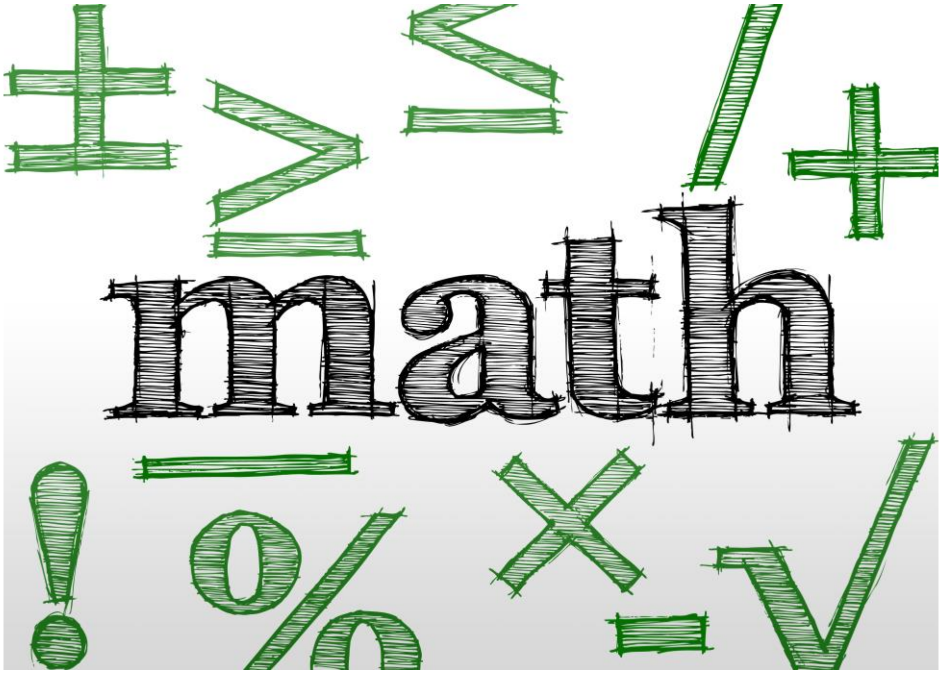
7th Grade Math



Summer 2021,

Break Assignments

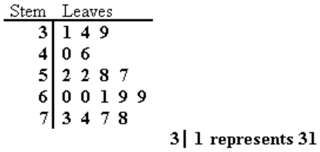
Due September 10, 2021

Study Guide

Summer Packet 7th Grade
06/09/2021

Interpret Stem-and-Leaf Plots

A stem-and-leaf plot summarizes the shape of a set of data (the distribution) and provides extra detail regarding individual values. The data is arranged by place value. The digits with the largest place value are referred to as the stem (stems) and the digits with the smallest place value are referred to as the leaf (leaves). The leaves are always displayed to the right of the stem. A stem can contain one or more digits, but a leaf can only be a one-digit number. Stem-and-leaf plots are generally used for organizing large amounts of information. An example of a stem-and-leaf plot is below.

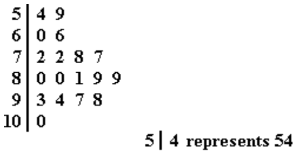


Stem	Leaves
3	1 4 9
4	0 6
5	2 2 8 7
6	0 0 1 9 9
7	3 4 7 8

3| 1 represents 31

The stems of a stem-and-leaf plot are always listed in numerical order from smallest at the top to largest at the bottom. The leaves of the stem-and-leaf plot are always listed in numerical order from left to right. The stem is read with each leaf. In this case, the stems are the tens place and the leaves are the ones place, so 3 | 1 4 9 represents 31, 34, and 39.

Example 1: What is the maximum value of the data set represented in the stem-and-leaf plot?



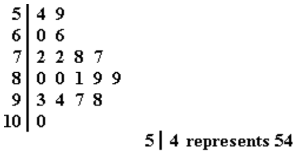
5	4 9
6	0 6
7	2 2 8 7
8	0 0 1 9 9
9	3 4 7 8
10	0

5| 4 represents 54

Solution: The largest stem is 10 and the largest leaf for that stem is 0, so the largest number represented by the plot is 100.

Answer: 100

Example 2: The stem-and-leaf plot below shows the test scores from students in Mr. Nguyen's class. In which of the following ranges did **most** students score?



5	4 9
6	0 6
7	2 2 8 7
8	0 0 1 9 9
9	3 4 7 8
10	0

5| 4 represents 54

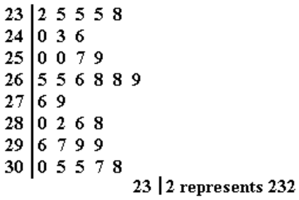
A. between 50 and 59
B. between 60 and 69
C. between70 and 79
D. between 80 and 89

Solution:
A. is not the correct answer because only 2 students scored between 50 and 59.

B. is not the correct answer because only 2 students scored between 60 and 69.
C. is not the correct answer because only 4 students scored between70 and 79.
D. is the correct answer because 5 students scored between 80 and 89. The next highest range only had 4 students score in it.

Answer: D.

Example 3: The stem-and-leaf plot shows numbers of miles driven while on a vacation by a group of families. How many families drove 235 miles while on vacation?



23	2 5 5 5 8
24	0 3 6
25	0 0 7 9
26	5 5 6 8 8 9
27	6 9
28	0 2 6 8
29	6 7 9 9
30	0 5 5 7 8

23 | 2 represents 232

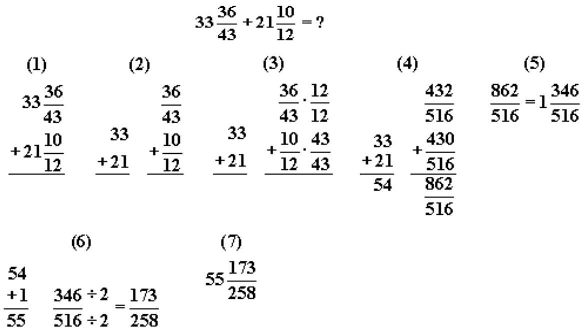
Solution: In this stem-and-leaf plot, the stems represent the hundreds and tens places and the leaves represent the ones place. To figure out how many families drove 235 miles while on vacation, look at the stem of 23 and count the number of 5s listed in the corresponding leaves column. There are 3 leaves that fit these two conditions, so 3 families drove 235 miles while on vacation.

Answer: 3 families

Add Fractions: Mixed Numbers - B

Adding mixed fractions requires an understanding of adding fractions and the multiplication facts. If the numerator (the number on the top of a fraction) is less than the denominator (the number on the bottom of a fraction), the fraction is called a proper fraction. If the numerator is equal to or greater than the denominator, the fraction is called an improper fraction. An improper fraction can be rewritten as a mixed number. For example, 5/3 is an improper fraction. It can be rewritten as 1 2/3, which is a mixed number.

Example 1: Solve.



$$33\frac{36}{43}+21\frac{10}{12}=?$$

(1)

$$\begin{array}{r} 33\frac{36}{43} \\ +21\frac{10}{12} \\ \hline \end{array}$$

(2)

$$\begin{array}{r} 33 \\ +21 \\ \hline \end{array} \qquad \begin{array}{r} \frac{36}{43} \\ +\frac{10}{12} \\ \hline \end{array}$$

(3)

$$\begin{array}{r} 33 \\ +21 \\ \hline \end{array} \qquad \begin{array}{r} \frac{36}{43}\cdot\frac{12}{12} \\ +\frac{10}{12}\cdot\frac{43}{43} \\ \hline \end{array}$$

(4)

$$\begin{array}{r} 33 \\ +21 \\ \hline 54 \end{array} \qquad \begin{array}{r} \frac{432}{516} \\ +\frac{430}{516} \\ \hline \frac{862}{516} \end{array}$$

(5)

$$\frac{862}{516}=1\frac{346}{516}$$

(6)

$$\begin{array}{r} 54 \\ +1 \\ \hline 55 \end{array} \qquad \frac{346\div 2}{516\div 2}=\frac{173}{258}$$

(7)

$$55\frac{173}{258}$$

Step 1: Rewrite the problem vertically.
Step 2: Separate the problem into addition of whole numbers and addition of fractions.
Step 3: Find a common denominator (a common multiple of the denominators of two or more fractions) for the fractions. The simplest way to find a common denominator is to multiply all the denominators together. For this problem, the common denominator is 516 because 12 x 43 = 516. Multiply 36/43 by 12/12. Multiply 10/12 by 43/43.
Step 4: Add the whole numbers (33 + 21 = 54). Add the numerators (432 + 430 = 862). The denominator remains the same (516).

<u>Step 5</u>: 862/516 is an improper fraction, so it must be rewritten as a mixed number. Since 516 will divide into 862 one time with 346 left over, 862/516 can be rewritten as 1 346/516.
<u>Step 6</u>: Add the whole numbers (54 + 1 = 55). Since 346 and 516 can both be divided by 2, 346/516 can be reduced to 173/258.
<u>Step 7</u>: Combine the whole number and the fraction to produce the answer.

Answer: $55\frac{173}{258}$.

Example 2: Solve.

$$3\frac{5}{8}+2\frac{1}{6}+5\frac{1}{5}=?$$

$$\begin{array}{cccccc}
(1) & (2) & (3) & (4) & (5) & (6) \\
\begin{array}{r} 3\frac{5}{8} \\ 2\frac{1}{6} \\ +5\frac{1}{5} \\ \hline \end{array} &
\begin{array}{r} \\ 3 \\ 2 \\ +5 \\ \hline \end{array}\ \begin{array}{r} \frac{5}{8} \\ \frac{1}{6} \\ +\frac{1}{5} \\ \hline \end{array} &
\begin{array}{r} \\ 3 \\ 2 \\ +5 \\ \hline \end{array}\ \begin{array}{r} \frac{5}{8}\times\frac{30}{30} \\ \frac{1}{6}\times\frac{40}{40} \\ +\frac{1}{5}\times\frac{48}{48} \\ \hline \end{array} &
\begin{array}{r} \\ 3 \\ 2 \\ +5 \\ \hline 10 \end{array}\ \begin{array}{r} \frac{150}{240} \\ \frac{40}{240} \\ \frac{48}{240} \\ \hline \frac{238}{240} \end{array} &
\frac{238\div 2}{240\div 2}=\frac{119}{120} &
10\frac{119}{120}
\end{array}$$

<u>Step 1</u>: Rewrite the problem vertically.
<u>Step 2</u>: Separate the problem into addition of whole numbers and addition of fractions.
<u>Step 3</u>: Find a common denominator for the fractions. For this problem, the common denominator is 240 because 8 x 6 x 5 = 240. Multiply 5/8 by 30/30 (multiply by 30/30 because 8 x 30 = 240). Multiply 1/6 by 40/40. Multiply 1/5 by 48/48.
<u>Step 4</u>: Add the whole numbers (3 + 2 + 5 = 10). Add the numerators (150 + 40 + 48 = 238). The denominator remains the same (240).
<u>Step 5</u>: Since 238 and 240 can both be divided by 2, the fraction 238/240 can be reduced to 119/120.
<u>Step 6</u>: Combine the whole number and the fraction to produce the answer.

Answer: $10\frac{119}{120}$.

Order of Operations with Decimals - A

Performing operations with decimals is similar to performing operations with whole numbers.

Operations inside parentheses are performed first.

Example 1: (7.2 + 3.4) + (2.31 + 5.352) = ?

(1) 7.2 + 3.4 = 10.6 and 2.31 + 5.352 = 7.662
(2) 10.6 + 7.662 = ?
(3) 10.6 + 7.662 = 18.262

<u>Step 1:</u> Perform all operations within parentheses. Add 7.2 + 3.4 = 10.6. And add 2.31 + 5.352 = 7.662.
<u>Step 2:</u> Rewrite the equation with the new numbers in place of the parentheses.
<u>Step 3</u>: Add 10.6 and 7.662.

The answer is 18.262

Example 2: (13.295 - 1.62) - (3.5625 + 5.92) = ?

(1) 13.295 - 1.62 = 11.675 and 3.5625 + 5.92 = 9.4825
(2) 11.675 - 9.4825 = ?
(3) 11.675 - 9.4825 = 2.1925

Step 1: Perform operations within parentheses. Subtract 13.295 - 1.62 = 11.675. And add 3.5625 + 5.92 = 9.4825.
Step 2: Rewrite the equation with the new numbers in place of the parentheses.
Step 3: Subtract 9.4825 from 11.675.

The answer is 2.1925.

Polynomials: Subtraction

A monomial is the product of a number and an unknown variable or unknown variables. 6xy is a monomial. The sum or difference of two or more monomials is called a polynomial.

Here is an example of a polynomial: $y^2 + 4y + 3$.
Adding and subtracting polynomials includes simplifying and combining "like" terms. Like terms are monomials that have the same variable or variables for which the variable or variables have the same exponent.

Examples :
$\begin{Bmatrix} 2x \\ 4x \end{Bmatrix}$ like terms $\begin{Bmatrix} 2x \\ -4x^2 \end{Bmatrix}$ not like terms

To subtract polynomials, first write the polynomials as one long polynomial. Then distribute the subtraction sign through the second polynomial. Finally, combine like terms. Practice by subtracting the following polynomials.

Example 1: Subtract $(p^2 - 2p - 6)$ from $(p^2 + 3p + 3)$.

(1)
$p^2 + 3p + 3 - (p^2 - 2p - 6)$

(2)
(p^2) becomes $(-p^2)$
$(-2p)$ becomes $(+2p)$
(-6) becomes $(+6)$

(3)
$p^2 + 3p + 3 - p^2 + 2p + 6$

(4)
$p^2 - p^2 = 0$
$3p + 2p = 5p$
$3 + 6 = 9$

Step 1: Set up the two polynomials as one long polynomial. Since the problem is to subtract one polynomial from another, the second polynomial in the problem must be written first.
Step 2: Distribute the subtraction sign through the second polynomial. This involves changing the sign of each term in the second polynomial.
Step 3: Rewrite the polynomial after changing the signs in the second polynomial.
Step 4: Combine like terms.

Answer: 5p + 9

Example 2: Subtract four times a number decreased by ten from eight times the same number less six.

Step 1: "Four times a number decreased by ten" can be written (4x - 10).
Step 2: "Eight times the same number less six" can be written (8x - 6).
Step 3: Now the problem reads: Subtract (4x - 10) from (8x - 6).

(4)
$(8x - 6) - (4x - 10)$

(5)
$4x$ becomes $-4x$
-10 becomes $+10$

(6)
$8x - 6 - 4x + 10$

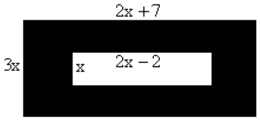
(7)
$8x - 4x = 4x$
$-6 + 10 = 4$

Step 4: Set up the polynomials as one long polynomial.
Step 5: Distribute the subtraction sign through the second polynomial. This involves changing the sign of each term in the second polynomial.
Step 6: Rewrite the entire polynomial after changing the signs in the second polynomial.
Step 7: Combine like terms.

(4x - 10) subtracted from (8x - 6) equals 4x + 4.

Answer: 4x + 4

Example 3: Find area of the shaded region.



(1)
$3x(2x + 7)$
$3x(2x) + 3x(7)$
$6x^2 + 21x$

(2)
$x(2x - 2)$
$x(2x) - x(2)$
$2x^2 - 2x$

(3)
$(6x^2 + 21x) - (2x^2 - 2x)$

(4)
$6x^2 + 21x - 2x^2 + 2x$

(5)
$6x^2 - 2x^2 = 4x^2$
$21x + 2x = 23x$

Step 1: Determine the area of the large rectangle by multiplying the length (2x + 7) by the width (3x). This involves multiplying each term in (2x + 7) by 3x.
Step 2: Determine the area of the small rectangle by multiplying the length (2x - 2) by the width (x). This involves multiplying each term in (2x - 2) by x.
Step 3: Now subtract the area of the small rectangle from the area of the large rectangle. Remember to put the second polynomial in parentheses since this is subtraction.
Step 4: Distribute the subtraction sign through the second polynomial. This involves changing the sign of each term in the second polynomial.
Step 5: Combine like terms.

Answer: $4x^2 + 23x$.

Perimeter - A

Perimeter is the measurement around a figure.

To calculate the perimeter of a figure, add the lengths of all the sides of the figure. For example, a figure has four sides measuring 3 inches, 7 inches, 3 inches and 7 inches.

Add all sides of the figure.

P = 7 + 3 + 7 + 3 = 20

The perimeter of the figure is 20 inches.

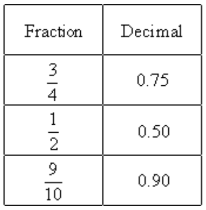
Help the student practice finding the perimeter on different shaped objects. For example, a figure with four sides measuring 3, 6, 7, and 2 inches has a perimeter equal to 18 inches. It may be useful to create perimeter problems using graph paper.

Equivalent Forms: Decimal/Fraction

Equivalent forms of numbers name the same numbers. Fractions can be written in equivalent forms as decimals and vice versa. For example, 1/4 = 0.25.

It may be advantageous to concentrate on either fractions or decimals. Do not introduce a new area until one has been completely mastered. Once the student has mastered either fractions or decimals, begin to interject its equivalent form. Develop a series of fractions and decimals and help the student find the equivalent forms.

The following examples will help get you started:



Fraction	Decimal
$\frac{3}{4}$	0.75
$\frac{1}{2}$	0.50
$\frac{9}{10}$	0.90

To write a fraction as a decimal number, simply divide the numerator (the top number) by the denominator (the bottom number).

Example 1: Write the fraction 5/8 as a decimal.

(1) 5 ÷ 8 = ?
(2) 5 ÷ 8 = 0.625

Step 1: Divide the numerator by the denominator.
Step 2: Complete the division problem.

Answer: 0.625

The following example will demonstrate the equivalent form of a decimal in fraction form:

Example 2: Which of the following is another way to write 0.38?

A. 38/100
B. 3810
C. 38/100
D. 38/1000

Solution:

(1) 0.38 = "thirty-eight hundredths" = 38/100

(2) $\frac{38 \div 2}{100 \div 2} = \frac{19}{50}$

Step 1: Since the 8 is in the hundredths place, 0.38 can be written in fraction form as 38/100.
Step 2: Since 38 and 100 can both be divided by 2, to completely reduce the fraction 38/100, divide 38 by 2 and 100 by 2.

Answer: 38/100 or 19/50

It may be necessary to completely reduce a fraction. A fraction is said to be in lowest terms when the greatest common factor of the numerator and denominator is 1.

Example 3: Determine another way to write 24/36.

$\frac{24 \div 12}{36 \div 12} = \frac{2}{3}$

Solution: Determine the greatest common factor of 24 and 36. The greatest common factor (GCF) of two or more numbers is the largest number that will divide into all of the numbers without remainders. The GCF of 24 and 36 is 12. Divide the numerator and the denominator by the GCF. 24 ÷ 12 = 2 and 36 ÷ 12 = 3

The fraction 24/36 can also be written as the fraction 2/3.

Add Decimals: Story Problems - B

Story problems, also called word problems, relate addition of decimal numbers to actual situations. Operational symbols, such as the addition (+) symbol, are replaced with text. Word problems in this skill also deal with money ($3.74).

Story problems are often very difficult for students to master. It may be beneficial for you to create humorous problems and help the student determine the correct formulas.

For example, Fred ran 8.971 miles on Saturday and 5.363 miles on Sunday. How many miles did Fred run in all?

(1)	(2)	(3)	(4)	(5)
		1	1 1	1 1
8.971	8.971	8.971	8.971	8.971
+ 5.363	+ 5.363	+ 5.363	+ 5.363	+ 5.363
	4	34	.334	14.334

Step 1: Rewrite the problem vertically. Always line up the decimal points.
Step 2: Add the numbers in the thousandths position (1 + 3 = 4). Write the 4 in the thousandths position.
Step 3: Add the numbers in the hundredths position (7 + 6 = 13). Write the 3 in the hundredths position. Carry the 1 to the next column (tenths).

Step 4: Add the numbers in the tenths column, including the number carried over from the previous column (1 + 9 + 3 = 13). Write the 3 in the tenths position. Carry the 1 to the next column (ones). Bring the decimal point down.
Step 5: Add the numbers in the ones position, including the number carried over from the previous column (1 + 8 + 5 = 14). Write the 14 to the left of the decimal point.

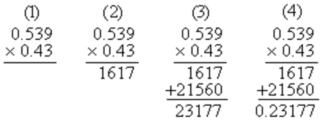
Answer: Fred ran 14.334 miles.

Multiply Decimals: Thousandths

Multiplying a decimal number by another decimal number (0.539 x 0.43) requires a strong understanding of multiplication skills, specifically with multiple digit numbers.

The following is a step-by-step example of a decimal number multiplied with another decimal number.

Solve: 0.539 x 0.43 = ?



Step 1: Rewrite horizontal problems vertically.

Step 2: Multiply 539 by 3. Write the product (1617) below the line.

Step 3: Place a 0 below the product of Step 2 in the ones position. Multiply 539 by 4. Write the product (2156) to the left of the 0. Add the two products (1617 + 21560) and write the sum (23177) below the line.

Step 4: Place the decimal point. Each place to the right of the decimal point is a decimal place. Count the number of decimal places in the factors (5). Place the decimal point in that position in the product. The number of decimal places in the product equals the sum of the decimal places in the factors.

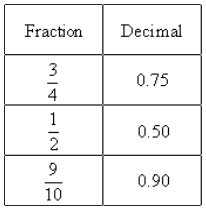
The correct answer is 0.539 x 0.43 = 0.23177.

Equivalent Forms: Decimal/Mixed Fract.

Fractions can be written in decimal number format, and vice versa. For example, 1/4 = 0.25.

It may be advantageous to concentrate on either fractions or decimals. Do not introduce a new area until one has been completely mastered. Once the student has mastered either fractions or decimals, begin to introduce its equivalent form. Develop a series of fractions and decimals and help the student find the equivalent forms.

The following examples will help get you started:



Fraction	Decimal
$\frac{3}{4}$	0.75
$\frac{1}{2}$	0.50
$\frac{9}{10}$	0.90

To write a fraction as a decimal number, simply divide the numerator (the top number) by the denominator (the bottom number).

Example 1: Write the fraction 5/8 as a decimal.

(1) 5 ÷ 8 = ?
(2) 5 ÷ 8 = 0.625

Step 1: Divide the numerator by the denominator.
Step 2: Complete the division problem.

Answer: 0.625

Example 2: Write the mixed number 2 3/4 as a decimal.

(1) whole number: 2; fraction: 3/4
(2) 3/4 = 3 ÷ 4 = 0.75
(3) 2 3/4 = 2.75

Step 1: Separate the mixed number 2 3/4 into a whole number and a fraction. The whole number will always remain a whole number, but the fraction can be changed into a decimal.
Step 2: Write the fraction 3/4 as a decimal by dividing the numerator by the denominator.
Step 3: Put the whole number and the decimal back together to get the complete decimal number.

Answer: 2.75

Example 3: Which of the following is another way to write 7.38?

A. 738/10
B. 7 3810
C. 7 38/100
D. 7 38/1000

Solution:

(1) whole number: 7; decimal: 0.38
(2) 0.38 = "thirty-eight hundredths" = 38/100
(3) 7.38 = 7 38/100

Step 1: Separate 7.38 into its parts: whole number and decimal number.
Step 2: Since the 8 is in the hundredths place, we can state 0.38 as "thirty-eight hundredths", which can be written as 38/100.
Step 3: Put the whole number and the fraction back together to get the mixed number.

Answer: C.

It may be necessary to completely reduce a fraction. A fraction is said to be in lowest terms when the greatest common factor of the numerator and denominator is 1.

Example 4: Determine another way to write 24/36.

$$\frac{24 \div 12}{36 \div 12} = \frac{2}{3}$$

Solution: Determine the greatest common factor of 24 and 36. The greatest common factor (GCF) of two or more numbers is the largest number that will divide into all of the numbers without remainders. The GCF of 24 and 36 is 12. Divide the numerator and the denominator by the GCF. 24 ÷ 12 = 2 and 36 ÷ 12 = 3.

Answer: 2/3

Multiply Whole and Mixed Numbers

A mixed number is a number written as a whole number followed by a fraction. Students must be comfortable rewriting mixed numbers as improper fractions and vice versa. Improper fractions are fractions in which the numerator is larger than the denominator. This form allows students to easily multiply two fractions, two mixed numbers, two whole numbers, or any combination of the three.

Remember:
In order to write a mixed number as an improper fraction, multiply the denominator by the whole number and then add the numerator. The result then becomes the numerator and the original denominator remains the same.

Example: Write $8\frac{5}{9}$ as an improper fraction.

(1)	(2)
$(9\times8)+5=77$	$\frac{77}{9}$

Step 1: Multiply the denominator (9) by the whole number (8) and then add the numerator (5).
Step 2: Rewrite the fraction using the result from step one (77) as the numerator and 9 (the original denominator) as the denominator.

In order to write an improper fraction as a mixed number, divide the numerator by the denominator. The new quotient becomes the whole number and the remainder becomes the numerator of the mixed number. The denominator remains the same.

Example: Write $\frac{77}{9}$ as a mixed number.

(1)	(2)
$77 \div 9 = 8r5$	$8\frac{5}{9}$

Step 1: Divide the numerator (77) by the denominator (9).
Step 2: Write the mixed number using the whole number quotient, 8, as the whole number and the remainder, 5, as the numerator. The denominator remains the same.

Once the student is comfortable with converting mixed fractions to improper fractions and improper fractions to mixed numbers, he or she is ready to move on to multiplying a mixed number by a whole number.

Example 1: Multiply. Reduce your answer to lowest terms.

$5\times4\frac{7}{9} =$

(1) $5\times4\frac{7}{9}$

(2) $4\frac{7}{9}=\frac{43}{9}$ $\quad 5=\frac{5}{1}$

(3) $\frac{5}{1}\times\frac{43}{9}=$

(4) $\frac{5\times43}{1\times9}=\frac{215}{9}$

(5) $215\div9=23r8$

(6) $23\frac{8}{9}$

Step 1: Rewrite the problem.
Step 2: Rewrite 4 7/9 as an improper fraction and 5 as a fraction. Remember, to change a whole number into a fraction, write the whole number as the numerator with a denominator of 1.
Step 3: Rewrite the problem using the new forms of 5/1 and 43/9.
Step 4: Multiply the numerators and the denominators.
Step 5: In order to reduce the answer to lowest terms, the student will need to change the answer of 215/9 back into a mixed number. The first step to doing this is to divide the numerator by the denominator.
Step 6: Since 215 divided by 9 is 23 r8, 23 becomes the whole number and 8 becomes the numerator. The denominator will remain 9. The answer 23 and 8/9 cannot be reduced any further since 8 and 9 do not share any common factors.

Answer: $23\frac{8}{9}$

Example 2: Multiply. Reduce your answer to lowest terms.

$27\times3\frac{4}{9} =$

(1) $27\times3\frac{4}{9} =$

(2) $3\frac{4}{9}=\frac{31}{9}$ $\quad 27=\frac{27}{1}$

(3) $\frac{27}{1}\times\frac{31}{9}$

(4) $\frac{\overset{3}{\cancel{27}}}{1}\times\frac{31}{\underset{1}{\cancel{9}}}=\frac{93}{1}$

(5) $\frac{93}{1}=93$

Step 1: Rewrite the problem.
Step 2: Rewrite 3 4/9 as an improper fraction and 27 as a fraction.
Step 3: Rewrite the problem using the new forms of 27/1 and 31/9.
Step 4: Before multiplying the numerators and the denominators, use cross cancellation to make the numbers in the problem more manageable. Since the numerator (27) and denominator (9) are both divisible by 9, divide both numbers by 9 and then perform the multiplication. 3 X 31 = 93 and 1 X 1 = 1.
Step 5: Since 93/1 is a whole number written as a fraction, remove the denominator to write 93 in its whole number form.

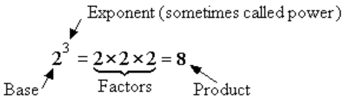
Answer: 93

***Cross cancellation is the process of reducing the numbers within a multiplication of fractions problem before multiplying the fractions. If a numerator and a denominator of any of the fractions to be multiplied can be divided by the same number, this division can be performed before the fractions are multiplied.

An activity to reinforce the concept of multiplying mixed numbers by a whole number is to create two stacks of flash cards. Write only whole numbers on the cards in one stack and only mixed numbers on the cards in the other stack. Place each stack separately into two brown paper bags. Have the student randomly pull one whole number and one fraction from each bag and calculate the product of the two numbers.

Calculating With Exponents

In this study guide, students will learn how to perform basic calculations with exponents. An exponent is a number that represents repeated multiplication. It tells the student how many times the base is used as a factor. A factor is a number that is multiplied by another number. For example, the base number 2 with an exponent of 3 is equal to 2 × 2 × 2. It is usually written in the following format:



Before calculating exponents within an expression, find the equivalent whole number forms of these exponential numbers:

6^2 (or "six to the second power" or "six squared")
$6\times6 = 36$

3^3 (or "three to the third power" or "three cubed")
$3\times3\times3 = 27$

2^6 (or "two to the sixth power")
$2\times2\times2\times2\times2\times2 = 64$

The most common error among students learning about exponents is to multiply the base number by the exponent. That is, many students will calculate 8 to the 3rd power as 8 × 3 = 24, instead of 8 × 8 × 8 = 512.

Calculating Exponents Within An Expression

When working with exponents within an expression, the student must remember the rules for the order of operations. The order of operations can be remembered with the phrase "**P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally."

The student should always perform operations in the following order:

P - Parentheses
E - Exponents
M/D - Multiplication/Division in order from left to right
A/S - Addition/Subtraction in order from left to right

Example 1: Subtract.

$5{,}000 - 8^4 =$

(1) $8^4 = 8 \times 8 \times 8 \times 8 = 4{,}096$
(2) $5{,}000 - 4{,}096 = 904$

Step 1: According to the rules for order of operations, calculate the exponent first.
Step 2: Subtract 4,096 from 5,000.

Answer: $5{,}000 - 8^4 = 904$

Example 2: Add.

$9^2 + 3^4 =$

(1) $9 \times 9 = 81$
(2) $3 \times 3 \times 3 \times 3 = 81$
(3) $81 + 81 = 162$

Step 1: Since both terms in the expression contain exponents, the student should work from left to right. Calculate 9^2 first.
Step 2: Next, calculate 3^4.
Step 3: Finally, add 81 + 81.

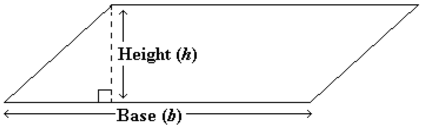
Answer: $9^2 + 3^4 = 162$

To help the student practice calculating exponents try the following activity. Begin with several blank index cards. First, write the numbers 1-10 on ten different cards. Next, write *exponent of 1, exponent of 2*...up to *exponent of 10* on ten different cards. Then, write ten whole numbers of your choice on ten different cards. Finally, write the addition and subtraction symbols on two different cards. (For a challenge you may want to include multiplication and division.) Sort the cards into 4 separate piles (single-digit whole numbers, exponents, whole numbers, and operational symbols). Turn all the cards face down. Have the student randomly select one card from each pile and then combine the numbers and symbols to create an expression. Finally, have the student calculate the various exponential expressions.

Area of Parallelogram - B

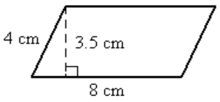
A parallelogram is a quadrilateral (a four-sided figure) with two pairs of parallel and congruent sides. Area is the measure, in square units, of the interior region of a two-dimensional figure.

To find the area of a parallelogram, multiply the length of the base (b) by the height (h). The base is one of the sides of the parallelogram. The height is the length of the segment going from the base at a right angle (or perpendicular) to the opposite side. Here is the formula:



Area of a parallelogram = base × height

Example 1: Find the area of the parallelogram.



Solution:

The formula for the area of a parallelogram is Area = base × height. The height of this parallelogram is 3.5 cm and the base is the length of the side that the height is perpendicular to, in this case, 8 cm. Therefore, the area of the parallelogram is $3.5 \text{ cm} \times 8 \text{ cm} = 28 \text{ cm}^2$

Answer: 28 cm^2.

One way to help the student reinforce the concept of finding the area of parallelograms is to use a ruler to draw a few parallelograms. Have the student measure the base and height of the parallelograms and then calculate the area using the formula given above. Also, try to find parallelograms in real world figures (such as those in designs) that can be measured so the area can be computed.

Equations With Two Variables

This study guide will focus on solving equations that contain two variables.

Remember:

Variables are letters or symbols that represent numbers that are unknown.

Expressions are variables or combinations of variables, numbers, and symbols that represent a mathematical relationship. Expressions do not have equal signs, but can be evaluated or simplified.

Example: $y - 9$

Equations are expressions that contain equal signs. They can be solved, but not evaluated.

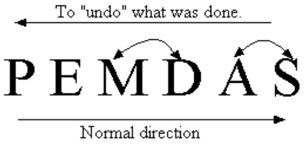
Example: $5 + x = 13$

Like terms are those terms that have the same variable(s) in common, or no variable. Like terms can be combined.

Examples: 2 and 3 are like terms, $2x$ and $3x$ are like terms, but 2 and $3x$ are not like terms.

Solving Equations

To solve an equation, it is necessary to "undo" what was done to the variable in question. Another way to think about this is to do the order of operations in reverse.



P = Parenthesis, E = Exponents, M = Multiplication, D = Division, A = Addition, S = Subtraction.

**In the normal direction, first evaluate multiplication and division from left to right (whichever comes first), then evaluate addition and subtraction from left to right (whichever comes first).

**To "undo" what was done, reverse the direction.

- Addition "undoes" subtraction.
- Subtraction "undoes" addition.
- Multiplication "undoes" division.
- Division "undoes" multiplication.

Addition/Subtraction Properties - Adding or subtracting the same real number to each side of an equation will result in an equivalent equation.

Example 1: Solve $16 = 5 + x - 8$ for x.

(1)

$$\begin{array}{l} 16 = 5 + x - 8 \\ +8 \qquad\quad +8 \\ \hline 24 = 5 + x + 0 \end{array}$$

(2)

$$\begin{array}{l} 24 = \; 5 + x \\ -5 = -5 \\ \hline 19 = \; 0 + x \end{array}$$

Step 1: Begin to isolate the variable, x, by adding 8 to both sides of the equation. Remember to only add and subtract like terms, so the 8 must be added to the - 8 and the 16.

Step 2: Subtract 5 from both sides of the equation to completely isolate the variable, x.

Answer: $x = 19$

<u>Multiplication/Division Properties</u> - Multiplying or dividing each side of an equation by the same (nonzero) number will result in an equivalent equation.

Example 2: Solve the following equation for *t*.

$$\frac{4t}{17} = 32$$

(1)

$$(17)\frac{4t}{17} = 32(17)$$
$$4t = 544$$

(2)

$$\frac{4t}{4} = \frac{544}{4}$$
$$t = 136$$

<u>Step 1:</u> Multiply both sides of the equation by 17 to eliminate the fraction.
<u>Step 2:</u> Divide both sides of the equation by 4 to isolate the variable, *t*.

Answer: $t = 136$.

Solving Equations With Two Variables

In order to solve equations that contain two variables, the student will need to solve for one variable in terms of the other. This means that the answer may not be entirely numeric.
The same properties as described above should be used when solving for a given variable in a two-variable equation. Students should treat the second variable as if it were a number.

Example 3: Solve $30w - 9v = 6$ for *w*.

(1)

$$\begin{array}{rl} 30w - 9v & = 6 \\ +9v & = +9v \\ \hline 30w + 0 & = 6 + 9v \end{array}$$

(2)

$$30w = 6 + 9v$$
$$\frac{30w}{30} = \frac{6+9v}{30}$$
$$w = \frac{6+9v}{30}$$

(3)

$$w = \frac{(6+9v) \div 3}{30 \div 3}$$
$$w = \frac{2+3v}{10}$$

<u>Step 1:</u> Begin to isolate *w* by adding 9*v* to both sides of the equation. Remember to only combine like terms.
<u>Step 2:</u> Completely isolate the variable, *w*, by dividing by 30 on both sides of the equation.
<u>Step 3:</u> Simplify the solution. Since 6, 9, and 30 can all be divided by 3, divide the numerator and denominator of the fraction by 3.

Answer: $w = \frac{2+3v}{10}$

Example 4: Solve the following equation for *r*.

$$\frac{r}{7} - 7 = 10s$$

(1)

$$\begin{array}{rl} \frac{r}{7} - 7 & = 10s \\ +7 & = \quad +7 \\ \hline \frac{r}{7} + 0 & = 10s + 7 \end{array}$$

(2)

$$\frac{r}{7} = 10s + 7$$
$$(7)\frac{r}{7} = 7(10s + 7)$$
$$r = 7(10s + 7)$$

<u>Step 1:</u> Begin to isolate *r* by adding 7 to both sides of the equation. Remember to only combine like terms. 10*s* + 7 cannot be combined because they are not like terms.
<u>Step 2:</u> Completely isolate *r* by multiplying both sides of the equation by 7.
Answer: $r = 7(10s + 7)$

Example 5: Solve the following equation for *a*.

$$5(a - b) = 14b$$

(1)

$$\overset{\frown}{5(a-b)} = 14b$$
$$5a - 5b = 14b$$

(2)

$$\begin{array}{r} 5a - 5b = 14b \\ +5b = +5b \\ \hline 5a + 0 = 19b \end{array}$$

(3)

$$\frac{5a}{5} = \frac{19b}{5}$$
$$a = \frac{19b}{5}$$

<u>Step 1:</u> Questions of this type involve using the distributive property. The <u>distributive property</u> states that for all numbers *a, b,* and *c*, *a(b + c) = ab + ac*. Therefore, begin by multiplying 5 by *a* and by *b*.
<u>Step 2:</u> Next, begin to isolate *a* by adding 5*b* to both sides of the equation. 14*b* and 5*b* are considered like terms so they can be added together to get 19*b*.
<u>Step 3:</u> Completely isolate the variable, *a*, by dividing both sides of the equation by 5.

Answer: $a = \frac{19b}{5}$

Subtract Fractions: Mixed Numbers - A

This study guide will focus on subtracting mixed numbers that do not require regrouping (borrowing) or reducing.

To review, a <u>mixed number</u> is a whole number followed by a fraction that, together, represent one value. If the numerator (the top number) of a fraction is less than the denominator (the bottom number), the fraction is called a <u>proper fraction</u>. If the numerator is equal to or greater than the denominator of a fraction, the fraction is called an <u>improper fraction</u>. The following is a step-by-step example of how to subtract two mixed numbers with no regrouping or reducing.

Example 1: Subtract.

$$\begin{array}{r} 5\frac{3}{5} \\ -2\frac{1}{3} \\ \hline \end{array}$$

(1)

$$5\frac{3\times3}{5\times3} = 5\frac{9}{15}$$
$$2\frac{1\times5}{3\times5} = 2\frac{5}{15}$$

(2)

$$\begin{array}{r} 5\frac{9}{15} \\ -2\frac{5}{15} \\ \hline 3\frac{4}{15} \end{array}$$

<u>Step 1</u>: Find the lowest common denominator for the fractions (15) and rewrite the fractions using the common denominator. Multiply the numerator and denominator of 3/5 by 3 (because 5 × 3 = 15) and multiply the numerator and denominator of 1/3 by 5 (because 3 × 5 = 15).
<u>Step 2</u>: Subtract the new fractions. First, subtract the numerators of the fractions (9 - 5 = 4) and place the 4 in the numerator of the answer. The denominator remains the same (15). Now, subtract the whole numbers (5 - 2 = 3).

Answer: $3\frac{4}{15}$

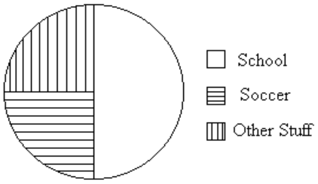
One way to reinforce this skill is to write mixed numbers on two sets of index cards. For one set, use large whole numbers (10 - 20) and large fractions (such as 3/4 or 4/5). For the other set, use small whole numbers (1 - 9) and small fractions (such as 2/5 or 1/8). Have the student draw one card from each set of cards and subtract the mixed number with the smaller whole number from the mixed number with the larger whole number.

Circle Graphs - A

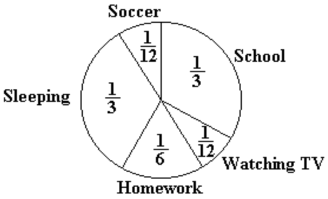
A <u>graph</u> is a drawing used to show and compare information. A <u>circle graph</u>, or pie chart, is often used to show parts of a whole.

An interesting method for increasing the student's understanding of graphs is to help him or her develop a graph for a school project or event.

Have him or her create a circle graph for the events that typically occur in the student's day. If he or she spends half of the day at school, then half (1/2) of the circle would be filled with the title "School." Similarly, if one-quarter (1/4) of the day is spent at the soccer field, then a quarter of the pie would be titled "Soccer." The following is an example:



Example 1: Callie wanted to show how she spent her time. She made a pie graph of her typical 24 hour day. Use the pie graph to answer the question.



How many hours does Callie spend in school?

(1) $\frac{1}{3}\times\frac{24}{1}$ (2) $\frac{1\times24}{3\times1}=\frac{24}{3}$ (3) $\frac{24}{3}=8$

Step 1: Callie spends 1/3 of her day in school, so we need to multiply 1/3 by 24 hours to determine the number of hours Callie spends in school.
Step 2: Multiply the numerators (top numbers) together (1 x 24 = 24) and multiply the denominators (bottom numbers) together (3 x 1 = 3).
Step 3: Divide 24 by 3 to determine the number of hours Callie spends in school each day.

Answer: Callie spends 8 hours in school each day.

Exponential Notation - A

An exponent is a number that represents how many times the base is used as a factor. For example, the number 2 with an exponent of 3 is equal to 2 x 2 x 2.

Have the student find the equivalent whole number forms of these exponential numbers:

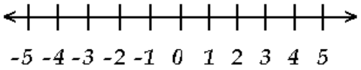
(1)
6^2 (or 6 to the second power)
$6\times6=36$
(2)
3^3 (or 3 to the third power)
$3\times3\times3=27$
(3)
2^5 (or 2 to the fifth power)
$2\times2\times2\times2\times2=32$

The most common error among students learning about exponents is multiplying the base number by the exponent. That is, many students will calculate 8 to the 3rd power as 8 x 3 = 24. The correct answer is 8 x 8 x 8 = 512.

Adding Integers

Integers are the set of positive and negative whole numbers, including zero. To add integers, students must understand how integers appear on a number line. Numbers to the right of 0 on a number line are positive and numbers to the left of 0 are negative. The number -3 is a negative integer and the number 3 is a positive integer. The number zero is neither positive nor negative, it is neutral.

It may be beneficial to verify that the student understands integers by having him or her create a number line. Label points to the left of 0 "negative," and points to the right of the 0 "positive." The following is an example of a number line:



Confirm that the student understands that -4 is less than 4. Once he or she is comfortable with the concept of integers, introduce adding and subtracting. For example, -4 + 2. Start at -4 and move 2 places to the right (because we are adding). The answer is -2.

When adding two integers with the same sign, add their absolute values. Then give the sum (answer) the sign of the integers.

-3 + -2 = ?
|-3| + |-2| = ?
3 +2 = 5, then make the result negative.

Answer: -5

When adding integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value, and give the result the sign of the integer with the greater absolute value.

-7 + 3 = ?
|-7| = 7 and |3| = 3 (find the absolute values)
7 - 3 = ? (subtract the lesser from the greater)
7 - 3 = 4
-7 + 3 = -4 (The result is given the sign of the greater integer.)

Ratio/Proportion - B

A ratio is a comparison of two numbers expressed as a quotient. They can be written in three ways: a fraction (3/5), a ratio (3:5), or a phrase (3 to 5). Like fractions, ratios refer to a specific comparison. The ratios 3/5, 3:5, and 3 to 5 (as in "the ratio of cellos to violins was 3 to 5") all express the same ratio or comparison. A proportion reflects the equivalency of two ratios. The ratio 3/5 expresses the same proportion as the ratio 15/25.

To understand how ratios operate, students need to understand equivalent fractions. Fractions represent portions or parts. For every fraction, there is a corresponding portion. The fraction 1/2 communicates a specific portion of something, but this specific portion can also be communicated by the fractions 2/4, 3/6, 8/16, 10/20, etc. All of these fractions are equal to 1/2 because the relationship between the numerator and denominator in 1/2 is the same relationship between the numerators and denominators in 2/4, 3/6, 8/16, and 10/20. Ratios and proportions operate in a similar manner. The ratio 2:5 communicates a specific portion. The ratio 4:10 communicates the same portion.

Example 1: Sandra has 15 lollipops and 25 jellybeans. What is the ratio of lollipops to jellybeans?

There are 15 lollipops to 25 jellybeans, so the ratio of lollipops to jellybeans is 15:25.

Answer: 15:25

Proportions occur when two ratios are equal. In a proportion the cross products of the terms are equal.

Example 2: Is the following proportion True or False?

1/3 = 3/9

$$\frac{1}{3} \overset{=}{\times} \frac{3}{9}$$

$$9 \times 1 = 3 \times 3$$

$$9 = 9$$

The cross products are both equal to 9, so the proportion is TRUE. If the cross products are not equal, the proportion is false.

Sometimes you must find the value of a variable in a proportion. To solve the proportion, you must find the value of the variable that makes both ratios equal.

Example 3: 9/12 = a/48

$$\frac{9}{12} \overset{=}{\times} \frac{a}{48}$$

(1) $48 \times 9 = 12 \times a$

(2) $432 = 12a$

(3) $\frac{432}{12} = \frac{12a}{12}$

(4) $36 = a$

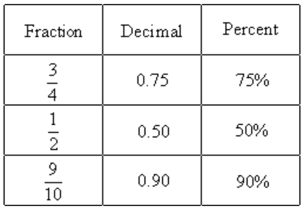
Step 1: Find the cross products. Multiply 48 by 9 and 12 by 'a'.
Step 2: 48 x 9 = 432 and 12 x a = 12a. Rewrite the equation with the new products.
Step 3: Divide each side of the equation by 12 to isolate the variable 'a'.
Step 4: Divide 432 by 12 to get a = 36.

Answer: a = 36

Equivalent Forms: Dec./Fract./Percent

Fractions can be written as decimals and percents. For example, 1/4 is 0.25 or 25%. The numerator of a fraction is the number on the top of the fraction and the denominator of a fraction is the number on the bottom of the fraction.

Develop a series of fractions and decimals and help the student find the equivalent forms. The table below will help get you started.



Fraction	Decimal	Percent
$\frac{3}{4}$	0.75	75%
$\frac{1}{2}$	0.50	50%
$\frac{9}{10}$	0.90	90%

Example 1: Write 2/5 as a decimal and as a percent.

$$\overset{(1)}{\frac{2}{5} = 2 \div 5} \qquad \overset{(2)}{2 \div 5 = 0.4} \qquad \overset{(3)}{0.4 \times 100 = 40\%}$$

Step 1: Every fraction can also be written as a division problem by dividing the numerator by the denominator.
Step 2: Complete the division problem to write 2/5 as a decimal.
Step 3: To write a decimal as a percent, multiply the decimal number by 100. This involves moving the decimal point two places to the right.

Answers: Decimal 0.4 and Percent 40%

Example 2: Write 8.2% as a decimal and as a fraction.

$$\overset{(1)}{8.2\% \div 100 = 0.082} \qquad \overset{(2)}{0.082 = \frac{82}{1000}} \quad \overset{(3)}{\frac{82 \div 2}{1000 \div 2} = \frac{41}{50}}$$

Step 1: To change a percent into a decimal, divide the percent by 100. This involves moving the decimal point two places to the left.
Step 2: The decimal 0.082 is read "eighty-two thousandths," so it can be written as the fraction 82/1000.
Step 3: Since 82 and 1000 can both be divided by 2, the fraction can be reduced to 41/500.

Answers: Decimal 0.082 and Fraction 41/500.

Scientific Notation

Scientific notation is a condensed way to write very large or small numbers without including each digit. Scientific notation is a number written as the product of a number between 1 and 10 and a power of 10.

To write a large number using scientific notation, count the digits (from right to left) to be represented by a power of 10. 123,000,000 can be written in scientific notation as 1.23 x 10 to the 8th power. To write a small number, count the digits from left to right. To undo scientific notation, move the decimal point the same number of places as the exponent in the power of ten.

Example 1: $6.29 \times 10^7 = ?$
Answer: 62,900,000 (move the decimal 7 places to the right)

Example 2: $56,700 = 5.67 \times 10^?$
Answer: The missing exponent would be 4.

Circumference - B

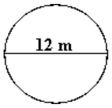
Circumference is the distance around a circle.

The following is the formula necessary for calculating the circumference of a circle:

$$\text{circumference} = \pi \text{ x Diameter}$$

Pi is equal to about 3.14. The symbol for pi is π.
The <u>diameter</u> is a line segment from one point on the circle through the center of the circle to another point on the circle. The <u>radius</u> is a line segment from the center of a circle to a point on the circle. The length of the diameter of a circle is twice the length of the radius of the circle. For example, if a circle has a radius equal to 6 inches, the diameter equals 2 x 6 inches which is 12 inches.

Example 1: What is the circumference of a circle with a diameter of 12 meters?

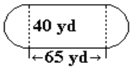


(1) Circumference = 3.14 x 12
(2) Circumference = 37.68m

Step 1: Substitute the value of the diameter into the formula for the circumference of a circle. Remember, pi is equal to about 3.14.
Step 2: Multiply 3.14 by 12 to get the circumference of the circle.

The circumference of the circle is 37.68 m.

Example 2: Joshua Pine High School has an oval track. Use the diagram to find the length of the track.



Solution:
The center section of the track (between the two dotted lines) is a rectangle with a length of 65 yards. Each end of the track is a semicircle (half of a circle) with a diameter equal to 40 yards.

(1)

$\text{Circumference (C)} = \pi \times d$
$d = 40 \text{ yd}$
$C = 3.14 \times 40$
$C = 125.6 \text{ yd}$

(2)

$\text{Length of track} = 125.6 \text{ yd} + 65 \text{ yd} + 65 \text{ yd}$

Step 1: Since each end of the track is a semicircle with diameter 40 yd, the two ends can be put together to make a full circle with diameter 40 yd. Finding the circumference of the circle will find the distance around both ends of the track. The circumference of the circle is 125.6 yd.
Step 2: The length of the track is equal to the sum of the distance around the two ends plus the length of the two straight sides. The distance around the two ends is 125.6 yd and the length of each of the two straight sides is 65 yd.

The length of the track is 255.6 yd.

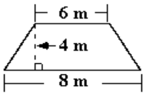
Area of Trapezoid

The area of a trapezoid is the number of square units needed to cover the surface of the figure.

The following is the formula needed for calculating the area of a trapezoid:

$$\text{Area} = \frac{1}{2} \times \text{height} \times (\text{sum of the length of the bases})$$

Example 1: Solve for the area of a trapezoid with bases equal to 6 meters and 8 meters, and height equal to 4 meters.



(1) $\text{Area} = \frac{1}{2} \times 4 \times (6+8)$

(2) $\text{Area} = \frac{1}{2} \times 4 \times (14)$

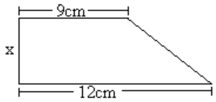
(3) $\text{Area} = \frac{1}{2} \times 56$

(4) $\text{Area} = 28\text{m}^2$

Step 1: Apply the amounts given in the problem to the formula.
Step 2: Add the numbers within the parentheses.
Step 3: Multiply the whole numbers.
Step 4: Perform calculations to find the answer.

Answer: 28 square meters

Example 2: Find x if the area of the trapeziod is 73.5 centimeters squared.



(1) $\text{Area} = \frac{1}{2} \cdot h \cdot (b_1 + b_2) \rightarrow 73.5 = \frac{1}{2} \cdot x \cdot (9+12)$

(2) $73.5 = \frac{1}{2} \cdot x \cdot 21$

(3) $73.5 = \frac{21x}{2}$

(4) $2 \cdot 73.5 = \frac{21x}{\cancel{2}} \cdot \cancel{2}$

$147 = 21x$

(5) $\frac{147}{21} = \frac{21x}{21}$

$7 = x$

Step 1: Apply the given values to the formula for the area of a trapeziod. (NOTE: This time you are given the area of the trapeziod.)
Step 2: Add the numbers within the parentheses.
Step 3: Perform the multiplications on the right side of the equation.
Step 4: Multiply both sides of the equation by 2. Simplify.
Step 5: Divide both sides of the equation by 21.

Answer: x = 7

Dividing Integers

Integers are the set of positive and negative whole numbers, including zero. To find the quotient (answer to a division problem) of two integers, the following rules apply:
The quotient of two integers with different signs is negative. Example: **16 ÷ -4 = -4**.
The quotient of two integers with the same sign is positive. Examples: **16 ÷ 4 = 4** and **-16 ÷ -4 = 4**.

Operations within parentheses are completed first. After performing operations within parentheses, perform all multiplication and division in order from left to right. The last step is to perform all addition and subtraction in order from left to right. (It may be helpful here to review order of operations and/or multiplying with integers.)

Example 1: 4(-3 x 2) ÷ (12 ÷ 2) = ?

(1) -3 x 2 = -6 and 12 ÷ 2 = 6
(2) 4(-6) ÷ 6 = ?
(3) -24 ÷ 6 = ?
(4) -24 ÷ 6 = -4

Step 1: Perform operations within parentheses: (-3 x 2 = -6) and (12 ÷ 2 = 6).
Step 2: Write out the problem, replacing the values within the parentheses with the new values.
Step 3: Perform multiplication or division in order from left to right. Multiply first because it comes first when reading from left to right. 4(-6) = -24.
Step 4: Divide -24 by 6 to get -4. Remember the quotient of two integers with different signs is negative.

Answer: -4

The following example illustrates the use of rules for dividing integers using "is greater than" (>) and "is less than" (<).

Example 2: -24 ? 3(10 ÷ -2)

(1) 10 ÷ -2 = -5
(2) -24 ? 3(-5)
(3) 3 x -5 = -15
(4) -24 ? -15
(5) -24 < -15

Step 1: Perform operations within parentheses. 10 ÷ -2 = -5.
Step 2: Rewrite the problem with -5 in place of the parentheses.
Step 3: Multiply 3 x -5 to get -15.
Step 4: Rewrite the problem with -15 in place of 3(-5).
Step 5: To determine which symbol to place between -24 and -15, think of the integers as being money. -24 would be like owing someone $24 and -15 would be like owing someone $15. Since owing $24 is more in debt than owing $15, -24 is less than -15.

Answer: -24 < -15

Integers: Multiple-step Computation

Integers are positive and negative whole numbers, including zero.

Before computing with integers, let's first review the rules of operations on integers.

When adding two integers with the same sign, add their absolute values. Then give the sum (answer) the sign of the integers.

-3 + -2 = ?
|-3| + |-2| = ?
3 +2 = 5, then make the result negative.

Answer: -5

When adding integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value, and give the result the sign of the integer with the greater absolute value.

-7 + 3 = ?
|-7| = 7 and |3| = 3 (find the absolute values)
7 - 3 = ? (subtract the lesser from the greater)
7 - 3 = 4
-7 + 3 = -4 (The result is given the sign of the greater integer.)

Subtracting integers is the same as adding the opposite.

3 - -7 = ?
3 + +7 = 10 (add the opposite)
3 + 7 = 10

When multiplying integers, the product (answer) of two integers with the same sign is positive. The product of two integers with different signs is negative.

(-5)(-6) = 30
(-5)(6) = -30

When dividing integers, the quotient (answer) of two integers with the same sign is positive. The quotient of two integers with different signs is negative.

-6 ÷ -3 = 2
-6 ÷ 3 = -2

When performing computations with more than one operation, follow the rules for the order of operations.The order of operations is as follows:

1. Perform operations within parentheses, braces, or brackets.
2. Multiply and divide from left to right
3. Add and subtract from left to right

Example 1: (-2 - 5) + 10 = ?

(1) -2 - 5 = -7
(2) -7 + 10 = ?
(3) -7 + 10 = 3

Step 1: Perform the operation within parentheses, -2 - 5 = -7.
Step 2: Replace the -7 for the value of the parentheses.
Step 3: Complete the addition problem.

Answer: 3

When calculating problems with <, >, and =, perform the calculations on each side to determine the values of each side.

Example 2: -(57 - -10)   ?   (-12 - -22)

(1) -(57 - -10) = -(57 + 10) = -(67) = -67
(2) -12 - -22 = -12 + 22 = 10
(3) -67 ? 10
(4) -67 < 10

<u>Step 1</u>: Evaluate the value in the first set of parentheses. Remember, subtracting a negative is the same as adding the opposite. Then distribute the negative sign to the answer.
<u>Step 2</u>: Evaluate the value in the second set of parentheses.
<u>Step 3</u>: Rewrite the mathematical sentence with the new values.
<u>Step 4</u>: Negative 67 is less than positive 10.

Answer: <

Equations: Two-Step

Two-step equations require students to perform two operations before solving the equation.

For example, the equation 3x - 3 = 18 requires adding 3 to both sides of the equation and dividing both sides of the equation by 3.

Example 1: Find the value of n in the equation 6n - 9 = 9

$$\begin{array}{c} \textbf{(1)} \\ \begin{array}{r} 6n + -9 = +9 \\ +9 \quad +9 \\ \hline 6n + 0 = +18 \end{array} \end{array} \qquad \begin{array}{c} \textbf{(2)} \\ \frac{6n}{6} = \frac{18}{6} \end{array}$$

<u>Step 1:</u> In the equation, solve for the value of n by first getting n alone.   Add +9 to both sides of the equation.
<u>Step 2:</u> Divide both sides of the equation by 6.

Answer: n = 3

Example 2: Solve for t.
(1/8)t + 3 = 12

$$\begin{array}{c} \textbf{(1)} \\ \begin{array}{r} \left(\frac{1}{8}\right)t + 3 = 12 \\ -3 \quad -3 \\ \hline \left(\frac{1}{8}\right)t \quad = 9 \end{array} \end{array} \qquad \begin{array}{c} \textbf{(2)} \\ \frac{8}{1} \times \left(\frac{1}{8}\right)t = 9 \times \frac{8}{1} \\ t = 72 \end{array}$$

<u>Step 1:</u> To get the variable alone, subtract 3 from both sides of the equation.
<u>Step 2:</u> Isolate the 't' by multiplying by the reciprocal of 1/8, which is 8/1.

Answer: t = 72

Polynomials: Addition

A monomial is the product of a number and an unknown variable or unknown variables. 6xy is a monomial. The sum of two or more monomials is called a polynomial. Here is an example of a polynomial: $y^2 + 4y + 3$.

Adding and subtracting polynomials includes simplifying and combining "like" terms. Like terms are monomials that have the same variable or variables for which the variable or variables have the same exponent.

Examples :

$\begin{Bmatrix} 2x \\ 4x \end{Bmatrix}$ like terms $\begin{Bmatrix} 2x \\ -4x^2 \end{Bmatrix}$ not like terms

To add polynomials, combine similar terms.

Example 1: $(p^2 + 3p + 3) + (p^2 - 2p - 6)$

(1) $p^2 + 3p + 3 + p^2 - 2p - 6$

(2) $p^2 + p^2 = 2p^2$

$3p - 2p = p$

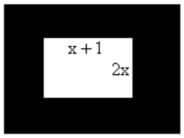
$3 - 6 = -3$

(3) $2p^2 + p - 3$

Step 1: Set the two polynomials up as one long polynomial.
Step 2: Combine the like terms.
Step 3: Add the results of combining the like terms to determine the answer.

The sum is $2p^2 + p - 3$.

Example 2:



(1) $3x^2 + 4x - 2 + \left(2x^2 + 2x\right)$

(2) $\left(3x^2 + 2x^2\right) + \left(4x + 2x\right) - 2$

(3) $5x^2 + 6x - 2$

Step 1: The area of the large rectangle would be the area of the shaded region added to the area of the small rectangle. Since we know both areas, we simply add them together.
Step 2: Collect like terms so they can be added.
Step 3: Add together any like terms that were collected to determine the final answer.

The area of the large rectangle is $5x^2 + 6x - 2$.

Sometimes it is necessary to use the distributive property before we can combine like terms.

Example 3: $3\left(8x^2 + 16x - 7\right) - 4\left(x^2 + 3x - 5\right)$

(1) $3(8x^2) + 3(16x) + 3(-7) + (-4)(x^2) + (-4)(3x) + (-4)(-5)$

$24x^2 + 48x - 21 - 4x^2 - 12x + 20$

(2) $(24x^2 - 4x^2) + (48x - 12x) + (-21 + 20)$

(3) $20x^2 + 36x - 1$

Step 1: Multiply each term of the first polynomial by 3. Then multiply each term of the second polynomial by -4.
Step 2: Group like terms together.
Step 3: Combine like terms.

Answer: $20x^2 + 36x - 1$

Example 4: Solve for a, b, and c.

$$\left(9x^2 + bx + 4\right) + \left(ax^2 - 5x - 3\right) = 5x^2 - 7x + c$$

(1) $(9x^2 + ax^2) + (bx - 5x) + (4 - 3) = 5x^2 - 7x + c$

(2) $9x^2 + ax^2 = 5x^2$

$bx - 5x = -7x$

$4 - 3 = c$

(3) $a = -4, b = -2, c = 1$

<u>Step 1</u>: Group the similar terms on the left side of the equation together.
<u>Step 2</u>: Now, group like terms from both sides of the equal sign together.
<u>Step 3</u>: Solve for a, b, and c.

Answer: a = -4, b = -2, and c = 1

Polynomials: Division

A <u>monomial</u> is the product of a number and an unknown variable or unknown variables. 6xy is a monomial. The sum of two or more monomials is called a <u>polynomial</u>. Here is an example of a polynomial: $y^2 + 4y + 3$.
A <u>binomial</u> is a polynomial with exactly two monomial terms. 3x + 4 is a binomial. A <u>trinomial</u> is a polynomial with exactly three terms. 4xy - 3x +6y is a trinomial.

Before dividing polynomials, recall the following properties associated with exponents:

Exponential Properties for Division

$$\frac{a^m}{a^n} = a^{m-n}$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^0 = 1$$

Example 1: Divide.

$$\frac{12x^3y}{-3xy}$$

(1)	(2)	(3)	(4)
$\frac{12}{-3} = -4$	$\frac{x^3}{x} = x^{3-1} = x^2$	$\frac{y}{y} = y^{1-1} = y^0 = 1$	$(-4)(x^2)(1)$ $-4x^2$

<u>Step 1</u>: Divide the whole numbers: 12 ÷ -3 = -4.
<u>Step 2</u>: Use the properties above to divide the variables. Begin with the x-variables. x-cubed divided by x equals x-squared.
<u>Step 3</u>: Now divide the y-variables. y divided by y equals y to the power of zero. Any number taken to the power of zero equals 1.
<u>Step 4</u>: Finally, multiply the quotients back together.

The answer is $-4x^2$.

Dividing a Polynomial by a Monomial:

To divide a polynomial by a monomial, divide each term of the polynomial by the monomial. Then, combine the similar terms.

Example 2: Divide.

$$\frac{3m - 9n}{3}$$

(1)	(2)	(3)
$\frac{3m}{3} = m$	$\frac{-9n}{3} = -3n$	$m - 3n$

Step 1: Divide 3m by 3, to get m.
Step 2: Divide -9n by 3, to get -3n.
Step 3: Combine the terms.

Answer: m - 3n

Dividing a Polynomial by a Polynomial:

Dividing one polynomial by another is very similar to long division.

Example 3: Divide $(6x^2+8x+8)$ by $(3x+1)$.

$$\begin{array}{ll} \text{Step 1:} & 3x+1\overline{\big)\,6x^2+8x+8} \\ & \qquad\qquad\quad 2x+2 \\ \text{Step 2:} & 3x+1\overline{\big)\,6x^2+8x+8} \\ \text{Step 3:} & \qquad\underline{-(6x^2+2x)} \\ \text{Step 4:} & \qquad\qquad\quad 6x+8 \\ \text{Step 5:} & \qquad\qquad\underline{-(6x+2)} \\ & \qquad\qquad\qquad 6 \end{array}$$

Step 1: Write the problem as a long division problem. The binomial belongs on the outside of the division symbol because it is the term we are dividing by.
Step 2: Now, we can begin dividing.
$(3x)(2x)=6x^2$ So, 2x belongs above the 8x.
Step 3: The next step is to multiply 2x by (3x + 1).
$(2x)(3x+1)=6x^2+2x$ Subtract that product from $6x^2+8x$. Now, bring the + 8 straight down beside the 6x.
Step 4: (3x)(2) = 6x, so we place the 2 above the 8 in the answer.
Step 5: Multiply 2 by (3x + 1) to get 6x + 2. Subtract (6x + 2) from (6x + 8). There is a remainder of 6, so we write the remainder as a fraction with the binomial as the denominator.

Answer: $2x+2+\frac{6}{3x+1}$

Summer Packet 7th Grade
06/09/2021

Student Name: ______________________________

Class: ______________________________

Date: ______________________________

Instructions: **Read each question carefully and select the correct answer.**

1. The stem-and-leaf plot below shows the number of baskets made by players during a week of basketball practice. Anthony made the fewest baskets during the week. How many baskets did he make?

1 | 8 9
2 | 2 5 6
3 | 3 5 5 5 7 9
4 | 6 8
5 | 0 1 3

5 | 1 represents 51

A. 1 baskets
B. 0 baskets
C. 18 baskets
D. 189 baskets

2. The scores from a midterm exam are shown in the following stem-and-leaf plot. What was the best score in the class?

3 | 4 9
4 | 2 6 8 8
5 | 1 2 5 6 6 7 9
6 | 0 3

4 | 2 represents 42

A. 6 points
B. 49 points
C. 63 points
D. 9 points

3. What is the maximum value of the data set represented in the stem-and-leaf plot?

1 | 8 9
2 | 2 5 6
3 | 3 5 5 5 7 9
4 | 6 8
5 | 0 1 3

5 | 1 represents 51

A. 3,355,579
B. 53
C. 68
D. 5

4. The stem-and-leaf plot below shows the number of baskets made by players during a week of basketball practice. How many people made 35 baskets during the week?

1 | 8 9
2 | 2 5 6
3 | 3 5 5 5 7 9
4 | 6 8
5 | 0 1 3

5 | 1 represents 51

A. 3 players
B. 0 players
C. 6 players
D. 1 players

5. Reduce your answer to lowest terms.

$42\frac{13}{23}+56\frac{23}{27}$

A. $99\frac{351}{621}$

B. $99\frac{259}{621}$

C. $98\frac{259}{621}$

D. $98\frac{1}{3}$

6. Reduce your answer to lowest terms.

$3\frac{5}{8}+13\frac{1}{6}=$

A. $16\frac{6}{14}$

B. $16\frac{19}{48}$

C. $16\frac{19}{24}$

D. $43\frac{19}{24}$

7. Reduce your answer to lowest terms.

$8\frac{3}{7}+3\frac{2}{3}+4\frac{2}{5}$

A. $15\frac{19}{35}$

B. $15\frac{52}{105}$

C. $16\frac{52}{105}$

D. $16\frac{19}{35}$

8. Reduce your answer to lowest terms.

$2\frac{2}{5}+3\frac{3}{8}+1\frac{5}{6}$

A. $7\frac{73}{240}$

B. $6\frac{386}{240}$

C. $6\frac{73}{120}$

D. $7\frac{73}{120}$

9. (6.57 + 2.009) - (1.56 - 0.003) =

A. 3.004
B. 10.136
C. 7.022
D. 6.118

10. (20,203.014 - 5.223) - 6.999 =

A. 20,190.801
B. 20,197.791
C. 20,190.918
D. 20,190.792

11. (7.3320 + 0.0123) + (9.260 - 7.39) =

A. 9.1897
B. 9.2143
C. 23.982
D. 5.4743

12. (8.21 - 6.31) - (1.11 + 0.111) =

A. 0.901
B. 2.899
C. 3.121
D. 0.679

13. Subtract eight more than three times a number from six less than five times a number.

A. $2x - 14$
B. $-2x -14$
C. $2x + 2$
D. $-2x + 2$

14. Simplify.

$(3a^3 + 5a + 7) - (4a^2 - 6a)$

A. $-a^3 + 11a + 7$
B. $3a^3 - 4a^2 - a + 7$
C. $3a^3 - 4a^2 + 11a + 7$
D. $7a^3 - a + 7$

15. Subtract the following.

$\left(4x^3+2x^2-9x+4\right)-\left(2x^3-4x^2-3\right)-\left(6x+2\right)$

A. $2x^3-2x^2-15x+5$

B. $2x^3-2x^2+3x-1$

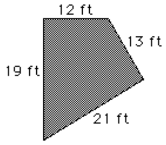
C. $2x^3+6x^2-15x+5$

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

16. Subtract three times a number increased by four from ten times the same number less twelve.

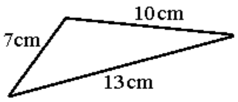
A. $-7x - 8$
B. $-7x + 16$
C. $7x - 16$
D. $7x - 8$

17. What is the perimeter of this shape?



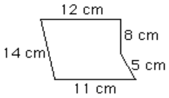
A. 65 ft
B. 130 ft
C. 84 ft
D. 32 ft

18. Find the perimeter of the figure.



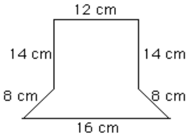
A. 17 cm
B. 20 cm
C. 23 cm
D. 30 cm

19. What is the perimeter of this shape?



A. 50 cm
B. 25 cm
C. 100 cm
D. 10 cm

20. What is the perimeter of this shape?



A. 42 cm
B. 50 cm
C. 36 cm
D. 72 cm

21. Which of the following is another way to write 1/4?

A. 25
B. 0.25
C. 0.025
D. 0.0025

22. Which of the following is another way to write 6/10 ?

A. 6
B. 0.6
C. 0.06
D. 1.6

23. Which of the following is another way to write 8/16?

A. 1/4
B. 1/2
C. 1/16
D. 2/16

24. Which of the following is another way to write 1/2?

A. 0.50
B. 5.0
C. 10/200
D. 2/1

25. Lauren bought 2 pairs of shoes for dance class. One pair cost $29.99 and the other pair cost $12.98.

How much money did Lauren spend on shoes in all?

A. $31.87
B. $42.97
C. $43.97
D. $43.87

26. Chrissy went shopping on Saturday and spent $75.00. She went shopping again on Tuesday and spent $68.00. What would be the best mathematical operation to figure out the total amount of money that Chrissy spent shopping over the course of the two days?

- **A.** subtraction
- **B.** multiplication
- **C.** addition
- **D.** division

27. Kelsey rode her bike 14.568 miles on Saturday. She rode 17.5689 miles on Sunday.

How many miles did she ride in all?

- **A.** 32.1369 miles
- **B.** 21.0269 miles
- **C.** 31.0369 miles
- **D.** 19.0157 miles

28. It rained 1.7445 inches in January and it rained .2334 inches in February.

How many inches did it rain in all?

- **A.** 207.85 inches
- **B.** 197.79 inches
- **C.** 1.9779 inches
- **D.** 3.0785 inches

29. 7.963 x 2.1 =

- **A.** 23,889
- **B.** 16.7223
- **C.** 2.3889
- **D.** 167,223

30. Multiply.

29.63 X 37 =

- **A.** 296.30
- **B.** 1,073.63
- **C.** 29.2331
- **D.** 1,096.31

31.

```
  1.999
x 2.336
```

A. 4.335000
B. 4.669664
C. 4,335
D. 4,669,664

32.

```
  4.901
x 0.345
```

A. 1.690845
B. 58,812
C. 0.058812
D. 1,690,845

33. Which of the following is equivalent to 1 9/100?

A. 1.9
B. 19/10
C. 1 7/8
D. 1.09

34. Convert 0.28 to a fraction. Reduce your answer to lowest terms.

A. $\frac{28}{100}$
B. $\frac{7}{25}$
C. $\frac{14}{5}$
D. $\frac{7}{250}$

35. Which of the following is equivalent to 34/136?

A. 1/3
B. 3/5
C. 1/4
D. 2/3

36. Which of the following is another way to write 1.43?

A. 143/10
B. 1 43/100
C. 100/143
D. 1 100/43

37. Multiply. Reduce your answer to lowest terms.

$5\frac{3}{4}\times 3 =$

A. $15\frac{3}{4}$

B. $17\frac{1}{4}$

C. $11\frac{1}{4}$

D. $8\frac{3}{4}$

38. Multiply. Reduce your answer to lowest terms.

$7\frac{2}{9}\times 5 =$

A. $1\frac{4}{9}$

B. $\frac{9}{13}$

C. $35\frac{2}{9}$

D. $36\frac{1}{9}$

39. Multiply. Reduce your answer to lowest terms.

$4\frac{2}{7}\times 4 =$

A. $17\frac{1}{7}$

B. $16\frac{2}{7}$

C. $8\frac{2}{7}$

D. $5\frac{1}{7}$

40. Multiply. Reduce your answer to lowest terms.

$6\frac{3}{10} \times 4 =$

A. $25\frac{1}{5}$

B. $24\frac{3}{10}$

C. $10\frac{3}{10}$

D. $7\frac{1}{5}$

41. Add.

$1^9 + 19 =$

A. 28
B. 20
C. 38
D. 29

42. $6^2 - 4 =$

A. 8
B. 4
C. 58
D. 32

43. Add.

$9^5 + 5 =$

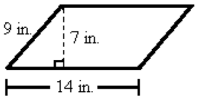
A. 531,446
B. 50
C. 59,054
D. 70

44. Subtract.

$1{,}300 - 6^4 =$

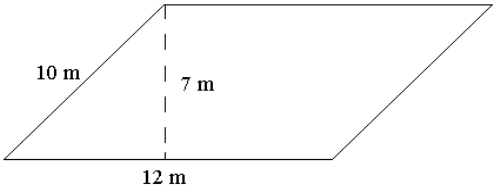
A. 868
B. 1,296
C. 1,276
D. 4

45. Find the area of the parallelogram.



A. 63 in.^{2}
B. 98 in.^{2}
C. 126 in.^{2}
D. 49 in.^{2}

46. Find the area of the parallelogram.



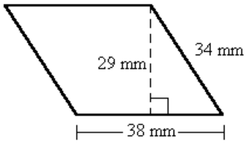
A. 84 m^2

B. 19 m^2

C. 70 m^2

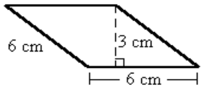
D. 120 m^2

47. Find the area of the parallelogram.



A. 1,292 mm^2
B. 986 mm^2
C. 1,102 mm^2
D. 551 mm^2

48. Find the area of the parallelogram.



A. 27 cm^2
B. 36 cm^2
C. 9 cm^2
D. 18 cm^2

49. Solve for *c*.

$31c + cd = -18$

A. $c = \frac{-18}{31+d}$

B. $c = \frac{-18-cd}{31}$

C. $c = \frac{-18-31c}{d}$

D. $c = -18(31+d)$

50. Solve for a.

a + 16ab = 42

A. $\mathbf{a} = \frac{\mathbf{42}}{\mathbf{17b}}$

B. $\mathbf{a} = \frac{\mathbf{42}}{\mathbf{16b}}$

C. $\mathbf{a} = \frac{\mathbf{42}}{\mathbf{1+16b}}$

D. $\mathbf{a} = \frac{\mathbf{1-16b}}{\mathbf{42}}$

51. Solve for *p*.

$6 - \frac{p}{5} = 3q$

A. $p = -5(3q - 6)$

B. $p = 5(3q - 6)$

C. $p = \frac{3q-6}{5}$

D. $p = \frac{-3q+6}{5}$

52. Solve for *z*.

$8 + 4zy = 21$

A. $z = 13 - 4y$

B. $z = 13(4y)$

C. $z = \frac{13}{4y}$

D. $z = \frac{29}{4y}$

53. Subtract.

$$\begin{array}{r} 2\frac{5}{8} \\ -1\frac{1}{3} \\ \hline \end{array}$$

A. $1\frac{4}{5}$

B. $1\frac{4}{24}$

C. $1\frac{7}{24}$

D. $1\frac{7}{8}$

54. Reduce your answer to lowest terms.

$$\begin{array}{r} 9\frac{1}{2} \\ -\ 3\frac{1}{4} \\ \hline \end{array}$$

A. $6\frac{0}{4}$

B. $5\frac{10}{4}$

C. $6\frac{1}{4}$

D. $6\frac{1}{2}$

55. Subtract.

$$\begin{array}{r} 7\frac{1}{2} \\ -4\frac{1}{5} \\ \hline \end{array}$$

A. $3\frac{0}{3}$

B. $3\frac{1}{3}$

C. $3\frac{3}{10}$

D. $3\frac{7}{10}$

56. Subtract.

$$\begin{array}{r} 5\frac{9}{10} \\ -3\frac{2}{3} \\ \hline \end{array}$$

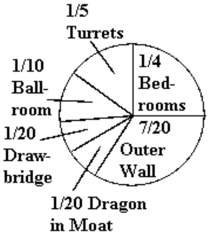
A. $2\frac{11}{13}$

B. $2\frac{11}{30}$

C. $2\frac{7}{7}$

D. $2\frac{7}{30}$

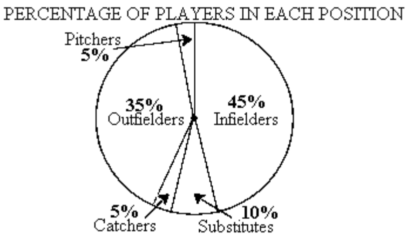
57. Grant built a sandcastle. He used 1,000 pounds of sand. The pie graph shows how the 1,000 pounds of sand was divided in building the sandcastle. Use the pie graph to answer the question.



How many pounds of sand did Grant use to build the turrets?

A. 250 pounds of sand
B. 200 pounds of sand
C. 300 pounds of sand
D. 100 pounds of sand

58. There were twenty players on the JV baseball team. How many players were either pitchers or outfielders?



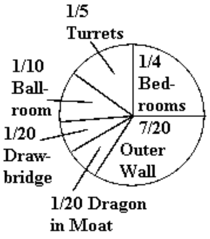
A. 17 players
B. 10 players
C. 8 players
D. 7 players

59. Mia wanted to show how she spent her time. She made a pie graph of her typical 24 hour day. Use the pie graph to answer the question.

How many hours a day does Mia spend watching TV?

A. 3 hours
B. 2 hours
C. 4 hours
D. 1 hour

60. Grant built a sandcastle. He used 1,000 pounds of sand. The pie graph shows how the 1,000 pounds of sand was divided in building the sandcastle. Use the pie graph to answer the question.



How many pounds of sand did Grant use to build the ballroom?

A. 50 pounds of sand
B. 150 pounds of sand
C. 100 pounds of sand
D. 200 pounds of sand

61. What is another way to write:

6^9

A. 6 x 6 x 6 x 6 x 6 x 6 x 6
B. 9 x 9 x 9 x 9 x 9 x 9
C. 9 x 6 x 9 x 6
D. 6 x 6 x 6 x 6 x 6 x 6 x 6 x 6 x 6

62. What does 3^{10} equal?

A. 3 x 10
B. 10 x 10 x 10
C. 3 x 3 x 3
D. 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3 x 3

63. What is another way to write:

3^6

A. 3 x 6
B. 6 x 6 x 6
C. 3 x 3 x 3 x 3 x 3 x 3
D. 30 x 6

64. What is another way to write:

10^2

A. 10 x 10
B. 2 x 10
C. 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2
D. 10 x 10 x 10

65. 52 + -60 =

A. 8
B. -112
C. 112
D. -8

66. Add.

19 + (- 34) =

A. 15
B. 53
C. - 53
D. - 15

67. -26 + -3 =

A. -23
B. 23
C. 29
D. -29

68. -4 + -7 =

A. 3
B. -11
C. -3
D. 11

69. The Groovy Garment Clothing Company has 13 blue sweaters and 17 green sweaters.

What is the ratio of green sweaters to blue sweaters?

A. 13:17
B. 30:17
C. 17:13
D. 4:17

70. Mr. and Mrs. Abdul want to repaint the outside of their house. To get the specific shade of green that they want, the woman at the hardware store needs to mix green paint and white paint in the ratio of 7:2. How many gallons of white paint will the woman need if she uses 14 gallons of green paint?

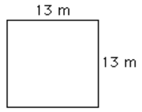
A. 49 gallons
B. 4 gallons
C. 1 gallons
D. 28 gallons

71. Find the value of x in the following proportion.

$\frac{4}{6} = \frac{16}{x}$

A. 6
B. 48
C. 24
D. 4

72. What is the ratio of one side to the perimeter?



A. 13:52 m
B. 52:13 m
C. 1:52 m
D. 1:13 m

73. Which of the following is another way to write 19/25?

- **A.** 1.31%
- **B.** 76%
- **C.** 13.2%
- **D.** 48%

74. Write 0.28 as a percent.

- **A.** 0.28%
- **B.** 2.8%
- **C.** 0.028%
- **D.** 28%

75. Which of the following is another way to write 56%?

- **A.** 5.6
- **B.** 56
- **C.** 14/25
- **D.** 1 9/14

76. What is the value of X?

$$\frac{3}{25} = 12\% = X$$

- **A.** 8.33
- **B.** 1.2
- **C.** 3.25
- **D.** 0.12

77. Find the value of the ? in the given statement.

$$7.26 \times 10^{7} = ?$$

- **A.** 72,600,000
- **B.** 7,260,000
- **C.** 726,000,000
- **D.** 726,000

78. Write 4,000 in scientific notation.

- **A.** 0.4×10^4
- **B.** 4.0×10^4
- **C.** 4.0×10^3
- **D.** 40.0×10^2

79. Find the value of the ? in the given statement.

$3.24 \times 10^4 = ?$

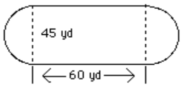
- **A.** 3,240,000
- **B.** 324,000
- **C.** 3,240
- **D.** 32,400

80. Find the value of the ? in the given statement.

$100,600 = 1.006 \times 10^?$

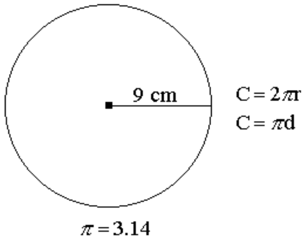
- **A.** 6
- **B.** 4
- **C.** 5
- **D.** 7

81. The River Valley Junior High School has an oval track. Use the diagram to find the length of the track.



- **A.** 308.4 yd
- **B.** 315 yd
- **C.** 2700 yd
- **D.** 261.3 yd

82. Find the circumference of the circle. Round your answer to the nearest centimeter.



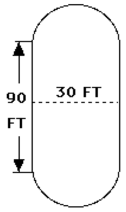
A. 28 cm
B. 254 cm
C. 113 cm
D. 57 cm

83. Cal built a brick wall around his pool. The wall is a semicircle. The diameter of the wall is 78 feet.

What is the total length of the wall?

A. 244.92 feet
B. 122.46 feet
C. 489.84 feet
D. 39 feet

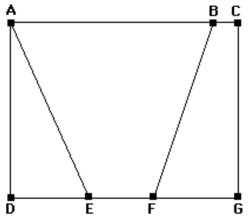
84. Tom needs to build a safety rail around the ice skating rink. The ice skating rink is oval shaped.



What is the length of the rail?

A. 282.6 ft
B. 274.2 ft
C. 859.9 ft
D. 270 ft

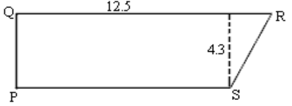
85. In the figure, BC is equal to 5 meters, AD is equal to 21 meters, DF is equal to 18 meters, and FG is equal to 12 meters.



What is the area of trapezoid BCGF?

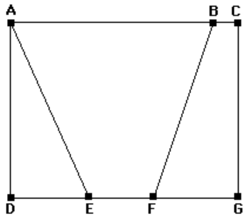
A. 19,845 square meters
B. 367.5 square meters
C. 178.5 square meters
D. 115.5 square meters

86. The area of figure PQRS is 41.925 cm^2. Find the length of side PS. Round your answer to the nearest hundredth if necessary.



A. side PS = 6.59 cm
B. side PS = 5.5 cm
C. side PS = 12.5 cm
D. side PS = 7 cm

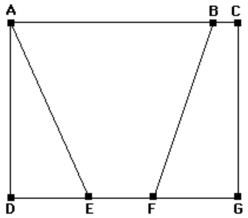
87. In the figure, AB is equal to 13 meters, CG is equal to 15 meters, and EF is equal to 7 meters.



What is the area of trapezoid ABFE?

A. 300 square meters
B. 35 square meters
C. 91 square meters
D. 150 square meters

88. In the figure, AB is equal to 14 meters, BC is equal to 4 meters, AD is equal to 13 meters, DE is equal to 5 meters, EF is equal to 6 meters and FG is equal to 7 meters.



What is the area of the trapezoid ACGE?

A. 201.5 square meters
B. 130 square meters
C. 49 square meters
D. 343 square meters

89. Choose the symbol that replaces the question mark.

-2(14 ÷ 7) ? 3(-26 ÷ 2)

A. =
B. >
C. <

90. Divide.

- 144 ÷ 12 =

A. 12
B. 1,728
C. - 1,728
D. - 12

91. 9(-2 x -3) ÷ (-3 x -2) =

A. 9
B. 6
C. -9
D. -6

92. Choose the symbol that replaces the question mark.

-8(-144 ÷ 6) ? -2(1320 ÷ -12)

A. =
B. >
C. <

93. Choose the symbol to replace the question mark.

$-66 \; ? \; |35 + 31|$

A. >
B. <
C. =

94. $-43 + 7 + (-13) =$

A. 49
B. - 63
C. 63
D. - 49

95. Choose the symbol to replace the question mark.

$|-7 + -8| \; \underline{?} \; -7 + -8$

A. >
B. <
C. =

96. Simplify.

$27 + 19 + (-60) + (-7) + 3$

A. - 14
B. 116
C. - 18
D. 18

97. Solve for x.

$3x - 9 + 4x = 12$

A. $x = 21$
B. $x = 3/7$
C. $x = 3$
D. $x = -21$

98. Solve for t.
$-6t + 4 = 34$

A. $t = 5$
B. $t = -5$
C. $t = 6\frac{1}{3}$
D. $t = -6\frac{1}{3}$

99. Solve for x.

$5x - 9x - 6 = 14$

A. $x = -5$
B. $x = -2$
C. $x = -80$
D. $x = -32$

100. Solve for x.

$4(2 - 3x) = 20$

A. $x = -144$
B. $x = -336$
C. $x = -7/3$
D. $x = -1$

101. Add eight less than four times a number to fifteen less seven times the same number.

A. $11x^2 - 23$
B. $11x-23$
C. $^-3x^2 + 7$
D. $-3x + 7$

102. Add and simplify completely.

$(2x^3 - 9x^2 + 6x - 2) + (-3 - 8x^2 + 7x^3)$

A. $9x^3 - 17x^2 + 6x - 2$

B. $9x^3 - x^2 + 6x - 1$

C. $9x^3 - 17x^2 - 2x - 5$

D. $9x^3 - 17x^2 + 6x - 5$

103. Add $\left(6x^4 + 2x^3 - 9x - 7\right)$ to $\left({}^{-}12x^4 - 6x^3 + 21x + 32\right)$

A. ${}^{-}6x^8 - 4x^6 + 12x^2 + 25x$

B. $-6x^4 - 4x^3 - 30x + 25$

C. $-6x^4 - 4x^3 + 12x + 25$

D. $x\left({}^{-}6x^7 - 4x^5 + 12x + 25\right)$

104. At Masterson Department Store, they issue prices for their clothing using polynomials and the variable x. The following is a sample listing of their prices.

Shirts = $\$4x + 9$ Pants = $\$3x^2 + 2$
Dresses = $\$9x - 20$ Shoes = $\$6x$

If Heather wants to buy three pairs of pants, one pair of shoes, and two dresses, how much will her total bill be?

A. $\$33x^3 - 34$

B. $\$9x^2 + 24x - 34$

C. $\$3x^2 + 15x - 18$

D. $\$9x^2 + 24x - 46$

105. Divide the monomial.

$$\frac{-32x^3}{-4x^8}$$

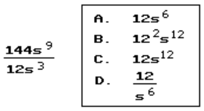
A. $-8x^{24}$
B. $\frac{8}{x^5}$
C. $8x^{11}$
D. $8x^{24}$

A. A
B. B
C. C
D. D

106. Divide $\left(3x^4 - 2x^3 + 7x^2 + 12x + 40\right)$ by $\left(x^2 + 2x + 5\right)$.

- **A.** $3x^2 - 4x - 30 - \frac{104x + 220}{x^2 + 2x + 5}$
- **B.** $3x^2 + 8x - 8 + \frac{44x}{x^2 + 2x + 5}$
- **C.** $3x^2 + 4x + 30 + \frac{104x + 220}{x^2 + 2x + 5}$
- **D.** $3x^2 - 8x + 8 + \frac{36x}{x^2 + 2x + 5}$

107. Divide the monomial.



$\frac{144s^9}{12s^3}$

A. $12s^6$
B. 12^2s^{12}
C. $12s^{12}$
D. $\frac{12}{s^6}$

- **A.** A
- **B.** B
- **C.** C
- **D.** D