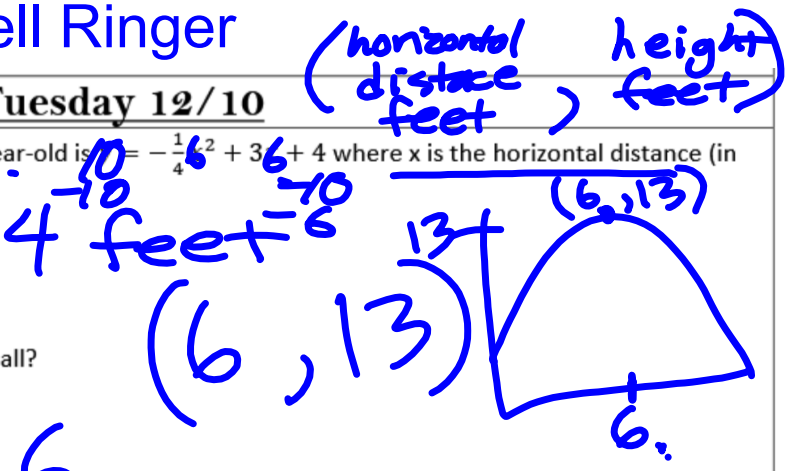
# Bell Ringer

## Tuesday 12/10

The height y (in feet) of a ball thrown by an 8-year-old is $y = -\frac{1}{4}x^2 + 3x + 4$ where x is the horizontal distance (in feet) from where the ball is thrown.

1. What is the starting height of the ball?

2. 2. What is the maximum height of the ball?




$\frac{-b}{2a}$ $\frac{-3}{2(-\frac{1}{4})} = 6$

# Correct Applications Day 2 ws

Key

## Applications of Quadratics - Day 2

1. A firework is shot upward so that its distance, in feet, above the ground after t seconds is $h(t) = -13t^2 + 312t$ . (sec, height)

x-int a. Find the zeros of the function and explain the meaning in the context of the problem.

$-(13t^2 - 24t)$ $-13t = 0$ $t - 24 = 0$ $t = 0$ and $24$ Shoots at 0 seconds and lands at 24 seconds

b. Find the vertex of the function and explain the meaning in the context of the problem.

$\frac{-(312)}{2(-13)} = 12$ $h(12) = -13(12)^2 + 312(12) = 1,872$ At 12 seconds it reaches a max height of 1,872 ft

2. From 1970-1990, the average cost of a new car $C$ (in dollars) can be approximated by the model $C = 30.5t^2 + 4192$ , where $t$ is the number of years since 1970. During which year was the average cost of a new car $7,242?

y = 7242 find x

$30.5t^2 + 4192 = 7242$ $-7242 \quad -7242$

$\frac{30.5t^2}{30.5} = \frac{3,050}{30.5}$ $t = \pm 10$

$t^2 = 100$

$1970 + 10 =$ 1980 (year)

3. The height $h(x)$ (in feet) of a ball thrown by a child is $h(x) = -\frac{1}{12}x^2 + x + 2$ where x is the horizontal distance (in feet) from where the ball is thrown. (horizontal distance, vertical height)

vertex, k a. How high is the ball when it is at its maximum height? (h, k) (6, 5)

$h = \frac{-1}{2(-\frac{1}{12})} = \frac{-1}{-\frac{1}{6}} = 6$ $k = -\frac{1}{12}(6)^2 + 6 + 2$ 5 ft

y-int b. How high is the ball when it leaves the child's hand?

2 ft

x-int c. How far from the child does the ball strike the ground?

$x = \frac{-1 \pm \sqrt{1^2 - 4(-\frac{1}{12})(2)}}{2(-\frac{1}{12})} = -1.75$ 13.5 ft

d. What is a realistic domain and range?

D: [0, 13.5] R: [0, 5]

y = 4 find x e. At a height of 4 feet how far has the ball gone?

$-\frac{1}{12}x^2 + x + 2 = 4$ $-4 \quad -4$

$-\frac{1}{12}x^2 + x - 2 = 0$

$x = \frac{-1 \pm \sqrt{1^2 - 4(-\frac{1}{12})(-2)}}{2(-\frac{1}{12})}$ 2.54 ft & 9.46 ft

4. A bottle rocket is fired from the ground upwards at 64 feet per second. Using the quadratic model $h(t) = -16t^2 + 64t$ find the following:

(time, height) (sec) (ft)

a. What is the maximum height the bottle rocket reaches?

Vertex K $h = \frac{-64}{2(-16)} = 2$ $-16(2)^2 + 64(2) = 64$ ft

b. How long does it take for the bottle rocket to hit the ground?

X-int $-16t(t-4) = 0$ $t = 0, t = 4$ 4 seconds ≠ starts on ground at 0 seconds...

5. Suppose the cost of producing x crates of pencils is given by $C(x) = \frac{1}{2}x^2 - 10x + 1000$. Find the following:

(crates, cost)

a. How much does it cost to produce 100 crates of pencils?

Y = 100 $\frac{1}{2}(100)^2 - 10(100) + 1000 =$ $5,000

b. How many crates of pencils will minimize the cost of production?

Vertex h $\frac{-(-10)}{2(\frac{1}{2})} = \frac{10}{1} =$ 10 crates

6. A geyser sends a blast of boiling water high into the air. During the eruption, the height $h$ (in feet) of the water $t$ seconds after being forced out from the ground can be modeled by $h = -16t^2 + 70t$. How long is the boiling water in the air?

X-int (seconds, height)

$-2t(8t + 35) = 0$

$-2t = 0$ $t = 0$ $8t + 35 = 0$ $t = +35/8 \approx 4.38$

4.38 seconds

7. A projectile is thrown upward so that its distance above the ground after t seconds is $h(t) = -12t^2 + 504t$. What is the maximum height of the projectile? (time, height) (sec, height)

Vertex K $h = \frac{-504}{2(-12)} = 21$ $k = -12(21)^2 + 504(21) =$ 5,292 ft

8. When an object is dropped, its height in feet, $h$, can be determined after $t$ seconds by using the falling object model $h = -16t^2 + s$, where $s$ is the initial height in feet. Find the time it takes an object to hit the ground when it is dropped from a height of 196 feet.

(seconds, height)

Find t when h = 0 (s = 196) $h = -16t^2 + 196$

$0 = -16t^2 + 196$ $\frac{-16t^2}{-16} = \frac{-196}{-16}$ $t^2 = 12.25$ $t = \pm 3.5$

3.5 seconds

9. Find an expression that could represent the length and the width of a billboard given the area of the billboard is $A = x^2 + 14x + 48$.

48 = 6 · 8

$A = (x+6)(x+8)$

(x+6) or (x+8)

Week #3 Packet due today - hand in

The height y (in ft) of a ball thrown is $h(x) = -\frac{1}{12}x^2 + 1x + 2$

where x is the horizontal distance (in ft) from where the ball is thrown

a) What is the starting height of the ball? (horiz. ft, height)

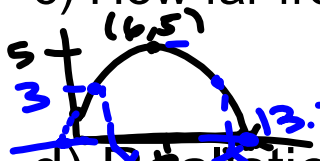
2 ft!

b) What is the maximum height of the ball?

$\frac{-b}{2a} \quad \frac{-(1)}{[2(-1/12)]} = \frac{-1}{1/6} = (6, 5)$ 5ft

The height y (in ft) of a ball thrown is $h(x) = -\frac{1}{12}x^2 + x + 2$ where x is the horizontal distance (in ft) from where the ball is thrown

c) How far from the child does the ball strike the ground?




$$x = \frac{-1 \pm \sqrt{1^2 - 4(-1/12)(2)}}{2(-1/12)}$$

d) Realistic Domain and Range?

D: [0, 13.74] R: [0, 5]

The height y (in ft) of a ball thrown is $h(x) = -\frac{1}{12}x^2 + x + 2$ where x is the horizontal distance (in ft) from where the ball is thrown

(horiz. dist, height)

e) How high is the ball when it's 1 foot from the child

$-\frac{1}{12}(1)^2 + 1 + 2 \approx 2.92$ ft

f) At a height of 3 feet, how far has the ball gone?

find x

$-3 = -\frac{1}{12}x^2 + x + 2$

$0 = -\frac{1}{12}x^2 + x - 1$

$x = \frac{-1 \pm \sqrt{(1)^2 - 4(-1/12)(-1)}}{2(-1/12)}$

$\approx 1.1$ ft

$\approx 10.9$ ft

## 4C Opportunity 1

Carefully fill in bubble sheets!

NO PHONES

**When finished:**

Double check work!
**Staple bubble sheet and turn in basket**
Clear calculator

Finish any missing hw
Read a book