Unit 6

Generating Sequences 8as1

Linear Sequence: Terms in the sequence increase by the same amount each time
Example A: 5 7 9 11 13...
+2 +2

Term-to-term rule: A rule to find a term of a sequence, given the previous term
Example: The term-to-term rule for *Example A* is +2

Position-to-term rule: The rule that allows any term in a sequence to be calculated, given its position number
Example: The position-to term sequence is: 2 x position number +3 Plug In!

Position Number	1	2	3	4	5
Term	5	2×2+3 = 7	9	2×4+3 = 11	13

Example #1: The first term of a sequence is 4. The term –to-term rule of the sequence is 'subtract 3'. Write the first three terms of the sequence.

First term: 4, 1, -2
(-3, -3)

Example #2: The position-to-term rule of a sequence is: term= 4 x position number +1. Work out the first three terms of the sequence.

Position Number	1	2	3
Term	4×1²+1 = 5	4×2²+1 = 9	4×3²+1 = 13

Practice!

Practice! Find the first three terms
a. First Term: 1 term-to-term rule: 'add 5'
b. First Term: 20 term-to-term rule: 'subtract 4'
c. Term=6 x position number
d. Term= position number -4
e. First term:-3 term-to-term rule: 'subtract 6'

Finding Rules for sequences 8as1

Example A:

Pattern 1 | Pattern 2 | Pattern 3

5 Dots | 7 Dots | 9 Dots

Term-to- term Rule: +2

Position-to-term Rule: 2 × pn + 3

2(1) ? = 5

2(1)

2 +3 = 5

Try. 2pn+3

2(2)+3=

4 +3 = 7 ✓

Find the Term-to- term Rule and work out the Position-to-term Rule

Example #1: 3,6,9,12,...,...

A. Term-to- term Rule: +3

B. Position-to-term Rule

Step One: Create a table with the position number, term, and multiples

Position Number	1	2	3	4
Term	3	6	9	12
Multiples of	3	3	3	3

Step Two: Fill in the rule **term=** 3 **x position number**

Step Three: Check if the rule works with the first terms

3×(1)=3

3×(2)=6

3×(3)=9

3×(4)=12 ✓

Example #2: 5,9,13,17,...,...

A. Term-to- term Rule: +4

B. Position-to-term Rule

Step One: Create a table with the position number, term, and multiples

Position Number	1	2	3	4
Term	5	9	13	17
Multiples of	x4	x4	x4	x4

Step Two: Fill in the rule **term=** 4 **x position number** ?

Step Three: Check if the rule with the first terms

$4x(1) + ? = 5$ > 4pn+1

$4x1$

$4 + (1) = 5$

Example#3: 6,7,8,9

A. Term-to- term Rule:

B. Position-to-term Rule

Step One: Create a table with the position number, term, and multiples

Position Number	1	2	3	4
Term	6	7	8	9
Multiples of	1	2	3	4

Step Two: Fill in the rule **term=** 1 **x position number** ?

Step Three: Check if the rule with the first terms

$1x(1) + ? = 6$ > 1pn+4

$2 + 4 = 6$

Example #4:

1,4,7,10,...,...

A. Term-to- term Rule:

B. Position-to-term Rule

Step One: Create a table with the position number, term, and multiples

Position Number	1	2	3	4
Term	1	4	7	10
Multiples of	3	3	3	3

Step Two: Fill in the rule **term=** 3 **x position number** ?

Step Three: Check if the rule with the first terms

$1x(3) - ? = 1$ > 3pn-2

$3 - 2 = +1$

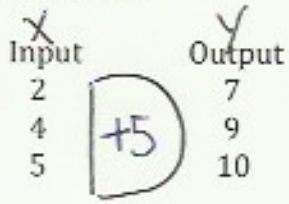
Class/Home Work: #2-5

Using Functions and Mapping 8as3

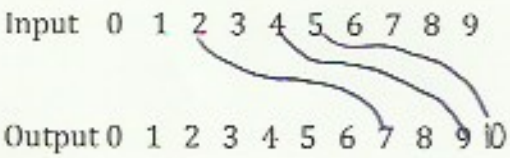
Function: Relationship between two sets of numbers

Three ways to represent the function

1) Function Machine:



2) Mapping Diagram: Input number map the output numbers



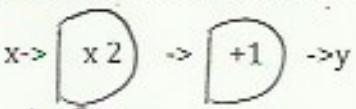
3) Algebraic Equation:

- Letter "x" represents input number
- Letter "y" represents output number

$x+5=y$

Example #1:

A. Copy and complete the table of values for this function machine



1x2 2+1=2

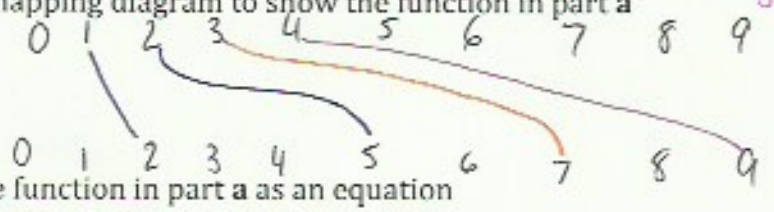
2x2 4+1=5

X	1	2	3	4
Y	2	5	7	9

3x2 6+1=7

4x2 8+1=9

B. Draw a mapping diagram to show the function in part a



C. Write the function in part a as an equation

$x \cdot 2 + 1 = y$

$2x + 1 = y$

Constructing Linear Expressions 8ae3

Algebraic Expressions: Using letters to represent an unknown number

$N+5$

Variable: Letter used in an algebraic expression

Linear Expression: An expression with at least one variable
***n^2 is **NOT** a linear expression; it is only multiplied by itself

Example #1:
A) Write the number that is five more than the mystery number → $5+n$

B) Write the number that is three times the mystery number → $3 \times n \rightarrow 3n$

C) Write the mystery number multiplied by itself → $n \cdot n \rightarrow n^2$

Example #2:
Victoria thinks of a number, x. Write down an expression Victoria gets when:
A) She subtract five from the number → $n-5$

B) She doubles the number and adds three → $n \times 2+3 \rightarrow 2n+3$

C) Divides the number by three and adds two → $\frac{n}{3}+2$

D) Adds 2 to the number and then multiplies by 4 → $(2+n) \times 4 \rightarrow 4(2+n)$

Class Work 1-4

White Board Practice

Deriving and using formulas 8nc10

Formula: mathematical rule that shows the relationship between two or more quantities (variables)

Derive: write a formula

Using Formula

***Use order of operations: Please Excuse my Dear Aunt Sally

Brackets (Parenthesis)
Indices (Exponents)
Division] Left to Right
Multiplication]
Addition] Left to Right
Subtraction]

Practice #1:

$2 - 1 \times (5 + 3) =$

$2 - 1 \times 8 =$

$2 - 8 = -6$

Practice #2:

$2 - 1 \times 5 + 3 =$

$2 - 5 + 3 =$

$-3 + 3 = 0$

Practice#3:

$44 - 6^2 \div 4 \times 2 =$

$44 - 36 \div 4 \times 2$

$44 - 9 \times 2$

$44 - 18 = 26$

Practice!

$6 \div 2 (1 + 2) = ?$

9 or 1

WHAT IS THE ANSWER?

7 + 7 ÷ 7 + 7 x 7 - 7

Like term worksheet!

Collecting Like Terms 8ae2

A Short Story:

Once upon a time there were these groups of families scattered across the country in a kingdom far, far, away. The different family groups all decided to find the other members of their family so that each group could hold a giant family reunion. Each family could identify their other family members because they all had the same last name. There was even a family group with no last name! Now let's use our math properties to help these families join up with each other for their big family reunions!

$2x_2 + 3xy + 3x + 6 + 5x_2 + 3 + 4v_2 + 2x + xy + 1$

$2x^2 + 5x^2 \rightarrow 7x^2$

$3xy + xy \rightarrow 3xy + 1xy \rightarrow 4xy$

$3x + 2x \rightarrow 5x$

$6 + 3 + 1 \rightarrow 9 + 1 \rightarrow 10$

$4y^2$

→ rewrite

$7x^2 + 4y^2 + 4xy + 5x + 10$

B brackets ( )
indices/exponents
division
multiplication > Left to Right
addition
Subtraction > Left to Right

Numeric values and a variable

$3 + 5 \times n$

$3 + 5n \Rightarrow$ rewrite $5n+3$ (variable before integer)

$5 \div n + 3 - 2$

$\frac{5}{n} + 3$

$3n - 4 + 2$

$3n - 2$

Numeric values and several variables

$d + 5 + 2 \times c$

$d + 5 + 2c \Rightarrow$ Rewrite $2c + d + 5$ (alphabetical order)

$d + 3d + 4$

$4d + 4$

$4 + 2x^2 + 3x + 1x$ Rewrite

$4 + 2x^2 + 4x \Rightarrow 2x^2 + 4x + 4$ (exponent first)

First set of cards pg 97

Simplifying like terms

Simplify: transform an expression by writing it in a different way

Example: 2n+3 same as 2xn+3 same as 3+2n same as 3+2 x n

Which one is the same to 5n-3? 3-5n or -3+5n

$-5n+3$ $+5n-3$

HW #1&3 page 97

Expanding Brackets

Expand: multiply each term inside the brackets by the term outside the bracket
(Distributive example with Integers:

4(8+3) Using BIDMAS

$4(11) = 44$

4(8+3) Expanding Brackets

$4 \cdot 8 + 4 \cdot 3$

$32 + 12 = 44$

$d^2(d-1)$

$d^2 \cdot d \quad d^2(-1)$

$d^3 - d^2$

$x(y+1)$

$x \cdot y \quad 1 \cdot x$

$xy + x$

Example With Variables:

3(b+ 5)

$3 \cdot b \quad 3 \cdot 5$

$3b + 15$

a(a-3)

$a \cdot a \quad a(-3)$

$a^2 - 3a$

5(2c-1)

$5 \cdot 2c \quad 5(-1)$

$10c - 5$

6(3-4e)

$6 \cdot 3 \quad 6(-4e)$

$18 - 24e$

6(6-d)

$6 \cdot 6 \quad 6(-d)$

$36 - 6d$

Example with several expansion

$4(2x+3x^2)-x(6+x)$

$4 \cdot 2x \quad 4 \cdot 3x^2 \quad -x \cdot 6 \quad -x \cdot x$

$8x + 12x^2 \quad -6x \quad -x^2$

$8x - 6x \quad 12x^2 - x^2$

$2x + 11x^2$

$2(x+3)+3(x+4)$

$2 \cdot x \quad 2 \cdot 3 \quad 3 \cdot x \quad 3 \cdot 4$

$2x + 6 + 3x + 12$

$2x + 3x + 6 + 12$

$5x + 18$

Practice:

a) $8(x+5)-3(2x+7)$

b) $a(2b+c)+b(3c-2a)$

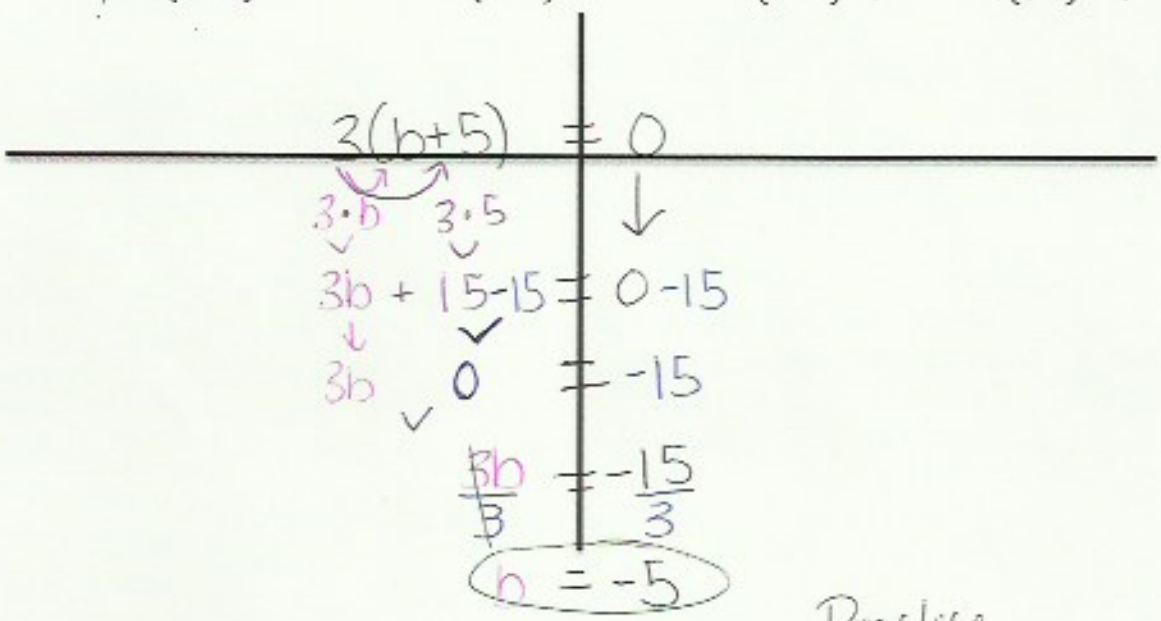
c) $2y(y+5x)+x(3x+4y)$

Solving and Constructing Equations

With equations that equal 0

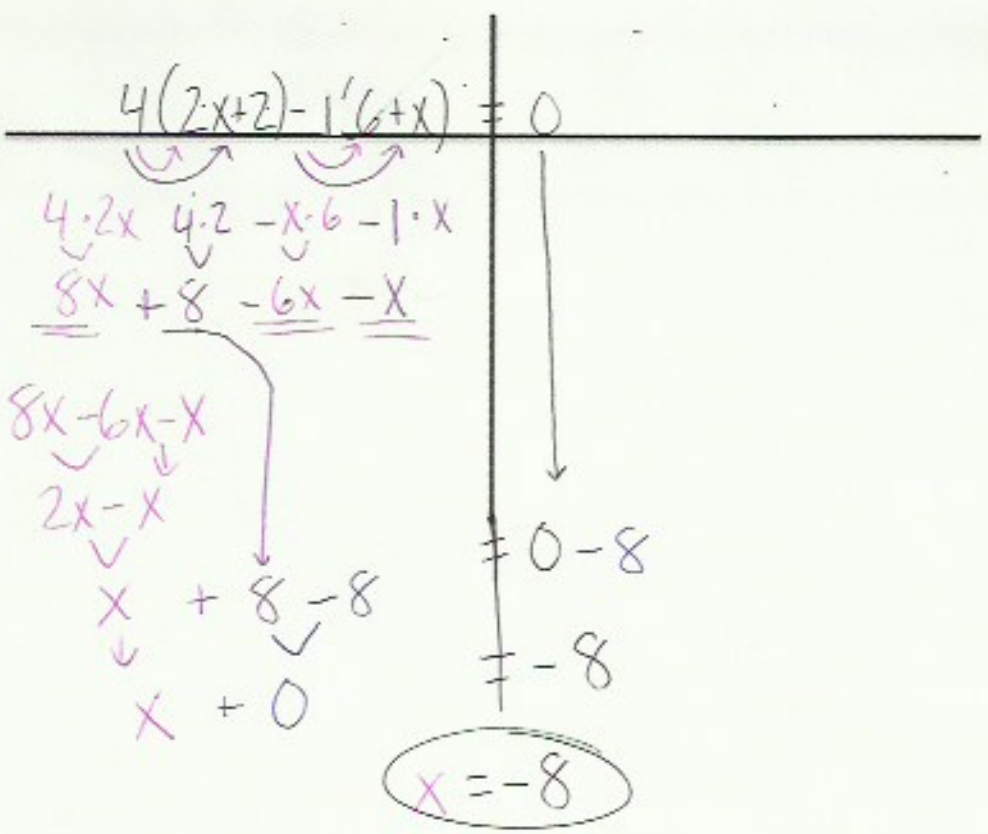
Practice

★ $3(b+5)=0$ $5(2c-1)=0$ $6(3-4e)=0$ $6(6-d)=0$



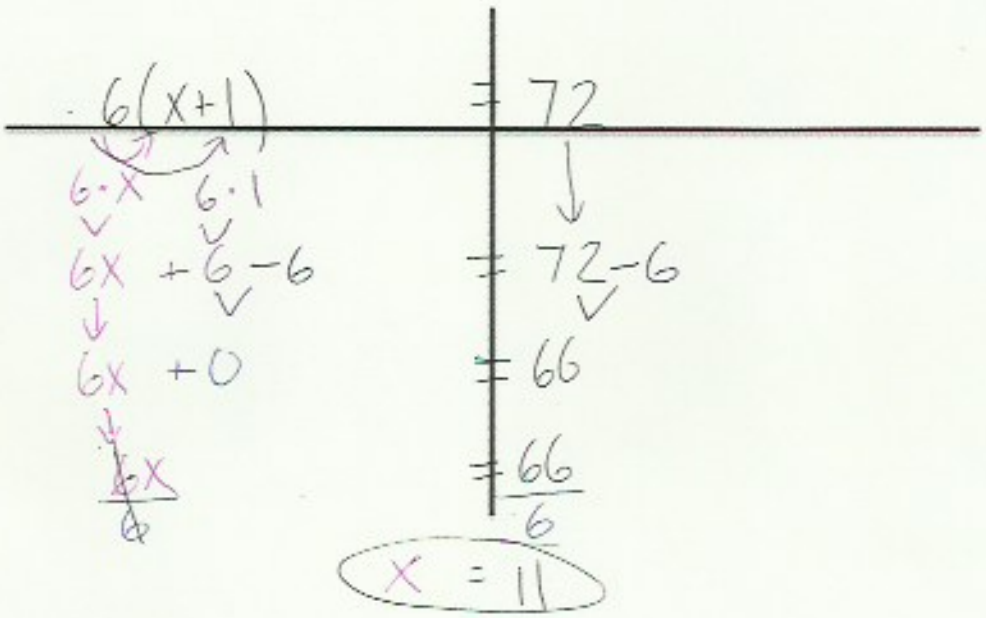
Practice

★ $4(2x+2)-1(6+x)$ $2(x+3)+3(x+4)$



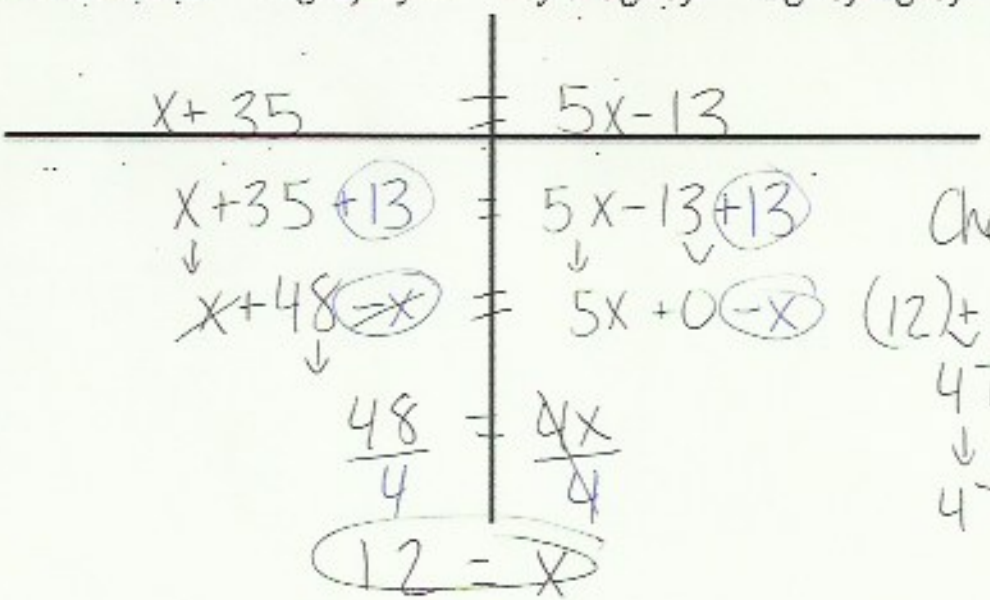
With equations that equal something other than 0

~~X~~ 6(x+1)=72 6x-3=9 3(x+5)=27



With Equation that equal a variable

~~X~~ X+35=5x-13 4(y-3)=2y+2 8y-5=3(y+5). 2(y+6)=4(y-3)



Check!

(12)+35 = 5(12)-13

47 60-13

47 = 47 ✓

Arithmetic with Integers

Integers:

- Whole numbers
- Negative or positive
- Includes zero
- Can be displayed in the number line

Adding and subtracting positive and negative integers

How it works:

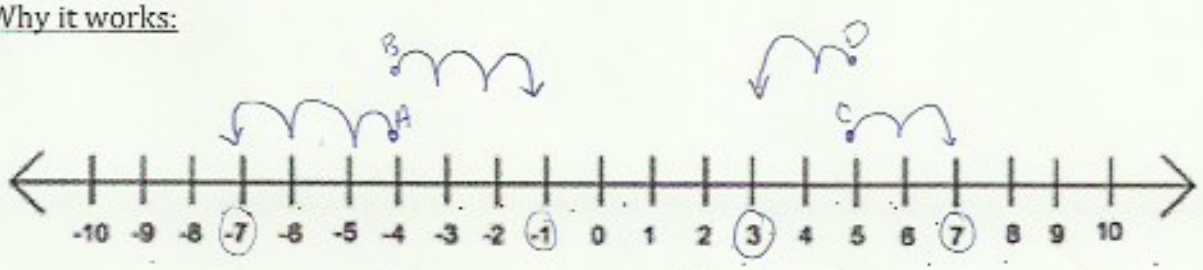
Same signs add and keep

(A) -4-3= -7 5+2= +7 (C)

Different signs subtract
Keep the sign of the bigger number
Then you will be exact

(B) -4+3= -1 (D) 5-2= +3

Why it works:



Real life Application:

You owe four dollars and you spend three more now you owe -7 dollars
You have five dollars and you get two more now you have +7 dollars

You owe four dollars but you pay three now you owe -1 dollars
You have five dollars but you buy something for two now you have +3 dollars

White Board Practice

Multiplying and Dividing Negative and Positive inters

SAME sign= Positive answer 4x4=16 -2x-2=4
Different sign=Negative answer 4x-4=-16 -2x2=-4

Cheat Sheet-Term Rules 8nc9

Write products without the multiplication sign	2×n 8 x n= 8n 2n
Write the number before the letter	2n NOT n2 except in addition/subtraction
Generally, write terms with letters before terms with numbers	2n+4 NOT 4+2n
Generally, write terms in alphabetical order	2c + 2b → 2b+2c
When a term has more than one letter, write them in alphabetical order	a·c·b → acb → abc
Write negative terms after positive terms	4 − 2a NOT −2a+4

* exponents take priority

$X + X^2 \rightarrow X^2 + X$

Simplify with like terms, Example:

$2ab + ab - 5ab \rightarrow$ $3ab - 5ab \rightarrow -2ab$

$2y + 6y^2 - 3y^2 - 10y \rightarrow 2y - 10y \quad 6y^2 - 3y^2 \rightarrow -8y + 3y^2 \rightarrow 3y^2 - 8y$ (exponents first, negatives in the back)

$-8y \quad + \quad 3y^2$

Second set of cards (pyramid) pg.97

Quiz 8as3/8ea3

1. Copy and complete the table of values for the function machine

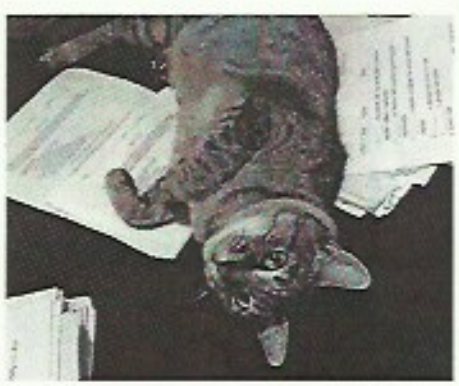
$x \rightarrow \div 2 \rightarrow +10 \rightarrow y$

X	2		10	
Y		13		25

2. Write the formula for the function machine in problem 1
3. Work out the rule for the function machine

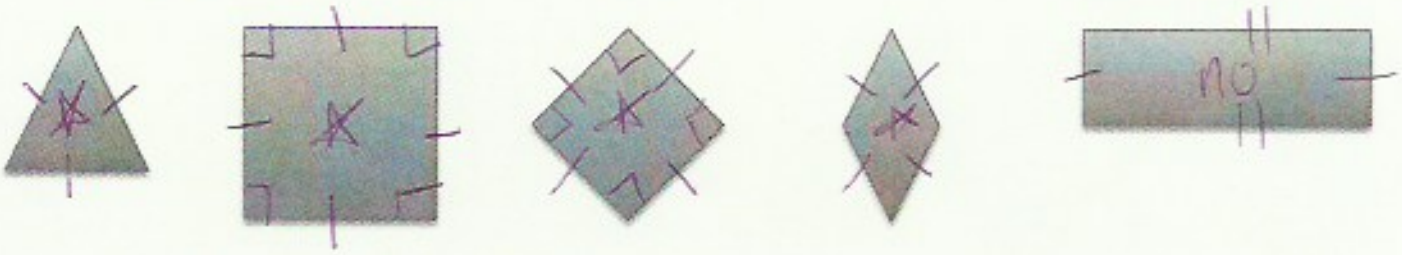
4	2
8	4
18	9

Denise thinks of a number, *n*
Write an expression for the number she gets when she:
4. Multiplies the number by 2 then adds 7
5. Divides the number by 3 then adds a 6



WRITING EQUATIONS

Review: Star the ones with equal sides



Construct: use information to write a formula

Example #1:

The diagram shows shapes. Work out the values of x and y.

$27 = 3(x+5)$

$-15 + 27 = 3x + 15 - 15$

$3 \div 12 = 3x \div 3$

$4 = x$

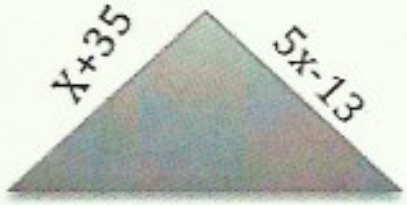
$4(y-3) = 2y+2$

$4y - 12 = 2y + 2$ (+12)

$4y = 2y + 14$ (−2y)

$2y = 14$

$y = 7$

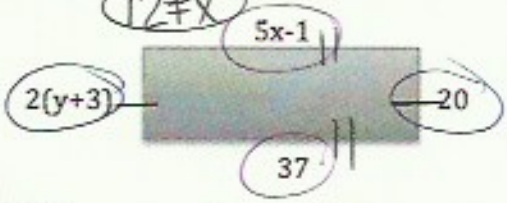


$x + 35 = 5x - 13$ (+13)

$x + 48 = 5x$ (−x)

$4 = 48$ (÷4)

$12 = x$



$2(y+3) = 20$

$2y + 6 = 20$ (−6)

$2y = 14$ (÷2)

$y = 7$

$5x - 1 = 37$ (+1)

$5x = 38$ (÷5)

$x = 7.6$

Check answers by substitution!