

Dear Students,
This packet is part one of your summer assignment. It is designed to help you retain the information you learned in 7th grade. For this practice to be effective, work on these exercises for 15 minutes per day. On the top of each page or work or your packet please write the date to remind yourself to space out the packet during the summer. Do not try to complete this packet in one day. All work should be completed on loose leaf paper and will be collected on the first full day of school. It is not necessary to print out this packet, however, feel free to do so if it is easier for you. Any loose leaf should be stapled to the packet. Also some topics may be new to you. Allow yourself to be challenged. Try it out and do your best. Remember to always be resourceful. If you forgot a topic, look it up online or in an old notebook. The packet will be graded as your first homework grade.

Part two (for those in accelerated math) will be to create a mini-lesson on any of the following topics and complete each of the four parts to be handed in and graded as your first project grade.

| Topics: | Parts of the Lesson: <br> 1. Pythagorean theorem <br> 2. Slope and Rate of Change <br> 3. Scientific Notation <br>  <br>  <br>  <br>  <br>  <br> 1. Introduction <br> 2. Steps, procedure and notes <br> needed to teach the topic. |
| :--- | :--- |
|  | 3. Examples with work shown to <br> be taught to the class. |
| 4. Activity such as a worksheet, |  |
| game (can be from online) etc. |  |

Have a safe, healthy and fun filled summer!

Mrs. Melia

## Topic: Integers



## Examples:

| Addition | Subtraction | Multiplication | Division |
| :---: | :---: | :---: | :---: |
| Same signs: <br> Add ©゚ keep sign $\begin{aligned} & +6++5=+11 \\ & -8+-2=-10 \end{aligned}$ | Keep-Change-Opposite ${ }^{+} 10--8=+10++8=18$ | Same signs: <br> Positive product <br> $(+7)(+8)=+56$ <br> $(-2)(-6)=+12$ | Same signs: <br> Positive quotient $\begin{aligned} & +42 \div+6=+7 \\ & -24 \div-8=-3 \end{aligned}$ |
| Different signs: <br> Subtract © take sign of larger value $+9+-5=+4$ $-6++1=-5$ | $-20--8=-20+-8=-12$ | Different signs: Negative product $\begin{aligned} & (+3)(-9)=-27 \\ & (-5)(+4)=-20 \end{aligned}$ | Different signs: Negative quotient $\begin{aligned} & +56 \div-7=-8 \\ & -50 \div+2=-25 \end{aligned}$ |

Recall the order of operations:
1 - $\underline{\text { Parentheses (or grouping symbols) }}$
2 - Exponents

4-
Find each answer.
Answers:

1. ${ }^{-} 12+7=$ $\qquad$
2. $-25+18=$ $\qquad$
3. $\qquad$
4. $\qquad$
5. $2+{ }^{-} 25=$ $\qquad$
6. $-28-{ }^{-} 8=$ $\qquad$ 3. $\qquad$
7. $\qquad$
8. $11-5=$ $\qquad$
9. $-21-4=$ $\qquad$
10. $\qquad$
11. $\qquad$
12. $(-9)(-8)=$ $\qquad$
13. $(2)(-12)=$ $\qquad$
14. $\qquad$
15. $\qquad$
16. $-35 \div{ }^{-} 7=$ $\qquad$
17. ${ }^{-} 48 \div{ }^{+} 8=$ $\qquad$
18. $\qquad$
19. $\qquad$
20. $(-2)(+6)(-5)=$ $\qquad$
21. $-30+24 \div 6 \cdot-2=$ $\qquad$ 11. $\qquad$
22. $\qquad$
23. $\qquad$
24. $16 \div 4+2 \cdot-8=$ $\qquad$
25. $-3(1-8)+2^{3}=$ $\qquad$
26. $\qquad$

## Scientific Notation

A number written as a number that is at least 1 , but less than 10 multiplied by a power of 10 .
Ex. $\quad 7.16 \times 10^{4}=71600$ in standard form
$9.2 \times 10^{-3}=.0092$ in standard form
Write each of the following in standard form.
Answers:
15. $8.2 \times 10^{5}$
16. $2.45 \times 10^{-4}$
15. $\qquad$
16. $\qquad$
Write each of the following in scientific notation.
17. 25,900
17. $\qquad$
18. . 039
18. $\qquad$

## Topic: Algebra

Solving equations by using the Subtraction or Addition Property of Equality. Check the solution.
Ex 1: $7 x-6=11 x-14$
Ex 2: $2(3 x-6)=3(6 x+8)$

$$
\begin{aligned}
& 7 x-6=11 x-14 \\
&-7 x \quad-7 x \\
& \hline-6=4 x-14 \\
&+14=\quad+14
\end{aligned}
$$

$$
\begin{aligned}
& \frac{8}{4}=\frac{4 x}{4} \\
& 2=x
\end{aligned}
$$

Check:
$7 x-6=11 x-14$
$7(2)-6=11(2)-14$
14-6=22-14
$8=8$

Translate and evaluate the following equations.
Ex 3: The product of 4 and a number is 28. Ex 4. The quotient of a number and 3 is 15 .

$$
\begin{aligned}
4 \cdot n & =28 & & \frac{n}{3}=15 \\
\frac{4 n}{4} & =\frac{28}{4} & n & =45
\end{aligned}
$$

(sum means + ), (difference means -$),($ product means $x(\cdot)),($ quotient means $\div)$

## Graphing inequalities



Solve the following questions. Show your work and check your answer. Write your answers on the answer blanks on the next page.

1. $\frac{x}{3}-9=-12$
2. $8(2 w-6)+4(-1-5 w)=0$
3. $\mathbf{3}(12+n)=5(n-4)$
4. One-half of a number is -12 . Find the number.
5. The sum of 2 times a number and 28 is 42 . Find the number.
6. Solve the inequality $2 \mathrm{n}+3 \geq 7$ and graph the solution on the number line.


Check:
Check:

## Check:

## Answers:

1. $\qquad$
2. $\qquad$
3. $\qquad$
4. $\qquad$
5. $\qquad$
6. $\qquad$

## TRY THE CHALLENGE

## Topic: Polynomials

## Multiplying \& Dividing Monomials (powers with the same base)

Recall that exponents are used to show repeated multiplication. You can use the definition of exponent to help you understand how to multiply or divide powers with the same base.

Examples:
Multiplication: $\quad 1.2^{3} \cdot 2^{4}=(2 \cdot 2 \cdot 2) \cdot(2 \cdot 2 \cdot 2 \cdot 2)=2^{7}$
(Note: the values are: $8 \cdot 16$, which is equal to 128 , which is $2^{7}$ )
2. $x^{3} \cdot x^{2}=(x \bullet x \bullet x) \cdot(x \bullet x)=x^{5}$

Product of Powers rule: You can multiply powers with the same base by adding their exponents.

Division:

1. $\frac{2^{6}}{2^{2}}=\frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot \not 2 \cdot \not 2}{\not 2} \cdot \not \underline{2} \quad=2 \cdot 2 \cdot 2 \cdot 2=2^{4}$
2. $\frac{x^{10}}{x^{7}}=\frac{x \cdot x \cdot x \cdot k \cdot \not k \cdot k x \cdot k \cdot k \cdot \not k \cdot \not k}{\not k \cdot \not x \cdot k \cdot \not x \cdot \not \subset \cdot k x \cdot \not k}=x \cdot x \cdot x=x^{3}$

Quotient of Powers rule: You can divide powers with the same base by subtracting their exponents.

Using the power rules above, simplify each expression. Write your answer using exponents.

1. $7^{2} \cdot 7^{5}=$
2. $3^{8} \cdot 3^{6}=$

Answers:

1. $\qquad$
2. $6^{4} \cdot 6=$
3. $x^{2} \cdot x^{6}=$
4. $\qquad$
5. $\qquad$
6. $n^{6} \cdot n^{4}=$
7. $y^{3} \cdot y^{6}=$
8. $\qquad$
9. $\qquad$
10. $m^{8} \cdot m^{7}=$
11. $a^{m} \cdot a^{n}=$
12. $\qquad$
13. $\qquad$
14. $\qquad$
15. $\frac{3^{8}}{3^{3}}=$
16. $\frac{10^{10}}{10^{6}}=$
17. $\qquad$
18. $\qquad$
19. $\frac{x^{11}}{x^{7}}=$
20. $\frac{4^{7}}{4}=$
21. $\qquad$
22. $\qquad$
23. $\qquad$
Find the missing exponent for problems $13 \& 14$.
24. $5^{4} \cdot 5^{-}=5^{12}$
25. $\frac{12^{7}}{12^{-}}=12^{5}$
26. $\qquad$

## TRY THE CHALLENGE!

## Combining like terms and applying the Distributive Property

In algebraic expressions, like terms are terms that contain the same variables raised to the same power. Only the coefficients of like terms may be different.

In order to combine like terms, we add or subtract the numerical coefficients of the like terms using the Distributive Property: $\mathbf{a x}+\mathbf{b x}=(\mathbf{a}+\mathbf{b}) \mathbf{x}$.

Examples: 1. $2 \mathrm{x}+9 \mathrm{x}=(2+9) \mathrm{x}=11 \mathrm{x}$
2. $12 \mathrm{y}-7 \mathrm{y}=(12-7) \mathrm{y}=5 \mathrm{y}$
3. $5 \mathrm{x}+8-2 \mathrm{x}+7=3 \mathrm{x}+15 \quad$ Here, the like terms are: 5 x and $-2 \mathrm{x}=3 \mathrm{x}$ and: $8+7=15$

The Distributive Property of multiplication over addition/subtraction is frequently used in Algebra:
Examples: 1. $7(2 \mathrm{x}+9)=7 \cdot 2 \mathrm{x}+7 \cdot 9=14 \mathrm{x}+63$
2. $4(6-5 \mathrm{x})=4(6)-4(5 \mathrm{x})=24-20 \mathrm{x}$

Simplify each expression by combining like terms.
15. $8 y+2 y$
16. $10-6 y+4 y+9=$
17. $3 \mathrm{x}+7-2 \mathrm{x}=$
18. $8 n-7 y-12 n+5-3 y=$

Answers:
15. $\qquad$
16. $\qquad$
17. $\qquad$

Apply the distributive property and write your answer in simplest form.
19. $7(x-4)=$
20. $5(4 n-3)=$
21. $-6(3 y+5)=$
22. $-4(8-9 x)=$
19. $\qquad$
20. $\qquad$
21. $\qquad$
22. $\qquad$
23. $\qquad$
23. $8(3 n+7)-10 n=$
24. $\qquad$

## Topic: Ratio, Proportion

Example: 1. In a circle graph, what is the measure of the central angle of a section that represents $40 \%$ of the graph?

$$
\text { Solution: } \quad \begin{array}{rlrl}
\frac{40}{100} & =\frac{x}{360} \quad \text { Cross multiply } \\
100 \mathrm{x} & =14400 \quad \text { Divide by } 100 \\
\mathrm{x} & =144 & \mathbf{1 4 4} \mathbf{4}^{\circ} \text { represents } \mathbf{4 0} \% \text { on the circle graph. }
\end{array}
$$

Example: 2. On a map, Max found that the straight line distance between Buffalo and Auburn was 2.3 in.
Find the actual distance between the two cities, if 1 in . represents 65 mi .
Solution: $\quad \frac{1 \text { in }}{65 m i}=\frac{2.3 \text { in }}{x m i} \quad$ Cross multiply
$x=149.5 \quad$ The distance is 149.5 miles between the two cities.
Hint: When writing a proportion, always put the corresponding quantities in the same part of the fraction.

A unit rate is a rate that has been simplified so it has a denominator of 1 . For example, if a $3 \mathbf{l b}$. box of pasta costs $\$ 3.21$, the unit rate (or unit price) is $3.21 / 3=1.07, \$ 1.07$ per lb.

Solve the following exercises. Show work. Write your answer on the line provided. Round answers to the nearest whole number.

1. In a circle graph, what is the measure of the central angle that represents $21 \%$ ?
2. $\qquad$
3. In a circle graph, if the central angle measures $54^{\circ}$, what percent of the whole does this represent?
4. $\qquad$
5. A recipe calls for 1.5 cups of raisins for 18 cookies.

How many cups of raisins must be used for making 30 cookies?
3. $\qquad$
4. Express each ratio as fraction in simplest form.

Hint: convert to the same unit before simplifying.
a) 14 girls to $\mathbf{3 5}$ boys
b) $\mathbf{1 8}$ in to $\mathbf{6}$ feet
c) $\mathbf{1 5}$ dollars to $\mathbf{1 2 0}$ cents
5. Express each ratio as a unit rate: (round to the nearest hundredths if necessary)
a) $\mathbf{\$ 3 . 0 0}$ for $\mathbf{6}$ cans of tuna
b) 25 feet in 3.2 hours
c) $\$ 0.99$ for 10 pencils
6. A package of 22 green pens cost $\$ 8.59$, and a package of 5 green pens cost $\$ 1.85$. Which package has the lower cost per pen?
6. $\qquad$

Round answers to the nearest tenth.
7. Jim went to a concert and spent $\$ 60$ for his ticket, $\$ 25$ for food, $\$ 15$ for parking and $\$ 20$ for gas.
a) What percent of all his spending was the cost of parking?
7.a $\qquad$
b) What is the measure of the central angle that would represent the price of the food on a circle graph for his spending?
7.b $\qquad$
8. The distance on a map between two cities is 6.5 cm .

If $1 \mathrm{~cm}=8 \mathrm{~km}$ on the map, how many miles apart the two cities are from each other?
( $1 \mathrm{~km}=0.621 \mathrm{mi}$ )
8. $\qquad$

## TRY THE CHALLENGE!

## Topic: Coordinate Geometry

Recall that we can graph coordinates ( $\mathrm{x}, \mathrm{y}$ ) on the coordinate plane.
The x -axis is the horizontal axis, and the y -axis is the vertical axis.

## To graph a line:

1) make a table of values for the equation
2) choose approx. 5 values for $x$ and solve each for $y$
3) plot the coordinates on the coordinate plane
4) draw a line through the points (use arrows) and 1

Example. Graph the line $\mathrm{y}=2 \mathrm{x}+1$

| $\mathbf{x}$ | $\mathbf{2 x}+\mathbf{1}$ | $\mathbf{y}$ | $(\mathbf{x}, \mathbf{y})$ |
| :---: | :---: | :---: | :---: |
| -1 | $2(-1)+1$ | -1 | $(-1,-1)$ |
| 0 | $2(0)+1$ | 1 | $(0,1)$ |
| 1 | $2(1)+1$ | 3 | $(1,3)$ |
| 2 | $2(2)+1$ | 5 | $(2,5)$ |



Complete the tables then graph the equations.

1. $\mathrm{y}=3 \mathrm{x}-1$

| $\mathbf{x}$ | $\mathbf{3 x}-\mathbf{1}$ | $\mathbf{y}$ | $(\mathbf{x}, \mathbf{y})$ |
| :---: | :---: | :---: | :---: |
| -2 |  |  |  |
| -1 |  |  |  |
| 0 |  |  |  |
| 1 |  |  |  |
| 3 |  |  |  |


2. $\mathrm{y}=-2 \mathrm{x}+3$

| $\mathbf{x}$ | $-\mathbf{2 x}+\mathbf{3}$ | $\mathbf{y}$ | $(\mathbf{x}, \mathbf{y})$ |
| :---: | :---: | :---: | :---: |
| -2 |  |  |  |
| -1 |  |  |  |
| 0 |  |  |  |
| 1 |  |  |  |
| 3 |  |  |  |



## Topic: Probability

$\mathrm{P}($ Event $)=\frac{\# \text { of favorable outcomes }}{\text { total } \# \text { of outcomes }}$

$$
\begin{aligned}
& \mathrm{P}(\mathrm{~A} \text { or } \mathrm{B})=\mathrm{P}(\mathrm{~A})+\mathrm{P}(\mathrm{~B}) \\
& \mathrm{P}(\mathrm{~A} \text { and } \mathrm{B})=\mathrm{P}(\mathrm{~A}) \bullet \mathrm{P}(\mathrm{~B})
\end{aligned}
$$

Sample Space: List of total \# of possible outcomes
Counting Principle: To find the total number of possible outcomes for a multiple events.
Using the Counting Principle: The counting principle states that 'if an event has $\mathbf{m}$ possible outcomes and another independent event has $\mathbf{n}$ possible outcomes, then there are $\mathbf{m} \bullet \mathbf{n}$ possible outcomes for the two events together.

Ex 1: If a fair 6-sided die is rolled once:
A) $\mathrm{P}(2)=\left(\frac{1}{6}\right.$
B) $\mathrm{P}($ even $)=\frac{3}{6}=\left(\frac{1}{2}\right.$
C) $\mathrm{P}(4$ or 5$)=\frac{1}{6}+\frac{1}{6}=\frac{2}{6}=\left(\frac{1}{3}\right)$

Ex 3: Jake packed 5 shirts, 3 pairs of pants and 2 pairs of shoes to go on a trip. How many different outfits consisting of 1 shirt, 1 pair of pants, and 1 pair of shoes can Jake make?


Ex 2: If a fair 6-sided die is rolled twice:
A) The total $\#$ of outcomes $=6 \bullet 6=36$
B) $\mathrm{P}($ even and then a 6$)=\frac{3}{6} \bullet \frac{1}{6}=\frac{3}{36}=\left(\frac{1}{12}\right.$

Ex 4: Show the sample space for tossing a coin and rolling a 6 -sided die using a tree diagram.


Use the following information to answer questions $1 \& 2$.
A spinner contains eight regions, numbered 1 through 8. The arrow has an equally likely chance of landing on any of the eight regions.

1) If the spinner is spun once find:
a) $\mathrm{P}(6)$ $\qquad$ b) P (even) $\qquad$
d) $\mathrm{P}(1$ or 8$)$ $\qquad$ e) $\mathrm{P}(2$ or 3 or 4$)$ $\qquad$
c) $\mathrm{P}(\operatorname{not} 5)$ $\qquad$
2) If the spinner is spun twice find:
a) The total \# of outcomes $\qquad$ b) P(two 3's) $\qquad$ c) $\mathrm{P}(7$ and then 4$)$ $\qquad$
3) What is the theoretical probability of choosing a vowel from the word MATHEMATICS? $\qquad$
4) Burger Queen offers 4 types of burgers, 5 types of beverages, and 3 types of desserts. If a meal consists of 1 burger, one beverage and one dessert, how many possible meals can be chosen?
5) The following information is given on girls ice skates:

Colors: white, beige, pink, yellow, blue
Sizes: 4, 5, 6, 7, 8
Extras: tassels, striped laces, bells
Assuming that all skates are sold with ONE extra, how many possible arrangements exist?
6) Your state issues license plates consisting of letters and numbers. There are 26 letters and the letters may be repeated. There are 10 digits and the digits may be repeated. How many possible license plates can be issued with two letters followed by three numbers?
7) There are 3 trails leading to Camp A from your starting position. There are 3 trails from Camp A to Camp B. How many different routes are there from the starting position to Camp B? Draw a tree diagram to illustrate your answer.

## Topic: Statistics

## Using the following data: $14,18,33,27,18$

Range: The span of data from lowest to highest.

$$
\text { range }=33-14=19
$$

Median: The middle value or the mean of the middle two values, when the data is arranged in numerical order.

## $\begin{array}{lllll}14 & 18 & 18 & 27 & 33\end{array}$

Mean: The average found by taking the sum of a set of data and dividing it by the number of data.

Mode: The value (\#) that appears the most.
It is possible to have more than one mode or no mode.

18

Histogram: A special type of bar graph that displays the frequency of data organized into equal intervals.


Answer each of the following.

1) A travel agent has 10-day vacation packages to Italy for the following prices per person: $\$ 899, \$ 980, \$ 1,020, \$ 1,350$ and $\$ 1,600$. (Show work for parts a \& b)
a) Find the range of the prices. $\qquad$ b) Find the mean of the prices. $\qquad$
2) Given the following set of data: $1,5,6,4,5,9,2,3,5,7$. Find the mean, median and mode. Round your answer to the nearest tenth when necessary and show work.

$$
\begin{aligned}
& \text { Mean }= \\
& \text { Median }= \\
& \text { Mode }=
\end{aligned}
$$

3) If 18 is added to the data set to the right, which statement is true? $16,14,22,16,16,18,15,25$
A) The mode increases
B) The mean decreases
C) The mean increases
D) The median increases
4) The monthly family budget is $\$ 1200$. According to the circle graph below, how much of the monthly budget, to the nearest dollar, is spent on pet supplies? Show work.

5) Use the data table below to construct a frequency histogram on the grid provided.

| Record High Temperatures for Each State |  |  |
| :---: | :--- | :---: |
| Temperature ( ${ }^{\circ}$ F) | Tally | Frequency |
| $100-104$ | III | 3 |
| $105-109$ | IH III | 8 |
| $110-114$ | HI HI HI II | 17 |
| $115-119$ | HI IHI II | 12 |
| $120-124$ | HH II | 7 |
| $125-129$ | II | 2 |
| $130-134$ | I | 1 |

Source: National Climatic Data Center

Title: $\qquad$

Frequency


Intervals
6) Jeff's test scores so far this year are $75 \%, 83 \%, 96 \%, 92 \%$, and $81 \%$. What must Jeff get on his $6^{\text {th }}$ test in order to have an overall average of exactly a $85 \%$ ? Show work.

