

Standard 4C Applications Reteach

Name: Key Hr: _____

Key words meanings:

max or min: vertex find "h" or "k" $h = \frac{-b}{2a}$ and $k = f(h)$

starting height: y intercept put zero in for x and simplify

realistic domain: from one x intercept to the other or zero to the furthest out x intercept

realistic range: from the ground to the maximum height or from zero to "k" (the y coordinate of the vertex)

given x find y: plug the x value in and simplify

given y find x: plug the y value in for y then move it to the other side of the equation to get zero on one side, then use the quadratic formula to find x

finding the time or the distance where/when it landed: use the quadratic formula.

A manufacturer of lighting fixtures has daily production costs of $C = .25x^2 - 15x + 500$ where C is the total cost (in dollars) and x is the number of units produced. (Units, Cost)

1. How many fixtures should be produced each day to yield a minimum cost? (minimum) cost?
vertex

$$h = \frac{15}{2(.25)} = \boxed{30 \text{ fixtures}}$$

2. What is the minimum cost?

$$k = .25(30)^2 - 15(30) + 500$$

$$k = \boxed{\$275}$$

3. If an M-16 is fired straight upward, then the height h(x) of the bullet in feet at distance x in feet is given by $h(x) = -16x^2 + 325x + 4$. (distance, height)

- a) What is the height of the bullet given it's traveled a distance of 5 feet?

$$h(5) = -16(5)^2 + 325(5) + 4$$

$$\boxed{\text{height of } 1,229 \text{ ft}}$$

- b) How high is the bullet when it reaches the maximum height?

$$h = \frac{-325}{2(-16)} = 10.16$$

$$k = -16(10.16)^2 + 325(10.16) + 4$$

$$\boxed{1,654.4 \text{ ft}}$$

- d) How far away does the bullet hit the ground?

$$0 = -16x^2 + 325x + 4$$

$a = -16 \quad b = 325 \quad c = 4$

$$x = \frac{-325 \pm \sqrt{(325)^2 - 4(-16)(4)}}{2(-16)}$$

$$x = -0.01$$

$$\boxed{x = 20.32 \text{ sec}}$$

- e) What is the starting height of the bullet?

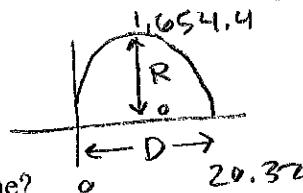
$$\text{height} = -16(0)^2 + 325(0) + 4$$

$$\boxed{4 \text{ ft}}$$

- e) What is a realistic domain and range?

$$D: [0, 20.32]$$

$$R: [0, 1,654.4]$$



- f) At a height of 500 feet how far has the bullet gone?

$$-500 = -16x^2 + 325x + 4$$

$$-500$$

$$x = \frac{-325 \pm \sqrt{(325)^2 - 4(-16)(-496)}}{2(-16)}$$

$$0 = -16x^2 + 325x - 496$$

$a = -16 \quad b = 325 \quad c = -496$

$$\boxed{x = 1.66 \text{ ft} \text{ and } x = 18.65 \text{ ft}}$$

$y = 500$
 $x = ?$