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Warmup $9 /\left(-1 \cdot 6^{4}+1296\right)+(4 \cdot 6)$
(This is Week 8!!!)

1) Pick two of the graphs and explain why they are SIMILAR. Use mathematical vocabulary.
2) Pick a different pair of graphs and explain why they are similar.
3) Show work to verify

 why the problem in the date is correct.

## Honorable Mentions: Sept. 23

Jalen H: 30 ${ }^{2}-877$
Braylon W: $2 \sqrt{\mathbf{1 0 0}}+3$
Jacob D: 20-1+2-3+4-4+5

## Honorable Mentions: Sept. 24

Avi K: The age you're allowed to vote + the last digit of the \# you can start to drive without a permit
Kennedi B: $(.5 \times 14) \times(-1+4)+3$
Reily G: The year we graduate high school!
Saoirse G: 4!
Maggie L: $5\left(2^{2}\right)+$ double the \# of siblings Mr. Lischwe has

## NEW UNIT!

- In the last unit, we learned about ALL DIFFERENT types of functions...


## Types of Functions

## -Functions with an $x^{2}$ term make parabolas...



## Types of Functions

## -Functions with absolute value make a "v" shape...



## Types of Functions

## -Functions with a square root make this shape...



## Types of Functions

## -Functions with a variable as an exponent make this shape...



## Types of Functions

## -Functions with "sin" and "cos" make wavy graphs...



## Types of Functions

-...and functions with the form $\square \mathrm{x}+\square$ make straight lines!


## In this unit...

-We are going to now focus exclusively on linear graphs. These are probably the most common, and useful, type of function.

- Anything that has a constant rate is linear!

Go over HW

## Table of Contents

p. 1 Converting Fractions and Decimals (1.1)
p. 2 Roots (1.8 \& 1.9)
p. 3 Solving $x^{2}$ and $x^{3}$ Equations (1.8)
p. 4 Rational vs. Irrational (1.1)
p. 5 What is a function?
p. 6 Function Notation: $f(x)$
p. 7 Linear vs. Nonlinear Functions
p. 8 Constant Rate of Change

## Constant Rate of Change

Objectives:
-Determine if a situation has a constant rate of change
-(If it does, you know it will be a straight line!)
-Calculate WHAT the rate of change is

Are the trees growing at a constant rate???



- On Monday, Gary had $\$ 65$ saved up. By Saturday, Gary $\$ 95$ saved up. How many dollars per day did Gary save in this span of time?

$$
\begin{aligned}
\$ 95-\$ 6 s & =\$ 30 \\
M o n \rightarrow \text { Sat } & =5 \text { days } \\
\frac{\$ 30}{5} & =\$ 6 \text { per day }
\end{aligned}
$$

## Remember UNIT RATES???

- Unit rate = per year, per minute, per shirt, etc.
- $\frac{42 \text { dollars }}{6 \text { shirts }}$
$-=\frac{7 \text { dollars }}{1 \text { shirt }}$
-= \$7 per shirt

The table shows the average temperature ( ${ }^{\circ} \mathrm{F}$ ) for five months in a certain city. Find the rate of change for each time period. During which time period did the temperature increase at the fastest rate?

| Month: | 2 | 4 | 5 | 8 | 9 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Temp <br> $\left({ }^{\circ} \mathrm{F}\right)$ | 54 | 61 | 67 | 76 | 78 |

Is the rate of change constant?


Months 2-4: 3.5 degrees per month Months 4-5: 6 degrees per month Months 5-8: 3 degrees per month Months 8-9: 2 degrees per month

Not constant!

| Month: | 2 | 4 | 5 | 8 | 9 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Temp <br> $\left({ }^{\circ} \mathrm{F}\right)$ | 54 | 6 | 67 | 76 | 78 |



- Anne was reading a book. She wrote down what page she was on at various times:

| Time | Page |
| :--- | :--- |
| $1: 45$ | 0 |
| $1: 50$ | 15 |
| $2: 00$ | 45 |
| $2: 03$ | 54 |
| $2: 19$ | 102 |

- Was she reading at a constant rate?
- If so, what is the rate?
- If not, when was she reading faster or slower?
- Anne was reading a book. She wrote down what page she was on at various times:

- Was she reading at a constant rate? Yes
- If so, what is the rate? 3 pages per minute
- If not, when was she reading faster or slower?



## COPY:

Rate of Change $=$ change in $y$ (output) change in $x$ (input)

> THIS IS THE MOST IMPORTANT FORMULA OF THE ENTIRE NEXT MONTH!!!

- Here is an $x / y$ table. Is the rate of change constant?

- Here is an $x / y$ table. Is the rate of change constant?


No, rate of change is not constant.


- Here is an $x / y$ table. Is the rate of change constant?

| $x$ | $y$ |  |
| :---: | :---: | :---: |
| 1 | 3 | 4 |
| 3 | 7 | 2 |
| 5 | 11 | $\frac{4}{2}=2$ |
| 8 | 17 | $\frac{6}{3}=2$ |
| 12 | 25 | $\frac{8}{4}=2$ |

Yes, rate of change is not constant. It is 2.


## Homework

p. $175(1-6,10,11)$

