



National 5 Mathematics

Graphs of Quadratic Functions - Solutions

Marks are indicated in brackets after each question number

2014 Paper 1 Question 3, (2)

$$x^2 - 14x + 44 = (x - 7)^2 - 5$$

2014 Paper 1 Question 7, (2)

$$y = ax^2$$

Substituting $(-3, 45)$ gives

$$45 = a(-3)^2$$

$$= 9a$$

$$a = 5$$

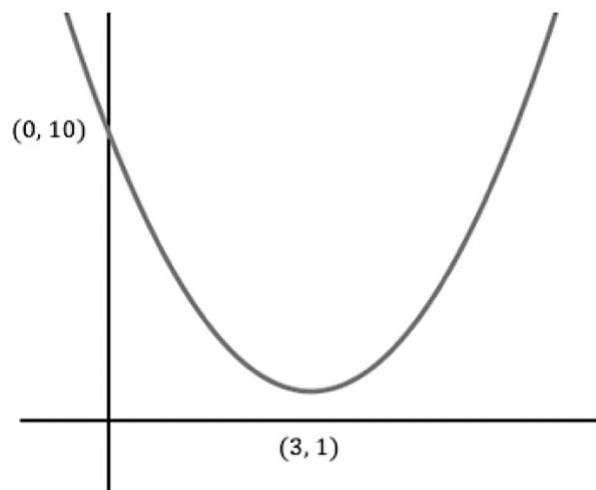
2015 Paper 1 Question 7, (1) (1) (1)

a) i) $a = -2$

ii) $b = -4$

b) $x = -4$

2016 Paper 1 Question 10, (3)





2016 Paper 2 Question 9, (2)

$$x^2 + 8x - 7 = (x + 4)^2 - 23$$

2017 Paper 1 Question 14, (1) (2)

a) $a = 5$

b) $y = (x + 5)^2 + b$

Substituting the point $(-3, 8)$ gives

$$8 = (-3 + 5)^2 + b$$

$$8 = 4 + b$$

$$b = 4$$

2018 Paper 1 Question 16, (3)

$$y = (x - 6)(x + 4)$$

For roots, let $y = 0$ to give

$$0 = (x - 6)(x + 4)$$

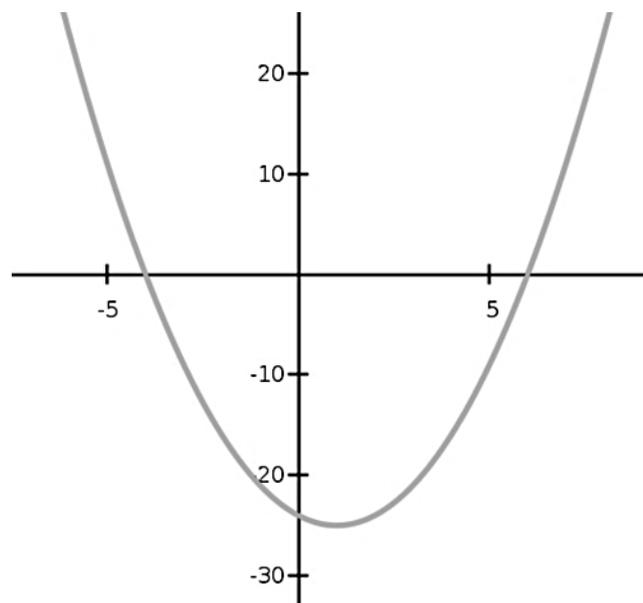
$$x = -4, x = 6$$

For y - intercept, let $x = 0$ to give

$$y = (0 - 6)(0 + 4)$$

$$= (-6)(4)$$

$$= -24$$





2018 Paper 1 Question 19, (2) (1)

a) i) $x^2 - 6x - 81 = (x - 3)^2 - 9 - 81$
 $= (x - 3)^2 - 90$

ii) $x = 3$

2019 Paper 1 Question 9, (1) (1) (1)

a) $x = 4$

b) i) $a = -4$

ii) $b = 20$

2019 Paper 2 Question 10, (2)

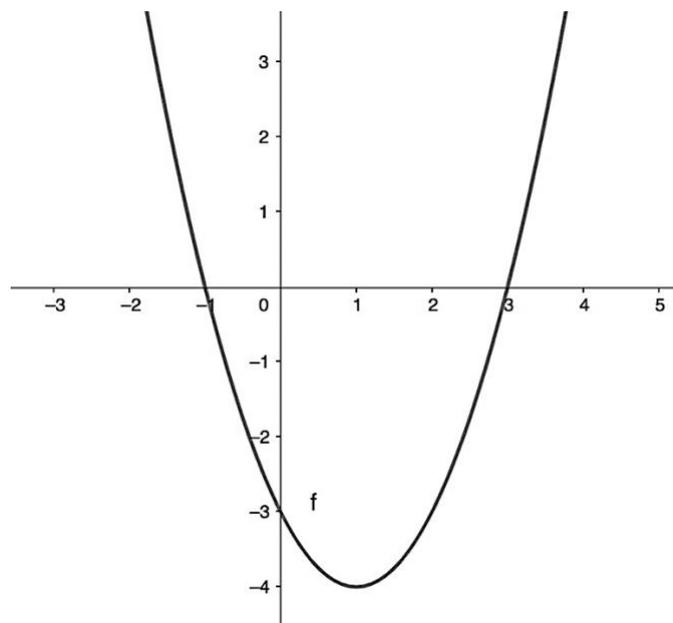
$$x^2 + 10x - 15 = (x + 5)^2 - 40$$

2022 Paper 1 Question 5, (2) (1)

a) $x^2 + 8x + 15 = (x + 4)^2 - 4^2 + 15$
 $= (x + 4)^2 - 1$

b) $(-4, -1)$

2022 Paper 1 Question 14, (3)





2023 Paper 1 Question 4, (1) (1) (1)

a) i) $a = -3$

ii) $b = 2$

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

Let $x = 0$ to give

$$y = (0 - 3)^2 + 2$$

$$y = 9 + 2$$

$$y = 11$$

$$\text{So, } c = 11$$

2024 Paper 1 Question 12, (2) (1) (2)

a) $x^2 - 6x + 8 = (x - 3)^2 - 9 + 8$
 $= (x - 3)^2 - 1$

b) $(3, -1)$

c) Substitute $x = 0$ into $x^2 - 6x + 8$ to give

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

So, the y -intercept is $(0, 8)$ – this is point P. The y co-ordinate as P and Q is the same.

By the symmetry of the graph the x co-ordinate of Q is $3 \times 2 = 6$

$$\text{So, } Q = (6, 8)$$

2025 Paper 1 Question 8, (2)

$$A = (120, 2)$$