



## 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

Answer: \_\_\_\_\_  
(2 marks)

b) Hence solve the equation:  $x^2 + 10x - 24 = 0$

Answer: \_\_\_\_\_  
(2 marks)

Q2. a) Express  $x^2 - 8x + 15$  in the form  $(x + a)^2 + b$   
where  $a$  and  $b$  are integers

Answer: \_\_\_\_\_  
(2 marks)

b) Hence solve the equation:  $x^2 - 8x + 15 = 0$

Answer: \_\_\_\_\_  
(2 marks)



Q3. a) Express  $2x^2 - 10x - 28$  in the form  $a(x + b)^2 + c$  where  $a$ ,  $b$  and  $c$  are numbers to be found.

Answer: \_\_\_\_\_  
(2 marks)

b) Hence solve the equation:  $2x^2 - 10x - 28 = 0$

Answer: \_\_\_\_\_  
(2 marks)

Q4. a) Express  $3x^2 + 28x + 60$  in the form  $a(x + b)^2 + c$  where  $a$ ,  $b$  and  $c$  are numbers to be found

Answer: \_\_\_\_\_  
(2 marks)

b) Hence solve the equation:  $3x^2 + 28x + 60 = 0$

Answer: \_\_\_\_\_  
(2 marks)



Q5. a) Express  $x^2 - 12x + 15$  in the form  $(x + a)^2 + b$   
where  $a$  and  $b$  are integers

Answer: \_\_\_\_\_  
(2 marks)

b) Hence state the co-ordinates of the minimum point of the  
graph of  $y = x^2 - 12x + 15 = 0$

Answer: \_\_\_\_\_  
(2 marks)



Q6. a) Express  $8x - 2x^2 + 3$  in the form  $a(x + b)^2 + c$   
where  $a$  and  $b$  are integers

Answer: \_\_\_\_\_  
(2 marks)

b) Hence state the co-ordinates of the maximum point of the  
graph of  $y = 8x - 2x^2 + 3 = 0$

Answer: \_\_\_\_\_  
(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.

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.

Answer: \_\_\_\_\_  
(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 :

- (i) the maximum height of the ball
- (ii) the time at which the ball reaches the maximum height.

Answer: \_\_\_\_\_  
(5 marks)



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

Answer: \_\_\_\_\_  
(2 marks)

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

Answer: \_\_\_\_\_  
(2 marks)