

SOLUTIONS

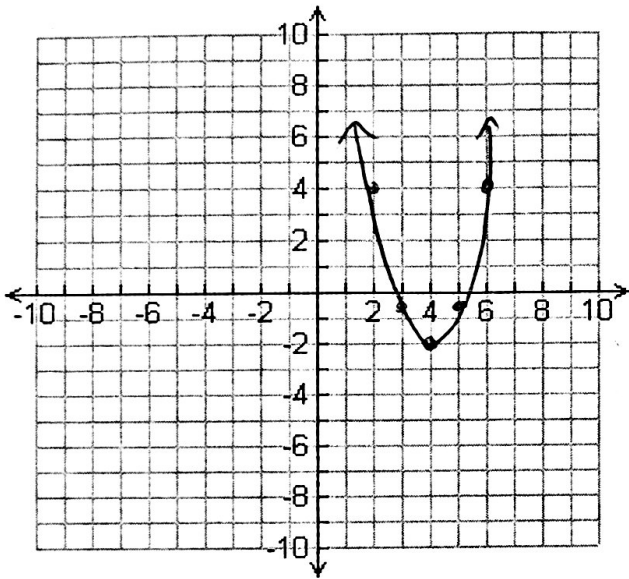
Exam Tune-up #2 | MPM2D

1) Make a sketch of the following quadratic relations.

a) $y = 1.5(x - 4)^2 - 2$

Vertex: $(4, -2)$

Step Pattern: 1.5, 4.5, 7.5

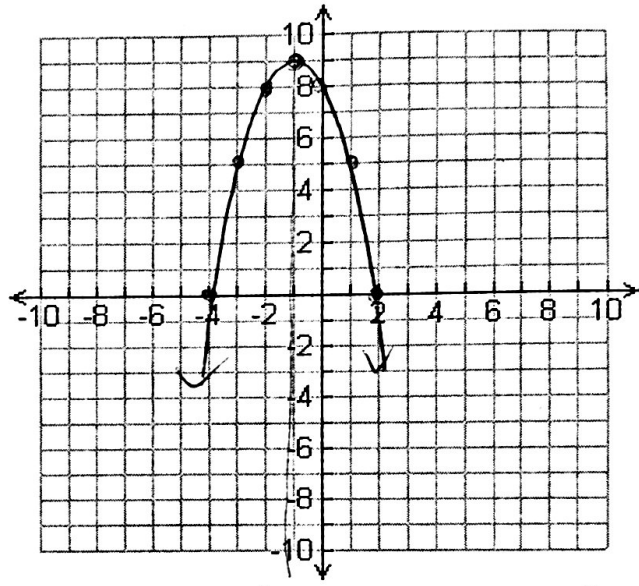


b) $y = -(x - 2)(x + 4)$

Zeros: $(2, 0)$ & $(-4, 0)$ = 9

Step Pattern: -1, -3, -5

$$y = -(-1-2)(-1+4) = -(-3)(3)$$



AOS: $x = -1$

\odot 18
 \oplus -9

2) Factor the following fully:

a) $x^2 + x - 42$

\odot -42
 \oplus 1

$$= (x + 7)(x - 6)$$

b) $9x^2 - 1$

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

c) $2x^2 - 9x + 9$

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

d) $3x^2 - 9x - 12$

$$= 3(x^2 - 3x - 4) \quad \begin{matrix} \odot -4 \\ \oplus -3 \end{matrix}$$

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

e) $16x^2 + 40x + 25$

$$= (4x + 5)^2$$

$$\sqrt{16x^2} = 4x$$

$$\sqrt{25} = 5$$

$$2(4x)(5) = 40x \checkmark$$

3) Consider the quadratic relation $y = 5x^2 + 10x + 3$

a) Determine the x-intercepts of the relation

b) Determine the vertex of the relation

$$x = \frac{-10 \pm \sqrt{10^2 - 4(5)(3)}}{2(5)}$$

$$= \frac{-10 \pm \sqrt{40}}{10}$$

$$x_1 = -0.37$$

$$x_2 = -1.63$$

$$\begin{aligned} y &= 5(x^2 + 2x) + 3 \\ &= 5(x^2 + 2x + 1 - 1) + 3 \\ &= 5(x^2 + 2x + 1) - 5 + 3 \\ &= 5(x+1)^2 - 2 \end{aligned}$$

vertex $(-1, -2)$

4) Mrs. Smith sells frozen cookies from home. In December, she sold 300 dozen cookies when they were priced at 5\$ per dozen. She thinks that if she increases the price by \$0.25, she would sell 5 less dozen cookies. What price should she charge to maximize her revenue?

Hint: Let "x" represent the number of price increases

$$\begin{aligned} \text{Revenue} = R &= (5 + 0.25x)(300 - 5x) \\ &= 1500 - 25x + 75x - 1.25x^2 \\ &= -1.25x^2 + 50x + 1500 \quad (\text{C.T.S.}) \\ &= -1.25(x^2 - 40x) + 1500 \\ &= -1.25(x^2 - 40x + 400 - 400) + 1500 \\ &= -1.25(x^2 - 40x + 400) + 500 + 1500 \\ &= -1.25(x-20)^2 + 2000 \end{aligned}$$

Increase the price 20 times \rightarrow New price is \$10/dozen