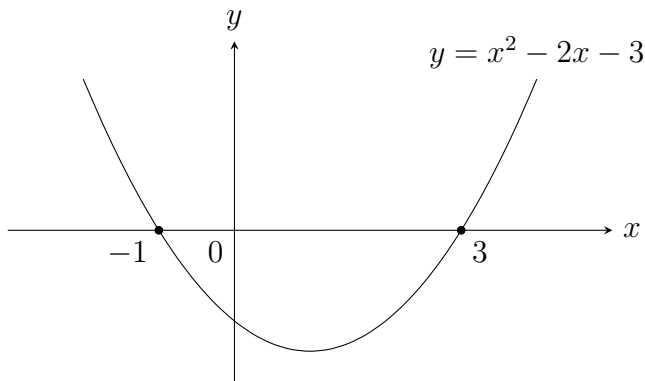


Exercise - Solving Quadratic Inequations

1. Use the sketch of $y = x^2 - 2x - 3$ provided below to state the solution to each of the following:



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

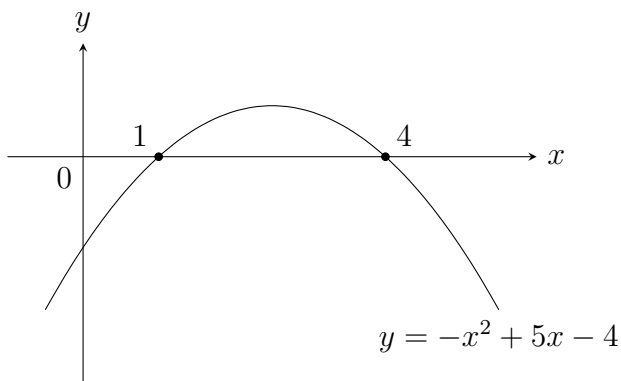
(b) $x^2 - 2x - 3 > 0$

(c) $x^2 - 2x - 3 \geq 0$

(d) $x^2 - 2x - 3 < 0$

(e) $x^2 - 2x - 3 \leq 0$

2. Use the sketch of $y = -x^2 + 5x - 4$ provided below to state the solution to each of the following:



(a) $-x^2 + 5x - 4 = 0$

(b) $-x^2 + 5x - 4 > 0$

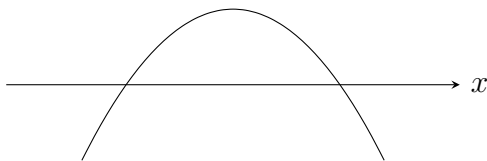
(c) $-x^2 + 5x - 4 \geq 0$

(d) $-x^2 + 5x - 4 < 0$

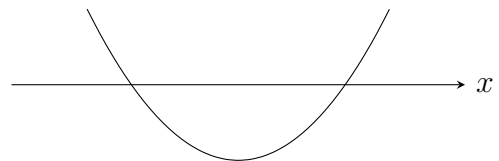
(e) $-x^2 + 5x - 4 \leq 0$

3. Two minimal, incomplete sketches of parabolas are shown below.

Sketch A



Sketch B



- (a) Explain why only *Sketch B* could possibly represent the graph of $y = x^2 - x - 20$.
- (b) Determine the x -coordinates of the points at which $y = x^2 - x - 20$ intercepts the x -axis.
- (c) Create a minimal sketch of $y = x^2 - x - 20$, showing the parabola, x -axis and x -intercepts.
- (d) Use this sketch to state the solutions to:
- $x^2 - x - 20 > 0$
 - $x^2 - x - 20 < 0$

Reminder! To gain full marks in an exam, a *suitable sketch* must be constructed for each inequation.

4. Solve:

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

(b) $x^2 + 5x - 14 > 0$

(c) $k^2 - 7k \leq 0$

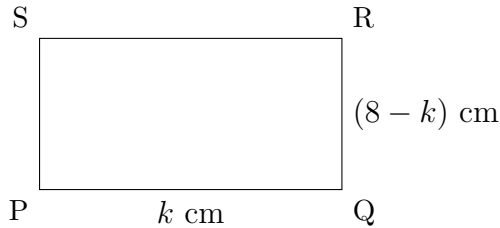
5. Solve:

(a) $-x^2 + x + 2 \leq 0$

(b) $8p - 2p^2 < 0$

(c) $1 - r^2 > 0$

6. PQRS is a rectangle with sides of lengths $(8 - k)$ centimetres and k centimetres, shown below.



(a) State an expression for the area of rectangle PQRS, in terms of k .

(b) Given that the area rectangle PQRS is greater than 12 square centimetres, determine the range of possible values for k .

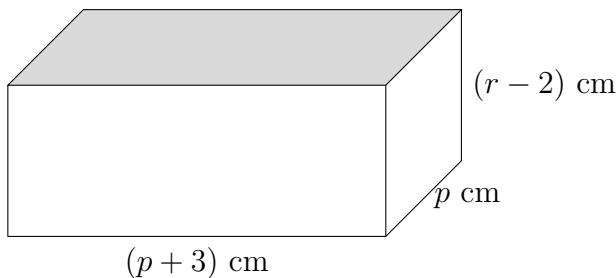
7. Solve:

(a) $x^2 + 3x \leq 10$

(b) $2x^2 + 3 > 7x$

(c) $16 > 8x - x^2$

8. The cuboid below has length $p + 3$ centimetres, breadth p centimetres and height $r - 2$ centimetres



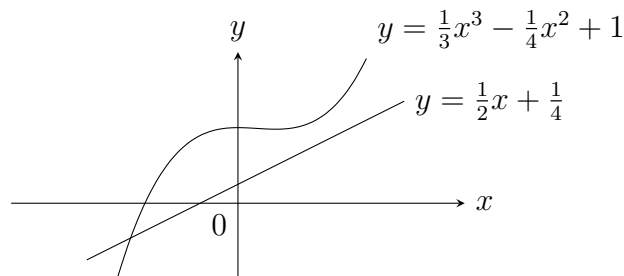
(a) State the range of possible values for r .

(b) State an expression for the area of the shaded face of the cuboid, in terms of p .

(c) Given that the shaded face of the cuboid has an area no greater than 28 square centimetres, determine the range of possible values for p .

9. Solve $x \leq x^2$.

10. The diagram below shows the graphs of the straight line $y = \frac{1}{2}x - 1$ and the cubic $y = \frac{1}{3}x^3 - \frac{1}{4}x^2 + 1$.



A tangent is drawn at a point P on the curve such that it has a gradient greater than that of the straight line. Determine the ranges of possible values of x for the coordinate of P.

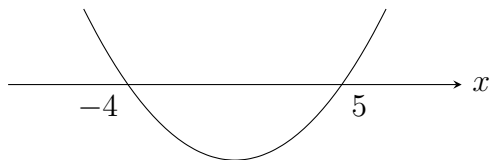
Quadratic Equations Answers

1. (a) $x = -1, x = 3$ (b) $x < -1, x > 3$ (c) $x \leq -1, x \geq 3$ (d) $-1 < x < 3$ (e) $-1 \leq x \leq 3$
2. (a) $x = 1, x = 4$ (b) $1 < x < 4$ (c) $1 \leq x \leq 4$ (d) $x < 1, x > 4$ (e) $x \leq 1, x \geq 4$

3. (a) Only sketch B shows a parabola with a positive x^2 coefficient

(b) $x = -4, x = 5$

(c)



- (d) i. $x < -4, x > 5$
ii. $-4 < x < 5$

4. (a) $x < 1, x > 3$ (b) $x < -7, x > 2$ (c) $0 \leq k \leq 7$

5. (a) $x \leq -1, x \geq 2$ (b) $p < 0, p > 4$ (c) $-1 < r < 1$

6. (a) $\text{Area} = k(8 - k)$

(b) $2 < k < 6$

7. (a) $-5 \leq x \leq 2$ (b) $x < \frac{1}{2}, x > 3$ (c) $x \neq 4$

8. (a) $r > 2$

(b) $\text{Area} = p(p + 3)$

(c) $0 < p \leq 4$

9. $x \leq 0, x \geq 1$

10. $p < -0.5, p > 1$