



Completing the Square Exam Practice

- Q1. a) Express $x^2 + 10x - 24$ in the form $(x + a)^2 + b$
where a and b are integers (2 marks)
- b) Hence solve the equation: $x^2 + 10x - 24 = 0$ (2 marks)
- Q2. a) Express $x^2 - 8x + 15$ in the form $(x + a)^2 + b$
where a and b are integers (2 marks)
- b) Hence solve the equation: $x^2 - 8x + 15 = 0$ (2 marks)
- Q3. a) Express $2x^2 - 10x - 28$ in the form $a(x + b)^2 + c$
where a, b and c are integers (2 marks)
- b) Hence solve the equation: $2x^2 - 10x - 28 = 0$ (2 marks)
- Q4. a) Express $3x^2 + 28x + 60$ in the form $a(x + b)^2 + c$
where a, b and c are integers (2 marks)
- b) Hence solve the equation: $3x^2 + 28x + 60 = 0$ (2 marks)
- Q5. a) Express $x^2 - 12x + 15$ in the form $(x + a)^2 + b$
where a and b are integers (2 marks)
- b) Hence state the co-ordinates of the minimum point of the
graph of $y = x^2 - 12x + 15$ (2 marks)
- Q6. a) Express $8x - 2x^2 + 3$ in the form $a(x + b)^2 + c$
where a, b and c are integers (2 marks)
- b) Hence state the co-ordinates of the maximum point of the
graph of $y = 8x - 2x^2 + 3$ (2 marks)



Applied Mixed Practice Problems

Q7. A student is asked to complete the square of the expression, $2x^2 - 12x + 13$ and her answer is as follows:

$$\begin{aligned} & 2x^2 - 12x + 13 \\ & = 2(x^2 - 6x) + 13 \\ & = 2(x - 3)^2 - 9 + 13 \\ & = 2(x - 3)^2 + 4 \end{aligned}$$

Identify the mistake in her answer and work out the correct answer.

(4 marks)

Q8. A suspension bridge consisting of 3 vertical towers connected by 2 steel connectors. The left and right connectors can be modelled by the quadratics $h = 2d^2 - 14d + 30$ and $h = d^2 - 16d + 69.5$ respectively, where h is the height (in metres) above the driveway and d is the distance from the left tower (in 10's of metres).



A service worker is positioned on the driveway underneath the lowest points on each connector. Work out the distance between the two workers.

(4 marks)

Q9. The height h of a ball above the ground in metres, t seconds after it is thrown, is given by the equation, $h = -4t^2 + 21t$. By completing the square, find, to 1 decimal place :

- the maximum height of the ball
- the time at which the ball reaches the maximum height.

(5 marks)

Q10. a) Express $2x^2 - 30x - 9$ in the form $a(x + b)^2 + c$ where a, b and c are integers

(2 marks)

b) Hence solve the equation: $2x^2 - 30x - 9 = 0$ giving your answer in surd form.

(2 marks)