

COMPLETING THE SQUARE

AS Unit 1: Pure Mathematics A

WJEC past paper questions: 2010 – 2017

Total marks available 74 (approximately 1 hour 30 minutes)

1. a) Express $4x^2 - 8x + 7$ in the form $a(x + b)^2 + c$, where a , b and c are constants whose values are to be found. (3)
- b) Use your answer to part a) to find the greatest value of $\frac{1}{4x^2 - 8x + 7}$. (2)
(January 10)

2. a) Express $2x^2 + 12x - 7$ in the form $a(x + b)^2 + c$, where the values of the constants a , b and c are to be found. (3)
- b) **Use your answer to part a)** to find the least value of $6x^2 + 36x - 17$ (2)
(Summer 10)

3. Show that $x^2 - 1.4x - 8.51$ may be expressed in the form $(x + p)^2 - 9$, where p is a constant whose value is to be found.
Hence solve the quadratic equation $x^2 - 1.4x - 8.51 = 0$. (5)
(January 11)

4. Express $-x^2 + 6x - 7$ in the form $-(x + a)^2 + b$, where the values of the constants a and b are to be found.
Hence sketch the graph of $y = -x^2 + 6x - 7$, indicating the coordinates of its stationary point. (4)
(May 11)

5. a) Express $3x^2 - 6x + 5$ in the form $a(x + b)^2 + c$, where a , b and c are constants whose values are to be found. (3)
- b) **Use your answer to part a)** to find the greatest value of $\frac{1}{3x^2 - 6x + 11}$. (2)
(January 12)

6. a) Express $3x^2 - 12x + 29$ in the form $a(x + b)^2 + c$, where the values of the constants a , b and c are to be found. (3)
- b) **Use your answer to part a)**, write down the stationary value of $y = 3x^2 - 12x + 29$.
State whether this stationary value is a maximum or a minimum. (2)
(Summer 12)

7. a) i) Express $x^2 + 8x + 5$ in the form $(x + a)^2 + b$, where the values of a, b are to be determined.
 ii) **Use your answer to part i)** to find the least value of $3x^2 + 24x + 15$ and the corresponding value of x . (4)
- b) Solve the simultaneous equations $y = x^2 - x - 9$ and $y = 2x - 5$ algebraically.
Write down a geometrical interpretation of your results. (5)
 (January 13)
8. a) Express $2x^2 - 16x - 8$ in the form $a(x + b)^2 + c$, where the values of the constants a, b and c are to be found. (3)
- b) **Use your answer to part a)**, find the least value of $x^2 - 8x - 4$ and the corresponding value of x . (2)
 (Summer 13)
9. Show that $x^2 + 1.6x - 24.36$ may be expressed in the form $(x + p)^2 - 25$, where p is a constant whose value is to be found.
Hence solve the quadratic equation $x^2 + 1.6x - 24.36 = 0$. (5)
 (January 14)
10. a) Express $4x^2 - 8x + 11$ in the form $a(x + b)^2 + c$, where a, b and c are constants whose values are to be found. (3)
- b) **Use your answer to part a)** to find the greatest value of $\frac{1}{4x^2 - 8x + 29}$. (2)
 (Summer 14)
11. a) Express $4x^2 - 24x - 189$ in the form $a(x + b)^2 + c$, where the values of the constants a, b and c are to be found. (3)
- b) **Using your answer to part a)**, solve the equation $4x^2 - 24x - 189 = 0$ (3)
 (Summer 15)
12. a) Express $x^2 + 4x - 8$ in the form $(x + a)^2 + b$, where a and b are constants whose values are to be found. (2)
- b) Use an algebraic method to solve the simultaneous equations $y = x^2 + 4x - 8$ and $y = 2x + 7$. (4)
- c) Draw a sketch illustrating geometrically the results of both part a) and part b). (4)
 (Summer 16)
13. a) Express $-2x^2 - 20x + 35$ in the form $a(x + b)^2 + c$, where the values of the constants a, b and c are to be found. (3)
- b) **Without carrying out any further calculation**, write down the stationary value of $y = -2x^2 - 20x + 35$ and state whether this stationary value is a maximum or a minimum. (2)
 (Summer 17)