Chapter 1
Notes Advanced Pre-algebra

This packet belongs to _____

Mathematical Expressions & the Order of Operations

<u>Expression</u>: collection of _____, _____

& _____. Does not have an _____ sign.

<u>Variable</u>: a _____ used to represent a number.

Numerical expressions   Variable expressions

<u>Term</u>: parts of expressions separated by ___, ___, ___, ___, ___, ___, ___

Every term has a coefficient, a variable and a sign

<u>Simplify</u>: rewriting an expression the simplest way.
<u>Evaluate</u>: To solve or find the value of an expression.

Add   Subtract   Multiply   Divide

PEMDAS
Note: *Perform all multiplication and division operations left to right.*
Note: *Perform all addition and subtraction operations left to right.*

Evaluate each expression when $a = 6$ & $b = 2$

1) $9 + a$ 2) $a \div b$ 3) $3ab$

4) $ab \div b$ 5) $\dfrac{a \cdot a \cdot a \cdot b \cdot b}{a \cdot b \cdot b \cdot a \cdot a}$ 6) $2b \div ab$

1-5 Solving Equations using Inverse Operations

Inverse: _____.

Use the inverse operation to solve for the variable. Check !

1) $n + 6 = 11$

2) $y - 12 = 18$

3) $6r = 30$

4) $d \div 16 = 7$

5) $t + 7 > 18$

6) $4t \leq 32$

7) $t - 38 < 79$

8) $t \div 15 \geq 90$

9) $4a + 19 = 39$

10) $(c \div 3) + 22 = 30$

The parts of an expression separated by plus or minus signs are called **terms**.

$$5a + 7b - 3a + 6a^2$$

The expression shown has four terms. You can combine two of these terms to **simplify** the expression.

Like terms have the same variable raised to the same power.

$$5a + 7b - 3a + 6a^2$$

Complete to combine like terms.

1. $9z + 4z$

2. $9r + 5q - 2r$

3. $5t + 12f - t - 3f$

Simplify.

4. $7m + 3n - m + 2n$

5. $15r + 4 - 3r - 2$

6. $6x + 3z - y$

7. $-5z + 6n + 19z + 12n$

8. $n^3 + 8n^3 + 3dz^2 + 15dz^2 - 3dz^2 - 12n^3$

Simplify using the distributive property, then combine like terms.

9. $5x(y + 2) - 3x - 2xy$

10. $3x^5 + 10 - 5x^3(2x - 3x^2) + x^4$

Combine like terms in the equation to solve for x.

11. $4x + 2 - 3x - 2x = x - 4(3) + 7x$

Combining Like Terms

1. Label the components of the following term with their mathematical definitions:

   $2x^3$

2. What do terms have to share in common in order to be considered "like terms"?

Simplify the following expressions by combining all the like terms.

3. $3x + 2 - 6x^2 + 3x^2 - 4x + 3$

4. $-6x^3 + 3x^2 - 4x + 3$

5. $-3x + 2 - 6x^3 + 3x^2 - 4x + 3$

6. $3x - 2 - 6x^2 + 3x^2 - 3$

7. $-6x - 6 - 6x^2 + 6x^2 - 6x + 6$

8. $3x + 3 - 3x^2 + 3x^2 - 3x - 3$

9. $-6x^2 + 3x + 4 + 9x^2 - 10x + (-5)$

10. $-6x^3 - 6x^4 - 6x^2 - 6x^4 + 3x - 5 - 6x^2 + 4x^3 - 4x + 3$

11. Combine like terms in these equations to solve for x

a) $4x + 12 - 6x = 2x - 2(12) + 3x$

b) $\frac{1}{2}x + 16 - 2x + 4x - 13 = 14x - 7x$

c) $12x - 4 + -6 - 3^2 + 4x = -3 + 12x + -5x$

1-6 Writing expressions for word phrases

4 operations

+	—	X	÷

Write a variable expression for the word phrase.

1) A number t increased by nine _____

2) Sixteen less than a number q _____

3) A number x decreased by twelve _____

4) Eighteen more than the sum of five and six _____

5) The quotient when a number x is divided by four _____

6) A number t divided by the difference of c & five _____

7) The sum of a number b and a number c, multiplied by sixty-two _____

8) A number x divided by twenty-seven _____

9) Five less than a number y _____

10) Twenty increased by a number z _____

11) The total of a number y, a number w, and ten, divided by a number x _____

12) The greatest of three consecutive whole numbers, the smallest one is y _____

13) The number of centimeters in x meters _____

6.

1-7 Writing Equations and Inequalities for Word Sentences

Write an equation or inequality for each word sentence.

1) A number b increased by sixteen is forty _____

2) Seven times a number c is greater than thirty-three _____

3) The difference when a number s is subtracted from nineteen is four _____

4) The sum of a number and eleven is less than or equal to twenty-one _____

5) Three more than a number is less than twenty-five _____

6) Twice a number, divided by five is eight _____

7) The quotient when the sum of seven and x is divided by three is greater than nine

_____

8) Six times a number, decreased by 12, is equal to the product of a number and four

_____

9) Six times a number c is less than fifteen _____

10) Seventeen less than a number t is less than fifty _____

11) The sum of ten and a number is the same as twice the number _____

12) Thirty is less than the quotient of fifteen divided by a number c _____

13) Seven more than twice a number is greater than twenty-seven _____

14) Eighty-two is less than three times a number p _____

15) Twice a number is equal to the product when the sum of a number and four is

multiplied by eight _____

16) The sum when the quotient of b divided by eight is added to nine is less than thirty

_____

Write an equation to solve each problem below. Show all your work on this piece of paper.

1) On a Saturday shopping trip to Home Depot, George bought a telephone for $43.98, 2 gallons of paint for $8.99 a gallon, 5 lb. of potatoes for $1.95 and milk for $1.29. What was the total amount he spent?

2) Kramer walks to the fruit stand once a day. It is 1½ miles from his apartment to the fruit stand. How many miles does Kramer walk during April and May?

3) Elaine went to the fall craft fair to sell 48 eight-inch vases and 40 six-inch vases. At the end of the day, she had 9 eight-inch vases and 4 six-inch vases left. How many more eight-inch vases than six-inch vases did she sell?

4) Jerry's monthly bus pass costs $42.00. Except for 9 days, he used the bus daily during the month of September. What was the cost for each day he used the bus for the month of September?

5) Helen bought 5 yd. of wool fabric at $5.49 per yard, a jacket for $48.88, and a pair of mittens for $3.88. She had a coupon that allowed her to deduct $1.00 from the total cost for each item over $10.00. How much was Helen's bill?

LESSON	
9-1	*Probability*

The **probability** that something will happen is how often you can
expect that **event** to occur. This depends upon how many outcomes
are possible, the **sample space.**

In the spinner shown, the circle is divided into
four equal parts. There are 4 possible outcomes.

So, in a single spin:
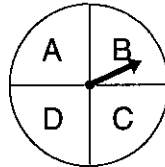
Complete to give the probability for each event.

	1. A fair coin is tossed.	**2.** A number cube is rolled.
List all the possible outcomes.	_____	_____
	_____	_____
How many outcomes in sample space?	_____	_____
Find the probability of the event shown.	$P(\text{heads}) =$ _____	$P(5) =$ _____

- A probability of 0 means the event is **impossible,** or can never happen.
  On the spinner above, $P(F) = 0$.
- A probability of 1 means the event is **certain,** or has to happen.
  In one roll of a number cube, $P(\text{a whole number from 1 through 6}) = 1$.

Give the probability for each event.

3. selecting a rectangle from
the set of squares

$P(\text{rectangle}) =$ _____

4. selecting a negative number from the
set of whole numbers

$P(\text{negative number}) =$ _____

- The sum of the probabilities of all the possible outcomes in a sample space is 1.
  If the probability of *snow* is 30%, then the probability of *no snow* is 70%.
  $$P(\text{snow}) + P(\text{no snow}) = 1$$

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5. If the probability of selecting a senior
for a committee is 60%, then the
probability of not selecting a senior is:

6. If the probability of choosing a red ball
from a certain box is 0.35, then the
probability of not choosing a red ball is:

_____

_____

Practice B
9-1 *Probability*

These are the results of the last math test. The teacher determines
that anyone with a grade of more than 70 passed the test. Find the
probability for the indicated grade.

Grade	65	70	80	90	100
# of Students	5	3	12	10	2

1. $P(70)$ **2.** $P(100)$ **3.** $P(80)$ **4.** $P(\text{passing})$

_____   _____   _____   _____

5. $P(\text{grade} > 80)$ **6.** $P(60)$ **7.** $P(\text{failing})$ **8.** $P(\text{grade} \le 80)$

_____   _____   _____   _____

The game of Marbles dates back to Roman times and is one of the
world's oldest games. Although rules vary depending on locality and
country, the object of the game is to roll, throw or drop against an
opponent's marbles to knock them from a designated area, usually a
circle. The person knocking the most marbles from the area wins.
Find the probability of drawing the following marbles from a bag
containing 20 red, 25 blue, 15 green, 10 white, and 30 black
marbles.

9. $P(\text{blue})$ **10.** $P(\text{black})$ **11.** $P(\text{green})$ **12.** $P(\text{red})$

_____   _____   _____   _____

13. $P(\text{pink})$ **14.** $P(\text{white})$ **15.** $P(\text{red or blue})$ **16.** $P(\text{marble})$

_____   _____   _____   _____

17. There are 3 red, 4 green, 2 purple, and 3 orange jelly beans in a bag.
What is the probability of picking a jelly bean that is not purple?

_____

18. What is the probability of tossing a 6 on a regular numerical cube?

_____

Name _____ Date _____ Class _____

Write the correct answer.

1. To get people to buy more of their product, a company advertises that in selected boxes of their popsicles is a super hero trading card. There is a $\frac{1}{4}$ chance of getting a trading card in a box. What is the probability that there will not be a trading card in the box of popsicles that you buy?

2. The probability of winning a lucky wheel television game show in which 6 preselected numbers are spun on a wheel numbered 1−49 is $\frac{1}{13,983,816}$ or 0.000007151%. What is the probability that you will not win the game show?

Based on world statistics, the probability of identical twins is $\frac{4}{1000}$, **while the probability of fraternal twins is** $\frac{23}{1000}$.

3. What is the probability that a person chosen at random from the world will be a twin?

4. What is the probability that a person chosen at random from the world will not be a twin?

Use the table below that shows the probability of multiple births by country. Choose the letter for the best answer.

5. In which country is it most likely to have multiple births?
   A Japan   **C** Sweden
   B United States   **D** Switzerland

6. In which country is it least likely to have multiple births?
   F Japan   **H** Sweden
   G United States   **J** Switzerland

7. In which two countries are multiple births equally likely?
   A Australia, United States
   B Canada, Switzerland
   C Sweden, United Kingdom
   D Japan, United States

Probability of Multiple Births

Country	Probability
Australia	$\frac{1}{72}$
Canada	$\frac{1}{85}$
Japan	$\frac{1}{120}$
United Kingdom	$\frac{1}{70}$
United States	$\frac{1}{35}$
Sweden	$\frac{1}{70}$
Switzerland	$\frac{1}{80}$

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