

Unit 2 Review Notes

Vocabulary

Properties of Equality

- Addition: + on both sides
- Subtraction: - on both sides
- Multiplication: X on both sides
- Division: ÷ divide on both sides
- Symmetric Property $X=5$ or $5=X$
- Reflexive property $X=X$ or $1=1$
- Transitive property $X=Y$ & $Y=4$, then $X=4$

Properties of Operations

- Commutative property $3+2=2+3$; $5 \cdot 2=2 \cdot 5$
- Associative property $1 \cdot (5 \cdot 6) = (1 \cdot 5) \cdot 6$
- Distributive property $3(x+4) = 3x+12$
- Additive identity $4 + \frac{0}{5} = 4$
- Additive inverse $5 + \frac{-5}{5} = 0$
- Multiplicative identity $8 \cdot \frac{1}{8} = 8$
- Multiplicative inverse $\frac{10}{1} \cdot \frac{1}{10} = 1$

Solving Linear Equations and Inequalities

Equations

$$3x + 8 = 14$$

$$\begin{array}{r} -8 \quad -8 \\ 3x = 6 \\ \frac{3x}{3} = \frac{6}{3} \end{array}$$

$$x = 2$$

SADMEP

$$4x - 3 = 2x + 7$$

$$\begin{array}{r} -2x \quad -2x \\ 2x - 3 = 7 \\ +3 \quad +3 \end{array}$$

$$\begin{array}{r} 2x = 10 \\ \frac{2x}{2} = \frac{10}{2} \\ x = 5 \end{array}$$

Inequalities

$$-4x + 8 > 40$$

$$\begin{array}{r} -8 \quad -8 \\ -4x > 32 \\ \frac{-4x}{-4} > \frac{32}{-4} \end{array}$$

$$x < -8$$

** Don't forget when you ÷ by a - you need to flip the sign**

inequality

Literal Equations

A = bh; solve for h

$$\frac{A}{b} = \frac{bh}{b} \quad h = \frac{A}{b}$$

y = mx + b; solve for m

$$\frac{y-b}{x} = \frac{mx+b-b}{x} \quad m = \frac{y-b}{x}$$

H O Y \leftarrow $y = \#$

Graphing

V U X \updownarrow $x = \#$

SLOPE INTERCEPT FORM

$$y = mx + b \rightarrow y\text{-intercept}$$

$$4x + 8y = 16$$

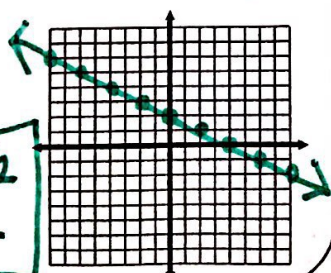
$$\begin{array}{r} -4x \quad -4x \\ 8y = -4x + 16 \\ \frac{8y}{8} = \frac{-4x+16}{8} \end{array}$$

$$y = -\frac{1}{2}x + 2$$

SLOPE (RISE / RUN)

$$m = -\frac{1}{2}$$

$$b = 2$$



INEQUALITIES

\leq, \geq

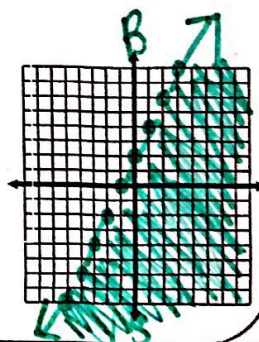
Solid or Dashed line?

Shade above or below the line?

$$\begin{array}{r} -2x + y < 2 \\ +2x \quad +2x \\ y < 2x + 2 \end{array}$$

$$m = 2$$

$$b = 2$$



The sum of 3 consecutive integers is 264. Find the 3 numbers.

$$X + X + 1 + X + 2 = 264$$

$$3X + 3 = 264$$

Solve & Find 3 #'s

Word Problems

Nicholas has 80 Christmas cookies. Every party he attends he gives 12 cookies away.

$$y = mx + b$$

$$y = -12x + 80$$

The length of a rectangle is 4 more than the width. The perimeter is 68. Find the l & w.

$$x + x + 4 + x + x + 4 = 68$$

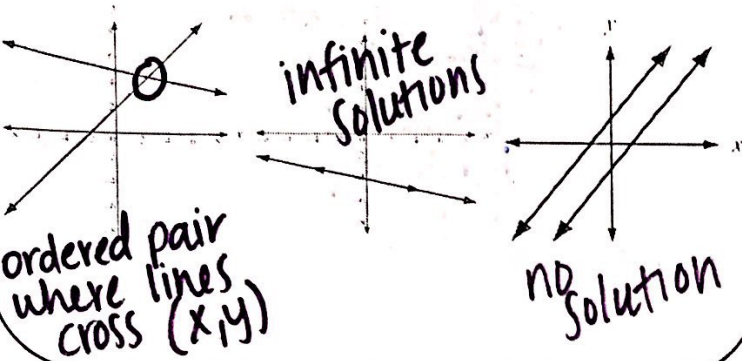
$$4x + 8 = 68$$

Solve & find l & w!

SYSTEMS

GRAPHING

*Graph both lines and see where they cross



SUBSTITUTION

*Use when an equation already has a variable solved for

*Substitute one equation into the other and solve

$$\begin{aligned}
 -7x + 8y &= 6 \\
 x &= -4y - 6
 \end{aligned}$$

$$\begin{aligned}
 X &= -4(-1) - 6 \\
 X &= 4 - 6 \\
 X &= -2
 \end{aligned}$$

$$\begin{aligned}
 -7(-4y - 6) + 8y &= 6 \\
 28y + 42 + 8y &= 6 \\
 36y + 42 &= 6 \\
 36y &= -36 \\
 y &= -1
 \end{aligned}$$

$(-2, -1)$

ELIMINATION

*Use when both equations have x and y on same side

*Make opposite coefficients and add equations

$$\begin{aligned}
 8x + 2y &= 16 \\
 (x - y = 7) \cdot 2 &+ 2x - 2y = 14 \\
 \hline
 10x &= 30 \quad \boxed{x=3} \\
 -y &= 7 \quad \boxed{y=-7}
 \end{aligned}$$

$(3, -4)$

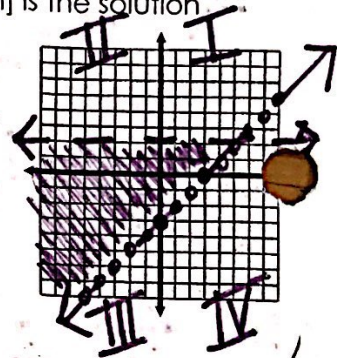
INEQUALITIES

*graph both inequalities on the same graph

*overlap [double shaded region] is the solution

$$\begin{aligned}
 y > x - 3 &\rightarrow m=1 \\
 y < 2 &b=-3
 \end{aligned}$$

Horizontal



Arithmetic Sequences

COMMON DIFFERENCE:

+ or - (d)

EXPLICIT: $*a_n = a_1 + d(n-1)$
- simplify -

RECURSIVE $*a_1 = \#$
 $*a_n = a_{n-1} + d$

Given the sequence 5, 8, 11, 14, 17. What is the common difference?

$$d = 3$$

What is the explicit formula?

$$\begin{aligned}
 a_n &= 5 + 3(n-1) \\
 &= 5 + 3n - 3 \\
 a_n &= 3n + 2
 \end{aligned}$$

What is the 75th term (a_{75})?

$$\begin{aligned}
 &= 3(75) + 2 \\
 a_{75} &= 227
 \end{aligned}$$

FUNCTIONS

IDENTIFY

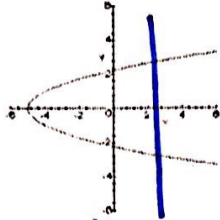
- Every **input** can only have **ONE** output
- Must pass the vertical line test

x	y
1	2
2	4
3	6
4	8
5	10
6	12

Function

x	y
2	4
3	5
4	4
5	10

Not a function



Not a function

EVALUATE

If $f(x) = 5x + 2$, find $f(7)$

$$= 5(7) + 2 = 37$$

If $f(x) = 10$ and $f(x) = 2x - 6$, find x .

$$10 = 2x - 6 \Rightarrow x = 8$$

Find $f(x) + g(x)$ if $f(x) = 2x + 4$ and $g(x) = 3x - 1$

$$2x + 4 + 3x - 1 = 5x + 3$$

Find $4g(x) - f(x)$

$$4(3x - 1) - (2x + 4) = 12x - 4 - 2x - 4 = 10x - 8$$

RATE OF CHANGE

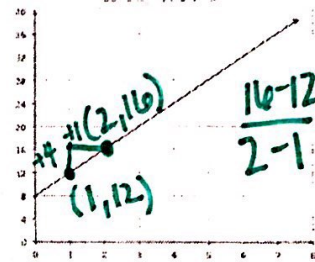
Same as **SLOPE**: change in y over the change in x

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$y_2 - y_1$$

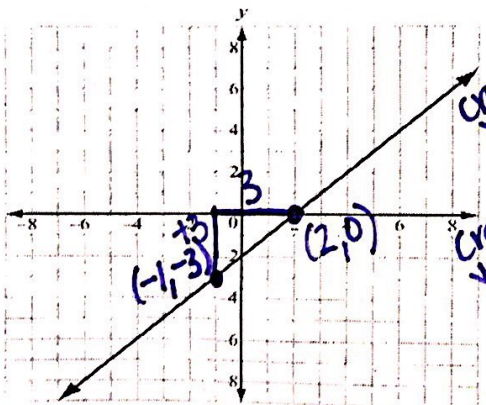
$$\frac{10 - 4}{5 - 2} = \frac{6}{3} = 2$$

x	y
1	2
2	4
3	6
4	8
5	10
6	12



$$\frac{16 - 12}{2 - 1} = \frac{4}{1} = 4$$

CHARACTERISTICS



Domain: $(-\infty, \infty) / \mathbb{R}$

Range: $(-\infty, \infty) / \mathbb{R}$

X intercept: $(2, 0)$

y-intercept: $(0, -2)$

Increasing or decreasing

End Behavior: $x \rightarrow \infty, f(x) \rightarrow \infty$
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$

Rate of change $x = -1$ & $x = 2$: $1 = m$

Equation of the line: $y = 1x - 2$