

DO NOW: If Lia completes the square for $f(x) = x^2 - 12x + 7$ in order to find the minimum, she must write $f(x)$ in the general form $f(x) = (x - a)^2 + b$. What is the value of a for $f(x)$?

1) 6

2) -6

3) 12

4) -12

$$f(x) = x^2 - 12x + 7$$

$$\left(\frac{-12}{2}\right)^2 = 36$$

$$f(x) - 7 = x^2 - 12x$$

$$f(x) - 7 + 36 = x^2 - 12x + 36$$

$$f(x) + 29 = (x - 6)^2$$

$$f(x) = (x - 6)^2 - 29$$

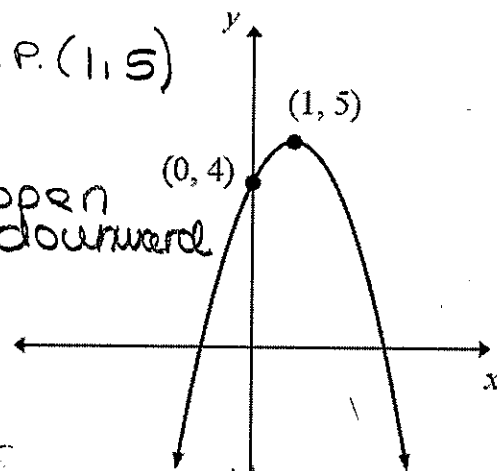
AIM: QUADRATIC EQUATION IN VERTEX FORM (REGENTS QUESTIONS)

1. Given the quadratic function to the right answer the following:

a. What is the equation of the function shown? Justify your answer. T.P. (1, 5)

$$y = -(x - 1)^2 + 5$$

The parabola is concave down/open right one unit & up 5 units downward



b. What are the x-intercepts?

$$0 = -(x - 1)^2 + 5$$

$$0 = -(x - 1)(x - 1) + 5$$

$$0 = -(x^2 - x - x + 1) + 5$$

$$0 = -(x^2 - 2x + 1) + 5$$

$$0 = -x^2 + 2x - 1 + 5$$

$$\frac{0}{-1} = \frac{-x^2}{-1} + \frac{2x}{-1} + \frac{4}{-1}$$

$$-4 = -x^2 + 2x - 4$$

$$4 = x^2 - 2x$$

$$x^2 - 2x = 4$$

$$x^2 - 2x + \square = 4 + \square$$

$$(x - 1)(x - 1) = 5$$

$$\sqrt{(x - 1)^2} = \sqrt{5}$$

$$x - 1 = \pm\sqrt{5}$$

$$x = 1 \pm \sqrt{5}$$

2) Given the function $f(x) = -x^2 + 8x + 9$, state whether the vertex represents a maximum or minimum point. Explain your answer. maximum point b/c a-value is (-)
 b) Rewrite $f(x)$ in vertex form by completing the square.

$$\begin{aligned} f(x) &= \frac{-x^2}{-1} + \frac{8x}{-1} + \frac{9}{-1} \\ -f(x) &= x^2 - 8x - 9 \\ &\quad +9 \qquad \qquad \qquad +9 \\ \hline -f(x) + 9 &= x^2 - 8x \\ -f(x) + 9 + 16 &= x^2 - 8x + 16 \\ -f(x) + 25 &= (x-4)(x-4) \\ -f(x) + 25 &= (x-4)^2 \\ &\quad -25 \qquad \qquad \qquad -25 \\ \hline \frac{-f(x)}{-1} &= \frac{(x-4)^2}{-1} - \frac{25}{-1} \qquad \text{vertex } (4, 25) \\ f(x) &= -(x-4)^2 + 25 \end{aligned}$$

Show calculator!

3. Which equation and ordered pair represent the correct vertex form and vertex for $f(x) = x^2 - 12x + 7$?

- 1) $f(x) = (x-6)^2 + 43, (6, 43)$
- 2) $f(x) = (x-6)^2 + 43, (-6, 43)$
- 3) $f(x) = (x-6)^2 - 29, (6, -29) \rightarrow y_2$
- 4) $f(x) = (x-6)^2 - 29, (-6, -29)$

$$\begin{aligned} &\quad \quad \quad y_1 \\ &\quad \quad \quad \underbrace{\hspace{10em}} \\ &\quad \quad \quad \frac{(12}{2})^2 = 36 \\ f(x) - 7 &= x^2 - 12x \\ f(x) - 7 + 36 &= x^2 - 12x + 36 \\ f(x) + 29 &= (x-6)^2 \\ &\quad -29 \qquad \qquad \qquad -29 \\ \hline f(x) &= (x-6)^2 - 29 \end{aligned}$$

4. Which equation is equivalent to $y - 34 = x(x-12)$?

- 1) $y = (x-17)(x+2)$
- 2) $y = (x-17)(x-2)$
- 3) $y = (x-6)^2 + 2$
- 4) $y = (x-6)^2 - 2$

$$\begin{aligned} &\quad \quad \quad \frac{(12}{2})^2 = 36 \\ y - 34 &= x^2 - 12x \\ y - 34 + 36 &= x^2 - 12x + 36 \\ y + 2 &= (x-6)^2 \\ &\quad -2 \qquad \qquad \qquad -2 \\ \hline y &= (x-6)^2 - 2 \end{aligned}$$