MPM2D Name: _____

Thread 2, Quiz 2 – Quadratic Equations /K 7 /A 7

Marks

1. Re-write the equation below in the form $y = a(x-h)^2 + k$ by completing the square.

Then, state the maximum or minimum value of the relation.

$y = x^2 - 8x + 13$

$y = x^2 - 8x + 16 - 16 + 13$

$y = (x-4)^2 - 16 + 13$

K 3 $y = (x-4)^2 - 3$

- opens up
- minimum value of -3

2. The cost, in dollars, of operating an appliance is given by the formula $C = 2t^2 - 24t + 150$ where t is the time, in months, the appliance is running.

What is the minimum cost of running the appliance?

$C = 2t^2 - 24t + 150$

$C = 2(t^2 - 12t) + 150$

$C = 2(t^2 - 12t + 36 - 36) + 150$

A 4 $C = 2((t-6)^2 - 36) + 150$

$C = 2(t-6)^2 - 72 + 150$

$C = 2(t-6)^2 + 78$

- opens up
- minimum value of 78

∴ the minimum cost of running the appliance is $78.

Marks

3. What are the x intercepts of this quadratic relation?

$y = (2x + 1)(2x - 7)$

K 2

$0 = (2x+1)(2x-7)$

$2x+1=0$ $\quad$ $2x-7=0$

$2x=-1$ $\quad$ $2x=7$

$x=-\frac{1}{2}$ $\quad$ $x=\frac{7}{2}$

$\therefore$ the x-intercepts are $-\frac{1}{2}$ and $\frac{7}{2}$.

4. What are the x intercepts of this quadratic relation?

$y = x^2 + 8x + 12$

K 2

$y = (x+6)(x+2)$

$0 = (x+6)(x+2)$

$x+6=0$ $\quad$ $x+2=0$

$x=-6$ $\quad$ $x=-2$

$\therefore$ the x-intercepts are -6 and -2.

5. The path of a toy rocket is defined by the relation $y = -3x^2 + 11x + 4$ where x is the horizontal distance, in metres, travelled and y is the height, in metres, above the ground.

How far has the rocket travelled, horizontally, when it hits the ground?

A 3

$y = -3x^2 + 11x + 4$

$y = -(3x^2 - 11x - 4)$

$3 \times 1 = 3$, $1 \times -4 = -4$, $3 - 4 = -1 = -11$

$y = -(3x+1)(x-4)$

$0 = -(3x+1)(x-4)$

$x = -\frac{1}{3}$ $\quad$ $x = 4$

we discard the negative root since the rocket would not travel backwards

$\therefore$ the rocket travels 4 m horizontally