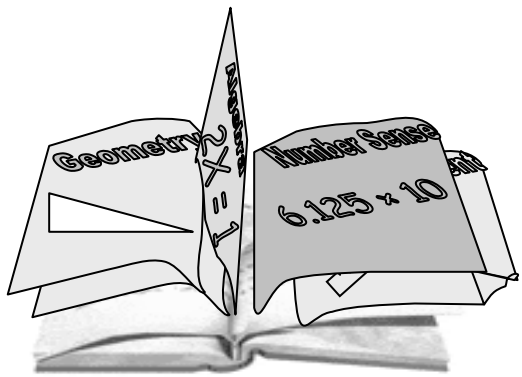
pREview

Grade 6-8



ACALETICS®

Prep It Up!

pREview

Concept: Prime and Composite **Grade Cluster: 6-8**

Definition: A prime number only has 1 and itself as factors. A composite number has more than two factors.
(Example of prime: 3; 1 and 3 are the only factors of 3)

Hook(s)/Quik-Pt(s):
1. The numbers **0** and **1** are neither prime nor composite.
2. The only even prime number is ***2***.
3. The First Twenty Prime Numbers: ***2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71***
4. **4** is the first composite number.
5. Not all odd numbers are prime.

Example: Which of the numbers below is a prime number?

a) 1 b) 2 c) 4 d) 8

Workspace:
1. The number 1 is neither prime nor composite.
2. The only even number that is prime is 2.
3. The number 4 is composite 1, 4 and 2 are factors of 4.
4. The number 8 is composite 1, 8, 2 and 4 are factors of 8.

Answer: b) 2

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Concept: Prime Factorization **Grade Cluster: 6-8**

Definition: A whole number written as the product of prime numbers.

Hook(s)/Quik-Pt(s): 1. All of the factors must be prime and be equal to the number they represent. (Example: the prime factorization of 20 = 2 x 2 x 5) All of the numbers (2, 2 and 5) are prime and when multiplied together equal 20.

Example: What is the prime factorization of 36?

a) 6 x 6 b) 3 x 12 c) 2 x 2 x 3 x 3 d) 2 x 3 x 6

Workspace:

1. A prime number only has one and itself as a factor.
2. All of the answers are equal to 36.
3. The only choice with all prime numbers being multiplied is c).

Answer: c) 2 x 2 x 3 x 3

pREview

Concept: Real World (Fractions) **Grade Cluster: 6-8**

Definition: Applying mathematical methods to real life problems.

Hook(s)/Quik-Pt(s):

1. List the relevant facts in the problem and find out what you have to solve.
2. Break the problem down into more manageable pieces.
3. The words proportion and fraction are interchangeable.

Example: Last year $\frac{1}{8}$ of the students in the 6th Grade class did not go on the Fun Fair field trip. This year the proportion who did not go doubled. What proportion went on the trip this year?

a) $\frac{2}{8}$ b) $\frac{1}{4}$ c) $\frac{3}{4}$ d) $\frac{4}{3}$

Workspace:

1. $\frac{1}{8}$ did not go last year. This year the proportion doubled.

   That means $2 \times \frac{1}{8}$ did not go this year.

2. If $\frac{2}{8}$ did not go then $\frac{6}{8}$ must have gone.

3. $\frac{6}{8} \div \frac{2}{2} = \frac{3}{4}$

   Dividing the numerator and denominator by the same number will not change the value of the fraction.

Answer: c) $\frac{3}{4}$

pREview

Concept: Multiplying Fractions **Grade Cluster: 6-8**

Definition: Finding the product when two fractions are multiplied.

Hook(s)/Quik-Pt(s):

1. Fractions are multiplied in a parallel fashion.
   (Example: $\frac{3}{5} \times \frac{3}{4} = \frac{3}{5} \times \frac{3}{4} = \frac{9}{20}$)
2. Use the Greatest Common Factor (GCF) as a tool to simplify.
3. To simplify fractions divide the numerator and denominator by the GCF.

Example: What is the product of $\frac{3}{4} \times \frac{4}{8}$?

a) $\frac{7}{12}$ b) $\frac{3}{8}$ c) $\frac{24}{16}$ d) $\frac{2}{3}$

Workspace:

1. $\frac{3}{4} \times \frac{4}{8} = \frac{3 \times 4}{4 \times 8} = \frac{12}{32}$

2. **Find the GCF by listing the factors of 12 and 32.**

   Factors of 12: 1, 2, 3, 4, 6, 12
   Factors of 32: 1, 2, 4, 8, 16, 32

   GCF

3. **Divide the numerator and denominator by the GCF To simplify your fraction.**

   $\frac{12 \div 4}{32 \div 4} = \frac{3}{8}$

Answer: b) $\frac{3}{8}$

pREview

Concept: Decimals to Fractions **Grade Cluster: 6-8**

Definition: Converting decimals into equivalent fractions.

Hook(s)/Quik-Pt(s): 1. Write the numbers after the decimal in the numerator and the place of the last digit in the denominator.

(Example: .25 $\frac{25}{100}$ ← 25 goes in the numerator)

$\frac{25}{100} \div \frac{25}{25} = \frac{1}{4}$

100 goes in the denominator, because the last digit is 5 and the five is in the hundredth place.

Example: Write .375 as a fraction. (Remember to simplify)

a) $\frac{3}{8}$ b) $\frac{375}{1000}$ c) $\frac{375}{100}$ d) $\frac{8}{3}$

Workspace: 1. .375

the last number is in the thousandth place

$\frac{375}{1000}$ ← 375 goes in the numerator

1000 goes in the denominator

2. Simplify using the Greatest Common Factor (GCF)

3. $\frac{375}{1000} \div \frac{125}{125} = \frac{3}{8}$

Answer: a) $\frac{3}{8}$

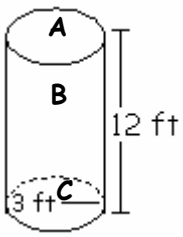
pREview

Concept: Surface Area **Grade Cluster: 6-8**

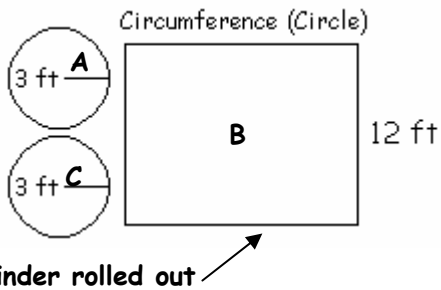
Definition: The number of square units that cover the outside of a figure.

Hook(s)/Quik-Pt(s): 1. Break the figure into pieces. Find the surface area of the separate pieces, then add them together. (Example: Find the Surface area of a cylinder with a radius of 3 ft and a height of 12 ft; Answer : 282.60 ft^2)

Cylinder



Step 1: ***Break into pieces***



Step 2: ***Find area of each piece***

Area of a **Rectangle** = l x w
Area of a **Circle** = πr^2
Circumference = $2\pi r$
$\pi \approx 3.14$

Area of **A** = **3.14 x (3)^2 = 28.26 ft^2**
Area of **C** = **3.14 x (3)^2 = 28.26 ft^2**
Circumference = 2 x 3.14 x (3) = 18.84
Area of **B** = **12 x 18.84 = 226.08 ft^2**

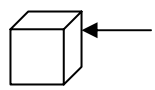
Step 3: ***Add***

S.A. = A+B+C

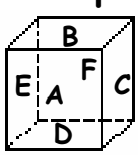
28.26 ft^2
28.26 ft^2
+226.08 ft^2
282.60 ft^2

Example: What is the surface area of a cube whose edge measures 4 inches?

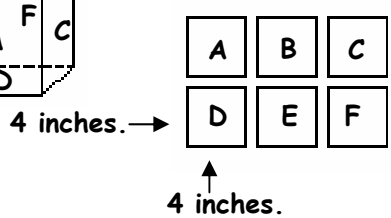
a) 16 in^2 b) 64 in^2 c) 64 in^3 d) 96 in^2



Workspace:



1. ***Break into pieces***



2. ***Find area of each piece***

Area of a **square** = s^2
Area of **A** = **4 x 4 = 16 in^2**
All of the other squares are equal in area.
This means you can use this area for all of them.

3. ***Add***

S.A. = A+A+A+A+A+A
or
S.A. = 6A
S.A. = 6 x 16 in^2
S.A. = 96 in^2

Answer: d) 96 in^2

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Concept: Unit Conversion **Grade Cluster: 6-8**

Definition: Changing one unit into another unit. (Example: ft → yds)

Hook(s)/Quik-Pt(s):

1. **Big** to small → Multiply; small to **Big** → Divide
2. Multiply or Divide the given number by the conversion factor given with the smaller unit.
3. The smaller unit has the bigger number.
   (Example: 3 ft = 1 yd)

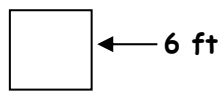
Bigger number ↑ — Smaller unit ↑

4. This method only works when the big unit has a 1 in front of it. (Example: 3 ft = 1 yd)

Has a 1 it will work ↑ — Big unit ↑

Example: What is the perimeter of the square below in yards?

a) 8 yds b) 8 ft c) 48 yds d) 24 ft



Workspace:

1. First convert 6 ft into _ yds.

small to **Big** → Divide

2. Take the 6 and divide it by 3

3 ft = 1 yd

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

6 ft = 2 yds

3. Now find the Perimeter

P = 2+2+2+2

or

P = 2 x 4 =8

Perimeter = 8 yds

Answer: a) 8 yds

pREview

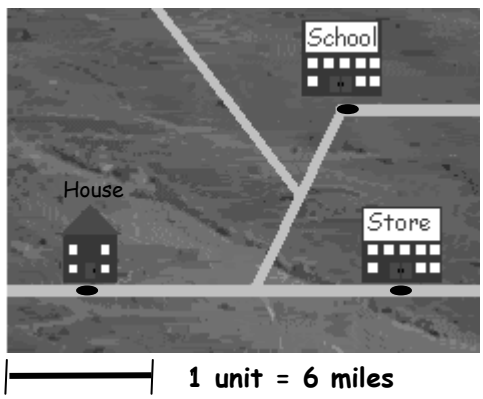
Concept: Map Scale

Grade Cluster: 6-8

Definition: Drawing of an object or landscape that is different from the size of the original object or landscape.

Hook(s)/Quik-Pt(s):

1. Find out the ratio of the actual distance to the distance on the model or map.
2. To find the actual distance multiply the scale distance by this ratio.



Example: What is the distance from the house to the store in miles?

a) 2 units b) 12 miles c) 6 units d) 6 miles

Workspace:

1. The ratio of real distances to map distances is 6 miles : 1 unit
2. The house is 2 units away from the store
3. Multiply 6 x 2 = 12 miles

number of miles

number of units

Answer: b) 12 miles

pREview

Concept: Metric Unit Conversion **Grade Cluster: 6-8**

Definition: Changing units within the same measurement system.

Hook(s)/Quik-Pt(s): 1. To convert within the metric system use:

Kids	**H**ate	**D**rinking	**U*gly**	**D**ark	**C**hocolate	**M**ilk
i	e	e	n	e	e	i
l	c	k	i	c	n	l
o	t	a	t	i	t	i
	o				i	

***U** represents the base units
l - capacity
g - mass
m - distance

Example: 5. cm = ? m

Step 1: *Write out the prefixes*

K H D U D C M

Step 2: *Find the current unit*

K H D U D C M

we're at Centimeters

Step 3: *Find the number of spaces you must move to get to the unit you want.*

K H D U D C M

2 1

We need to get to meters, the base unit.

Step 4: *Move the decimal the same number of spaces*

5. cm

2 1

Step 5: *Fill the empty loops with Os*

.0 5 m ← write in your new unit

2 1

Example: Convert 8m to mm?

Workspace:

1. K H D U D C M

1 2 3

2. 8. 0 0 0 mm ← write in your new unit

1 2 3

3. 8,000 mm

Answer: 8,000 mm

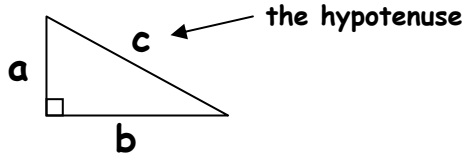
pREview

Concept: Pythagorean Theorem **Grade Cluster: 6-8**

Definition: Theorem that relates the three sides of a right triangle as $a^2 + b^2 = c^2$ where **c** is the hypotenuse.

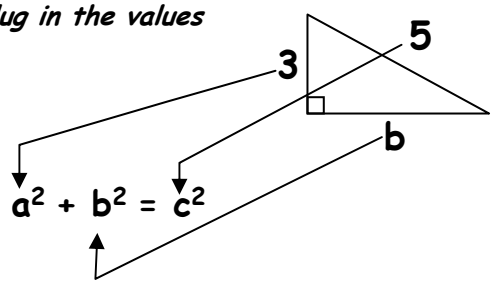
Hook(s)/Quik-Pt(s): 1. The hypotenuse of a triangle is the longest side.

$a^2 + b^2 = c^2$



2. If you know two sides of a right triangle, using the Pythagorean Theorem will allow you to get the third side. (Example: Find the length of **b** in the figure below; b= **4**)

Step 1: ***Plug in the values***



Step 2: ***Solve the equation***

$3^2 + b^2 = 5^2$

$b^2 = 5^2 - 3^2$

$b^2 = 25 - 9$

$b^2 = 16$

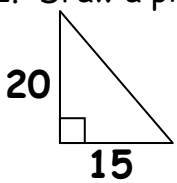
$\sqrt{b^2} = \sqrt{16}$

$b = 4$

Example: **A right triangle has a base of 15 and a height of 20. What is the length of the hypotenuse?**

Workspace:

1. Draw a picture



2. Plug in the values

$20^2 + 15^2 = c^2$

3. Solve the equation

$400 + 225 = c^2$

$625 = c^2$

$\sqrt{625} = \sqrt{c^2}$

$25 = c$

Answer: **25**

pREview

Concept: Slope **Grade Cluster: 6-8**

Definition: Every straight line can be represented by the equation: $y = mx + b$. The slope m of this line - its steepness, or slant - can be calculated like this:

$$m = \frac{\text{change in y-value}}{\text{change in x-value}}$$

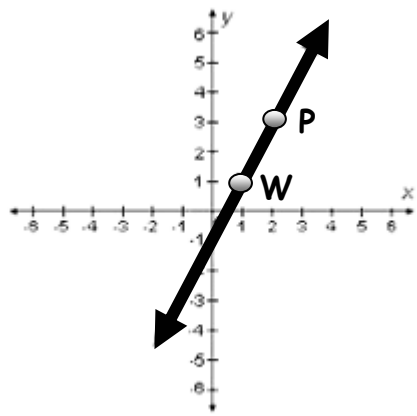
Hook(s)/Quik-Pt(s):

1. Carpenters often refer to the slope of a line as the "rise over the run."
2. To calculate slope, you can use the carpenter's philosophy, by using the equation below:

$$m = \frac{\text{change in y-value}}{\text{change in x-value}} = \frac{\text{rise}}{\text{run}}$$

Example: Using the points below, calculate the slope m of the line.
W = (1,1) and P = (2,3)

x_1 y_1 x_2 y_2



Workspace:

1. Calculate the change in the x values: 2-1 = 1
2. Calculate the change in the y values: 3-1 = 2
3. Solve the equation:

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

Answer: m= 2

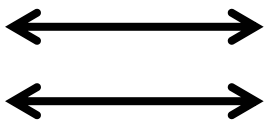
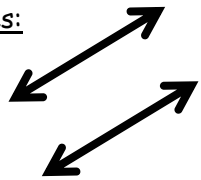
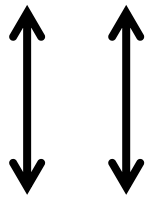
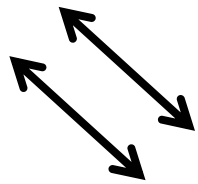
pREview

Concept: Parallel Lines **Grade Cluster: 6-8**

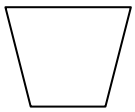
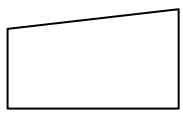
Definition: Parallel Lines: two lines on the same plane that will never intersect.

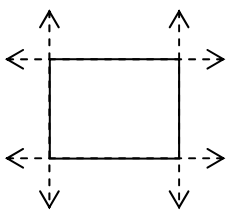
Hook(s)/Quik-Pt(s): 1. Think of parallel parking on the road – your car has to stay out of the way of traffic, therefore it *parallels* the road.

All parallel Lines:

a)  b)  c)  d) 

Example: Which shape has two sets of parallel lines?

a)  b)  c)  d) 

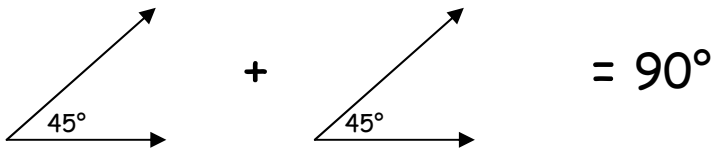
Answer: a) 

pREview

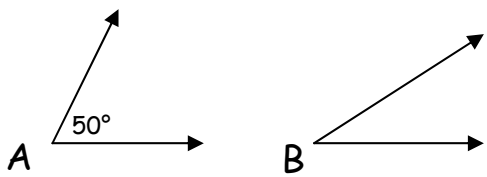
Concept: Complementary Angles **Grade Cluster: 6-8**

Definition: Two angles whose sum is 90 degrees.

Hook(s)/Quik-Pt(s): 1. $m\angle A + m\angle B = 90°$



Example: Angles A and B are complementary. If $m\angle A = 50°$, find $m\angle B$.



Workspace:

1. 50 + m∠ B = 90
2. Subtract 50 from both sides:
   m ∠ B = 90 – 50
3. m∠ B = 40

Answer: $m\angle B = 40°$

pREview

Concept: Transformation within an x, y plane **Grade Cluster: 6-8**

Definition: A change in the position, shape or size of a geometric figure.

Hook(s)/Quik-Pt(s): 1. Think of flip (reflection), slide (translation) or turn (rotation), enlarge or reduce (dilation).

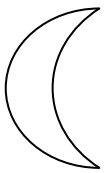
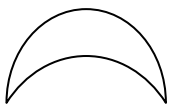


Figure 1



(Turned 90°)
Rotation

(Horizontal Flip)
Reflection

(Reduce)
Dilation

Example: What form of transformation occurs to Figure 2?

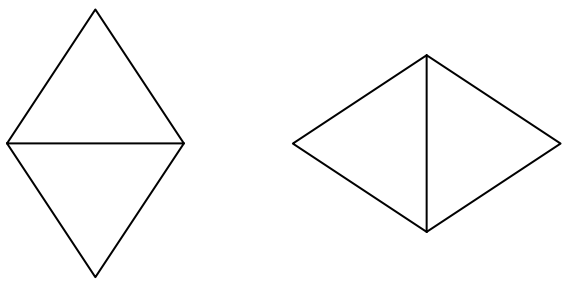


Figure 2

Answer: 90° clockwise rotation

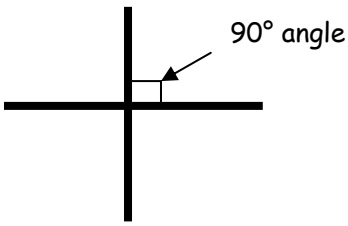
pREview

Concept: Perpendicular Lines **Grade Cluster: 6-8**

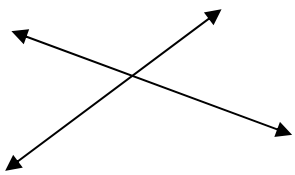
Definition: Two lines that intersect at 90 degree angles.

Hook(s)/Quik-Pt(s):

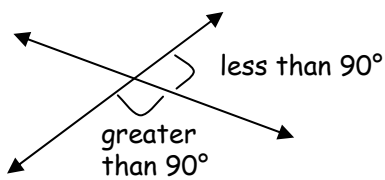
1. When you are thinking of perpendicular lines, think of a plus sign. Two lines that intersect to form 90° angles.



Example: Are these intersecting lines perpendicular?



Workspace:



Answer: No, not all intersecting lines will be perpendicular, unless they intersect at 90° angles.

pREview

Concept: Function Charts **Grade Cluster: 6-8**

Definition: Chart that demonstrates the relationship that one variable has with another variable.

Hook(s)/Quik-Pt(s):

1. Find the rule to a function chart before you attempt to complete it.
2. Test the rule on the existing values of your function chart. If the rule does not predict the values on the chart look for another rule.

Example:

f(b)	2	4	?	8
b	1	2	3	4

the rule is **b** multiplied by **2**; Answer 6

Testing the Rule:

f(b)	1x2=2	2x2=4	3x2=6	4x2=8
b	1	2	3	4

(b → 1; rule → x2)

Example: Find the missing value in the function chart.

f(x)	4	8	12	16	20	?
x	1	2	3	4	5	6

Workspace:

1. The rule appears to be **x** multiplied by **4**
2. Testing the rule:

x	x4 = f(x)
1	x4 = 4
2	x4 = 8
3	x4 = 12
4	x4 = 16
5	x4 = 20
6	x4 = **24**

The rule is correct. All values of **x** *agree with values of* **f(x)**.

In the chart above ?= 24

Answer: 24

pREview

Concept: Algebraic Equations (Real World) **Grade Cluster: 6-8**

Definition: Expresses the mathematical relationship of one or more variables with another.

Hook(s)/Quik-Pt(s):

1. When working with algebraic equations make sure you collect all like terms.
2. Substitute the known values into the equation and solve for the unknown.

rate →
(Example: d = rt; is read ***distance*** *equals* ***rate*** *times* ***time***)
distance → time

(If the rate is 50 mph with a travel time of 2 hours, what is the distance traveled? Answer: 100 miles)

Step 1: ***Substitute***

50 mph →
d = rt
? → 2 hours

Step 2: ***Solve for the unknown***

$d = 50 \times 2$

$d = 100$ miles

Example: The equation for revenue is R = PQ where P is price and Q is quantity. If the revenue from ticket sales for a game was $350 and 70 tickets were sold, what was the price of each ticket?

Workspace:

Step 1: ***Substitute***

Price →
R = PQ
Revenue → Quantity

Step 2: ***Solve for the unknown***

$350 = P \times 70$

$\frac{350}{70} = \frac{P \times 70}{70}$

$5 = P$

or

$P = \$5$

Answer: $5

pREview

Concept: Simplifying Equations **Grade Cluster: 6-8**

Definition: Collecting like terms in an equation.

Hook(s)/Quik-Pt(s):
1. Make sure the terms are like terms before adding or subtracting.
2. Rearrange the variables to see if you can collect them as like terms.

Example: 7 apes + 8 peas (term 1 = apes, term 2 = peas) term 1 appears to be different from term 2. If you move the a in peas in front however, they are the same terms 7 apes + 8 apes; Answer 15 apes

Example: Collect like terms $15x - 3xy + 5yx$

a) $17x$ b) $12x + 2xy$ c) $17x + 2y$ d) $2xy + 15x$

Workspace:

Step 1: ***Rearrange Variables***

$15x - 3xy + 5yx$

switch x and y

$15x - 3xy + 5xy$

term 1 term 2 term 2

$15x - 3xy + 5xy$

Step 2: ***Collect like terms***

1. Add term 1

$15x$

2. Add term 2

$- 3xy + 5xy = 2xy$

3. Put the terms together

$15x + 2xy$

or

$2xy + 15x$

Answer: d) $2xy + 15x$

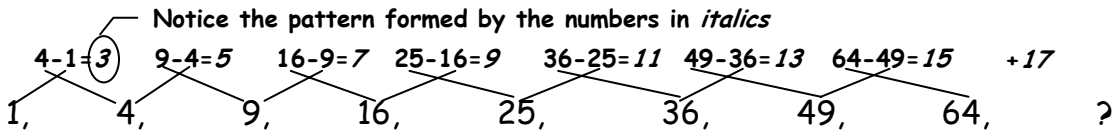
pREview

Concept: Patterns **Grade Cluster: 6-8**

Definition: *A sequence of numbers that can be described by a rule.*

Hook(s)/Quik-Pt(s): 1. One way to make a rule for a sequence is to subtract an earlier term from a latter term.

Example: Find the next term in the pattern; 1, 4, 9, 16, 25, 36, 49, 64, ?



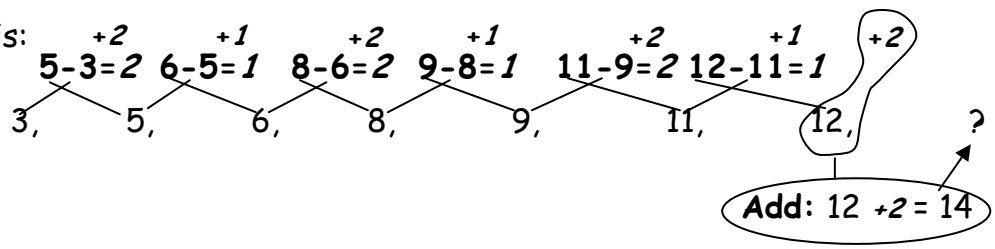
If the number in italics is added to it's earlier term you get the latter term. For instance 9 + 7 = 16. Noticing the pattern of the differences if you do 64 + 17 you get the next term; Answer 81)

Example: Find the next number in the following patter:

3, 5, 6, 8, 9, 11, 12, ?

Workspace:

The pattern is:



Answer: 14

pREview

Concept: Solving Equations **Grade Cluster: 6-8**

Definition: Manipulating an equation to find an unknown.

Hook(s)/Quik-Pt(s):

1. To solve for an unknown in an equation use the order of operations in reverse. Use inverses of what is being done to the variable.
2. Use **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally to remember the order of operations.

Use reverse order to solve equations

Parenthesis

Exponents

Multiplication/**D**ivision

Addition/**S**ubtraction

(Example: 12b - 7 = 17 ; Answer b = 2)

Use the order of operations in reverse.

$12b - 7 = 17$

Inverse of -7 → $+7 \quad +7$

$12b = 24$

Inverse of ×12 → $\frac{12b}{12} = \frac{24}{12}$

Answer → $b = 2$

Example: Solve for **a**: $\frac{a}{8} + 5 = 7$

Workspace: ***Use the order of operations in reverse.***

Inverse of +5 → $\frac{a}{8} + 5 = 7$

$-5 \quad -5$

$\frac{a}{8} = 2$

Inverse of ÷8 → $8 \times \frac{a}{8} = 2 \times 8$

Answer → $a = 16$

Answer: a = 16

pREview

Concept: Mode **Grade Cluster: 6-8**

Definition: The quantity that appears the **most** often in a set of data.

Hook(s)/Quik-Pt(s):

1. M O d e
   0 f
   S t
   t e
   n

2. Order the data from Least to Greatest.

3. Common types of Modes.

   No mode: 1, 5, 6, 7 (No mode ≠ mode = 0)

   Mode = 0: 0, 3, 4, 7, 0 (mode = 0)

   Multi-modes: 1) 5, 4, 6, 7, 5, 4 (modes = 4 and 5)
   bimodal

   2) 5, 6, 6, 5, 11, 10, 11, 12 (modes = 5, 6, 11)
   trimodal

Example: Ralph's bowling scores were: 186, 192, 150, 169, 195, 125, 186.

Workspace: 125, 150, 169, **186, 186,** 192, 195

Answer: **186** appears the Most Often.

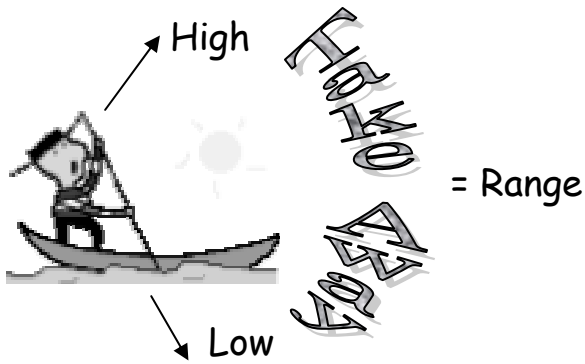
pREview

Concept: Range **Grade Cluster: 6-8**

Definition: The difference between the greatest and the least value in a set of data.

Hook(s)/Quik-Pt(s):

1. What is the **range** of my voice?



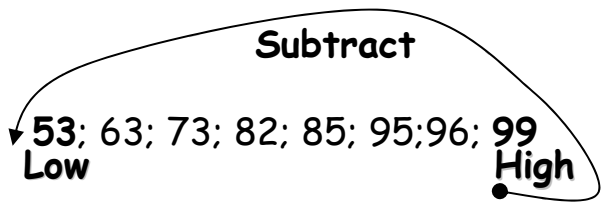
2. Order the data from Least to Greatest.

Example: Rey's Science test scores for the first quarter were:

95; 85; 96; 99; 82; 63; 53; 73

What is the range of his scores?

Workspace:



99 – 53 = **46**

Answer: **46** is the **range**.

pREview

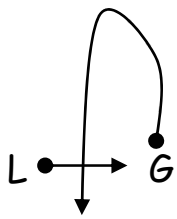
Concept: Median **Grade Cluster: 6-8**

Definition: The middle number in a set of data.

Hook(s)/Quik-Pt(s):

1. **M e d i a N**

2. Chant: "Least to Greatest down the Middle."



3. Order the data from Least to Greatest.

Example: Find the **median** for the set of numbers below.

1005, 900, 2500, 500, 1500

Workspace: 500, 900, **1005**, 1500, 2500

Answer: **1005** is the **median**.

pREview

Concept: Mean (Average) **Grade Cluster: 6-8**

Definition: The sum of a set of numbers divided by the number of elements in the set. The Mean is often referred to as the **Average**.

Hook(s)/Quik-Pt(s):

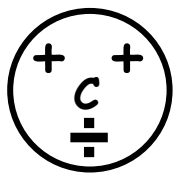
1. **"Mean Apes Can't Drive"**

   Mean - 1. **Apes** (Add)
   2. **Can't** (Count)
   3. **Drive** (Divide)

2.

"3 Easy Steps"
1. Add (A)
2. Count (C)
3. Divide: **A** ÷ **C** = **Mean**

3. **"Mr. Meanie"**



Example: The traveling all-star basketball team scores are listed below. Find the **mean** value of their scores.

Game	1	2	3	4	5
Score	170	150	120	120	120

Workspace:
1. **Apes** (Add) = 680
2. **Can't** (Count) = 5
3. **Drive** (Divide) = 680 ÷ 5 = **136**

Answer: **136** is the mean (Average) score.

pREview

Concept: Stem-and-Leaf Plot **Grade Cluster: 6-8**

Definition: A graph used to organize data by grouping the values of their digits.

Hook(s)/Quik-Pt(s):

1. Several leaves can be attached to one stem.
2. The ones digits are the leaves. The remaining digits represent the stem.
3. Order the data from Least to Greatest.

Example: Place the following numbers in a stem-and-leaf plot.

211, 125, 214, 123, 219, 126, 125

Workspace: The **two stems** are (**12**,**21**).

123, **125**, **125**, **126**, **211**, **214**, **219**

The **seven** digits in the **ones** place are the **leaves** (1,2,3,4,5,5,9).

Answer:

Stem	Leaf
12	3 5 5 6
21	1 4 9

This row shows 123, 125, 125, 126

Key: 12|3 means 123.