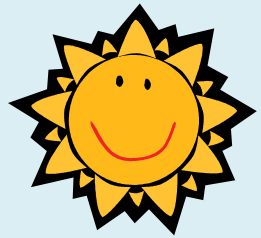
Unit 2 Day 9

FRED Functions

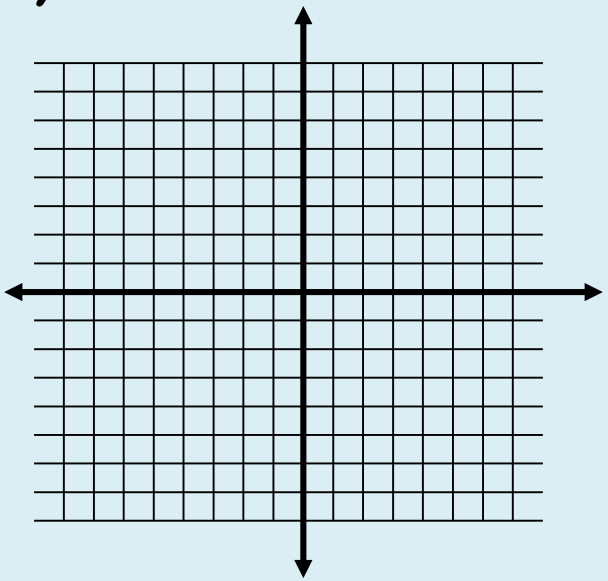
Warm Up

1. Graph
2. Test a point (0,0)
3. Shade

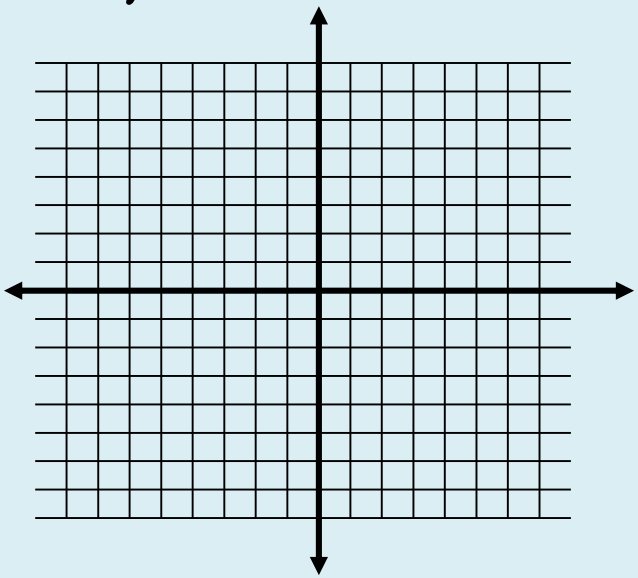


You may want to try the problems on this slide by hand! Practice for the non-calculator part of the test! ☺

1. $y \leq x^2 - 2x - 8$



2. $y < -x^2 - 4x + 5$



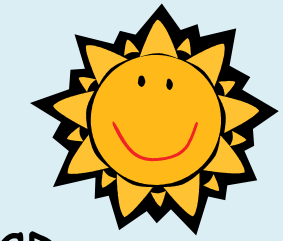
3. Factor Completely

a. $4x^2 - 12x + 9$

b. $4x^2 - 36$

Warm-Up Continued ->

Warm Up Continued



4. An electronics company has a new line of portable radios with CD players. Their research suggests that the daily sales, s, for the new product can be modeled by $s = -p^2 + 120p + 1400$, where p is the price of each unit.

   a. What is the maximum daily sales total for the new product?
   b. What price should the company charge to make this profit?

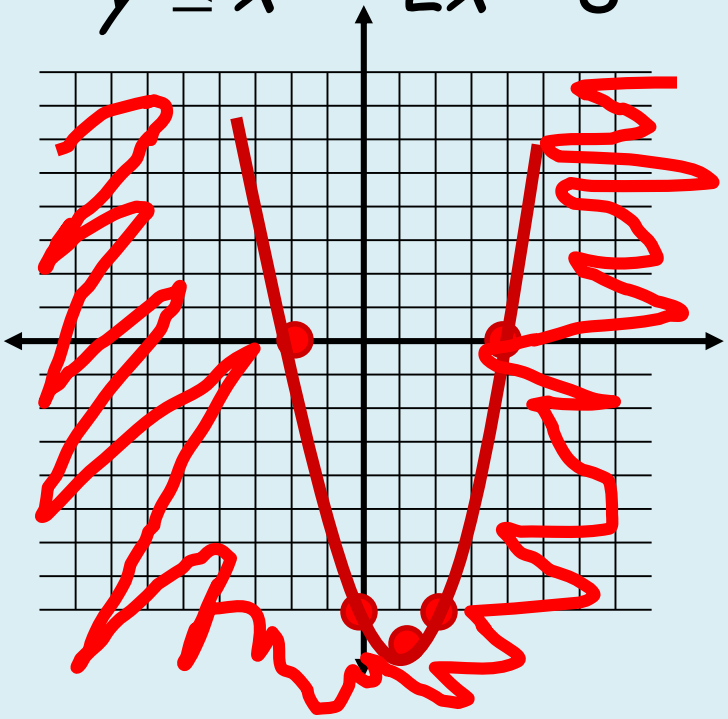
5. The shape of the Gateway Arch in St. Louis is a catenary curve, which closely resembles a parabola. The function $y = -\frac{2}{315}x^2 + 4x$ closely models the shape of the arch, where y is the height in feet and x is the horizontal distance from the base of the left side of the arch in feet.

   a. What is the width of the arch at the base?
   b. What is the maximum height of the arch?

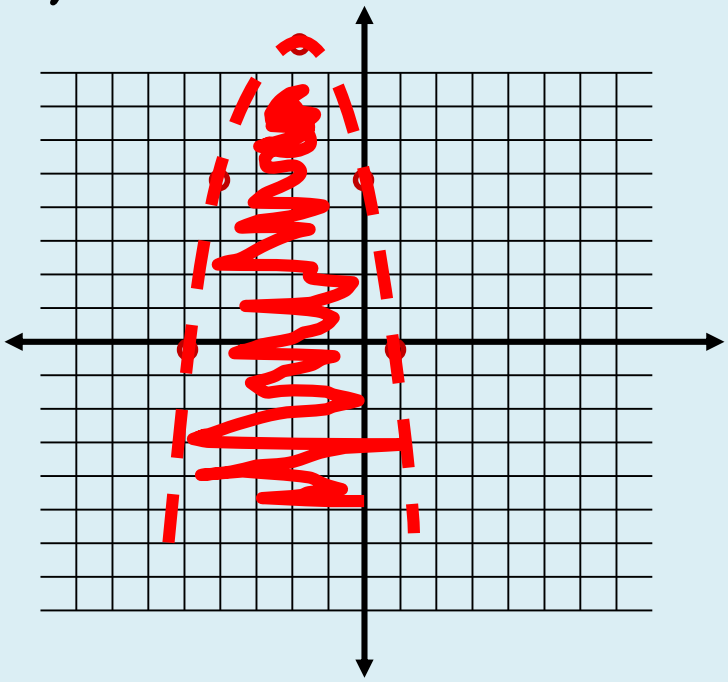
Warm Up ANSWERS

1. Graph
2. Test a point (0,0)
3. Shade

1. $y \leq x^2 - 2x - 8$



2. $y < -x^2 - 4x + 5$



3. Factor Completely

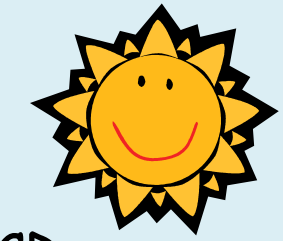
a. $4x^2 - 12x + 9$

$(2x - 3)^2$

b. $4x^2 - 36$

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

Warm Up ANSWERS



4. An electronics company has a new line of portable radios with CD players. Their research suggests that the daily sales, s, for the new product can be modeled by $s = -p^2 + 120p + 1400$, where p is the price of each unit. ($60 per unit, $5000 profit)

   a. What is the maximum daily sales total for the new product?
   b. What price should the company charge to make this profit?

5. The shape of the Gateway Arch in St. Louis is a catenary curve, which closely resembles a parabola. The function $y = -\frac{2}{315}x^2 + 630$ closely models the shape of the arch, where y is the height in feet and x is the horizontal distance from the base of the left side of the arch in feet.

   a. What is the width of the arch at the base? 630 ft.
   b. What is the maximum height of the arch? 630 ft.

Before Homework Answers, let's watch a video on solving Quadratics with Quadratic Formula AND simplifying the formula completely! ☺

https://www.youtube.com/watch?v=3ayhvAI3IeY

Homework Answers – Packet p. 10 EVENS

2) $x = \{8, -3\}$

4) $x = \dfrac{-5 \pm \sqrt{5}}{2}$

6) $x = \dfrac{-2 \pm \sqrt{5}}{2}$

8) $x = \{-5, 2\}$

10) $x = \dfrac{3 \pm 2\sqrt{6}}{3}$

12) $x = \dfrac{-2 \pm 2\sqrt{5}\ i}{3}$

14) $x = \dfrac{3 \pm \sqrt{65}}{4}$

Homework Answers p. 11-12 evens

2) -7
4) 41
6) 57

8) 0; 1 real solution
10) 0; 1 real solution
12) 0; 1 real solution
14) 0; 1 real solution

16) 0; 1 real solution
18) 140; 2 irrational real solutions
20) 337; 2 irrational real solutions
24) When taking the square root of a complex number, you have to account for both the positive and negative values of the root.

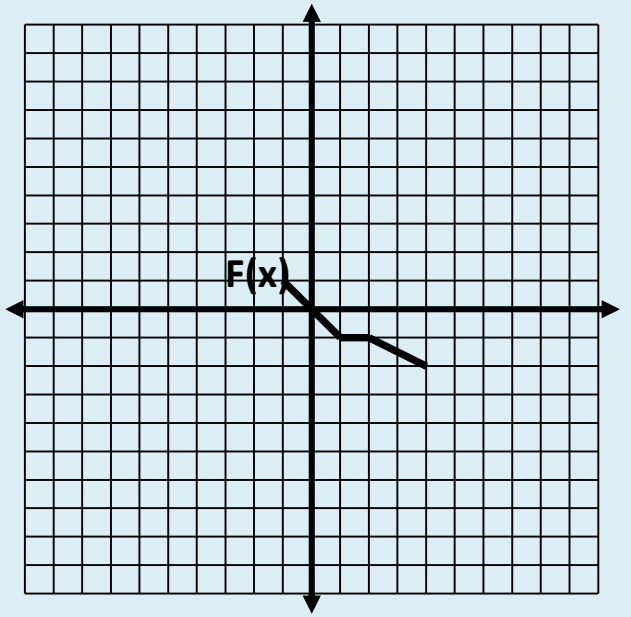
Homework Tonight

Packet p. 13-14
AND
Finish Fred Function Notes

Fred Functions
p. 33-34

Fred Functions

To the right is a graph of a **"Fred" function**. We can use Fred functions to explore transformations in the coordinate plane. Let's review briefly.



1. a. Explain what a function is in your own words.

A function is a relation in which every element in the domain maps to exactly 1 element of the range.

b. Using the graph, how do we know that Fred is a function?

- It passes the vertical line test
- It has 1 y-value for each x-value

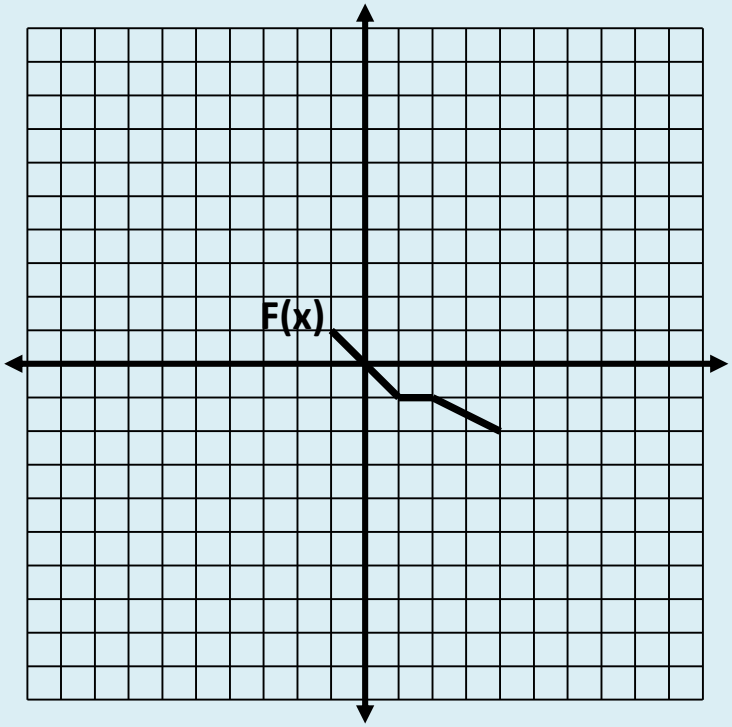
Fred Functions

2. a. Explain what we mean by the term domain.

The set of all inputs (**x-values**) of a function or relation

b. Using the graph, what is the domain of Fred?

$$\{x \mid -1 \le x \le 4\}$$



3. a. Explain what we mean by the term range.

The set of all outputs (**y-values**) of a function or relation

b. Using the graph, what is the range of Fred?

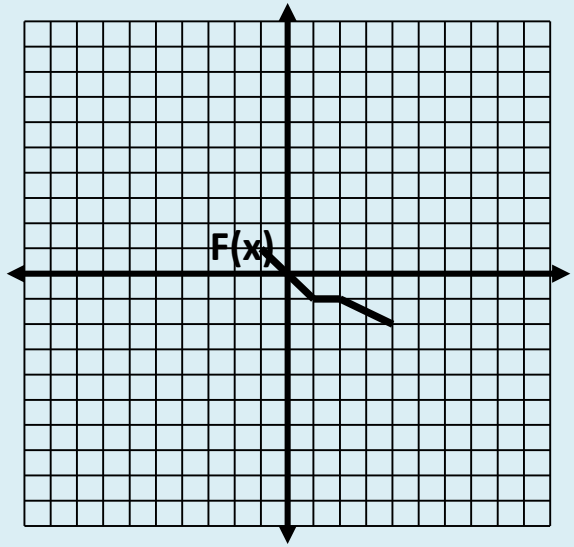
$$\{y \mid -2 \le y \le 1\}$$

Fred Functions

4. Let's explore the points on Fred.

a. How many points lie on Fred? Infinite!

Can you list them all? Nope!



b. What are the key points that would help us graph Fred?

(-1, 1), (1, -1), (2, -1), (4, -2)

We are going to call these key points **"characteristic" points**.
It is important when graphing a function that you are able to identify these characteristic points.

Use the graph of graph to evaluate the following.

F(1) = -1 F(–1) = 1 F(4) = –2 F(5) = Undefined!
Not in the domain

Continue Fred Functions p. 34-35

Remember to check in with teacher after doing the checkpoint!

Checkpoint p. 35

Equation	Effect to Fred's graph
Example: y=F(x) + 18	**Translate up 18 units**
1. y = F(x) – 100	**Translate down 100 units**
2. y = F(x) + 73	**Translate up 73 units**
3. y = F(x) + 32	**Translate up 32 units**
4. y = F(x) – 521	**Translate down 521 units**

Fred Functions
p. 36-38

After doing BOTH checkpoints, remember to check in with teacher!

Checkpoint p. 37

Equation	Effect to Fred's graph
Example: y=F(x + 18)	**Translate left 18 units**
1. y = F(x – 10)	**Translate right 10 units**
2. y = F(x) + 7	**Translate up 7 units**
3. y = F(x + 48)	**Translate left 48 units**
4. y = F(x) – 22	**Translate down 22 units**
5. y = F(x + 30) + 18	**Translate left 30 units and up 18 units**

Checkpoint p. 37

Equation	Effect to Fred's graph
Example: y=F(x + 8)	Translate left 8 units
1. y = F(x) + 29	Translate up 29 units
2. y = F(x – 7)	Translate right 7
3. y = F(x + 45)	Translate left 45
4. y = F(x+5) + 14	Translate left 5 and up 14
5. y = F(x – 6) – 2	Translate down 2 and right 6

Start Homework

Packet p. 13-14
AND Finish Fred Function notes

Exit Ticket
on NEW paper

1. Graph
2. Test a point (0,0)
3. Shade

$$y > x^2 - 3x - 10$$