

Name: KEY

Date: _____

Vocabulary Review: (what will help you remember?)

Equation: 2 THINGS EQUAL TO EACH OTHER - EQUAL SIGN

Equal Sign: SHOWS EQUALITY (=) USED IN AN EQUATION

Addition: ADDING SOMETHING TO SOMETHING ELSE (+)

Subtraction: DIFFERENCE BETWEEN THINGS - TAKEAWAY (-)

Multiply: HOW MANY TIMES SOMETHING IS ADDED TO ITSELF (x, ·, ())

Division: BREAK INTO EQUAL PARTS (÷, /, $\frac{x}{b}$)

Inverse operation: OPERATION TO "UNDO", OPPOSITES (+, -) (x, ÷)

Addition Property of Equality: CAN ADD/SUB FROM BOTH SIDES OF EQUAL SIGN

Division Property of Equality: CAN MULT/DIV. FROM BOTH SIDES OF EQUAL SIGN

Variable: A LETTER USED AS PLACE HOLDER, QUANTITY THAT CAN BE CHANGED

Solving For a variable: GET LETTER BY ITSELF BY USING INVERSE OPERATIONS

$$\begin{array}{r} 25 = x + 21 \\ -21 \quad -21 \\ \hline 4 = x \end{array}$$

Addition Property of Equality

$$\begin{array}{r} 3 = x - 37 \\ +37 \quad +37 \\ \hline 40 = x \end{array}$$

$$\begin{array}{r} 4 = \frac{1}{4}x \\ \frac{4}{4} \quad \frac{1}{4} \\ \hline 1 = x \end{array}$$

Division Property of Equality

$$\begin{array}{r} (5) 15 = \frac{1}{5}x \\ \hline 75 = x \end{array}$$

KEY

Scavenger Hunt Answer Sheet: Solving Equations

Write down the question.

Show your work to get to your answer.

Find the next Task Card that has your answer on the top!

Repeat!

<p>1)</p> $\begin{array}{r} 115 = x + 103 \\ -103 \\ \hline 12 = x \end{array}$ <p>GO FIND CARD WITH 12 @ TOP.</p>	<p>2)</p> $\begin{array}{r} 100 = x + 4 \\ -4 \\ \hline 96 = x \end{array}$ <p>GO FIND CARD WITH 96 @ TOP</p>
<p>3)</p> $\begin{array}{r} 7 = x \\ + 21 \\ \hline 28 = x \end{array}$	<p>4)</p> $\begin{array}{r} 35 = x \\ + 115 \\ \hline 150 = x \end{array}$
<p>5)</p> $\begin{array}{r} 10 = \frac{1}{2}x \\ \frac{1}{2} \quad \frac{1}{2} \\ \hline 20 = x \end{array}$	<p>6)</p> $\begin{array}{r} 40 = 4x + 24 \\ -24 \\ \hline 16 = 4x \\ \frac{16}{4} = \frac{4x}{4} \\ 4 = x \end{array}$ <p>THIS TAKES YOU BACK TO #1.</p>

KEY

Name: _____

Date: _____

Frayer Model 1: Solving Equations – Vocabulary

Students will use the Frayer Model to define the vocabulary

<p>Definition</p> <p>EQUAL SIGN – SHOWS 2 THINGS ARE THE SAME</p> <p>EQUATION – SHOWING THINGS ARE EQUAL: USE EQUAL SIGN</p>	<p>Facts/Characteristics</p> <p>– SHOWS EQUALITY BETWEEN 2 THINGS.</p> <p>– CAN SOLVE FOR VARIABLE</p>
<p>Examples</p> <ul style="list-style-type: none"> • $5x = 20$ • $35x + 18 = 53$ • $7 = 14x$ • $5x - 8 + 3x = 18x - 5$ 	<p>Non-examples</p> <ul style="list-style-type: none"> • $5x - 8 + 3x$ • $4 + 18x - 9$ • $5x - 8 + 3x$ – THESE ARE EXPRESSIONS

EQUATION / EQUAL SIGN

Visual Representation

EQUAL SIGN: =

EQUATION

$5x = 20$

<p>Definition</p> <p>OPERATIONS USED IN MATH</p>	<p>Facts/Characteristics</p> <p>– USED IN MATH TO FIND Totals, difference, #groups</p>
<p>Examples</p> <ul style="list-style-type: none"> • $8 + 4$: Add • $8 - 4$: subtract • $8 \cdot 4$: multiply • $8/4$: divide 	<p>Non-examples</p> <p style="text-align: center; font-size: 2em;">X</p>

**ADDITION
SUBTRACTION
MULTIPLICATION
DIVISION**

Visual Representation

ADDITION : +

SUBTRACTION : -

MULTIPLY : x, ·, ()

DIVIDE : ÷, /, $\frac{x}{b}$

KEY

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Frayer Model 1: Solving Equations – Vocabulary

Students will use the Frayer Model to define the vocabulary

Definition	Facts/Characteristics
<p>TO USE THE OPPOSITE 'sign' TO "UNDO" AN OPERATION</p>	<p>- IF '+' is shown, use '-' to 'undo' - IF '-' is shown, use '+' to 'undo'</p>
<p>INVERSE OPERATION</p>	
Examples	Non-examples
<p>THIS IS MULTIPLY $\frac{3}{3}x = \frac{9}{3}$ Need to divide $x - 3 = 9$ THIS IS SUBTRACTION $+3 +3$ Need to add</p>	<p>$\frac{x}{4} = \frac{4}{4}$ ← <u>WRONG</u> need to multiply $x - 3 = 9$ ← <u>WRONG</u> need to ADD</p>
Visual Representation	
<p>$\frac{4}{4} = \frac{-4}{-4}$ THIS SIMPLIFIES TO ZERO $\frac{3(5+8)}{3} = \frac{\dots}{3}$ THIS SIMPLIFIES TO</p>	

1

Definition	Facts/Characteristics
<p>- A LETTER USED AS A 'PLACE HOLDER' - GOAL IS TO GET LETTER BY ITSELF - THIS IS WHAT LETTER IS EQUAL TO</p>	<p>- A LETTER THAT REPRESENTS SOMETHING THAT COULD CHANGE - SOMETIMES W/ AN EQUATION WE NEED TO FIND A 'FIXED' NUMBER</p>
<p>VARIABLE Solve for Variable</p>	
Examples	Non-examples
<p>A VARIABLE CAN BE ANY LETTER REPRESENTING A QUANTITY IN AN EQUATION OR EXPRESSION - X, y, a, b are common $4x - 8 = 16$ Solving: $\frac{4x}{4} = \frac{24}{4}$ Get variable alone by using inverse operations $x = 6$</p>	<p>$3 + 4 = 7$: No variable TRUE statement $3x - 4 + 7x$ $10x - 4$ CAN'T SOLVE, NO EQUAL SIGN</p>
Visual Representation	
<p>$3x, \frac{x}{4}, a + 6$ $8c - 4 = 36$ $\frac{8c}{8} = \frac{40}{8}$ $c = 5$</p>	

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Frayer Model 1: Solving Equations – Vocabulary

Students will use the Frayer Model to define the vocabulary

<p>Definition</p> <p>- ADD/SUB FROM BOTH SIDES OF EQUATION</p> <p>- EQUALITY STILL HOLDS TRUE</p>	<p>Facts/Characteristics</p> <p>- when +/- one side should 'cancel' out: simplify to 0.</p>	
<p>ADDITION PROPERTY OF EQUALITY</p>		
<p>Examples</p> <p>$x - 4 = 10$ 4 +4 $x = 14$</p> <p>$x + 4 = 10$ 4 -4 $x = 6$</p>	<p>Visual Representation</p> <p>$x - 4 = 10$ 4 +4 = 0 $x = 14$</p> <p>$x + 4 = 10$ 4 -4 = 0 $x = 6$</p>	<p>Non-examples</p> <p>NEED TO GO TO BOTH SIDES</p> <p>$x - 4 = 10$ 4 $x \neq 10$</p>

<p>Definition</p> <p>- MULT/DIV FROM BOTH SIDES OF EQUATION</p> <p>- EQUALITY STILL HOLDS TRUE</p>	<p>Facts/Characteristics</p> <p>- when \times/\div ONE SIDE SHOULD 'cancel' out: simplify to 1</p>	
<p>DIVISION PROPERTY OF EQUALITY</p>		
<p>Examples</p> <p>$4x = 8$ 4 /4 $x = 2$</p> <p>$\frac{1}{8}y = 3(8)$ 1/8 $\times 8$ $y = 24$</p>	<p>Visual Representation</p> <p>$4x = 8$ 4 /4 = 1 $x = 2$</p> <p>$\frac{1}{8}y = 3(8)$ 1/8 $\times 8 = 1$ $y = 24$</p>	<p>Non-examples</p> <p>NEED TO GO TO BOTH SIDES</p> <p>$4x = 8$ 4 $x \neq 8$</p>

KEY

Name: _____

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Frayer Model 2: Solving Equations – Vocabulary

Students will use the Frayer Model to define the vocabulary

Word/Phrase: EQUATION / EQUAL SIGN

Definition	Characteristics
<p>What is the Mathematical Definition?</p> <p>EQUAL SIGN - SHOWS EQUALITY</p> <p>EQUATION - SHOW 2 THINGS ARE EQUAL.</p>	<p>What does this look like (symbols)?</p> <p>Are there any synonyms?</p> <p>$4 = 4$</p> <p>$3 + 4 = 7$</p>
Examples/Models	Used Incorrectly
<p>Show an example of how we use the word/phrase.</p> <p>$5x = 20$ SHOWS EQUAL TO EACH OTHER</p> <p>$7 = 14x$</p> <p>$8 = 8$ $2(8) = 16$</p>	<p>**If applicable**</p> <p>Show how this term/phrase is often incorrectly used.</p> <p>$5 = 20$ $\frac{16}{2} = 4$</p> <p>$3(4) = 8$</p> <p>$3x - 8 + 5x$ ← THIS IS AN EXPRESSION</p>

Word/Phrase: ADDITION / SUBTRACTION / MULTIPLICATION / DIVISION

Definition	Characteristics
<p>What is the Mathematical Definition?</p> <p>OPERATIONS USED TO FIND TOTALS $+$, \times</p> <p>DIFFERENCES: $-$</p> <p># GROUPS: \div</p>	<p>What does this look like (symbols)?</p> <p>Are there any synonyms?</p> <p>addition: $+$ multiplication: $\times, \cdot, ()$</p> <p>subtraction: $-$ division: $\div, /, \frac{\times}{\div}$</p>
Examples/Models	Used Incorrectly
<p>Show an example of how we use the word/phrase.</p> <p>$3 + 7$: add = 10</p> <p>$3 - 7$: sub = -4</p> <p>$3 \cdot 7$: mult = 21</p> <p>$3 \div 7$: divide = $\frac{3}{7}$</p>	<p>**If applicable**</p> <p>Show how this term/phrase is often incorrectly used.</p> <p>$3 - (-7)$: subtract a negative = add = 10</p> <p>$3 + (-7)$: adding a negative = subtract = -4</p> <p>$3 \cdot -7$: when mult or divide a negative = -21</p> <p>$3 \div -7$: make answer negative = $-\frac{3}{7}$</p>

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Name: _____

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Frayer Model 2: Solving Equations – Vocabulary

Students will use the Frayer Model to define the vocabulary

Word/Phrase: INVERSE OPERATION

Definition	Characteristics
<p>What is the Mathematical Definition?</p> <p>PAIRS OF MATHEMATICAL MANIPULATIONS WHERE ONE OPERATION 'UNDO'S' THE OTHER</p>	<p>What does this look like (symbols)?</p> <p>Are there any synonyms?</p> <p>- IF adding (+) use subtraction (-) VISA VERSA</p> <p>- IF dividing (÷) use multiplication (x) VISA VERSA</p>
Examples/Models	Used Incorrectly
<p>Show an example of how we use the word/phrase.</p> <p>$\frac{+4}{-4} = \dots$ THIS SIMPLIFIES TO 0</p> <p>$\frac{3(S+8)}{3} = \dots$ THIS SIMPLIFIES TO 1</p>	<p>**If applicable**</p> <p>Show how this term/phrase is often incorrectly used.</p> <p>$\frac{x}{4}$ ← <u>WRONG</u> needed to 'x'</p> <p>$x-3 = \frac{-3}{-3}$ ← <u>WRONG</u> needed to add '+'</p>

Word/Phrase: VARIABLE / SOLVE FOR VARIABLE

Definition	Characteristics
<p>What is the Mathematical Definition?</p> <p>- A LETTER USED AS A PLACEHOLDER</p> <p>• REPRESENTS A 'FIXED' NUMBER</p> <p>- TO SOLVE NEEDS AN EQUATION AND THE VARIABLE BY ITSELF</p>	<p>What does this look like (symbols)?</p> <p>Are there any synonyms?</p> <p>- VARIABLES ARE LETTERS USED IN EQUATIONS/EXPRESSIONS TO REPRESENT A QUANTITY</p>
Examples/Models	Used Incorrectly
<p>Show an example of how we use the word/phrase.</p> <p>$4x-8=16$ $+8+8$ $4x=24$ $\frac{4x}{4}=\frac{24}{4}$ $x=6$</p> <p>$3x, \frac{x}{4}, a+6$</p>	<p>**If applicable**</p> <p>Show how this term/phrase is often incorrectly used.</p> <p>$3+4=7$ ← No variable, can't solve</p> <p>$3x-4+7x$ $10x-4$ ← can't solve because no equal sign</p>

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Frayer Model 2: Solving Equations – Vocabulary

Students will use the Frayer Model to define the vocabulary

Word/Phrase: ADDITION PROPERTY OF EQUALITY

Definition	Characteristics
<p>What is the Mathematical Definition? Add/sub from both sides of EQUATION. EQUALITY STILL HOLDS TRUE.</p>	<p>What does this look like (symbols)? Are there any synonyms? • When +/- one side should 'cancel out': simplify to 0</p>
Examples/Models	Used Incorrectly
<p>Show an example of how we use the word/phrase.</p> $\begin{array}{r} x - 4 = 10 \\ +4 \quad +4 \\ \hline x = 14 \end{array}$ $\begin{array}{r} x + 4 = 10 \\ -4 \quad -4 \\ \hline x = 6 \end{array}$	<p>**If applicable** Show how this term/phrase is often incorrectly used. <u>TO BOTH SIDES!!</u></p> $\begin{array}{r} x - 4 = 10 \\ +4 \quad +4 \\ \hline x \neq 10 \end{array}$

Word/Phrase: DIVISION PROPERTY OF EQUALITY

Definition	Characteristics
<p>What is the Mathematical Definition? MULT/DIV FROM BOTH SIDES OF EQUATION. EQUALITY HOLDS TRUE.</p>	<p>What does this look like (symbols)? Are there any synonyms? • When x/÷ one side should 'cancel out': simplify to 1.</p>
Examples/Models	Used Incorrectly
<p>Show an example of how we use the word/phrase.</p> $\begin{array}{r} 4x = 8 \\ \div 4 \quad \div 4 \\ \hline x = 2 \end{array}$ $\begin{array}{r} 4y = 3(8) \\ \div 8 \quad \div 8 \\ \hline y = 24 \end{array}$	<p>**If applicable** Show how this term/phrase is often incorrectly used. <u>TO BOTH SIDES!!</u></p> $\begin{array}{r} 4x = 8 \\ \div 4 \quad \div 4 \\ \hline x \neq 8 \end{array}$

Name: Key

Date: _____

Do/Undo: Solving Equations – Example Problems

Examples: When solving equations with a Do/Undo Frayer Model template, you should list all of the steps that you see in the given equation in the 'Do' section. Once you have listed all the steps and operations you see, move over to the 'Undo' section and write the inverse operation that would be used to help solve for the variable. These steps should be in reverse order of what is seen.

$$115 = x + 103$$

Do	Undo
<p>In this Box students will write out, in mathematical words, what is being done in the given equation.</p> <ol style="list-style-type: none">1) 1152) is equal to3) 103 added to a number	<p>In this box students will write out, in mathematical words, what needs to be done to 'undo' (solve) the operations shown in the original problem.</p> <ol style="list-style-type: none">1) 103 is subtracted from a number2) 103 is subtracted from BOTH sides (holding equality)3) a number is equal to 115 minus 103

Show your work to solve the equation here:

The 'undo' section should serve as a guide to work through the problem algebraically.

$$\begin{array}{r} 115 = x + 103 \\ -103 \quad -103 \\ \hline 115 - 103 = x \\ 12 = x \end{array}$$

KEY

Name: _____

Date: _____

Do/Undo: Solving Equations – Example Problems

Examples: When solving equations with a Do/Undo Frayer Model template, you should list all of the steps that you see in the given equation in the 'Do' section. Once you have listed all the steps and operations you see, move over to the 'Undo' section and write the inverse operation that would be used to help solve for the variable. These steps should be in reverse order of what is seen.

$$7 = x - 21$$

Do	Undo
<p>In this Box students will write out, in mathematical words, what is being done in the given equation.</p> <p>1) 7</p> <p>2) is equal to</p> <p>3) 21 subtracted from a number</p>	<p>In this box students will write out, in mathematical words, what needs to be done to 'undo' (solve) the operations shown in the original problem.</p> <p>1) 21 added to a number</p> <p>2) 21 added to both sides (holding equality)</p> <p>3) a number is equal to 21 added to 7.</p>

Show your work to solve the equation here:

The 'undo' section should serve as a guide to work through the problem algebraically.

$$\begin{array}{r}
 7 = x \\
 +21
 \end{array}
 \quad
 \begin{array}{r}
 \cancel{21} \\
 +\cancel{21}
 \end{array}$$

$$7 + 21 = x$$

$$\boxed{28 = x}$$

KEY

Name: _____

Date: _____

Do/Undo: Solving Equations – Example Problems

Examples: When solving equations with a Do/Undo Frayer Model template, you should list all of the steps that you see in the given equation in the 'Do' section. Once you have listed all the steps and operations you see, move over to the 'Undo' section and write the inverse operation that would be used to help solve for the variable. These steps should be in reverse order of what is seen.

$$35 = x - 115$$

Do	Undo
<p>In this Box students will write out, in mathematical words, what is being done in the given equation.</p> <p>1) 35</p> <p>2) is equal to</p> <p>3) 115 subtracted from a number</p>	<p>In this box students will write out, in mathematical words, what needs to be done to 'undo' (solve) the operations shown in the original problem.</p> <p>1) 115 is added to a number</p> <p>2) 115 is added to both sides (holding equality)</p> <p>3) a number is equal to 115 added to 35</p>

Show your work to solve the equation here:

The 'undo' section should serve as a guide to work through the problem algebraically.

$$\begin{array}{r} 35 = x - 115 \\ +115 \quad \quad +115 \end{array}$$

$$35 + 115 = x$$

$$150 = x$$

Name: KEY

Date: _____

Do/Undo: Solving Equations – Example Problems

Examples: When solving equations with a Do/Undo Frayer Model template, you should list all of the steps that you see in the given equation in the 'Do' section. Once you have listed all the steps and operations you see, move over to the 'Undo' section and write the inverse operation that would be used to help solve for the variable. These steps should be in reverse order of what is seen.

$$40 = 4x + 24$$

Do	Undo
<p>In this Box students will write out, in mathematical words, what is being done in the given equation.</p> <ol style="list-style-type: none">1) 402) is equal to3) 4 times a number4) 24 added to 4 times a number	<p>In this box students will write out, in mathematical words, what needs to be done to 'undo' (solve) the operations shown in the original problem.</p> <ol style="list-style-type: none">1) 24 is subtracted from 4 times a number2) 24 is subtracted from both sides (holding equality)3) 4 is divided from 4 times a #4) 4 is divided from both sides (holding equality)5) a number is equal to 24 subtracted from 24 added from 4 times a number

40 then divided by 4.

Show your work to solve the equation here:

The 'undo' section should serve as a guide to work through the problem algebraically.

$$\begin{array}{r} 40 = 4x + 24 \\ -24 \\ \hline 16 = 4x \\ = x \\ = x \end{array}$$

4 = x

Name: Key

(Frayer model example)

Date: _____

KWL Chart: Solving Equations – Vocabulary/Equations

Students should fill out the **K** and the **W** prior to starting the lesson.

When done with the lesson, have them fill out the **L** to explain what was learned.

<u>I Know</u>	<u>I Want to know</u>	<u>I Learned</u>
<p>Variable: a letter in place for a number to solve for</p> <p>Solving: need to get the variable by itself.</p> <p>Operations: add (+) sub (-) mult (x) divide (÷)</p>	<p>How do I know the operation to use?</p> <p>Why can I use operation?</p> <p>How does it stay equivalent?</p>	<p>- How to use inverse operations.</p> <p>- Inverse operations simplify to 0 or 1.</p> <p>- By addition or division property of equality</p> <p>- '+' , '-' are opposites</p> <p>- 'x' , '÷' are opposites</p>

Use a KWL chart like a Do/Undo Frayer Model

Example

<u>I Know</u>	<u>I Want to know</u>	<u>I Learned</u>
<p>In this Box students will write out what they know is happening in the given problem</p> <p>$115 = x + 103$</p> <p>1) 115 is equal to</p> <p>2) a number plus 103</p>	<p>In this Box students will write out the inverse operations that are used to solve for the variable.</p> <p>1) Subtract 103 from a number</p> <p>2) subtract 103 from both sides</p> <p>3) a number is equal to 115 minus 103</p>	<p>In this Box students will show all the work that is taken to get to the final answer for the variable.</p> <p>$115 = x + 103$ -103 -103</p> <p>$12 = x$</p>

VET

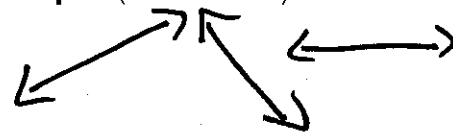
Name: _____

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Vocabulary Review: (what will help you remember?)

Example: (how it looks)

Linear: straight line



Proportional Relationship: Linear; through origin (0,0) is on line

Constant of Proportionality: How much I (x-value) is for y-value
(Unit Rate) in a proportional relationship.

Equation of a line: $y = mx + b$

y-intercept: b = where graph crosses horizontal line of graph



Slope (equation?): How graph ↑ or ↓ in $\frac{\Delta y}{\Delta x}$ over x-values

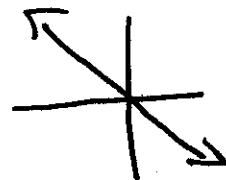
Rate of Change: same as slope: can be calculated no matter type of graph
calculated between 2 points.

ie.
$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Tables: the way we show points on a graph

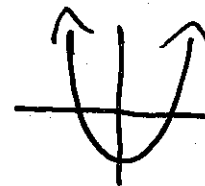
X	Y
-2	2
-1	1
0	0
1	-1
2	-2

Graphs: where we plot the points to create function



Coordinate Points: Position of a point on the graph (x,y)

Nonlinear: a function that is not a straight line
different rate of change throughout.



KEY

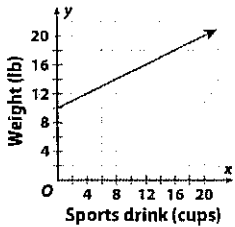
Name: _____

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Linear v Nonlinear Functions

Finding Rate of Change

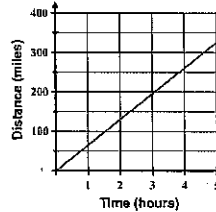
1) State if the following are proportional relationships? If proportional, what is the constant of proportionality?



NO. NOT THROUGH ORIGIN.

Time (min.)	Distance (ft.)
0	4
2	10
4	16
6	22

YES.
4 ft/min

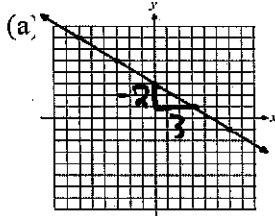


YES.
 $\frac{200}{3} = 66.\bar{6}$ mi/hr

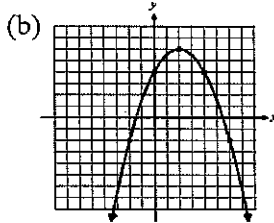
Number of Brownies	Cost of Brownies (\$)
0	0
4	3
8	6
12	9
16	12

YES.
\$0.75/brownie

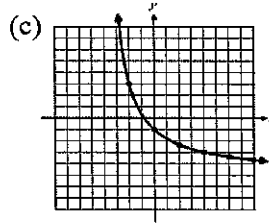
2) Which of the following graphs are linear functions? If linear, find the slope!



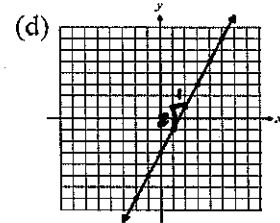
LINEAR
 $-\frac{2}{3}$



NON LINEAR



NONLINEAR



LINEAR
 $\frac{2}{1} = 2$

3) Which of the following tables represent a linear function? If linear, state the rate of change.

(1)

x	y
0	5
2	8
4	14
6	26

NON LINEAR

(2)

x	y
3	2
7	9
11	16
15	23

LINEAR
 $\frac{7}{4}$

(3)

x	y
3	6
6	8
9	10
12	12
15	14

LINEAR
 $\frac{2}{3}$

(4)

x	y
5	20
10	18
15	15
20	11
25	6

NON LINEAR

KEY

4) Which of the following equations represents a linear function? If linear, state the rate of change and the y-intercept $\leftarrow b$ $y = mx + b$ \leftarrow slope $\leftarrow m$

a. $y = \frac{2}{7}x + \frac{1}{3}$

LINEAR
 $m = \frac{2}{7}$
 $b = \frac{1}{3}$

b. $y = 9 - x^2$

NONLINEAR
 x^2 is A
Quadratic

c. $y = x^2 - 2x - 8$

NONLINEAR
 x^2 is A
Quadratic

d. $y = -\frac{1}{2}x + 7$

LINEAR
 $m = -\frac{1}{2}$
 $b = 7$

5) Find the Rate of Change between the given points.

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \text{slope}$$

a. x_1, y_1 and x_2, y_2
(3, 2) and (7, 12)

$$\begin{aligned} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{12 - 2}{7 - 3} \\ &= \frac{10}{4} \end{aligned}$$

$$m = \frac{5}{2}$$

b. (-6, 2) and (6, -2)
 x_1, y_1 and x_2, y_2

$$\begin{aligned} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-2 - 2}{6 - (-6)} \\ &= \frac{-4}{6 + 6} \\ &= \frac{-4}{12} \end{aligned}$$

$$m = -\frac{1}{3}$$

KEY

Name: _____

Date: _____

Gallery Walk Answer Sheet: Linear/NonLinear Functions

- Write down the question. Show your work to get to your answer.
- Move onto the next question. Repeat!

<p>1) IS PROPORTIONAL</p> <p>a) <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><th>x</th><th>y</th></tr> <tr><td>-9</td><td>-15</td></tr> <tr><td>-6</td><td>-10</td></tr> <tr><td>-3</td><td>-5</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>6</td><td>10</td></tr> <tr><td>9</td><td>15</td></tr> <tr><td>12</td><td>20</td></tr> </table></p> <p>$\frac{y}{x} = \frac{5}{3}$ up or 5 down or 3 right or 3 left</p> <p>b) $y = mx + b$ $y = \frac{5}{3}x$</p> <p>c) $y = \frac{5}{3}(21) = 35$ multiply 21 times $\frac{5}{3}$ together 'y'</p>	x	y	-9	-15	-6	-10	-3	-5	0	0	3	5	6	10	9	15	12	20	<p>2)</p> <p>a) non linear $\frac{\Delta y}{\Delta x} = \frac{1}{2}$</p> <p>b) non linear</p> <p>c) non linear</p> <p>d) Linear $\frac{9.75 - 6.55}{40} = .08$ $\frac{13.75 - 9.75}{50} = .08$</p> <p>e) non linear</p> <p>f) Linear $\frac{\Delta y}{\Delta x} = \frac{5}{1} = 5$</p>
x	y																		
-9	-15																		
-6	-10																		
-3	-5																		
0	0																		
3	5																		
6	10																		
9	15																		
12	20																		
<p>3)</p> <p>a) non linear</p> <p>b) linear not proportional $(5,3) (8,2) \frac{2-3}{8-5} = \frac{-1}{3}$</p> <p>c) linear, not proportional $(7,5) (2,2) \frac{5-2}{7-2} = \frac{3}{5}$</p> <p>d) linear, not proportional</p>	<p>4)</p> <p>a) $(2,5) (-8,4) \frac{\Delta y}{\Delta x} = \frac{5-4}{2+8} = \frac{1}{10}$</p> <p>b) $(-3,-9) (4,-2) \frac{\Delta y}{\Delta x} = \frac{-2+9}{4+3} = \frac{7}{7} = 1$</p> <p>c) $(12,34) (23,76) \frac{\Delta y}{\Delta x}$ $\frac{y_2 - y_1}{x_2 - x_1} = \frac{76-34}{23-12} = \frac{42}{11}$</p>																		
<p>5) $y = mx + b$; $m = \text{slope}$ $b = y\text{-int.}$</p> <p>a) Linear: $m = \frac{3}{2}$ $b = 3$</p> <p>b) non-linear</p> <p>c) non linear</p> <p>d) Linear: $m = -3$ $b = 5$</p>	<p>6)</p>																		

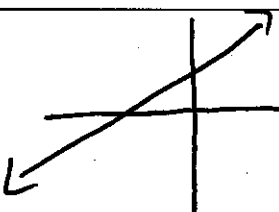
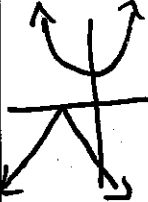
KEY

Name: _____

Date: _____

Desmos Activity Sheet: Linear/NonLinear Functions

In the table, show an example of what would be Linear or Nonlinear for each!

	Linear	Nonlinear																												
Equation	$y = mx + b$ - There is an x and m is slope b is y-int.	$y = x^2; y = x ; y = \sqrt{x}$ - x is being raised to exponent other than 1.																												
Graph	 - straight line - Diagonal or horizontal	 - anything that's not a straight line.																												
Table	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><th>X</th><th>Y</th></tr> <tr><td>-2</td><td>-5</td></tr> <tr><td>-1</td><td>-2</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>4</td></tr> <tr><td>2</td><td>7</td></tr> <tr><td>3</td><td>10</td></tr> </table> - x's change by same - y's change by same - $\frac{\Delta y}{\Delta x}$ is consistent	X	Y	-2	-5	-1	-2	0	1	1	4	2	7	3	10	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><th>X</th><th>Y</th></tr> <tr><td>-2</td><td>4</td></tr> <tr><td>-1</td><td>1</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>9</td></tr> </table> - y's change by different #'s every time	X	Y	-2	4	-1	1	0	0	1	1	2	4	3	9
X	Y																													
-2	-5																													
-1	-2																													
0	1																													
1	4																													
2	7																													
3	10																													
X	Y																													
-2	4																													
-1	1																													
0	0																													
1	1																													
2	4																													
3	9																													

Card Sort correct ANSWERS

Sort the cards into four categories.

Linear Equations
$y = 4.3x - 2$
$y = 9 - 3.5x$
$y = 9 + 3x$
$y = \frac{1}{2}x - 4$
$y = -\frac{2}{8}x$
$y = -x$

Linear Tables										
<table border="1"> <tr><th>x_1</th><th>y_1</th></tr> <tr><td>0</td><td>-5</td></tr> <tr><td>3</td><td>-1</td></tr> <tr><td>6</td><td>3</td></tr> <tr><td>9</td><td>7</td></tr> </table>	x_1	y_1	0	-5	3	-1	6	3	9	7
x_1	y_1									
0	-5									
3	-1									
6	3									
9	7									
<table border="1"> <tr><th>x_1</th><th>y_1</th></tr> <tr><td>0</td><td>10</td></tr> <tr><td>1</td><td>21</td></tr> <tr><td>2</td><td>32</td></tr> <tr><td>3</td><td>43</td></tr> </table>	x_1	y_1	0	10	1	21	2	32	3	43
x_1	y_1									
0	10									
1	21									
2	32									
3	43									

Nonlinear Tables										
<table border="1"> <tr><th>x_1</th><th>y_1</th></tr> <tr><td>-2</td><td>1</td></tr> <tr><td>-3</td><td>2</td></tr> <tr><td>-4</td><td>4</td></tr> <tr><td>-5</td><td>8</td></tr> </table>	x_1	y_1	-2	1	-3	2	-4	4	-5	8
x_1	y_1									
-2	1									
-3	2									
-4	4									
-5	8									
<table border="1"> <tr><th>x_1</th><th>y_1</th></tr> <tr><td>3</td><td>-5</td></tr> <tr><td>4</td><td>1</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>6</td><td>11</td></tr> </table>	x_1	y_1	3	-5	4	1	5	6	6	11
x_1	y_1									
3	-5									
4	1									
5	6									
6	11									

Nonlinear Equations
$y = 2 + 3x^2$
$y = \frac{1}{x}$
$y = -\frac{2}{x}$
$y = -x^2 - 5$

KEY

Reflect

Shane added this card to the linear category.

x_1	y_1
0	-5
3	-1
6	3
9	7

Is Shane correct?

Yes
 No

x 's go up +3
 y 's go up +4 EVERY time

Reflect

Malani added this card to the linear group because x is raised to the first power.

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

Do you agree with Malani?

Yes
 No

THIS is really
 $y = -2 \cdot \frac{1}{x}$ and $\frac{1}{x} = x^{-1}$

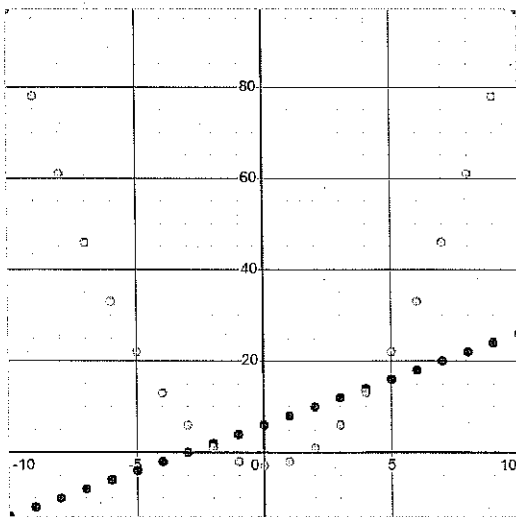
Write a Linear Equation:

$$y = \frac{3}{2}x - 4$$

Write a Nonlinear Equation:

$$y = |x - 2| + 6$$

Which is which?



Here are some points representing two different functions.

Which is a linear graph, and which is a nonlinear graph?

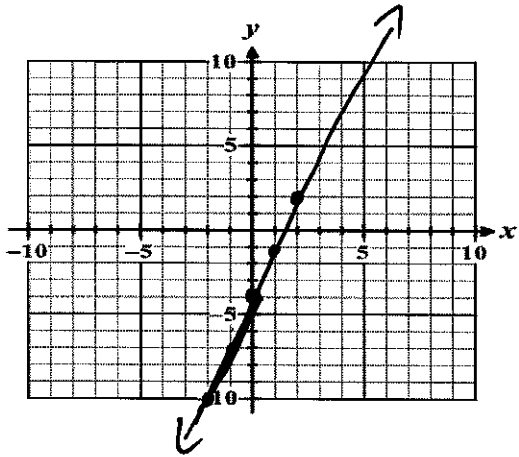
How do you know?

- Orange is linear, blue is nonlinear
- Blue is linear, orange is nonlinear
- Both are linear
- Both are nonlinear

-Blue is a straight line
 -Orange is a parabola

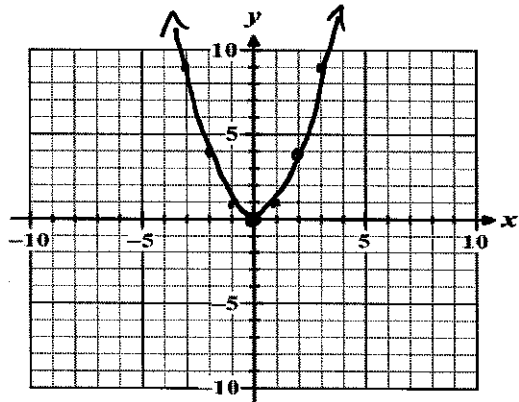
Copy Slides 8-10 down on this paper for your own records!

Complete the Table to show a **Linear** Relationship!



x	y
-2	-10
-1	-7
0	-4
1	-1
2	2

Complete the Table to show a **Nonlinear** Relationship!



x	y
-2	4
-1	1
0	0
1	1
2	4

Summarize

(1) How can you determine if an equation is linear or nonlinear?

- IN THE FORM $y = mx + b$

- The exponent for the x has to be 1

(2) How can you determine if a table of values represents a linear or nonlinear relationship?

- EACH x, y coordinate point has to follow

$\frac{\Delta y}{\Delta x}$ and has to be equivalent ~~to~~ For every point.

Complete IXL Exit Ticket

- IXL 8th Grade BB20

Name: Key

Date: _____


Two-Dimensional Shapes Vocabulary Review

Not Circles!

Two-Dimensional Figure: A flat shape you can draw, no depth

Perimeter: the length around the outside of a 2-D shape

Area: the amount of space inside a 2-D shape
2 dimensions, answer should be squared


Rectangle: four sided shape with 2 sets of parallel lines 

How to solve for perimeter:

$$P = S + S + S + S$$

area:

$$A = l \cdot w$$

Trapezoid: four sided shape with 1 set of parallel sides 


How to solve for perimeter:

$$P = S + S + S + S$$

area:

$$A = \frac{b_1 + b_2}{2} h$$



Triangle: three side shape that creates 3 angles 

How to solve for perimeter:

$$P = S + S + S$$

area:

$$A = \frac{1}{2} bh$$



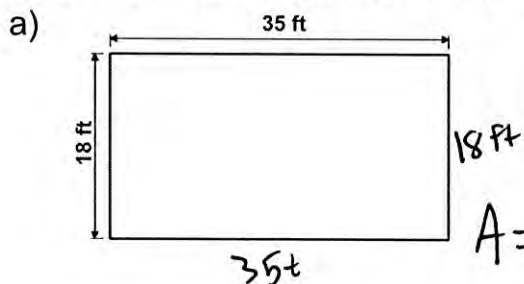
Key

Name: _____

Date: _____

Two-Dimensional Shapes (Not Circles) Practice Area and Perimeter

1) Find the Area and Perimeter of the Following:



Show your work:

$$A = l \cdot w$$

$$= 18 \cdot 35$$

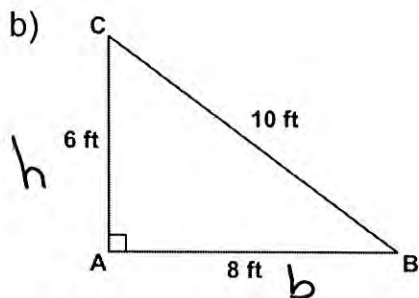
$$A = 630 \text{ ft}^2$$

$$P = 35 + 18 + 35 + 18$$

$$= 35 + 35 + 18 + 18$$

$$= 70 + 36$$

$$P = 106 \text{ ft}$$



$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(8)(6)$$

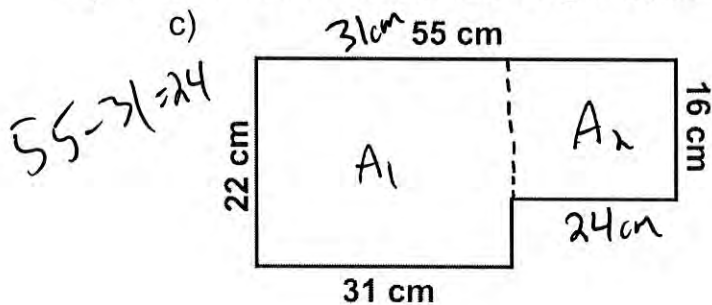
$$= 4(6)$$

$$A = 24 \text{ ft}^2$$

$$P = 6 + 8 + 10$$

$$P = 24 \text{ ft}$$

2) Find the Area of the following shapes.



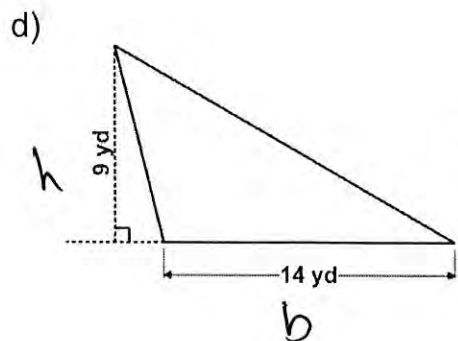
$$A_1 = 22 \cdot 31$$

$$= 682 \text{ cm}^2$$

$$A_2 = 16 \cdot 24$$

$$= 384 \text{ cm}^2$$

$$682 + 384 = 1066 \text{ cm}^2$$



$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(14)(9)$$

$$= 63 \text{ yd}^2$$


Name: Ly

Date: _____

Two-Dimensional Shapes Vocabulary Review

Circles!

Two-Dimensional Figure: A flat shape you can draw, no depth

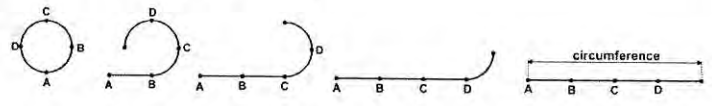
Circle: a round shape where the outside is all the same distance from the center 

Area: the space inside a shape

Circumference: the outside length of a circle (similar to perimeter)

Diameter: distance from one side to the other through center represented by the letter d

Radius: from center to outside edge represented by the letter r.



How to find Area :

$$A = \pi r^2$$

How to find Circumference:

$$C = 2\pi r \text{ or } C = \pi d$$

Name: Ray

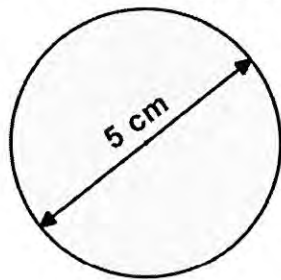
Date: _____

Two-Dimensional Shapes (Circles!!!) Practice

Area and Circumference

1) Find the Area and Circumference of the Following:

a)



$$d = 5 \text{ cm}$$
$$r = 2.5 \text{ cm}$$

Show your work:

$$A = \pi r^2$$
$$= \pi (2.5)^2$$
$$= \pi (6.25)$$

$$C = 2\pi r$$
$$= 2\pi (2.5)$$
$$= 2(2.5)\pi$$
$$= 5\pi$$

$$A = 19.635 \text{ cm}^2$$
$$C = 15.708 \text{ cm}$$

b) A Circle with a diameter of:

$$d = 10 \text{ in}$$

$$r = 5 \text{ in}$$

$$A = \pi r^2$$
$$= \pi 5^2$$

$$C = 2\pi r$$
$$= 2\pi 5$$

$$A = 78.54 \text{ in}^2$$
$$C = 31.416 \text{ in}$$

c) A Circle with a radius of:

$$r = 24 \text{ in}$$

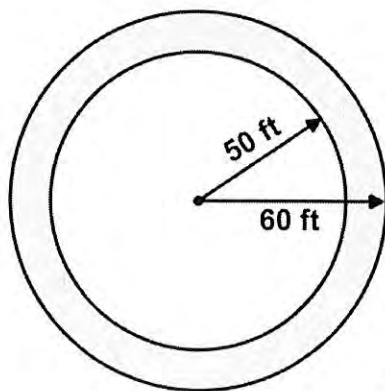
$$d = 48 \text{ in}$$

$$A = \pi r^2$$
$$= \pi 24^2$$

$$C = 2\pi r$$
$$= 2\pi 24$$

2) Find the area of of the shaded region:

$$A = 1809.557 \text{ in}^2$$
$$C = 150.796 \text{ in}$$



Circle 1

$$r = 60 \text{ ft}$$

Circle 2

$$r = 50 \text{ ft}$$

$$\underline{\text{Circle 1}} - \underline{\text{Circle 2}} = \underline{\text{shaded}}$$

$$A = \pi 60^2 - \pi 50^2$$

$$= 11309.734 - 7853.982$$

$$A = 3455.752 \text{ ft}^2$$

Name: Key

Date: _____

Three-Dimensional Shapes Vocabulary Review

Nothing that involves a circle(yet)!

Three-Dimensional Figure: A shape with length, width, & height.

Surface Area: area that is shown from each different side

Volume: amount of space a substance can occupy (inside)

Face: the flat surface of a 3-D shape

Prism: 3-d shape where two bases are identical

How to name a prism: by the shape of the identical bases

How to solve for

Surface Area:

$$SA = \text{add areas of each face} \\ = 2(\text{area of base}) + \text{area of facet} \dots$$

Volume:

$$V = B \cdot h \\ = (\text{area of the base}) \cdot h$$

Pyramid: 3-D shape with 1 base, an triangle faces up to a point

How to name a pyramid: by the shape of the base

How to solve for

Surface Area:
perimeter:

$$SA = \text{add areas of each face} \\ = \text{area of base} + \text{area of facet} \dots$$

Volume
area:

$$V = \frac{l \cdot w \cdot h}{3}$$

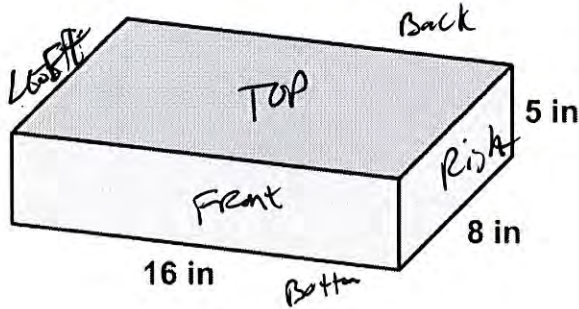
Name: Key

Date: _____

Three-Dimensional Shapes Practice

Nothing that involves a circle(yet)!

1) Name this shape, then find the surface area and volume!



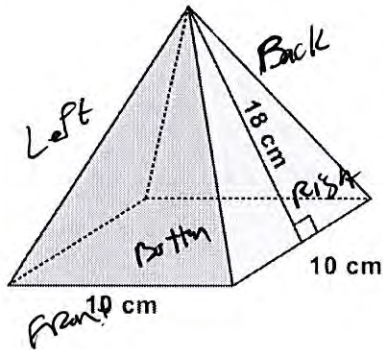
Net: Front = $16 \times 5 = 80$
Back = $16 \times 5 = 80$
Top = $16 \times 8 = 128$
Bottom = $16 \times 8 = 128$
Left = $8 \times 5 = 40$
Right = $8 \times 5 = 40$

Name: Rectangular prism

Volume: $V = L \cdot W \cdot h$
 $= 16 \cdot 8 \cdot 5$
 $= 640 \text{ in}^3$

$= 496 \text{ in}^2$

2) Name this shape, then find the surface area and volume!



Net: Bottom = $10 \times 10 = 100$
Front = $\frac{1}{2} 10 \times 18 = 90$
Back = $\frac{1}{2} 10 \times 18 = 90$
Left = $\frac{1}{2} 10 \times 18 = 90$
Right = $\frac{1}{2} 10 \times 18 = 90$

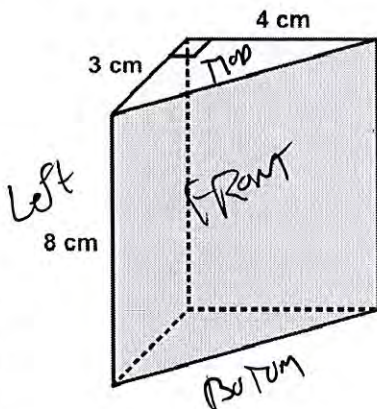
Name: Square Pyramid

Volume: $V = \frac{L \cdot W \cdot h}{3}$

$V = \frac{10 \cdot 10 \cdot 18}{3}$
 $= 600 \text{ cm}^3$

$= 460 \text{ cm}^2$

3) Name this shape, then find the surface area and volume!



Net: Top = $\frac{1}{2} (3)(4) = 6$
Bottom = $\frac{1}{2} (3)(4) = 6$
Front = $8 \cdot 5 = 40$
Left = $8 \cdot 3 = 24$
Right = $8 \cdot 4 = 32$

Name: triangular prism

Volume: $V = \frac{1}{2} B h$

$= \frac{1}{2} (3 \cdot 4) \cdot 8$
 $= \frac{1}{2} (12) \cdot 8$
 $= 6 \cdot 8 = 48 \text{ cm}^3$

108 cm^2

$3^2 + 4^2 = c^2$
 $9 + 16 = c^2$
 $25 = c^2$
 $5 = c$

Name: Key

Date: _____

Three-Dimensional Shapes Vocabulary Review

These involve Circles!

Three-Dimensional Figure: A shape that you can hold and has depth, not flat

Cone: shape with a circular top that goes to a point

How to solve for

Volume:

$$V = \frac{1}{3} \pi r^2 \cdot h$$



Cylinder: shape with 2 circular bases

How to solve for

Surface Area:

Volume:

$$SA = 2\pi rh + 2\pi r^2$$

$$V = \pi r^2 \cdot h$$



Sphere: A ball shaped figure

How to solve for

Volume:

$$V = \frac{4}{3} \pi r^3$$

Name: Key

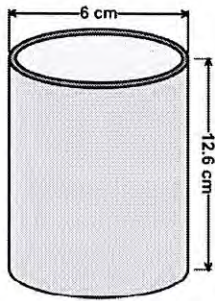
Date: _____

Three-Dimensional Shapes Practice

These involve Circles!

1) Name this shape, then find the surface area and volume!

$d = 6$
 $r = 3$



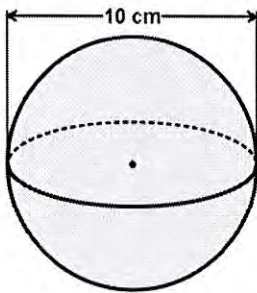
Cylinder

$$\begin{aligned} SA &= 2\pi rh + 2\pi r^2 \\ &= 2\pi(3)(12.6) + 2\pi(3)^2 \\ &= 237.5 + 56.55 \\ &= 294.05 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} V &= \pi r^2 \cdot h \\ &= \pi(3)^2 \cdot 12.6 \\ &= 356.3 \text{ cm}^3 \end{aligned}$$

2) Name this shape, then find the volume!

$d = 10$
 $r = 5$

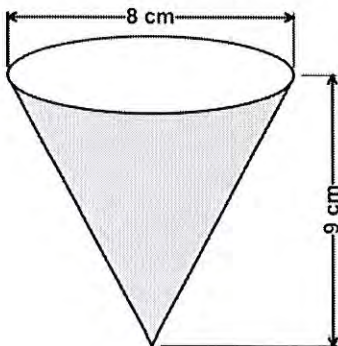


Sphere

$$\begin{aligned} V &= \frac{4}{3}\pi r^3 \\ &= \frac{4}{3}\pi(5)^3 \\ &= 523.6 \text{ cm}^3 \end{aligned}$$

3) Name this shape, then find the volume!

$d = 8$
 $r = 4$



Cone

$$\begin{aligned} V &= \frac{1}{3}\pi r^2 \cdot h \\ &= 150.8 \text{ cm}^3 \end{aligned}$$

Key

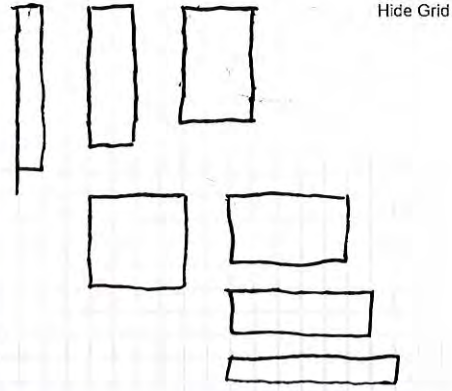
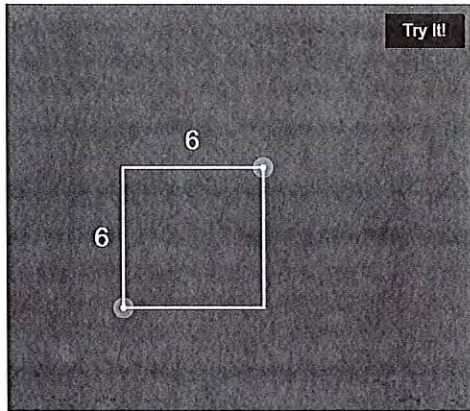
Desmos Activity for Area/Perimeter

STUDENT SCREEN PREVIEW

< 3 of 17 Next >

Activity 1

Create as many rectangular gardens with a perimeter of 16 units as you can.



STUDENT SCREEN PREVIEW

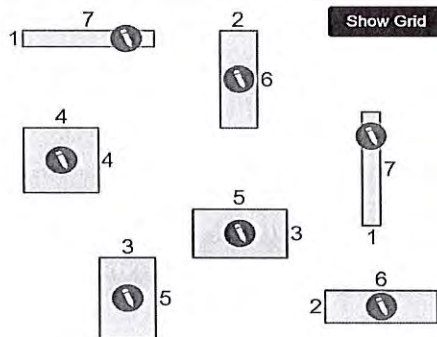
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< 4 of 17 Next >

Activity 1

Calculate the area of each rectangle, in square units.

$$\begin{array}{ll}
 7 \times 1 = 7 & 1 \times 7 = 7 \\
 2 \times 6 = 12 & 6 \times 2 = 12 \\
 3 \times 5 = 15 & 5 \times 3 = 15 \\
 4 \times 4 = 16 &
 \end{array}$$



STUDENT SCREEN PREVIEW

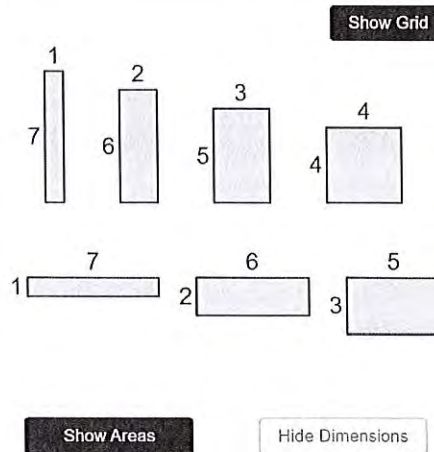
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< 6 of 17 Next >

Activity 1

Rectangles with different side lengths can have the same perimeter but different areas.

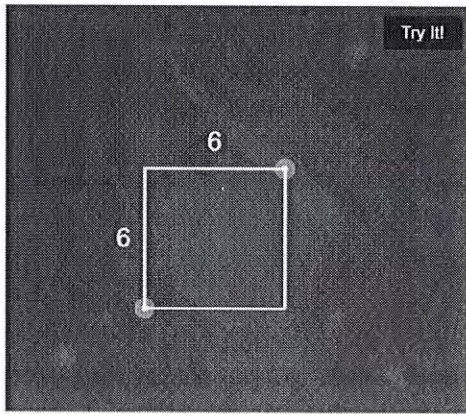
Length (units)	Width (units)	Perimeter (units)	Area (sq. units)
1	7	16	7
2	6	16	12
3	5	16	15
4	4	16	16
5	3	16	15
6	2	16	12
7	1	16	7



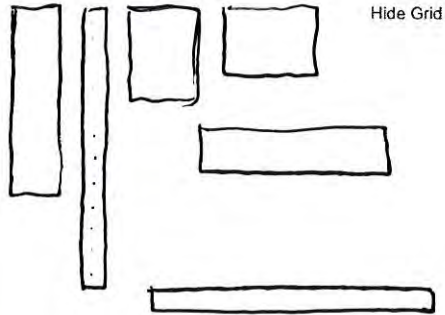
Key

Activity 2

Create as many rectangular gardens with an area of 12 square units as you can.



Remaining: 12 square units



Hide Grid

My Collection

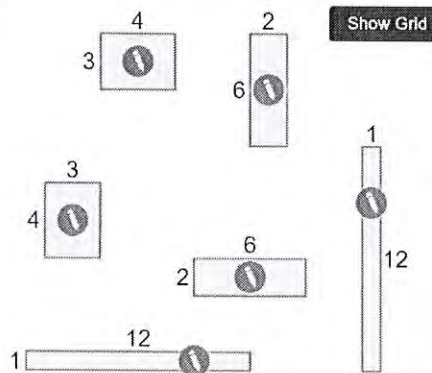
Activity 2

Calculate the perimeter of each rectangle, in units.

$$4 + 3 + 4 + 3 = 18$$

$$6 + 2 + 6 + 2 = 16$$

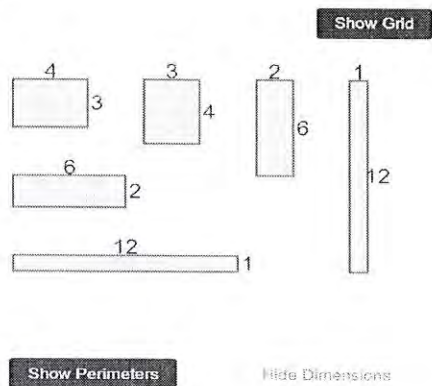
$$12 + 1 + 12 + 1 = 26$$



Activity 2

Rectangles with different side lengths can have the same area but different perimeters.

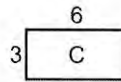
Length (units)	Width (units)	Perimeter (units)	Area (sq. units)
1	12	26	12
2	6	16	12
3	4	14	12
4	3	14	12
6	2	16	12
12	1	26	12



Key

Show What You Know

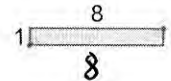
Drag the points to create another rectangle with the same perimeter as Rectangle C.



Show Grid

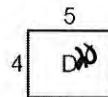
What are the perimeter and area of each rectangle?

	Perimeter (units)	Area (sq. units)
Rectangle C	18	18
Your Rectangle	18	8



Show What You Know

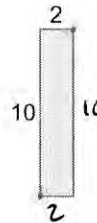
Drag the points to create another rectangle with the same area as Rectangle D.



Show Grid

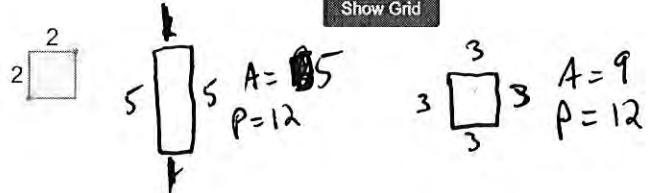
What are the perimeter and area of each rectangle?

	Perimeter (units)	Area (sq. units)
Rectangle D	18	20
Your Rectangle	24	20



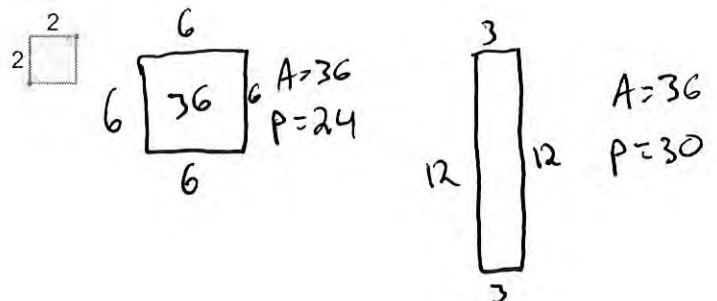
Practice

Drag the points to create two rectangles that have a perimeter of 12 units, but different areas.



Show Grid

Drag the points to create two rectangles that have an area of 36 square units, but different perimeters.

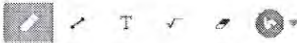


Key

Desmos Activity for Area/Circumference

STUDENT SCREEN PREVIEW

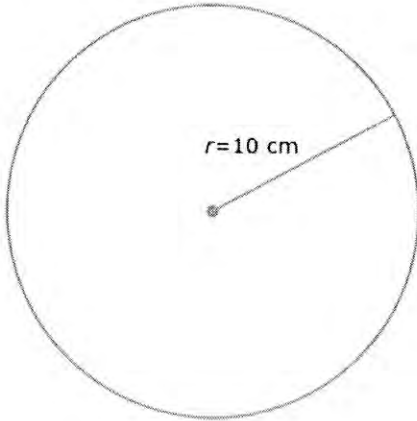
1 of 8 Next >



$$C = 2\pi r$$

$$= 2\pi(10)$$

$$= 62.83 \text{ cm}$$



a) What is the circumference of the circle? (Write your answer as a decimal rounded to two decimal places.)

Check your work: Keep trying
You've tried 0 times.

$$62.83 \text{ cm}$$

$$A = \pi r^2$$

$$= \pi(10)^2$$

$$= 314.2 \text{ cm}^2$$

$$= 314.16 \text{ cm}^2$$

b) What is the area of the circle? (Write your answer as a decimal rounded to two decimal places.)

Check your work: Keep trying
You've tried 0 times.

~~314.2~~
$$314.16 \text{ cm}^2$$

STUDENT SCREEN PREVIEW

2 of 8

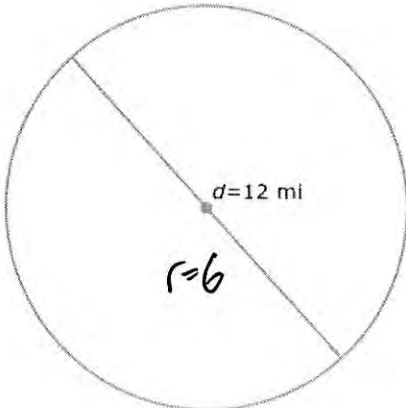
Next >



$$C = 2\pi r$$

$$= 2\pi(6)$$

$$= 37.70 \text{ mi}$$



a) What is the circumference of the circle? (Write your answer as a decimal rounded to two decimal places.)

Check your work: Keep trying
You've tried 0 times.

$$37.70 \text{ mi}$$

$$A = \pi r^2$$

$$= \pi(6)^2$$

$$= 113.10 \text{ mi}^2$$

b) What is the area of the circle? (Write your answer as a decimal rounded to two decimal places.)

Check your work: Keep trying
You've tried 0 times.

$$113.10 \text{ mi}^2$$

STUDENT SCREEN PREVIEW

3 of 8

Next >

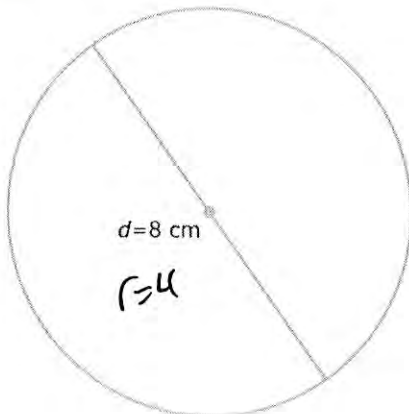


$$C = 2\pi r$$

$$= 2\pi(4)$$

$$= 25.1327$$

$$= 8\pi$$



a) What is the EXACT circumference of the circle?

Check your work: Keep trying
You've tried 0 times.

$$8\pi \text{ cm}$$

$$A = \pi r^2$$

$$= \pi(4)^2$$

$$= 16\pi$$

$$= 50.265 \text{ cm}^2$$

b) What is the EXACT area of the circle?

Check your work: Keep trying
You've tried 0 times.

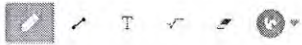
$$16\pi \text{ cm}^2$$

Key

STUDENT SCREEN PREVIEW

4 of 8

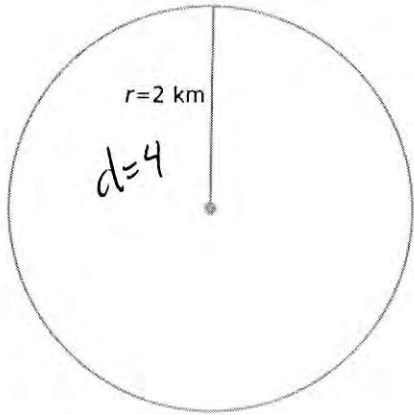
Next >



$$C = 2\pi r$$

$$= 2\pi \cdot 2$$

$$= 4\pi$$



a) What is the EXACT circumference of the circle?

Check your work: Keep trying
You've tried 0 times.

$$4\pi \text{ km}$$

$$A = \pi r^2$$

$$= \pi \cdot 2^2$$

$$= 4\pi$$

b) What is the EXACT area of the circle?

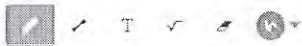
Check your work: Keep trying
You've tried 0 times.

$$4\pi \text{ km}^2$$

STUDENT SCREEN PREVIEW

5 of 8

Next >

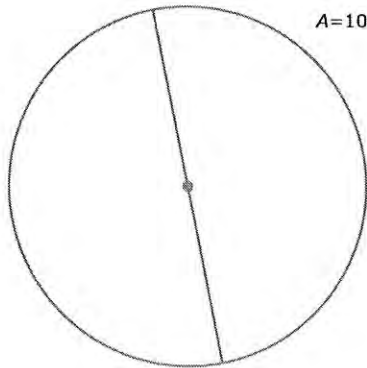


The area of a circle is 100π square centimeters

$$C = 2\pi r$$

$$= 2\pi \cdot 10$$

$$= 20\pi$$



a) What is the radius?

Check your work: Keep trying
You've tried 0 times.

$$10 \text{ cm}$$

$$A = 100\pi$$

$$A = \pi r^2$$

$$A = \pi \cdot 100$$

$$A = \pi (10)^2$$

$$r = 10$$

b) What is the EXACT circumference?

Check your work: Keep trying
You've tried 0 times.

$$20\pi \text{ cm}$$

STUDENT SCREEN PREVIEW

6 of 8

Next >



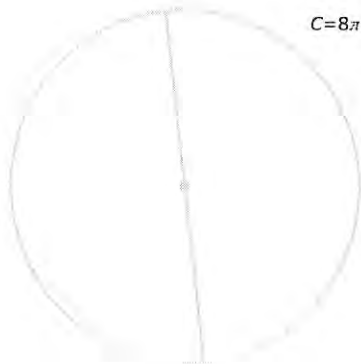
The circumference of a circle is 8π feet.

$$C = 8\pi$$

$$C = 2\pi r$$

$$C = 2\pi \cdot 4$$

$$r = 4$$



a) What is the radius?

Check your work: Keep trying
You've tried 0 times.

$$4 \text{ ft}$$

$$A = \pi r^2$$

$$= \pi (4)^2$$

$$= 16\pi$$

b) What is the EXACT area?

Check your work: Keep trying
You've tried 0 times.

$$16\pi \text{ ft}^2$$

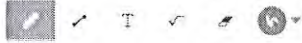
Key

STUDENT SCREEN PREVIEW

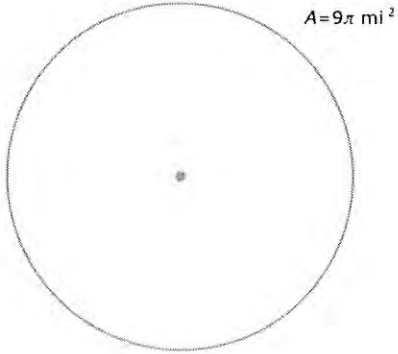


< 7 of 8 Next >

The area of a circle is 9π square miles



$$\begin{aligned} C &= 2\pi r \\ &= 2\pi 3 \\ &= 6\pi \end{aligned}$$



a) What is the radius?

Check your work: Keep trying
You've tried 0 times.

3 mi

$$\begin{aligned} A &= \pi r^2 \\ &= \pi 9 \\ &= \pi 3^2 \\ r &= 3 \end{aligned}$$

b) What is the EXACT circumference?

Check your work: Keep trying
You've tried 0 times.

6π mi

STUDENT SCREEN PREVIEW

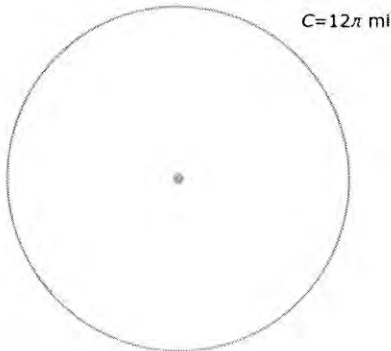


< 8 of 8

The circumference of a circle is 12π miles



$$\begin{aligned} C &= 2\pi r \\ C &= 12\pi \\ C &= 2\pi 6 \\ r &= 6 \end{aligned}$$



a) What is the EXACT area?

Check your work: Keep trying
You've tried 0 times.

36π mi²

$$\begin{aligned} A &= \pi r^2 \\ &= \pi 6^2 \\ &= 36\pi \end{aligned}$$

Key

Desmos Activity for Surface Area of Prisms

STUDENT SCREEN PREVIEW 1 of 12 Next >

Check out this rectangle! Notice the squares covering it? Those squares tell you how much space is taken up by that rectangle. Right now, there are 24 squares (unless, of course, you already changed the width and length...you rebel). We describe area by the number of squares covering a shape.

+

$W_{\text{width}} = 6$

$H_{\text{height}} = 4$

4

1	5	9	13	17	21
2	6	10	14	18	22
3	7	11	15	19	23
4	8	12	16	20	24

STUDENT SCREEN PREVIEW 2 of 12 Next >

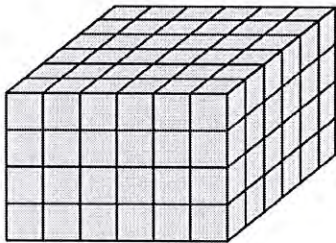
Ok, so you've seen rectangles before and you already know about area. Bully for you. But check this out! This rectangle can be changed into a rectangular prism. Just change the length.

+

$W_{\text{width}} = 6$

$H_{\text{height}} = 4$

$L_{\text{length}} = 5.9$



How many Sides are on this Rectangular Prism?

6 sides

Can you name all of the sides?

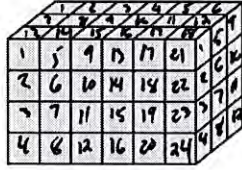
Front Top left
Back Bottom right

Key

Back on the first slide, we talked about how area describes the space taken up by something. We now want to know the area of this entire rectangular prism.

Figure out the area of the three visible sides:

- How many squares are on the front (blue) side?
- How many squares are on the right (green) side?
- How many squares are on the top (red) side?



Blue - 24
Green - 12
Red - 18



Find the area of the other 3 sides you can't see!

They all have opposite sides that are the same

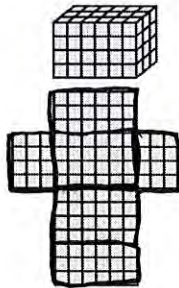
~~Blue~~ front \rightarrow back (Blue) = 24
right \rightarrow left (Green) = 12
top \rightarrow bottom (Red) = 18

If you couldn't quite figure out the other three sides, this picture should help.

Below the rectangular prism, there is a net that can be folded to create the same shape. The two blue sides represent the front and back of the prism. The two green sides represent the left and right sides. And the two red sides represent the top and the bottom.

What do you notice about the area of the opposite sides? Front and back? Left and right? Top and bottom?

Opposite sides have the same areas



Key

What is the total Area of the Previous Rectangular Prism?

Blue Front - 24
 Back - 24
 Green left - 12
 right - 12
 Red Top - 18
 Bottom - 18

108 sq units

Lets Try a few Practice Problems!

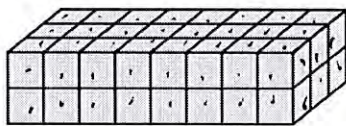
STUDENT SCREEN PREVIEW

✖

< 9 of 12 Next >

Let's try another one.

Find the surface area of this prism.



- 46 square units
- 54 square units
- 66 square units
- 78 square units
- 88 square units
- 92 square units

Handwritten calculations for the first practice problem:
 Front - 16 → 32
 Back - 16 → 32
 L - 6 → 12
 R - 6 → 12
 Top - 24 → 48
 Bottom - 24 → 48
 Total: 32 + 32 + 12 + 12 + 48 + 48 = 184

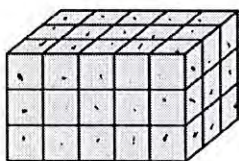
STUDENT SCREEN PREVIEW

✖

< 11 of 12 Next >

Let's try another one.

Find the surface area of this prism.



- 46 square units
- 54 square units
- 66 square units
- 78 square units
- 88 square units
- 92 square units

Handwritten calculations for the second practice problem:
 Top - 15 → 30
 B - 15 → 30
 L - 9 → 18
 R - 9 → 18
 F - 15 → 30
 Back - 15 → 30
 Total: 30 + 30 + 18 + 18 + 30 + 30 = 156

Key

STUDENT SCREEN PREVIEW

Let's try something different. Move the sliders below so that the width is 3 and the height is 4. Next, change the length until the surface area is 52 squares. You may have to use trial and error to figure this out.

Width = 3
Height = 4
Length = 2

For extra practice! Desmos Activity 2!

TEACHER PRESENTATION SCREEN

Warm-Up

- How many faces does this prism have? Explain how you counted.
- Calculate the area of the base.

14 faces
3 per

$$2 \cdot 2 + 2 \cdot 2 + 2 \cdot 2 + 2 \cdot 2 + 2 \cdot 2$$

$$4 + 4 + 4 + 4 + 4$$

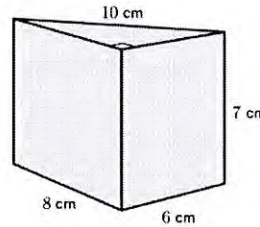
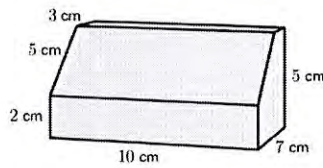
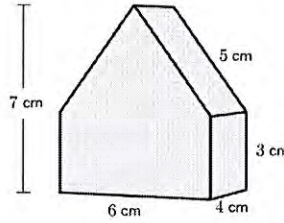
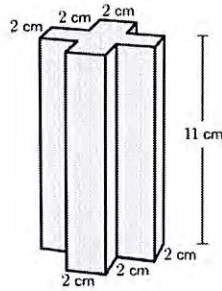
20cm

Key

Preview Only

Surface Area

Which one of these prisms do you think will have the largest surface area? Which will have the smallest?



Extra Extra Practice with Desmos Activity 3! Sort the Cards!

Find the surface area of each prism.

672 units²

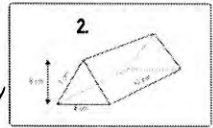
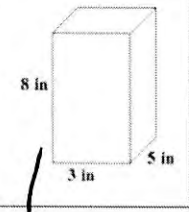
220 units²

144 units²

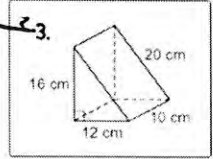
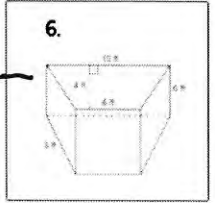
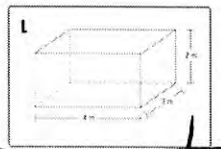
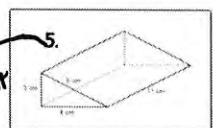
240 units²

52 units²

4



158 units²



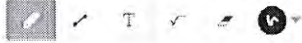
Key

Desmos Activity for Volume of Prisms

STUDENT SCREEN PREVIEW

xx

1 of 12 Next >

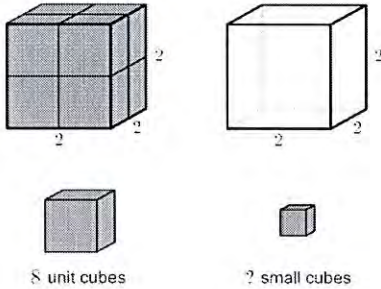


Warm-Up

A unit cube is a $1 \times 1 \times 1$ prism.

1. Discuss with a classmate how you know that it takes 8 unit cubes to fill a $2 \times 2 \times 2$ prism.

2. How many small cubes ($\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$) will it take?

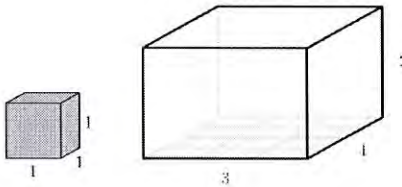


$$8 \times 2 = 16 \text{ small cubes}$$



container.

What is the volume of this rectangular prism?



$$\begin{aligned} V &= l \cdot w \cdot h \\ &= 3 \cdot 4 \cdot 2 \\ &= 24 \end{aligned}$$

STUDENT SCREEN PREVIEW

xx

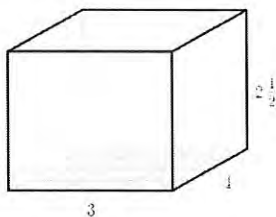
< 3 of 12 Next >



A Little Bit Taller

This prism has the same base as the previous one, but it's $\frac{1}{2}$ -unit taller.

What is the volume of this rectangular prism?



$$\begin{aligned} V &= l \cdot w \cdot h \\ &= 3 \cdot 4 \cdot 2\frac{1}{2} \\ &= 30 \end{aligned}$$

Key

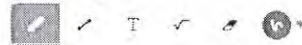
STUDENT SCREEN PREVIEW

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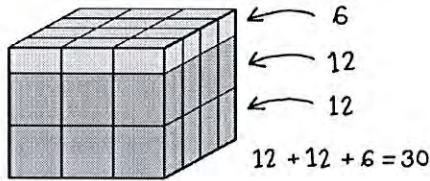
< 4 of 12 Next >

Two Strategies

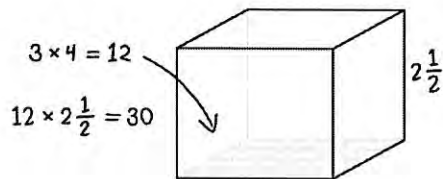
Here are Caasi's and David's strategies for calculating the volume of the prism. Describe each strategy with a partner.



Caasi



David



Caasi counted and David used the formula

STUDENT SCREEN PREVIEW

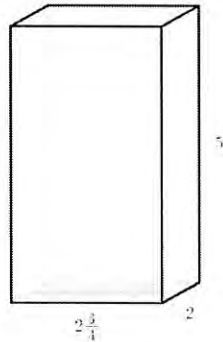
⌂

< 5 of 12 Next >

A New Prism

Here is a new rectangular prism.

What is its volume?



27.5 units^3

$V = l \cdot w \cdot h$
 $= 2\frac{3}{4} \cdot 2 \cdot 5$
 $= 27.5$

STUDENT SCREEN PREVIEW

⌂

< 6 of 12 Next >

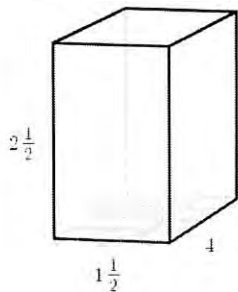
Settle a Dispute

Caasi and David are calculating the volume of a new prism.

Caasi thinks the area of the base is 10 square units. David thinks the area of the base is 6 square units.

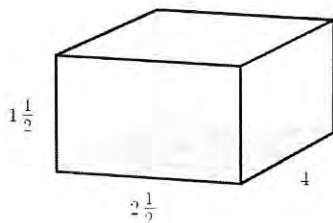
Who is correct?

Caasi David Both Neither



$1\frac{1}{2} \cdot 4 = 6$

David used a side



What is the volume?

$V = l \cdot w \cdot h$
 $= 2\frac{1}{2} \cdot 4 \cdot 1\frac{1}{2}$
 $= 15$

Key

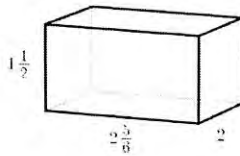
STUDENT SCREEN PREVIEW

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Four Challenges

Use paper to calculate the volume of each prism.



Dimensions (units)	Volume (cubic units)
$5 \times 2 \times 3$	30
$\frac{5}{6} \times 2 \times 3$	5
$2\frac{3}{6} \times 2 \times 3$	17
$2\frac{3}{6} \times 2 \times 1\frac{1}{2}$	8.5

$$5 \times 2 \times 3$$

30

$$\frac{5}{6} \times 2 \times 3$$

5

$$2\frac{3}{6} \times 2 \times 3$$

17

$$2\frac{3}{6} \times 2 \times 1\frac{1}{2}$$

8.5

Preview Only

STUDENT SCREEN PREVIEW

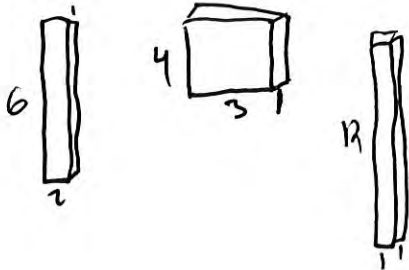
✖

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Are You Ready for More?

Find as many rectangular prisms as you can with a volume of 12 cubic inches. One has been done for you.

(Only use dimensions that are $2\frac{1}{2}$ inches or less.)



Length (inches)	Width (inches)	Height (inches)	Volume (cubic inches)
?	?	?	12

Try It

Preview Only

Two more to Practice!

STUDENT SCREEN PREVIEW

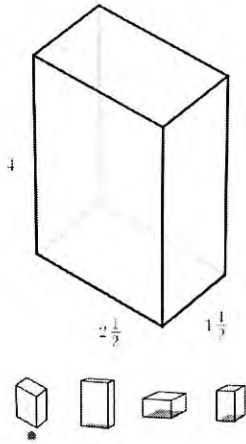
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< 10 of 12 Next >

Lesson Synthesis

Describe a strategy for calculating the volume of a rectangular prism like this one.

multiply all 3 numbers together



△ 🔊 ✓

Preview Only

STUDENT SCREEN PREVIEW

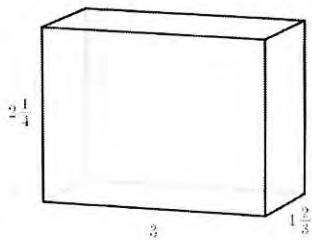
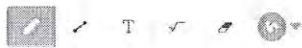
xx

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Cool-Down

Calculate the volume of this prism.

$$11.25$$
$$V = l \cdot w \cdot h$$
$$V = 3 \cdot 1\frac{2}{3} \cdot 2\frac{1}{4}$$
$$= 11.25$$



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Preview Only

Key

Desmos Activity for Surface Area and Volume of Cylinders and Volume of Cones/Spheres

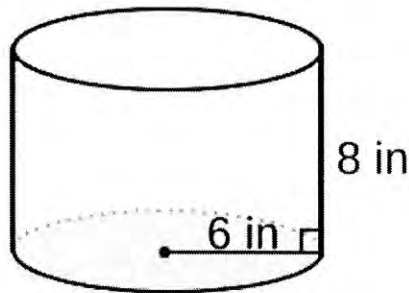
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Question 1

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$904.78 \text{ in}^3$$

$$\begin{aligned} V &= \pi r^2 \cdot h \\ &= \pi 6^2 \cdot 8 \\ &= 904.78 \text{ in}^3 \end{aligned}$$

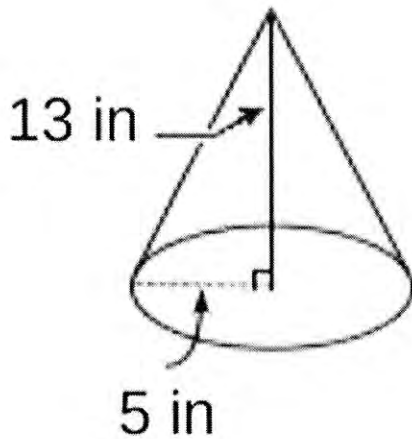
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Question 2

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$340.34 \text{ in}^3$$

$$\begin{aligned} V &= \frac{1}{3} \pi r^2 \cdot h \\ &= \frac{1}{3} \pi 5^2 \cdot 13 \\ &= 340.34 \text{ in}^3 \end{aligned}$$

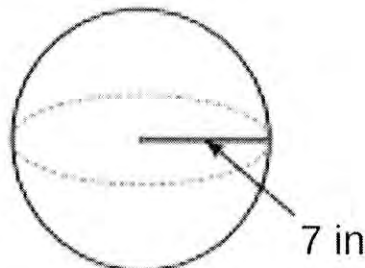
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Question 3

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$1,436.76 \text{ in}^3$$

$$\begin{aligned} V &= \frac{4}{3} \pi r^3 \\ &= \frac{4}{3} \pi 7^3 \\ &= 1,436.76 \end{aligned}$$

Key

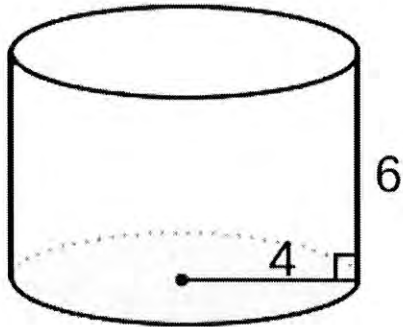
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Question 4

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$301.59$$

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi 4^2 6 \\ &= 301.59 \end{aligned}$$

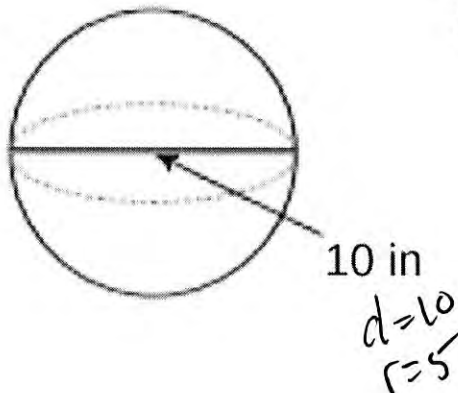
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Question 5

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$523.6 \text{ in}^3$$

$$\begin{aligned} V &= \frac{4}{3} \pi r^3 \\ &= \frac{4}{3} \pi 5^3 \\ &= 523.6 \text{ in}^3 \end{aligned}$$

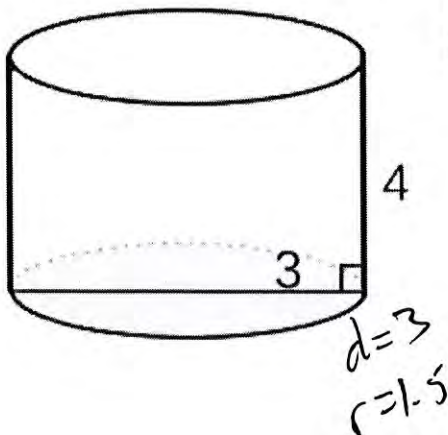
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Question 6

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$28.27$$

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi (1.5)^2 4 \\ &= 28.27 \end{aligned}$$

Key

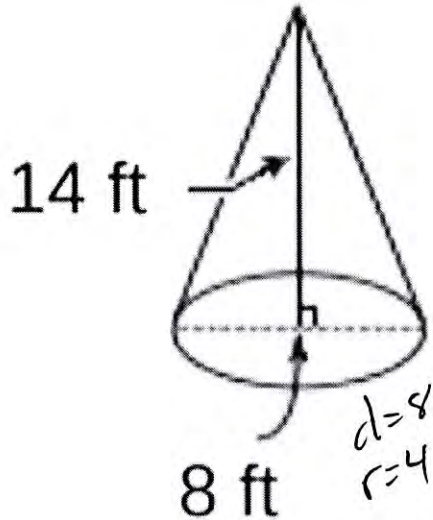
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Question 7

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$234.57 \text{ ft}^3$$

$$\begin{aligned} V &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \pi (4)^2 (14) \\ &= 234.57 \text{ ft}^3 \end{aligned}$$

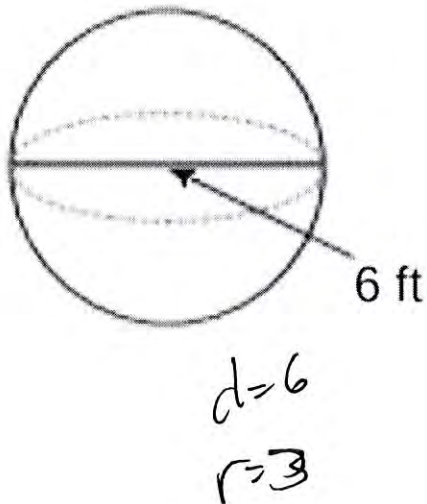
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Question 8

Find the volume. Round to two decimal places if necessary. If your answer is correct you will see an image appear on your screen.



$$37.7 \text{ ft}^3$$

$$\begin{aligned} V &= \frac{4}{3} \pi r^3 \\ &= \frac{4}{3} \pi (3)^3 \\ &= 37.7 \text{ ft}^3 \end{aligned}$$