Chapter 1: Real Numbers

1.1: Displaying Information and Vocabulary

Why do we need Tables and Graphs?

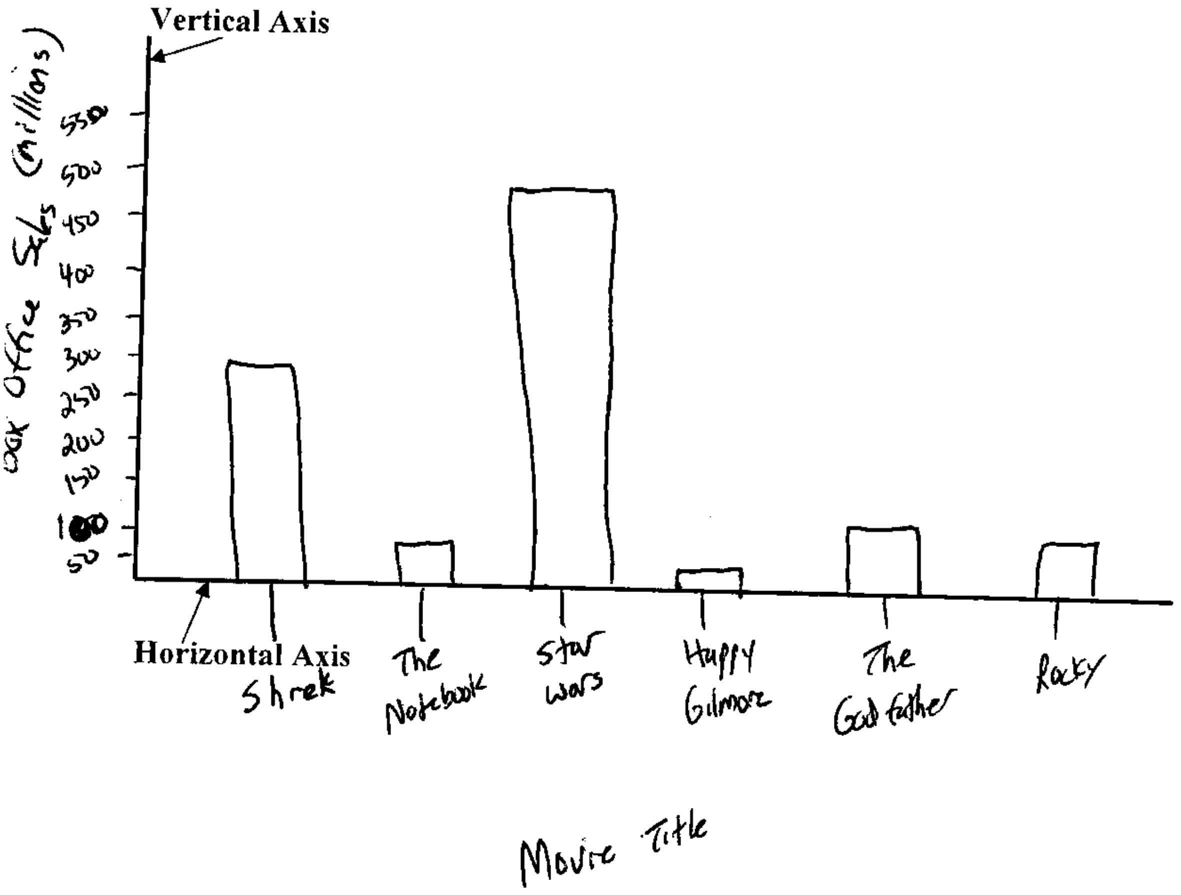
Creating a table

Table Title: Movies Box Office Sales

Source: www.leesmovieinfo.com

Column Title for Bar Graph: Movie Title	Column Title: Box Office Sales (US and Canada) Rounded
Shrek	$268,000,000
The Notebook	$80,000,000
Star Wars	$461,000,000
Happy Gilmore	$39,000,000
The Godfather	$135,000,000
Rocky	$117,000,000

Creating a Bar Graph

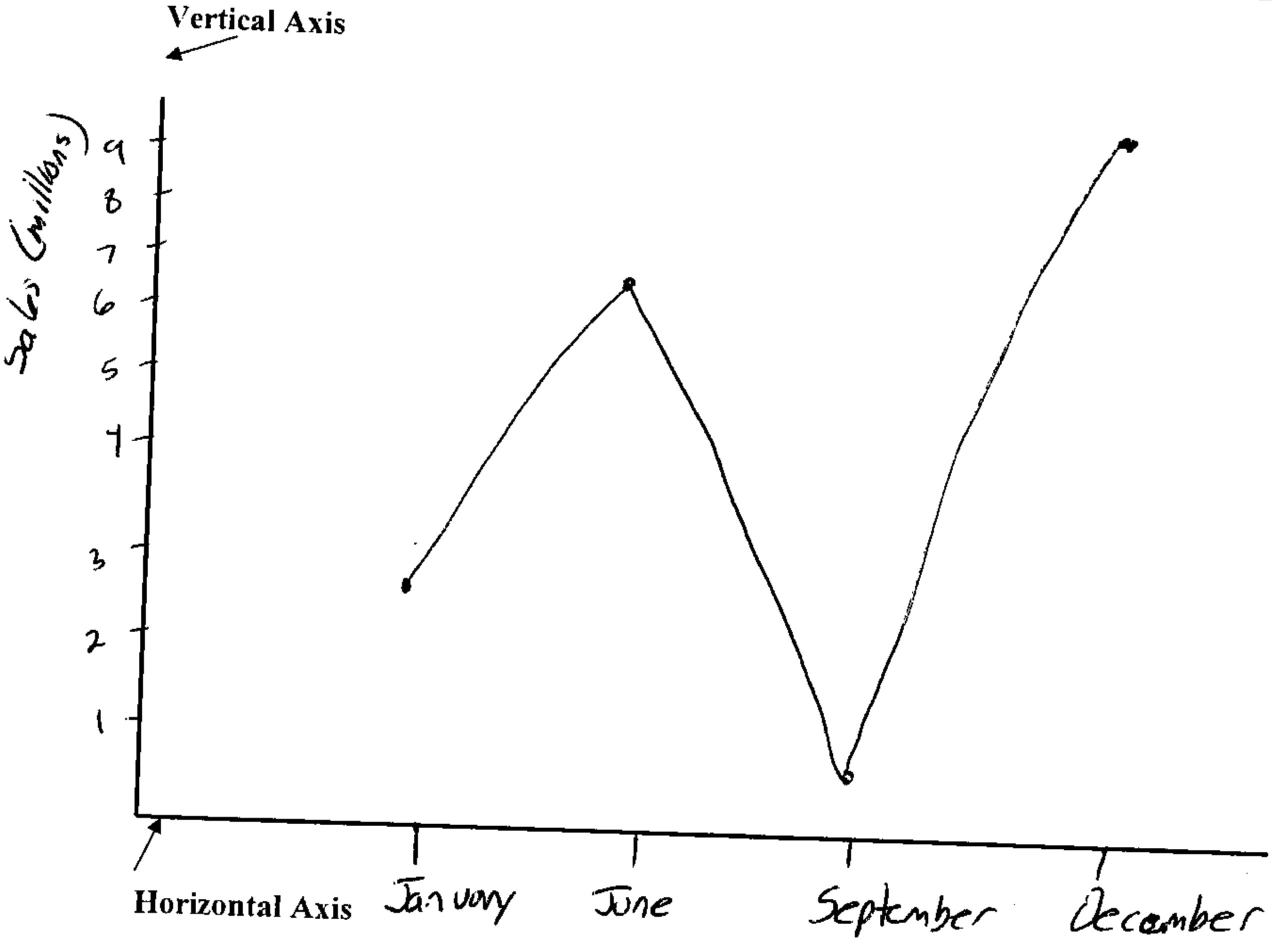


Creating a Line Graph

Table for Line Graph

Sales for Luxury Car Dealer in United States during 2001

Month	Sales
January	$2,500,000
June	$6,250,000
September	$750,000
December	$9,000,000



Why do we need Tables and Graphs?

Varies

Vocabulary

Sum- is the result of an addition.
Example: The sum of 5 and 7 is 12

Difference- is the result of a subtraction.
Example: The difference of 3 and 2 is 1

Product- is the result of a multiplication.
Example: The product of 4 and 7 is 28.

Quotient- is the result of a division.
Example: The quotient of 12 and 3 is 4.

Notation

Multiplication Symbols

$\times$ Times Sign (Will not be used often due to "$\times$" being used as a variable)
Example: $5 \times 4 = 20$

$\bullet$ Raised dot
Example: $3 \bullet 2 = 6$

( ) Parentheses
Example: $(6)(7) = 42$

Division Symbols

$\div$ Division Sign
Example: $15 \div 3 = 5$

$\overline{)}$ Long Division

Example: $\begin{array}{r} 6 \\ 4\overline{)24} \end{array}$

$-$ Fraction Bar

Example: $\frac{18}{2} = 9$

Variables, Expression, and Equations

Variables- Letters that stand for numbers.
Example: If you don't know how much money you have it can represented with an "x".

Equation- a mathematical sentence that contains an = symbol.
Examples: $3 + 5 = 8$ or $x + 9 = 12$

Algebraic Expression- variables and/or numbers that can be combined with the operations of addition, subtraction, multiplication, and division.

Examples: $x + 7$ or $\frac{x}{3} = 10$ or $10ac(5a)$

Constructing Tables

Given the situation:
Movies cost $8 each.
How much would it cost to bring my friends to the movies?

We don't know how many friends.
We will use the variable "f" to represent friends.

We also don't know the total cost.
We will use the variable "c" to represent total cost.

What will the formula be to represent this situation?

$c = 8 \cdot f$

Use this table to show possible costs based on how many friends go to the movies:

Cost of going to the movies

f	c
1	8
2	16
3	24
4	32
5	40
6	48
7	56
8	64

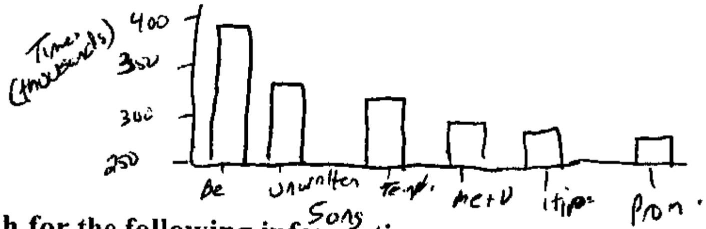
Section 1.1: Intro Language of Algebra Practice Problems

1. Create a table and bar graph for the following information:
Here are most played songs of 2006: (Source: www.nielsenmedia.com)
"Be Without You" Mary J. Blige (395,995 times), "Unwritten" Natasha Bedingfield (336,276)
"Temperature" Sean Paul (324,555), "Me & U" Cassie (312,073)
"Hips Don't Lie" Shakira (308,903), "Promiscuous" Nelly Furtado (292,264)

TABLE:

Song	Artist	Times
e Without You	Mary Blige	395,995
nwritten	Natasha B	336,276
emperature	Sean Paul	324,555
Me + U	Cassie	312,073
ps Don't Lie	Shakira	308 903
omiscuous	Nelly F.	292, 264

BAR GRAPH:

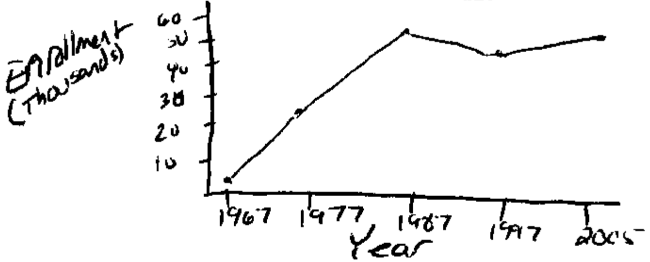


2. Create a table and line graph for the following information:
Here are the yearly enrollemnt for Valencia Community College:
(Source: http://valenciacc.edu/IR/EnrollmentStatistics.cfm)
1967: 567 1977: 24,483 1987: 54,515 1997: 48,503 2005: 53,806

TABLE:

Year	Enrollment
1967	567
1977	24,483
1987	54,515
1997	48,503
2005	53,806

LINE GRAPH:



3. Match the vocabulary word to the definition or symbols:

f 1. Algebraic Expression
i 2. Product
h 3. Division Symbols
c 4. Quotient

d 5. 3(x) – 2 = 10
e 6. Difference

g 7. Multiplication Symbols

b 8. Variables

a 9. Sum
j 10. Equation

a. Result of addition
b. Letters that stand for numbers
c. Result of division
d. Algebraic equation for the cost of 3 unknown priced tickets with a coupon for $2 off is $10.
e. Result of subtraction
f. Variables and/or numbers combined with arithmetic operations
g. ×, •, ( )

h. ÷, ⟌, –

i. Result of multiplication
j. Mathematical Sentence with an =

1.2: Fractions

Factor- means to express as a product of two or more numbers.

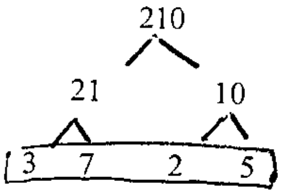
Ex. $24 = 2 \cdot 12$ or $24 = 3 \cdot 8$ or $24 = 4 \cdot 6$ or $24 = 2 \cdot 2 \cdot 2 \cdot 3$

Prime number- is a whole number greater than 1 that has only itself and 1 as factors.
The first ten prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23, and 29

Composite number- is a whole number greater than 1 that is not prime.
The first ten composite numbers are 4, 6, 8, 9, 10, 12, 14, 15, 16 and 18

Prime Factorization- every composite number can be factored into the product of two or more prime numbers.

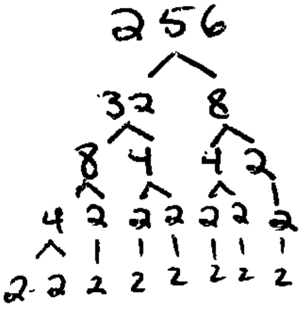
Example: Find the prime factorization of 210



The prime factors are: $210 = 2 \cdot 3 \cdot 5 \cdot 7$

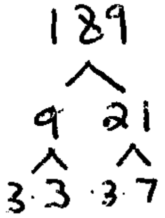
Practice Examples:

Find the prime factorization of 256:



$\boxed{2^8}$

Find the prime factorization of 189:



$\boxed{3 \cdot 3 \cdot 3 \cdot 7}$

What is a FRACTION and why do we need them?

Meaning of Fractions

Example of a fraction: $\frac{1}{2}$

1	Numerator
/	Fraction bar
2	Denominator

Special Fraction Forms: For any nonzero number a,

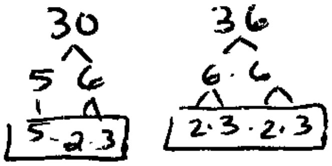
$\frac{5}{0}$ way undefined $0\overline{)5}$

$\frac{0}{5}$ ← $5\overline{)0}$ 0

$\frac{a}{a}=1$	ex. $\frac{5}{5}=1$	$\frac{1000}{1000}=1$
$\frac{a}{1}=a$	ex. $\frac{7}{1}=7$	$\frac{256}{1}=256$
$\frac{0}{a}=0$	ex. $\frac{0}{9}=0$	$\frac{0}{34}=0$
$\frac{a}{0}=$ *undefined*	ex. $\frac{3}{0}=$ *undefined*	$\frac{45}{0}=$ *undefined*

Simplifying Fractions- a fraction is in simplest form, or lowest terms, when the numerator and denominator have no common factors other

Example: Simplify $\frac{30}{36}$ $\frac{30}{36}$



Solution:
Find the prime factorization of the numerator and denominator. If the numerator and denominator have common factors, those factors become one.

$$\frac{30}{36}=\frac{\cancel{2}\cdot\cancel{3}\cdot5}{\cancel{2}\cdot2\cdot\cancel{3}\cdot3}=\frac{2\cdot3\cdot5}{2\cdot2\cdot3\cdot3}=\frac{5}{2\cdot3}=\boxed{\frac{5}{6}}$$

$\frac{30\div6}{36\div6}$ $\frac{5}{6}$

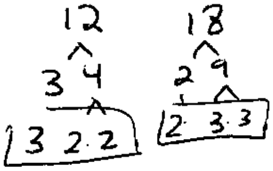
Practice Examples:
Simplify:

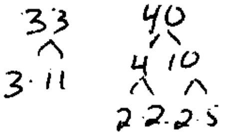
$\frac{12}{18}=\frac{\cancel{2}\cdot2\cdot\cancel{3}}{\cancel{2}\cdot\cancel{3}\cdot3}=\boxed{\frac{2}{3}}$

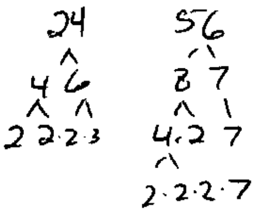
$\boxed{\frac{33}{40}}$ $\frac{3\cdot11}{2\cdot2\cdot2\cdot5}=$

$\frac{24}{56}$ $\frac{\cancel{2}\cdot\cancel{2}\cdot\cancel{2}\cdot3}{\cancel{2}\cdot\cancel{2}\cdot\cancel{2}\cdot7}=\boxed{\frac{3}{7}}$

$\frac{63}{42}=\frac{\cancel{7}\cdot\cancel{3}\cdot3}{2\cdot\cancel{3}\cdot\cancel{7}}=\boxed{\frac{3}{2}}$







Mixed Numbers- represents the sum of a whole number and a fraction.

Ex. $5\frac{3}{4}$

Improper Fraction- a fraction where the numerator greater than or equal to denominator.

Ex. $\frac{23}{4}$

Converting from an improper fraction to a mixed fraction:

Example: $5\frac{3}{4}$

$$\frac{23}{4} \Rightarrow \begin{array}{r} 5 \\ 4\overline{)23} \\ -20 \\ \hline 3 \end{array} \Rightarrow \boxed{5\frac{3}{4}}$$

Solution:

Multiply the denominator by the whole number, and then add the numerator. That number becomes the numerator with the original denominator.

$5\frac{3}{4} = 4 \cdot 5 = 20 + 3 = 23$ $\qquad \frac{23}{4}$

Practice Examples:

Convert from mixed fraction to an improper fraction:

$1\frac{1}{2}$ $\boxed{\frac{3}{2}}$ $\qquad 3\frac{2}{3}$ $\boxed{\frac{11}{3}}$ $\qquad 7\frac{5}{6}$ $\boxed{\frac{47}{6}}$

Converting from an improper fraction to a mixed fraction:

Example: $\frac{23}{4}$

Solution:

Divide the denominator into the numerator. The result will be the whole number, the remainder will be the numerator, and the original denominator will be the denominator.

$\frac{23}{4} = 4\overset{5}{\overline{)23}}$ remainder of 3 $= 5\frac{3}{4}$ $\qquad 5\frac{3}{4}$

Practice Examples:

Convert from improper fraction to a mixed fraction:

$\frac{7}{2}$ $\begin{array}{r} 3 \\ 2\overline{)7} \\ -6 \\ \hline 1 \end{array}$ $\boxed{3\frac{1}{2}}$ $\qquad \frac{42}{5}$ $\begin{array}{r} 8 \\ 5\overline{)42} \\ -40 \\ \hline 2 \end{array}$ $\boxed{8\frac{2}{5}}$ $\qquad \frac{101}{12}$ $\begin{array}{r} 8 \\ 12\overline{)101} \\ -96 \\ \hline 5 \end{array}$ $\boxed{8\frac{5}{12}}$

Multiplying Fractions-

to multiply fractions, multiply the numerators and multiply the denominators.

Example: Multiply $\frac{7}{8} \cdot \frac{3}{5}$ *Remember to simplify your answer if needed.*

Solution:

$$\frac{7}{8} \cdot \frac{3}{5} = \frac{7 \cdot 3}{8 \cdot 5} = \frac{21}{40}$$

Practice Examples:

Multiply:

$\frac{2}{3} \cdot \frac{4}{5} = \boxed{\frac{8}{15}}$

$\frac{2}{5} \cdot \frac{3}{4} = \frac{6}{20} \begin{smallmatrix} \div 2 \\ \div 2 \end{smallmatrix} \boxed{\frac{3}{10}}$

$\frac{\overset{1}{\cancel{2}}}{5} \cdot \frac{3}{\underset{2}{\cancel{4}}} = \boxed{\frac{3}{10}}$

$\frac{\overset{5}{\cancel{15}}}{\underset{2}{\cancel{8}}} \cdot \frac{\overset{1}{\cancel{4}}}{\underset{1}{\cancel{3}}} = \quad \frac{5}{2} \cdot \frac{1}{1} = \frac{5}{2}$

$2\overline{)\,5\,}^{\,2}$ $\quad -4$ $\quad 1$ $\qquad \boxed{2\frac{1}{2}}$

$1\frac{1}{2} \cdot 2\frac{2}{3} =$

$\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{2}}} \cdot \frac{\overset{4}{\cancel{8}}}{\underset{1}{\cancel{3}}} = \frac{4}{1} = \boxed{4}$

Dividing Fractions-

to divide fractions, multiply the first fraction by the reciprocal of the second. Remember to simplify your answer.

Example: Multiply $\frac{1}{7} \div \frac{2}{5}$ *Remember to simplify your answer if needed.*

KCF

Solution:

$$\frac{1}{7} \div \frac{2}{5} = \frac{1}{7} \cdot \frac{5}{2} = \frac{1 \cdot 5}{7 \cdot 2} = \frac{5}{14}$$

$\frac{1}{7} \cdot \frac{5}{2} \quad \boxed{\frac{5}{14}}$

Practice Examples:

Divide:

$\frac{2}{3} \div \frac{4}{5} = \quad \frac{\overset{1}{\cancel{2}}}{3} \cdot \frac{5}{\underset{2}{\cancel{4}}} = \boxed{\frac{5}{6}}$

$\frac{2}{5} \div \frac{3}{4} = \quad \frac{2}{5} \cdot \frac{4}{3} = \boxed{\frac{8}{15}}$

$\frac{8}{15} \div \frac{2}{3} = \quad \frac{\overset{4}{\cancel{8}}}{\underset{5}{\cancel{15}}} \cdot \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{2}}} = \boxed{\frac{4}{5}}$

$2\frac{3}{4} \div 6\frac{3}{5} = \quad \frac{11}{4} \div \frac{33}{5}$

$\frac{\overset{1}{\cancel{11}}}{4} \cdot \frac{5}{\underset{3}{\cancel{33}}} = \boxed{\frac{5}{12}}$

Adding and Subtracting Fractions- in order to add or subtract fractions, they must have the same denominator.

To add (or subtract) two fractions with same denominator, add (or subtract) their numerators and write the sum (or difference) over the common denominator.

Example: $\frac{2}{7}+\frac{3}{7}=\boxed{\frac{5}{7}}$ $\frac{10}{13}-\frac{4}{13}=\boxed{\frac{6}{13}}$

Solutions:

$$\frac{2}{7}+\frac{3}{7}=\frac{2+3}{7}=\frac{5}{7}$$

$$\frac{10}{13}-\frac{4}{13}=\frac{10-4}{13}=\frac{6}{13}$$

To add (or subtract) two fractions with unlike denominator, find the least common denominator, convert both fractions with the common denominator, then add (or subtract) their numerators and write the sum (or difference) over the common denominator.

Least Common Denominator (LCD)- for a set of fractions is the smallest number each denominator will denominator will divide exactly (divide with no remainder).

To find the LCD, find the prime factorization of both denominators and use each prime factor the greatest number of times it appears in any one factorization.

Example: Find the LCD of 10 and 28

Solution: First find the prime factorization of each number:

$10 = \boxed{2\cdot 5}$

$28 = \boxed{2\cdot 2\cdot 7}$ Then use each factor the greatest amount of times in each factor: $2\cdot 2\cdot 5\cdot 7=140$

$2\cdot 2\ 5\cdot 7=\boxed{140}$

Practice Examples:

Find the LCD of 15 and 20

15

$\boxed{3\cdot 5}$

20

2 10

$\boxed{2\cdot 2\ 5}$

$2\cdot 2\cdot 3\cdot 5=\boxed{60}$

LCD

Find the LCD of 8 and 12

8

4 2

$\boxed{2\cdot 2\ 2}$

12

4 · 3

$\boxed{2\cdot 2\cdot 3}$

$\boxed{2\cdot 2\cdot 2\cdot 3 \quad 24 \quad LCD}$

Adding and Subtracting Fractions with unlike denominators

Example: $\frac{2}{9}+\frac{7}{21}=$ $\qquad$ $3\frac{5}{8}-1\frac{1}{20}=$

Solutions:

The LCD is: $9=3\cdot3$, $21=3\cdot7$ $\qquad 3\cdot3\cdot7=63$

$$\frac{2}{9}\cdot\frac{7}{7}=\frac{14}{63}$$
$$+\frac{7}{21}\cdot\frac{3}{3}=\frac{21}{63}$$
$$\frac{35}{63}$$

$$\frac{2\cdot7}{9\cdot7}=\frac{14}{63}$$
$$+\frac{7\cdot3}{21\cdot3}=\frac{21}{63}$$
$$\boxed{\frac{35}{63}}$$

The LCD is: $8=2\cdot2\cdot2$, $20=2\cdot2\cdot5$ $\qquad 2\cdot2\cdot2\cdot5=40$

$$3\frac{5}{8}\cdot\frac{5}{5}=3\frac{25}{40}$$
$$-1\frac{1}{20}\cdot\frac{2}{2}=1\frac{2}{40}$$
$$2\frac{23}{40}$$

$$3\frac{5\cdot5}{8\cdot5}=3\frac{25}{40}$$
$$-1\frac{1\cdot2}{20\cdot2}=-1\frac{2}{40}$$
$$\boxed{2\frac{23}{40}}$$

Practice Examples:

Solve:

$\frac{5}{7}+\frac{3}{7}=$ $\frac{8}{7}$ $\qquad 7\overset{1}{\overline{)8}}$, -7, 1 $\qquad =\boxed{1\frac{1}{7}}$

$\frac{6}{15}-\frac{2}{9}=$

$\boxed{3\cdot5}$ $\boxed{3\cdot3}$

$3\cdot3\cdot5=\boxed{45}$

$$\frac{6\cdot3}{15\cdot3}=\frac{18}{45}$$
$$-\frac{2\cdot5}{9\cdot5}=\frac{10}{45}$$
$$\boxed{\frac{8}{45}}$$

$\frac{2}{9}+1\rightarrow\frac{2}{9}+\frac{9}{9}$

$5\frac{3}{10}+2\frac{5}{14}=$

$\boxed{2\cdot5}$ $\boxed{2\cdot7}$

$2\cdot5\cdot7=70$

$$5\frac{3\cdot7}{10\cdot7}=5\frac{21}{70}$$
$$+2\frac{5\cdot5}{14\cdot5}=2\frac{25}{70}$$
$$7\frac{46\div2}{70\div2}$$
$$\boxed{7\frac{23}{35}}$$

$8\frac{2}{9}-7\frac{2}{3}=$

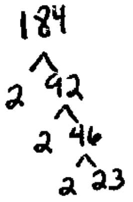
$$8\frac{2}{9}=8\frac{2}{9} \qquad \overset{7}{\cancel{8}}\frac{2}{9}+\frac{9}{9}=7\frac{11}{9}$$
$$-7\frac{2\cdot3}{3\cdot3}=-7\frac{6}{9} \qquad -7\frac{6}{9} \qquad -7\frac{6}{9}$$
$$\boxed{\frac{5}{9}}$$

What is a FRACTION and why do we need them?

Varies

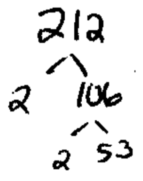
Section 1.2: Fractions Practice Problems

1. Find the prime factorization of 184:



$\boxed{2 \cdot 2 \cdot 2 \cdot 23}$

2. Find the prime factorization of 212:



$\boxed{2 \cdot 2 \cdot 53}$

3. Simplify: $\frac{1976}{1976}$ 1

4. Simplify: $\frac{0}{7}$ 0

5. Simplify: $\frac{14}{0}$ Undefined

6. Simplify: $\frac{20}{36}$ $\frac{5}{9}$

$\frac{20 \div 4}{36 \div 4}$ $\frac{5}{9}$

or

$\frac{\cancel{2}\cdot\cancel{2}\cdot 5}{\cancel{2}\cdot\cancel{2}\cdot 3\cdot 3} = \frac{5}{9}$

7. Simplify: $\frac{120}{300}$ $\frac{2}{5}$

$\frac{120 \div 60}{300 \div 60}$ $\frac{2}{5}$

or

$\frac{2\cdot 2\cdot\cancel{2}\cdot\cancel{3}\cdot\cancel{5}}{\cancel{2}\cdot\cancel{2}\cdot\cancel{3}\cdot\cancel{5}\cdot 5} = \frac{2}{5}$

8. Simplify: $\frac{21}{70}$ $\frac{3}{10}$

$\frac{21 \div 7}{70 \div 7}$ $\frac{3}{10}$

or

$\frac{3\cdot\cancel{7}}{2\cdot 5\cdot\cancel{7}} = \frac{3}{10}$

Convert from mixed fraction to an improper fraction:

9. $1\frac{2}{3}$ $\frac{5}{3}$

10. $5\frac{4}{7}$ $\frac{39}{7}$

11. $3\frac{1}{5}$ $\frac{16}{5}$

Convert from improper fraction to a mixed fraction:

12. $\frac{8}{3}$ $2\frac{2}{3}$

$3\overline{)8}$ quotient 2
-6
2

13. $\frac{80}{7}$ $11\frac{3}{7}$

$7\overline{)80}$ quotient 11
-7
10
-7
3

14. $\frac{123}{6}$ $20\frac{1}{2}$

$6\overline{)123}$ quotient 20
-12
03
-0
3

$20\frac{3}{6} = 20\frac{1}{2}$

Section 1.2: Fractions Practice Problems Continue

Multiply:

15. $\frac{2}{5}\cdot\frac{3}{7}=$ $\frac{6}{35}$

16. $\frac{25}{9}\cdot\frac{3}{5}=$ $\frac{5}{3}=1\frac{2}{3}$

$\frac{\cancel{25}^{5}}{\cancel{9}_{3}}\cdot\frac{\cancel{3}^{1}}{\cancel{5}_{1}}$ $\frac{5}{3}$

17. $2\frac{1}{2}\cdot3\frac{3}{5}=$ 9

$\frac{\cancel{5}^{1}}{\cancel{2}_{1}}\cdot\frac{\cancel{18}^{9}}{\cancel{5}_{1}}=\frac{9}{1}=9$

Divide:

18. $\frac{3}{7}\div\frac{5}{6}=$ $\frac{18}{35}$

$\frac{3}{7}\cdot\frac{6}{5}=\frac{18}{35}$

19. $\frac{9}{40}\div\frac{5}{8}=$ $\frac{9}{25}$

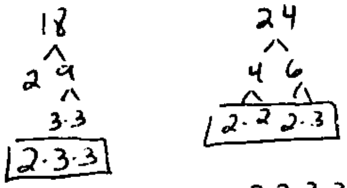
$\frac{9}{\cancel{40}_{5}}\cdot\frac{\cancel{8}^{1}}{5}=\frac{9}{25}$

20. $5\frac{5}{7}\div2\frac{6}{7}=$ 2

$\frac{40}{7}\div\frac{20}{7}$

$\frac{\cancel{40}^{2}}{\cancel{7}_{1}}\cdot\frac{\cancel{7}^{1}}{\cancel{20}_{1}}=\frac{2}{1}=2$

21. Find LCD of 18 and 24



$2\cdot2\cdot2\cdot3\cdot3=\boxed{72}$

LCD

22. Add: $\frac{2}{7}+\frac{4}{7}=$ $\frac{6}{7}$

23. Subtract: $\frac{9}{15}-\frac{4}{15}=$ $\frac{5\div5}{15\div5}$ $\frac{1}{3}$

Solve:

24. $\frac{7}{12}-\frac{3}{8}=$ $\frac{5}{24}$

$\frac{7\cdot2}{12\cdot2}=\frac{14}{24}$

$-\frac{3\cdot3}{8\cdot3}=\frac{9}{24}$

$\frac{5}{24}$

25. $2\frac{4}{15}+3\frac{6}{25}=$ $5\frac{38}{75}$

$2\frac{4\cdot5}{15\cdot5}=2\frac{20}{75}$

$+3\frac{6\cdot3}{25\cdot3}=3\frac{18}{75}$

$5\frac{38}{75}$

26. $10\frac{1}{6}-8\frac{11}{20}=$ ______

$10\frac{1\cdot10}{6\cdot10}=10\frac{10}{60}=9\frac{60}{60}+\frac{10}{60}=\frac{70}{60}$

$-8\frac{11\cdot3}{20\cdot3}=-8\frac{33}{60}=-8\frac{33}{60}$

$1\frac{37}{60}$

1.3: Real Numbers

What are REAL NUMBERS?

Set- collection of numbers, the symbol used is: $\{\quad\}$

counting

Natural Numbers- $\{1,2,3,4...\}$

Whole Numbers- $\{0,1,2,3,4...\}$

Integers- $\{...-3,-2,-1,0,\ 1,\ 2,\ 3...\}$

Rational Numbers- any number that can be written as a fraction with integer numerator and nonzero integer denominator.

Examples: $\frac{1}{2}$, $-3\frac{1}{4}$, $\frac{5}{3}$, 0.25, 0.333..., -7

Irrational Number- nonterminating, nonrepeating decimal UGLY!

Examples: 1.25987495..., π, $\sqrt{2}$

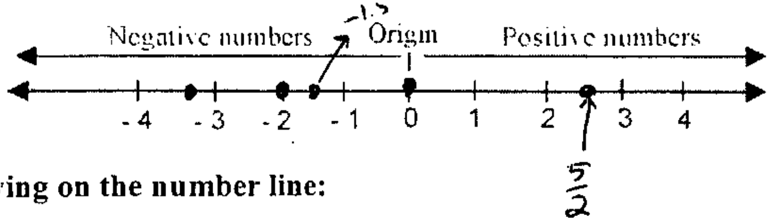
Real Number- rational and irrational numbers, all points on the number line.

Real Number	
▼	▼
Rational Number ▼	**Irrational Number**
Integer ▼	
Whole Number ▼	
Natural Number	

Classify the following numbers:

7	Natural, whole, Integer, Rational, Real
-5	Integer, Rational, Real
$\frac{5}{3}$	Rational, Real
$-\pi$	Irrational, Real

Real Number Line



Graph the following on the number line:

$-2,\ 0,\ \frac{5}{2},\ -3\frac{1}{4},\ -1.5$

$\begin{array}{r} 2 \\ 2\overline{)5} \\ \underline{-4} \\ 1 \end{array} \Rightarrow 2\frac{1}{2}$

Math Symbols

< Less Than   > Greater Than

Fill in the blanks with < or >

-4	<	4
-2	>	-3
-5	<	-4
1.09	<	1.1
$-\frac{5}{2}$	<	$-\frac{3}{2}$

$-2\frac{1}{2}$ $-1\frac{1}{2}$

1.09
1.10

Opposite- 2 numbers that are the same distance from O. Symbol: (-)

Example: 4 and -4   -3 and 3

$-(4) = -4$
$-(-3) = 3$

Absolute Value: the distance from 0. Symbol: | |

Example: $|5| = 5, \quad |-3| = 3, \quad -|-7| = -7$

-7

Fill in the blanks with < or > or =

$\|-4\| = 4$	=	4
$-(-5) = 5$	>	-3
$-\|-10\| = -10$	<	10
$-(9) = -9$	<	8
$\left\|-\frac{1}{2}\right\|$	>	$-\left(-\frac{1}{3}\right)$

$\frac{1}{2} = .5$ $\frac{1}{3} = .33$

What are REAL NUMBERS?

Varies

Section 1.3: Real Numbers Practice Problems

1. Classify the following numbers as: Natural, Whole, Integers, Rational, Irrational, Real Numbers may fall in more than 1 category.

a. $-\pi$ Irrational, Real

b. -10 Integer, Rational, Real

c. $-\frac{9}{2}$ Rational, Real

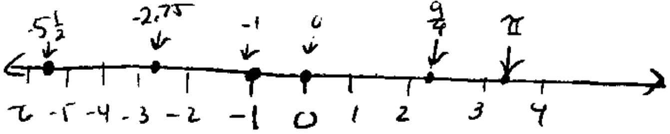
d. 23.458976975.... Irrational, Real

e. 0 Whole, Integer, Rational, Real

f. $\sqrt{9} = 3$ Natural, Whole, Integer, Rational, Real

2. Create a number line and graph the following on the number line:

4, 0, -1, $-5\frac{1}{2}$, $\underset{\downarrow\; 2\frac{1}{4}}{\frac{9}{4}}$, -2.75, $\underset{\approx 3.14}{\pi}$



3. Complete the table with: < Less Than OR > Greater Than OR = Equal to

a.	-17	>	-18
b.	3.001	<	3.01
c.	$-\frac{8}{3} = -2\frac{1}{3}$	>	$-\frac{9}{3} = -3$
d.	$\|-6\| = 6$	=	$\|6\| = 6$
e.	$-(-2) = 2$	>	$-(2) = -2$
f.	$-\|-23\| = -23$	=	$-\|23\| = -23$
g.	$\|-5\| = 5$	>	$-\|5\| = -5$
h.	$\left\|\frac{4}{5}\right\| = \frac{4}{5} = \frac{8}{10}$	>	$-\left(-\frac{7}{10}\right) = \frac{7}{10}$
i.	-(0.003)	>	$-\|-0.004\|$

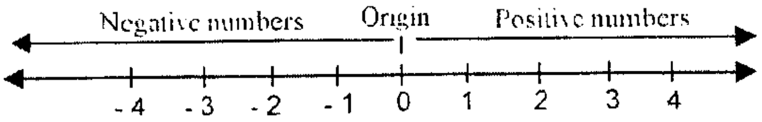
-0.003 -0.004

1.4: Adding/Subtracting Real Numbers

How do you ADD REAL NUMBERS?

Adding Real Numbers

Signed Numbers- positive and negative numbers



Adding Two Numbers with the Same Sign

1. Two positive numbers add them and keep the sign.

Example: 10 + 3 = 13 15 + 12 = 27

2. Two negative numbers add them and keep the sign.

Example: -2 + (-3) = -5 -1 + (-7) = -8

Practice Examples:

a) -22 + (-13) = -35

b) -1.23 + (-2.45) =

$$\begin{array}{r} -1.23 \\ -2.45 \\ \hline \boxed{-3.68} \end{array}$$

c) $-\frac{1}{4}+\left(-\frac{1}{2}\right)\cdot\frac{2}{2}$

$$-\frac{1}{4}+\left(-\frac{2}{4}\right)=\boxed{-\frac{3}{4}}$$

Adding Two Numbers with Different Signs

Subtract the numbers and take the sign of the larger number.
(Larger number without looking at the sign of the number)

Example: $-5 + 2 = -3$ $\quad$ $4 + (-1) = 3$

Practice Examples:

a) $-30 + 10 =$ $\boxed{-20}$

b) $5.4 + (-2.2) =$

$$\begin{array}{r} 5.4 \\ -\,2.2 \\ \hline 3.2 \end{array} \qquad \boxed{3.2}$$

c) $-\frac{7}{30}+\left(\frac{1}{5}\right)\overset{\cdot 6}{\underset{\cdot 6}{=}}$

$$-\frac{7}{30}+\left(\frac{6}{30}\right)= -\frac{1}{30}$$

d) $-20 + 5 + (-12) + (-3) + 7 =$

$$-15 + (-12) + (-3) + 7 =$$

$$-27 + (-3) + 7 =$$

$$-30 + 7 = \boxed{-23}$$

e) $(-7 + 8) + 2 + (-13 + 12) =$

$$(1) + 2 + (-1) =$$

$$3 + (-1) = \boxed{2}$$

Properties of Addition

Commutative Property of Addition- changing the order when adding does not affect the answer

Example: $2 + 3 = 3 + 2$

Associative Property of Addition- changing the grouping when adding does not affect the answer

Example: $(2 + 3) + 4 = 2 + (3 + 4)$

Addition Property of 0- when 0 is added to any real number, the result is the same as real number.

Example: $5 + 0 = 5$

Addition Property of Opposites- the sum of a number and its opposite is 0.

Example: $7 + (-7) = 0$

How do you ADD REAL NUMBERS?

Varies

How do you SUBTRACT REAL NUMBERS?

Subtracting Real Numbers

Opposite of an opposite- is the original number

Example: - (-5) is 5

Practice Examples:

a. - (-7) = 7 b. - (-g) = 9 c. $-|-15| =$ - 15

Subtraction of Real Numbers

Change the subtraction sign to an addition sign and take the opposite of the following number. Then follow addition rules.

Example: -5 – 3 =

Solution:

Change the subtraction sign to addition and take the opposite of the following number.

-5 – 3 =

-5 + (-3) =

Then follow addition rules.

-5 + (-3) = -8

Example: 7 – (-9) =

$7 \underset{\downarrow}{-} (-9) =$

Solution:

$7 + 9 = \boxed{16}$

Change the subtraction sign to addition and take the opposite of the following number.

7 – (-9) =

7 + 9 =

Follow addition rules.

7 + 9 = 16

Practice Examples:

a) $-10 - 7 =$

$-10 + (-7)$

$\boxed{-17}$

b) $50 - 85 =$

$50 + (-85)$

$\boxed{-35}$

c) $\frac{1 \cdot 3}{3 \cdot 3} - \left(-\frac{2}{9}\right) =$

$\frac{3}{9} - \left(-\frac{2}{9}\right)$

↓

$\frac{3}{9} + \frac{2}{9} = \frac{5}{9}$

d) $-7 - 4 + 10 - (-5) =$

$-7 + (-4) + 10 + 5$

$-11 + 10 + 5$

$-1 + 5$

4

e) **Water level**. In one week, the water level in a storage tank went from 25 feet above normal to 12 feet below. Find the change in the water level.

~~25 − 12 = 13~~

$25 - (-12)$

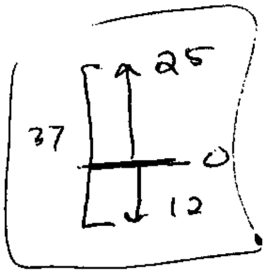
$25 + 12$

$\boxed{37}$

$25 + |-12|$

$25 + 12$

$\boxed{37}$



How do you SUBTRACT REAL NUMBERS?

Varies

Section 1.4: Adding/Subtracting Real Numbers Practice Problems

Solve the following problems

1a. 10 + (-2) = $\boxed{8}$ b. -4 + (-3) = $\boxed{-7}$ c. -12 + 6 = $\boxed{-6}$

2a. -3.4 + (-2.15) = $\boxed{-5.55}$

-3.4
$+\ -2.15$
-5.55

b. $-\frac{2}{3} + \left(\frac{3}{5}\right) = \boxed{-\frac{1}{15}}$

$-\frac{10}{15} + \frac{9}{15} = -\frac{1}{15}$

c. $5\frac{3}{4} + \left(-1\frac{1}{3}\right) = \boxed{\frac{53}{12} = 4\frac{5}{12}}$

$\frac{23}{4} + \left(-\frac{4}{3}\right)$

$\frac{69}{12} + \left(-\frac{16}{12}\right) = \frac{53}{12}$

3a. -5 – 5 = $\boxed{-10}$

$-5 + -5 = -10$

b. 10 - (-4) = $\boxed{14}$

$10 + 4 = 14$

c. -3 – (-8) = $\boxed{5}$

$-3 + 8 = 5$

4a. 6.25 – 10.75 = $\boxed{-4.5}$

$6.25 + -10.75$

-4.5

b. $-\frac{2}{7} - \left(\frac{1}{2}\right) = \boxed{-\frac{11}{14}}$

$-\frac{2}{7} + -\frac{1}{2}$

$-\frac{4}{14} + -\frac{7}{14} = -\frac{11}{14}$

c. $-4\frac{5}{6} - \left(-2\frac{3}{4}\right) = \boxed{-2\frac{1}{12} = -\frac{25}{12}}$

$-\frac{29}{6} + \frac{11}{4}$

$-\frac{58}{12} + \frac{33}{12} = -\frac{25}{12} = -2\frac{1}{12}$

5a. 7 + (-2) + (-3) + 8 + (-3) = $\boxed{7}$

$5 + (-3) + 8 + (-3)$

$2 + 8 + (-3)$

$10 + (-3) = 7$

b. -2.3 + (-4.2) + 1.24 + (-0.4) = $\boxed{-5.66}$

$-6.5 + 1.24 + (-0.4)$

$-5.26 + (-0.4) = -5.66$

6a. 15 - (-3) + (-6) - 21 - (-1) = $\boxed{-8}$

$15 + 3 + (-6) + (-21) + 1$

$18 + (-6) + (-21) + 1$

$12 + (-21) + 1$

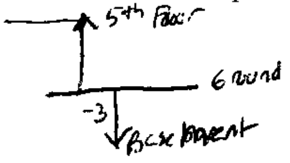
$-9 + 1 = -8$

b. $-\frac{1}{3} - \left(\frac{3}{4}\right) - \left(-\frac{5}{6}\right) = \boxed{-\frac{1}{4}}$

$-\frac{4}{12} - \left(\frac{9}{12}\right) + \left(\frac{10}{12}\right)$

$-\frac{13}{12} + \frac{10}{12} = -\frac{3}{12} \div 3 = -\frac{1}{4}$

7. Sam is on the fifth floor of a building and needs to use the restroom that is located on the third floor of the basement (3 floors below ground level). How many floors must he travel to use the restroom? Give the equation and the solution to this problem.



$5 - (-3) = \boxed{18 \text{ floors}}$

1.5: Multiplying and Dividing Real Numbers

How do you MULTIPLY/DIVIDE REAL NUMBERS?

Multiplying or Dividing Real Numbers

If the signs are the same, the solution is positive. $\boxed{+ \quad + = +}$ $\boxed{- \quad - = +}$

Examples: $2\cdot 3=6$ $\quad \frac{10}{5}=2$ $\quad -\frac{2}{3}\cdot -\frac{4}{5}=\frac{8}{15}$ $\quad \frac{-3.3}{-3}=1.1$

If the signs are different, the solution is negative. $\boxed{+ \quad - = -}$ $\boxed{- \quad + = -}$

Examples: $-5\cdot 7=-35$ $\quad \frac{-20}{4}=-5$ $\quad \frac{1}{4}\cdot -\frac{3}{7}=-\frac{3}{28}$ $\quad \frac{2.8}{-2}=-1.4$

Practice Examples:

$7(-12)= -84$

$\frac{-100}{-5}= 20$

$-\frac{\overset{1}{\cancel{5}}}{7}\cdot -\frac{3}{\underset{2}{\cancel{10}}}= \frac{3}{14}$

$\frac{2.25}{-0.5}= -4.5$

$0.5\overline{)2.25}$

$$\begin{array}{r} 4.5 \\ 5\overline{)22.5} \\ \underline{20} \\ 25 \end{array}$$

$-\frac{1}{2}\div\frac{2}{3}=$

$-\frac{1}{2}\cdot\frac{3}{2}=\boxed{-\frac{3}{4}}$

$(-3)(-2)(5)(-4)=$

✓

$6(5)(-4)$

$30(-4)=\boxed{-120}$

Properties of Multiplication

Commutative Property of Multiplication- changing the order when multiplying does not affect the answer.

Example: $2(3) = 3(2)$

Associative Property of Multiplication - changing the grouping when multiplying does not affect the answer

Example: $(5 \cdot 3)2 = 5(3 \cdot 2)$

Multiplication Property of 0- the product of 0 and any real number is 0.

Example: $4(0) = 0$

Multiplication Property of 1- the product of 1 and any real number is that number.

Example: $9(1) = 9$

Multiplicative Inverses- the product of any number and its multiplicative inverse (reciprocal) is 1.

Example: $\frac{8}{1}\left(\frac{1}{8}\right) = 1$ $\frac{8}{8} = 1$ $\frac{3}{4} \cdot \frac{4}{3} = \frac{12}{12} = 1$

Properties of Division

Dividing by 1- the quotient of dividing by 1 is the original number.

Example: $\frac{7}{1} = 7$

Dividing by itself- the quotient of dividing by itself is 1.

Example: $\frac{6}{6} = 1$

Division with 0- the quotient of dividing by 0 is undefined. Dividing 0 by any real number (except 0) is 0.

Example: $\frac{4}{0} =$ *undefined* N way $\frac{0}{4} = 0$ kay

How do you MULTIPLY/DIVIDE REAL NUMBERS?

Varies

Section 1.5: Multiplying/Dividing Real Numbers Practice Problems

Solve the following problems

1a. $4(-3) = \boxed{-12}$

b. $-15(-4) = \boxed{60}$

c. $-\frac{\cancel{5}^{1}}{\cancel{6}_{2}}\left(\frac{\cancel{3}^{1}}{\cancel{10}_{2}}\right) = \boxed{-\frac{1}{4}}$

$-\frac{1}{4}$

2a. $\frac{-30}{-3} = \boxed{10}$

b. $\frac{-72}{4} = \boxed{-18}$

c. $\frac{2.25}{-0.5} = \boxed{-4.5}$

$0.5\overline{)2.25}$

$5\overline{)22.5}$ 4.5

20

25

3a. $1.2(-3.5) = \boxed{-4.2}$

1.2

× 3.5

60

360

4.20

b. $-\frac{7}{12}\cdot\frac{2}{5} = \boxed{-\frac{7}{30}}$

$-\frac{7}{\cancel{12}_{6}}\cdot\frac{\cancel{2}^{1}}{5} = -\frac{7}{30}$

c. $\frac{-\frac{2}{3}}{-\frac{5}{12}} = \boxed{\frac{8}{5} = 1\frac{3}{5}}$

$-\frac{2}{3} \div -\frac{5}{12}$

$-\frac{2}{\cancel{3}_{1}} \cdot -\frac{\cancel{12}^{4}}{5} = \frac{8}{5} = 1\frac{3}{5}$

4a. $(-1)(-6)(-3)(-4) = \boxed{72}$

$6(-3)(-4)$

$-18(-4)$

72

b. $\left(-\frac{1}{2}\right)\left(\frac{\cancel{6}^{3}}{7}\right)\left(-\frac{3}{8}\right)(-2) = \boxed{-\frac{9}{28}}$

$-\frac{3}{7}\left(-\frac{3}{8}\right)(-2)$

$\frac{9}{\cancel{56}_{28}}\left(-\frac{2}{1}\right) = -\frac{9}{28}$

5. Create a word problem where to find the solution you need to multiple or divide a negative and positive value.

Varies

1.6: Exponents and Order of Operations

Exponents- used to indicate repeated multiplication.

2^3 2 is the base and 3 is the exponent.

$$2^3 = 2 \cdot 2 \cdot 2 = 8$$

Practice Examples:

Write each expression using exponents:

a. $5 \cdot 5 \cdot 5 \cdot 5 =$ 5^4

b. $(-3)(-3)(-3)(-3)(-3)(-3) =$ $(-3)^6$

c. fourteen cubed = 14^3

d. $7 \cdot 7 \cdot 7 \cdot 12 \cdot 12 =$ $7^3 \cdot 12^2$

e. $b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b =$ b^8

d. $\frac{4}{3} \cdot \pi \cdot r \cdot r \cdot r =$ $\frac{4}{3}\pi r^3$

Write out each expression and find the value:

a. $3^4 =$ $3 \cdot 3 \cdot 3 \cdot 3 = 81$

b. $(-2)^3 =$ $(-2)(-2)(-2) = -8$

c. $7^1 =$ 7

d. $(-1)^{100} =$ 1

e. $\left(-\frac{1}{2}\right)^3 =$ $\left(-\frac{1}{2}\right)\left(-\frac{1}{2}\right)\left(-\frac{1}{2}\right)$

$\boxed{-\frac{1}{8}}$

f. $(0.4)^2 =$ $(0.4)(0.4) = 0.16$

$$\begin{array}{r} 0.4 \\ 0.4 \\ \hline .16 \end{array}$$

Solve:

-3^2

$3 \cdot 3$

-9

$(-3)^2$

$(-3)(-3)$

9

What are the steps for ORDER OF OPERATIONS?

Order of Operations

1) **Parenthesis** $\{ [(\quad)] \}$

2) **Exponents**

3) **Multiplication/ Division (Left to right)**

4) **Addition/ Subtraction (Left to right)**

Practice Examples:

a. $2 \cdot 3^2 - 5 =$

$2 \cdot 9 - 5$

$18 - 5$

$\boxed{13}$

b. $160 \div (-4) - 6(-2)3 =$

$-40 - 6(-2)3$

$-40 - {}^{-}36$

$-40 + 36$

$-40 + {}^{-}6(-2)3$

$-40 + 36$

-4

Practice Examples continue:

c. $100 \div 2 \cdot 5 - 12 + 4 =$

✓

$50 \cdot 5 - 12 + 4$

$250 - 12 + 4$

$238 + 4$

$\boxed{242}$

d. $-4[-2 - 3(4 - 8^2)] - 2 =$

$-4[-2 - 3(4 - 64)] - 2$

$-4[-2 - 3(-60)] - 2$

$-4[-2 + 180] - 2$

$-4\ [178] - 2$

$-712 - 2 \qquad -712 + -2$

$\boxed{-714}$

e. $\frac{-3(3+2)+5}{8-3(-4)} = \frac{-10}{20} = \boxed{-\frac{1}{2}}$

$-3(3+2)+5 \qquad 8-3(-4)$

$-3(5)+5 \qquad 8+12$

$-15+5 \qquad 20$

-10

f. $10|2-5| - 2^5 =$

$10|-3| - 2^5$

$10 \cdot 3 - 2^5$

$10 \cdot 3 - 32$

$30 - 32$

$\boxed{-2}$

What are the steps for ORDER OF OPERATIONS?

Varies 1) Parenthesis

2) Exponents

3) Mult/ Division

4) Add / Subtract

The Mean (Average)

Arithmetic mean (average)- divide the sum of the values by the number of values.

Example:

What is your test average if your test scores were?:

Test 1: 90
Test 2: 80
Test 3: 100
Test 4: 70

$$\frac{90+80+100+70}{4} = \frac{340}{4} = 85$$

Section 1.6: Exponents/Order of Operations Practice Problems

Write each expression using exponents:

1a. $2\cdot2\cdot2\cdot2\cdot2\cdot2\cdot2=$ 2^7 b. $(-1)(-1)(-1)(4)(4)(-7)=$ $(-1)^3(4)^2(-7)$

2a. $-2\cdot5\cdot-2\cdot5\cdot5\cdot x\cdot y\cdot y=$ $(-2)^2(5)^3xy^2$ b. $3\cdot3\cdot3\cdot a\cdot a\cdot a\cdot a\cdot b\cdot b\cdot c=$ $(3)^3a^4b^2c$

Write out each expression and find the value:

3a. $4^3=$ $4\cdot4\cdot4=64$ b. $(-3)^5=$ $(-3)(-3)(-3)(-3)(-3)=-243$

4a. $0^1=$ 0 b. $(-1)^{31}=$ (Don't write out, just solve) -1

5a. $(1.2)^3=$ $(1.2)(1.2)(1.2)=1.728$ b. $\left(-\frac{2}{3}\right)^4=$ $\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right)=\frac{16}{81}$

6a. $(-5)^2=$ $(-5)(-5)=25$ b. $-5^2=$ $-(5)(5)=-25$

Solve:

7a. $5(-2)^3-3(-4)-6^2=$ $\boxed{-64}$

$5(-8)-3(-4)-36$

$-40+12-36$

$-28-36=\boxed{-64}$

b. $60\div(3)(-2)-4+10=$ $\boxed{-34}$

$20(-2)-4+10$

$-40-4+10$

$-44+10=-34$

8a. $80\div(2\cdot4)-(5^2-9)=$ $\boxed{-6}$

$80\div(8)-(25-9)$

$80\div(8)-(16)$

$10-16=\boxed{-6}$

b. $-\left|8-5(3-2^2)\right|-7=$ $\boxed{-20}$

$-[8-5(3-4)]-7$

$-[8-5(-1)]-7$

$-[8+5]-7$

$-[13]-7=-20$

9a. $\frac{2(-1-4)^2-6}{8-|2-6|}=$ $\boxed{11}$

$\frac{2(-5)^2-6}{8-|-4|}=\frac{2(25)-6}{8-4}=\frac{50-6}{4}$

$\frac{44}{4}=\boxed{11}$

b. $-|-3||7-5|-4^2=$ $\boxed{-22}$

$-(3)|2|-16$

$-(3)(2)-16$

$-6-16=-22$

10. What is the basketball point average if the points per game were?: $\boxed{22\frac{1}{6}}$

Game 1: 14 Game 2: 18 Game 3: 20 Game 4: 28 Game 5: 21 Game 6: 32

$\frac{14+18+20+28+21+32}{6}=\frac{133}{6}=22.1\overline{6}$

$\boxed{\text{or}}$

$22\frac{1}{6}$

1.7: Algebraic Expressions

What are ALGEBRAIC EXPRESSIONS and why do we use them?

Algebraic expressions- variables and/or numbers can be combined with the operations of arithmetic

Example: $3x^2y + 5x - 7$

Term- part of an algebraic expression that is separated by addition or subtraction

Example: The terms of the algebraic expression $3x^2y + 5x - 7$ are: $3x^2y$, $5x$, and -7

Coefficient- the numerical factor of a term

Example: The coefficient of the terms $3x^2y$, $5x$, and -7 are: 3, 5, -7

Algebraic equation- equation that contains variables

Example: $5x^2 - 7 = 2x + 5$

Practice Example:

Given the algebraic expression: $2x^2 - 6x + 9$

What are the terms? $2x^2$, $-6x$, 9

What are the coefficients? 2, -6, 9

Practice Example:

Given the algebraic expression: $x^3 - 4x^2y + 5xy - 6$

What are the terms? x^3, $-4x^2y$, $5xy$, -6

What are the coefficients? 1, -4, 5, -6

Translating from Words to Symbols

Addition	
Sum of x and 5	$x + 5$
f plus 9	$f + 9$
5 added to b	$5 + b$
8 more than r	$r + 8$
15 greater than g	$g +15$
Y increased by h	$Y + h$
Exceeds 6 by u	$6 + u$

Subtraction	
Difference of 5 and h	$5 - h$
100 minus b	$100 - b$
25 less than w	**$w - 25$**
8 decreased by J	$8 - J$
B reduced by 7	$B - 7$
10 subtracted from v	**$v - 10$**
L less 4	$L - 4$

Multiplication	
product of 5 and x	$5x$
25 times g	$25g$
twice w	**$2w$**
triple x	$3x$
$\frac{1}{2}$ of P	$\frac{1}{2}P$
x squared	x^2

Division	
quotient of x and 10	$\frac{x}{10}$
W divided by S	$\frac{W}{S}$
ratio of 5 to b	$\frac{5}{b}$
D split into 6 parts	$\frac{D}{6}$

Equals	
X plus 5 equals 7	$X + 5 = 7$
Twice b results in 10	$2b = 10$
6 times a number is 12	$6x = 12$

Special	
two consecutive numbers	x and $(x +1)$
two consecutive even (or odd) numbers	x and $(x + 2)$

Practice Examples: Translate into an algebraic expression or algebraic equation

1. Five times b plus twice w

$5b + 2w$

2. The product of 4 and Y is less than 12

$12 - 4y$

3. If 4 times a number is increased by 13, the result is 40 less than the square of the number.

$4x + 13 = x^2 - 40$

4. The sum of a number and 9 is 5 more than twice the number.

$x + 9 = 5 + 2x$ $x+9=2x+5$

5. If 7 times the sum of a number and 3 is equal to 15.

$7(x+3) = 15$

6. If 10 times a number is decreased by 25, the result is 12 less than twice the number.

$10x - 25 = 2x - 12$

7. The product of a number and the next consecutive even number is 6.

$x(x+2) = 6$

Evaluating Algebraic Expressions

To evaluate an algebraic expression, substitute given numbers for each variable and do the necessary calculations.

Example:
Evaluate the expression $2x-4y$ given x = 2 and y = -1.

Solution:
$2x-4y$
Substitute the values for x and y into the expression
$2(2)-4(-1)$
Evaluate the problem
$2(2)-4(-1)$
$4+4$
8

Practice Examples:

1. Evaluate the given expression when w = -3: $-w^2+6w-5$

$-(-3)^2+6(-3)-5$
$-9+6(-3)-5$
$-9+-18-5$
$-27-5=$
$-27+-5=\boxed{-32}$

2. Evaluate the given expression when x = -3, y = 4, z = -6: $9xy-z^2$

$9(-3)(4)-(-6)^2$
$9(-3)(4)-36$
$-108-36$
$\boxed{-144}$

Practice Examples continue:

3. Evaluate the given expression when x = -4, y = -1: $\frac{x-3y}{y^3}$

$$\frac{(-4)-3(-1)}{(-1)^3} = \frac{-4+3}{-1} = \frac{-1}{-1} = \boxed{1}$$

4. Evaluate the given expression when x = -2, y = 3: $|x-2y|+3|x|$

$$|-2-2(3)| + 3|-2|$$

$$|-2-6| + 3|-2|$$

$$|-8| + 3|-2|$$

$$8 + 3 \cdot 2$$

$$8 + 6 = \boxed{14}$$

What are ALGEBRAIC EXPRESSIONS and why do we use them?

Varies

Section 1.7: Algebraic Expressions Practice Problems

1. **Given the algebraic expression:** $2x^5 - x^3y^7 + 4x^5y + y - 8$

a. What are the terms? $2x^5,\ -x^3y^7,\ 4x^5y,\ y,\ -8$

b. What are the coefficients? $2,\ -1,\ 4,\ 1,\ -8$

Translate the following phrases into algebraic expressions or algebraic equations

2. The sum of a number and 5 $x+5$

3. The product of a number and 3 is less than 7 $7-3x$

4. If 7 times a number is decreased by 2, the result is 10 less than the twice the number

$$7x-2 = 2x-10$$

5. If 4 times the sum of a number and 8 is equal to 40.

$$4(x+8) = 40$$

6. The sum of a number and the square of a number is equal to 5 less than twice the number.

$$x + x^2 = 2x - 5$$

7. The product of a number and the next consecutive odd number is 10.

$$x(x+2) = 10$$

8. Evaluate the given expression when: a = 6, b = -4, c = -3: $\frac{2a}{b} - c^2$ $\boxed{-12}$

$$\frac{2(6)}{(-4)} - (-3)^2 \Rightarrow \frac{12}{-4} - 9 \Rightarrow -3-9 \Rightarrow -12$$

9. Evaluate the given expression when x = -2: $x^3 - x^2 - x$ $\boxed{-10}$

$$(-2)^3 - (-2)^2 - (-2)$$

$$-8 - 4 + 2$$

$$-12 + 2 = -10$$

10. Evaluate the given expression when x = -3, y = 10: $-3\left|x^2 - y\right| - \left|x\right|$ $\boxed{-6}$

$$-3\left|(-3)^2 - (10)\right| - \left|-3\right|$$

$$-3\left|9-10\right| - 3$$

$$-3\left|-1\right| - 3$$

$$-3(1) - 3 = -3-3 = \boxed{-6}$$