Algebra 1R – Mr. Bo
Unit 11 – Day 3 Warm-Up

Name:_____
Date:_____

1. A stone is thrown from the top of a 50ft platform with an initial velocity of 32 feet per second. The function $h(t) = -16t^2 + 32t + 50$ represents the height of the stone h(t) in terms of t.

a. What is the y-intercept? What does it mean in the problem?

(0, 50) the initial height of the stone is 50 ft.

b. What are the zeros? What do they mean in the problem?

$X = -1$, does not apply since time can't be negative.

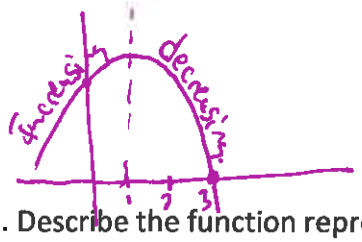
$X = 3$, the time it takes the stone to hit the ground.

c. What is the turning point? What does it mean in the problem?

(1, 66) It will take the stone 1 second to reach a max height of 66 ft.

↑ time ↑ height

d. Over what interval is the height of the stone increasing? Decreasing? Write your answers using interval notation.



increasing: $[0, 1)$

decreasing: $(1, 3]$

2. Describe the function represented in the table based on the first and second differences.

X	Y	first Diff.	2nd diff.
0	-6		
		3	
1	-3		6
		9	
2	6		6
		15	
3	21		6
		21	
4	42		6
		27	
5	69		

Quadratic, because the second differences are constant.

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Unit 11 – Day 3 Notes

Name:_____
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Factored Form & Vertical Motion

Problem 1 - Factored Form:

Factors (noun) – Numbers being multiplied together to form another number.

Factor (verb) – To rewrite a number as a product of factors.

Greatest Common Factor (GCF) – The largest number that divides into a set of given numbers.

1. Factor each number (this means rewrite each number as a product of factors). → may be more than one way.

a. 15 $15=(3)(15)$

b. 20 $20=(5)(4)$

c. 49 $49=7\cdot7$

2. Find the GCF for each set of number.

a. 5 and 15 GCF = 5

b. 8 and 20 GCF = 4

c. 2, 6, and 14 GCF = 2.

3. Factor each expression using a GCF.

a. $5x+15$

$= 5(x)+5(3)$ (GCF)

$= 5(x+3)$

b. $8x-20$

$= 4\cdot(2x)-4(5)$ (GCF)

$= 4(2x+5)$

c. $2x^2+6x-14$

$= 2(x^2)+2(3x)-2(7)$ (GCF)

$= 2(x^2+3x-7)$

d. $-4x+16$

$= -4(x)+(-4)(-4)$ (GCF)

$= -4(x-4)$

e. $6x+9$

$= 3(2x)+3(3)$ (GCF)

$= 3(2x+3)$

d. $4x^2-6x+10$

$= 2(2x^2)-2(3x)+2(5)$

$= 2(2x^2-3x+5)$

Problem 2 – Factored Form of a Quadratic:

use table from calculator.

1. Sketch the graph of $y = (x+1)(x-5)$ on the grid.

a. What type of function is this?

Quadratic

b. What is the y-intercept?

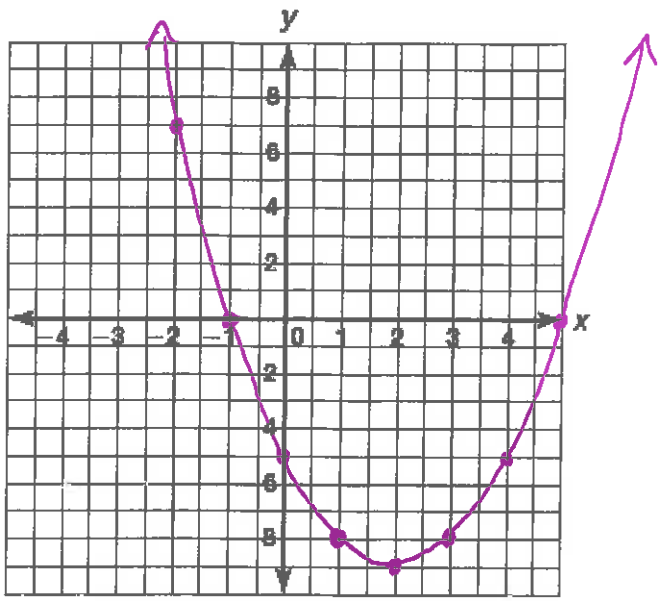
(0, -5)

c. What are the x-intercepts?

(-1, 0) and (5, 0)

d. What are the zeros?

$x = -1$ and $x = 5$



$y = (x+1)(x-5)$ is the factored form of a Quadratic. (x+1) and (x-5) are the factors.

2. Look closely at the factors. How are they related to the zeros of the quadratic?

If I set each factor = 0 and solve for x, it gives me the zeros.

$x+1=0$ and $x-5=0$

$x=-1$ $x=5$

3. List the zeros of each quadratic. State whether the quadratic opens up or down.

a. $y = (x-3)(x-2)$

$x-3=0$ $x-2=0$

$x=3$ $x=2$

b. $y = 2(x-6)(x+8)$

$x-6=0$ $x+8=0$

$x=6$ $x=-8$

c. $y = -3(x+4)(x-1)$

$x+4=0$ $x-1=0$

$x=-4$ $x=1$

4. Use a graphing calculator to find the zeros of each quadratic. Write the function in factored form.

a. $y = x^2 + x - 12$

Zeros: $x=-4$ $x=3$

$+4\ +4$ $-3\ -3$

$x+4=0$ $x-3=0$

(x+4) and (x-3) are factors.

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

b. $y = -x^2 + x + 6$

Zeros: $x=-2$, $x=3$

factors: (x+2) and (x-3)

GCF = -1

$y = -(x+2)(x-3)$

c. $y = 3x^2 + 15x + 12$

GCF = 3

Zeros: $x=-1$ $x=-4$

factors: (x+1) (x+4)

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

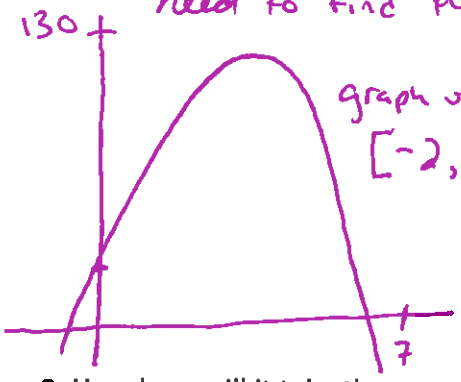
Problem 3 – Vertical Motion:

A catapult hurls a grapefruit from a height of 24 feet at an initial velocity of 80 feet per second. The function $h(t) = -16t^2 + 80t + 24$ represents the height of the grapefruit $h(t)$ in terms of time t.

1. When will the grapefruit reach its maximum height?

What part of the parabola needs to be found in order to answer this question?

need to find the y-coord. of the turning point.



graph using a window of $[-2, 7] \times [-10, 130]$

time height.

Turning point: (2.5, 124)

grape fruit reaches a max height of 124 feet.

2. How long will it take the grapefruit to reach its maximum height?

What part of the parabola needs to be found in order to answer this question?

need to find the x-coordinate of the turning point.

time height

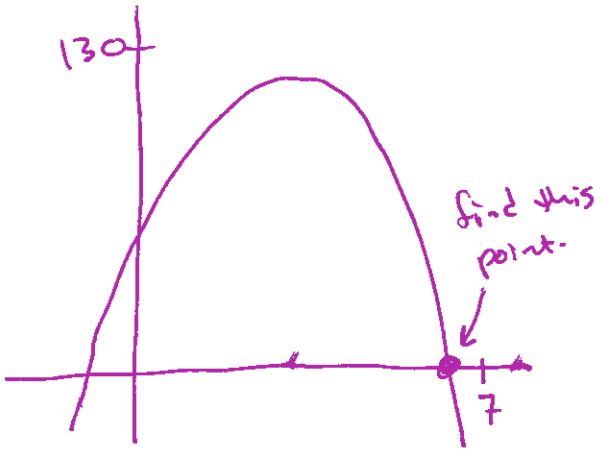
Turning point: (2.5, 124)

grape fruit reaches its max after 2.5 seconds.

3. How long will it take for the grapefruit to hit the ground?

What part of the parabola needs to be found in order to answer this question?

need to find the x-coord. of the x-intercepts. (this is the same as finding the zeros)



time height.

x-int: (5.3, 0)

Zero: 5.3

grape fruit will hit the ground after 5.3 seconds