

### 3/5 Algebra - Downing

Ex) The highway mileage ( $m$ ) in miles per gallon for a car is approximately  $m(s) = -0.025s^2 + 2.45s - 30$ , where " $s$ " is the speed in miles per hour. What is the maximum mileage for this car to the nearest tenth of a mile per gallon? What speed results in this mileage.

$m$  = mileage in mpg

$s$  = speed in mph

Find the max  $\rightarrow$  Find the vertex

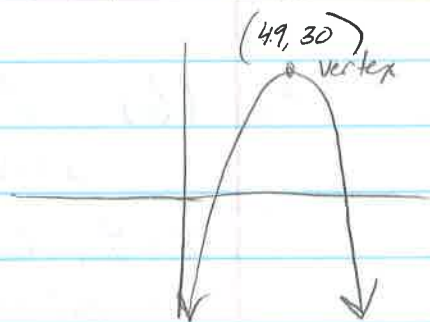
$$\text{AOS: } s = \frac{-b}{2a} = \frac{-2.45}{2(-0.025)} = 49$$

$$m(49) = -0.025(49)^2 + 2.45(49) - 30$$

$$m(49) = 30.0 \text{ mpg}$$

$$\text{max mileage} = 30.0 \text{ mpg}$$

$$\text{Speed: } 49 \text{ mph}$$



Ex)  $h$  = height in cm  $h(r) = 0.024r^2 - 1.28r + 33.6$

$r$  = distance in cm

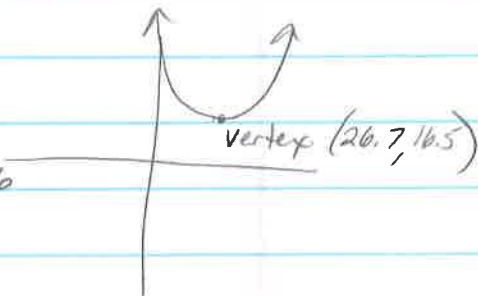
$$\text{AOS} = r = \frac{-b}{2a} = \frac{1.28}{2(0.024)} = 26.7$$

$$h(26.7) = 0.024(26.7)^2 - 1.28(26.7) + 33.6$$

$$h(26.7) = 16.5$$

$$\text{minimum height} = 16.5$$

$$\text{row spacing} = 26.7$$



Worksheet #1  $f(x) = -2x^2 - 4x$   $a$   $b$   $c=0$

$$\text{AOS} = x = \frac{-b}{2a} = \frac{4}{2(-2)} = -1$$

$$y = -2(-1)^2 - 4(-1)$$

$$y = 2 \quad \text{max } y = 2$$

$$y\text{-int} = 0$$

$$D: x \in \mathbb{R}$$

$$R: y \leq 2$$

$$x = -2, 0$$



#2  $f(x) = 2x^2 - 4x + 5$



$$x = \frac{-b}{2a} = \frac{4}{4} = 1$$

vertex

$$y = 2(1)^2 - 4(1) + 5$$

(1, 3)

$$y = 3$$

$$y\text{-int } (0, 5)$$

$$\text{min: } y = 3$$

$$D: x \in \mathbb{R}$$

$$R: y \geq 3$$

$$x\text{-int: none}$$

#8  $f(x) = -x^2 + 4$

$$a = -1 \quad b = 0 \quad c = 4$$

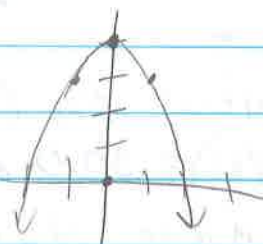
$$x = \frac{-b}{2a} = 0$$

$$y = -(0)^2 + 4$$

$$y = 4 \quad (0, 4)$$

$$y\text{-int } (0, 4)$$

} pick a number  
to plug in  $\rightarrow x = 1$



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

$$-1 + 4 = 3$$

(1, 3)

$$\text{max: } y = 4$$

$$D: x \in \mathbb{R}$$

$$R: y \leq 4$$

$$x\text{-int: } x = -2, x = 2$$

Worksheet #3-7