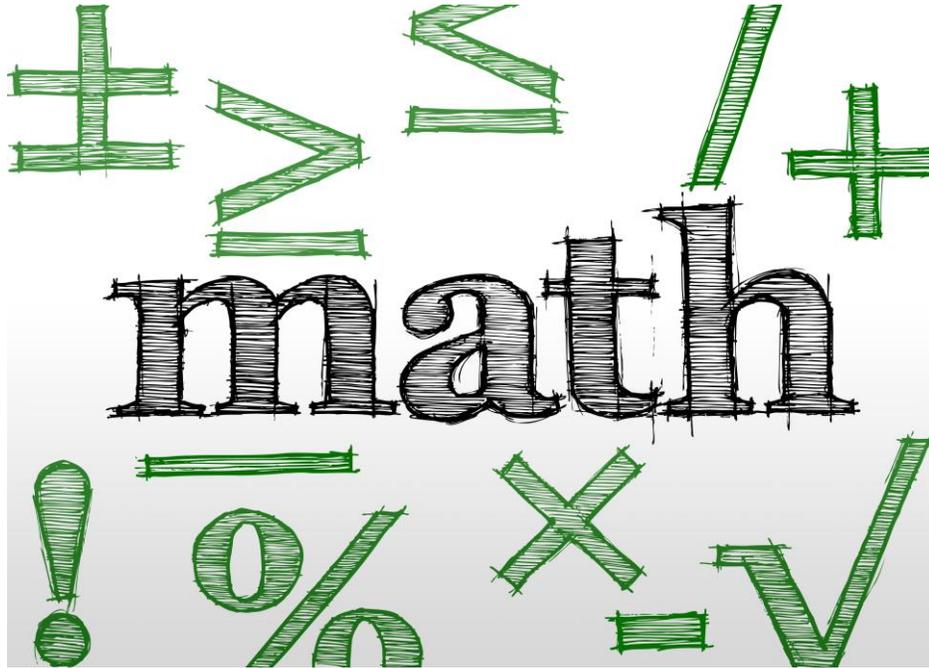


8th Grade Math



**Summer 2021,
Assignment Packet
Due September 10, 2021**

Study Guide

Spring Packet 8th 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. between 70 and 79
- D. between 80 and 89

Solution:

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

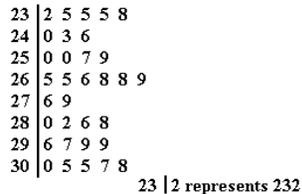
B. is not the correct answer because only 2 students scored between 60 and 69.

C. is not the correct answer because only 4 students scored between 70 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?



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

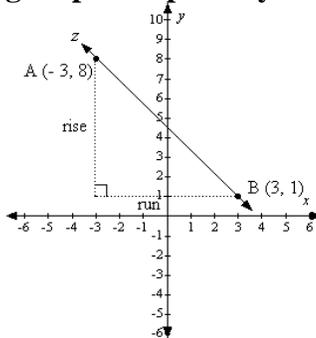
An activity to reinforce this skill is to create a stem-and-leaf plot with the student. Gather data about the ages of family members (from siblings to grandparents) and use the data to create a stem-and-leaf plot together. Then ask the student questions about the stem-and-leaf plot such as the ones below.

- How many people in our family are older than 30?
- Which age occurs the most/least?

Slope

Slope is the ratio of the vertical difference of two points on a line and the horizontal difference between the same two points. Slope is also defined as "rise over run" and is found by calculating the difference in the y -coordinates (rise) divided by the difference in the x -coordinates (run). Slope can be found either graphically or algebraically.

Finding Slope Graphically:



Two points are identified on line z : $A(-3, 8)$ and $B(3, 1)$.

To find the slope of line z , which passes through points A and B , follow these steps.

Step 1: Start at the left-most point (it is possible to start at either point, but it is important to be

consistent), which is point A (-3, 8).

Step 2: Count up (positive) or down (negative) until level with the right-most point, point B (3, 1). The count will be 7 in the downward direction, or -7. The *rise* is -7.

Step 3: Count right (positive) or left (negative) until point B is reached. The count will be 6 to the right, or +6. The *run* is 6.

Step 4: Using the "rise over run" definition of slope, place -7 on top of the fraction and 6 on the bottom of the fraction.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-7}{6} = -\frac{7}{6}$$

Finding Slope Algebraically:

To find the slope of line z algebraically, follow these steps.

Step 1: Use the formula for the slope of a line, where m is the variable that represents slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Step 2: Let (-3, 8) be point (x_1, y_1) , and (3, 1) be point (x_2, y_2) .

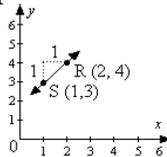
$$\begin{array}{l} x_1 = -3 \quad x_2 = 3 \\ y_1 = 8 \quad y_2 = 1 \end{array}$$

Step 3: Substitute the given coordinate points into the slope formula and simplify the fraction.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 8}{3 - (-3)} = -\frac{7}{6}$$

It does not matter which method (graphically or algebraically) is used for determining slope. Regardless, the slope of a line always remains the same.

Example 1: Find the slope of the line between Point R (2, 4) and Point S (1, 3).



Graphically:

Step 1: Start at the left-most point, which is point S (1, 3).

Step 2: Determine the rise (1).

Step 3: Determine the run (1).

Step 4: Using the "rise over run" definition of slope, place 1 on top of the fraction and 1 on the bottom of the fraction.

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

Answer: $m = 1$

Algebraically:

$$\begin{array}{lll} (1) & (2) & (3) \\ m = \frac{y_2 - y_1}{x_2 - x_1} & m = \frac{3 - 4}{1 - 2} & m = \frac{-1}{-1} \\ & & m = 1 \end{array}$$

Step 1: Write the formula.

Step 2: Substitute the given points into the formula. Let $(2, 4) = (x_1, y_1)$ and $(1, 3) = (x_2, y_2)$.

Step 3: Simplify the fraction.

Answer: $m = 1$

An activity that can reinforce the concept of slope is to have students randomly plot two points on a coordinate system and then find the slope graphically. They can check their answers by substituting the two points into the slope formula.

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.

$$\begin{array}{ll} (1) & (2) \\ (9 \times 8) + 5 = 77 & \frac{77}{9} \end{array}$$

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.

$$\begin{array}{ll} (1) & (2) \\ 77 \div 9 = 8r5 & 8\frac{5}{9} \end{array}$$

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.

$$\begin{array}{llll} & 5 \times 4\frac{7}{9} = & & \\ (1) & (2) & (3) & (4) \\ 5 \times 4\frac{7}{9} & 4\frac{7}{9} = \frac{43}{9} & \frac{5 \times 43}{1 \times 9} = & \frac{5 \times 43}{1 \times 9} = \frac{215}{9} \\ & 5 = \frac{5}{1} & & \\ (5) & (6) & & \\ 215 \div 9 = 23r8 & 23\frac{8}{9} & & \end{array}$$

Step 1: Rewrite the problem.

Step 2: Rewrite $4\frac{7}{9}$ 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 $\frac{5}{1}$ and $\frac{43}{9}$.

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 $\frac{215}{9}$ 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.

$$27 \times 3\frac{4}{9} =$$

(1)	(2)	(3)	(4)	(5)
$27 \times 3\frac{4}{9} =$	$3\frac{4}{9} = \frac{31}{9}$	$\frac{27}{1} \times \frac{31}{9}$	$\frac{\overset{3}{\cancel{27}} \times \frac{31}{\cancel{9}_1} = \frac{93}{1}$	$\frac{93}{1} = 93$
	$27 = \frac{27}{1}$			

Step 1: Rewrite the problem.

Step 2: Rewrite $3\frac{4}{9}$ 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. $3 \times 31 = 93$ and $1 \times 1 = 1$.

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

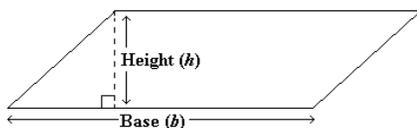
***Cross cancellation is the process of reducing the numbers within a multiplication of fractions problem before multiplying the fractions. If a numerator and a denominator of any of the fractions to be multiplied can be divided by the same number, this division can be performed before the fractions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

Area of Parallelogram - B

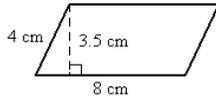
A parallelogram is a quadrilateral (a four-sided figure) with two pairs of parallel and congruent sides. Area is the measure, in square units, of the interior region of a two-dimensional figure.

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:



$$\text{Area of a parallelogram} = \text{base} \times \text{height}$$

Example 1: Find the area of the parallelogram.



Solution:

The formula for the area of a parallelogram is $\text{Area} = \text{base} \times \text{height}$. 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.

Divide Decimals

Dividing a decimal number by another decimal number requires repositioning the decimal point so that it does not appear in the divisor.

The following is a step-by-step example of a decimal number divided by a decimal number.

Solve: 17.28 divided by 3.2 = ?

(1)	(2)	(3)
$3.2 \overline{)17.28}$	$32 \overline{)172.8}$	$32 \overline{)172.8}$
	$\underline{160}$	$\underline{160}$
	128	128
		$\underline{128}$
		0

Step 1: Write the problem in long division format.

Step 2: There is a decimal point in the divisor. Multiply the dividend and the divisor by 10, thus moving the decimal point one place to the right. Then, place the decimal point directly above the decimal point in the dividend.

Step 3: Division follows the same format as with whole numbers. 32 goes into 172 five times because $32 \times 5 = 160$. Place 5 in the ones position. Subtract 160 from 172 resulting in 12. Bring down the 8.

Step 4: 32 goes into 128 four times because $32 \times 4 = 128$. Place 4 in the tenths position. Subtract 128 from 128 resulting in zero.

The correct answer for 17.28 divided by 3.2 is 5.4.

Divide Decimals: Story Problems

Story problems, also called word problems, relate division of decimal numbers to actual situations.

Operational symbols, such as the division symbol, are replaced with text. This skill also includes problems dealing with money.

Story problems are often very difficult for students to master. It may be useful for you to confirm that the student is comfortable with division skills. Then, create equations that relate to his or her daily activities, such as sports or music lessons. Help the student determine the correct formulas.

Example 1: If there are 18.9 pies and 9 children, how many pies does each child receive? (The student must determine that division is required to perform this problem.)

$$\begin{array}{r}
 \text{(1)} \quad \text{(2)} \quad \text{(3)} \quad \text{(4)} \\
 \hline
 9 \overline{)18.9} \quad 9 \overline{)18.9} \quad 9 \overline{)18.9} \quad 9 \overline{)18.9} \\
 \underline{-18} \quad \underline{-18} \quad \underline{-18} \quad \underline{-18} \\
 09 \quad 09 \quad 09 \quad 09 \\
 \underline{-9} \\
 0
 \end{array}$$

Step 1: Write the problem in long division format.

Step 2: Division follows the same format as with whole numbers. 9 goes into 18 two times because $9 \times 2 = 18$. Place 2 in the ones position. Subtract 18 from 18 resulting in 0. Bring down the 9.

Step 3: Place the decimal point.

Step 4: 9 goes into 9 one time because $9 \times 1 = 9$. Place 1 in the tenths position. Subtract 9 from 9 resulting in 0.

The answer is each child receives 2.1 pies.

Add Fractions: Mixed Numbers - A

Adding mixed fractions requires a solid understanding of adding fractions and the multiplication table. If the numerator of a fraction is less than the denominator, 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 fraction. For example, $5/3$ is an improper fraction. It can be rewritten as $1 \frac{2}{3}$, which is a mixed fraction.

The following is a step-by-step example of adding two mixed fractions with different denominators.

Example 1: Reduce all fractions to lowest terms.

$$3\frac{1}{5} + 6\frac{4}{9} =$$

$$\begin{array}{r}
 \text{(1)} \quad \text{(2)} \quad \text{(3)} \quad \text{(4)} \quad \text{(5)} \\
 3\frac{1}{5} \quad 3 \quad \frac{1}{5} \quad \frac{1}{5} \times \frac{9}{9} = \frac{9}{45} \quad 3 \quad \frac{9}{45} \\
 +6\frac{4}{9} \quad +6 \quad +\frac{4}{9} \quad \frac{4}{9} \times \frac{5}{5} = \frac{20}{45} \quad +6 \quad +\frac{20}{45} \quad 9\frac{29}{45} \\
 \hline
 \hline
 9 \quad \frac{29}{45}
 \end{array}$$

Step 1: Rewrite horizontal problems vertically. (This step is not necessary, but many students find it easier to add fractions when the problems are written 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 common denominator is 45 (because both 5 and 9 will divide into 45). Multiply $1/5$ by $9/9$. Multiply $4/9$ by $5/5$.

Step 4: Add the whole numbers ($3 + 6 = 9$). Add the numerators ($9 + 20 = 29$). The denominator remains the same (45).

Step 5: Combine the whole number and fraction to produce the answer.

Answer: $9\frac{29}{45}$

It may be necessary to reduce a fraction that is part of an answer. A fraction is in lowest terms when the numerator and denominator do not have a common factor greater than one. To reduce a fraction, determine the largest number that the numerator and the denominator can both be divided by and divide them by that number.

Example 2: Reduce all fractions to lowest terms.

$$\frac{32}{40}$$

$$\frac{32 \div 8}{40 \div 8} = \frac{4}{5}$$

Solution: The largest number 32 and 40 can both be divided by is 8. Divide 32 by 8 and divide 40 by 8.

Answer: $\frac{4}{5}$

Subtract Fractions: Story Problems - C

Story problems, also called word problems, relate subtraction of fractions to actual situations. At this level, problems include fractions with different denominators, as well as subtracting mixed fractions. Operational symbols, such as the subtraction (-) symbol, are replaced with text.

Story problems are often very difficult for students to master. It may be beneficial for you to confirm that the student is comfortable with subtraction and multiplication skills. Then, create equations that relate to his or her daily activities, such as sports or music lessons. Help the student determine the correct formulas.

Example 1:

Kevin made $3\frac{3}{4}$ gallons of punch. Leia drank $1\frac{1}{2}$ gallons of the punch.
How much punch is left?

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

Step 1: Determine that subtraction is required to solve the problem and write the equation needed. Since Kevin started with $3\frac{3}{4}$ gallons and $1\frac{1}{2}$ gallons have been drunk, the equation will be $3\frac{3}{4} - 1\frac{1}{2}$. Many students find it easier to subtract mixed numbers when the problem is written vertically as opposed to horizontally.

Step 2: Rewrite the problem as subtraction of whole numbers and subtraction of fractions.

Step 3: Find a common denominator (a common multiple of the denominators of two or more fractions) for the two fractions. For this problem, a common denominator is 4 because 2 and 4 will both divide into 4. $\frac{3}{4}$ does not need to be rewritten because it already has the common denominator (4). Multiply $\frac{1}{2}$ by $\frac{2}{2}$ to get $\frac{2}{4}$.

Step 4: Rewrite the problem with the fractions having common denominators. Subtract the whole numbers ($3 - 1 = 2$). Subtract the numerators of the fractions ($3 - 2 = 1$). The denominator (4) remains the same.

The correct answer is $2\frac{1}{4}$ gallons of punch.

Example 2:

Carlos had $35\frac{1}{3}$ feet of rope. He used $22\frac{3}{4}$ feet of the rope to make a swing.
How much rope is left?

$$\begin{array}{r}
 (1) \quad (2) \quad (3) \quad (4) \\
 35\frac{1}{3} \quad 35\frac{1}{3} \quad 35\frac{1}{3} \times \frac{4}{4} \quad 35\frac{4}{12} \\
 -22\frac{3}{4} \quad -22\frac{-3}{4} \quad -22\frac{-3 \times 3}{4 \times 3} \quad -22\frac{-9}{12} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 (5) \quad (6) \\
 \cancel{35}^4 \frac{4+12}{12} \quad 34\frac{16}{12} \\
 -22\frac{-9}{12} \quad -22\frac{-9}{12} \\
 \hline
 12\frac{7}{12}
 \end{array}$$

Step 1: Determine that subtraction is required to solve the problem and write the equation needed. Since Carlos started with $35\frac{1}{3}$ feet of rope and $22\frac{3}{4}$ feet have been used, the equation will be $35\frac{1}{3} - 22\frac{3}{4}$. Many students find it easier to subtract mixed numbers when the problem is written vertically as opposed to horizontally.

Step 2: Rewrite the problem as subtraction of whole numbers and subtraction of fractions.

Step 3: Find a common denominator for the two fractions. For this problem, a common denominator is 12 because 3 and 4 will both divide into 12. Multiply $\frac{1}{3}$ by $\frac{4}{4}$ to get $\frac{4}{12}$ and multiply $\frac{3}{4}$ by $\frac{3}{3}$ to get $\frac{9}{12}$.

Step 4: Rewrite the problem with the fractions having the common denominators.

Step 5: Since 9 cannot be subtracted from 4, it is necessary to "borrow" from the 35 to make $\frac{4}{12}$ an improper fraction. When "borrowing" using fractions, add the amount of the denominator to the existing numerator. Therefore, add 12 to 4 to get $\frac{16}{12}$. Do not forget to take 1 away from the whole number ($35 - 1 = 34$).

Step 6: Rewrite the problem with the correct fractions. Subtract the whole numbers ($34 - 22 = 12$). Subtract the numerators ($16 - 9 = 7$). The denominator (12) remains the same.

The correct answer is: $12\frac{7}{12}$ feet of rope.

It may be necessary to reduce a fraction that is part of an answer. A fraction is in lowest terms when the numerator and denominator do not have a common factor greater than one. To reduce a fraction, determine the largest number that the numerator and the denominator can both be divided by and divide them by that number.

Example 3: Reduce all fractions to lowest terms.

$$\begin{array}{l}
 \frac{32}{40} \\
 \frac{32 \div 8}{40 \div 8} = \frac{4}{5}
 \end{array}$$

Solution: The largest number 32 and 40 can both be divided by is 8. Divide 32 by 8 and divide 40 by 8.

The correct answer is: $\frac{32}{40}$ can be reduced to $\frac{4}{5}$.

Divide Fractions

Dividing fractions requires a strong knowledge of multiplication of fractions.

The following is a step-by-step example of dividing fractions.

Example 1: Reduce answer to lowest terms.

$$\begin{array}{l}
 \frac{2}{5} \div \frac{8}{9} = \\
 (1) \quad (2) \quad (3) \\
 \frac{2}{5} \div \frac{8}{9} \quad \frac{2 \times 9}{5 \times 8} = \frac{18}{40} \quad \frac{18 \div 2}{40 \div 2} = \frac{9}{20} \\
 \frac{2}{5} \times \frac{9}{8}
 \end{array}$$

Step 1: Rewrite the problem as a multiplication problem. There is a rhyme to help remember how to complete this process:

Dividing fractions is easy as pie,
Flip the second and multiply.

Using this rhyme, the second fraction (8/9) becomes 9/8, and the \div symbol becomes a \times symbol.

Step 2: Multiply the numerators ($2 \times 9 = 18$) and the denominators ($5 \times 8 = 40$).

Step 3: Reduce the fraction to lowest terms. A fraction is in lowest terms when the numerator and denominator do not have a common factor greater than one. Eighteen and 40 can both be divided by 2, so complete this division to reduce the fraction.

Answer: $\frac{9}{20}$

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 $2 \times 2 \times 2$.

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

(1)
 6^2 (or 6 to the second power)
 $6 \times 6 = 36$

(2)
 3^3 (or 3 to the third power)
 $3 \times 3 \times 3 = 27$

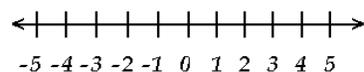
(3)
 2^5 (or 2 to the fifth power)
 $2 \times 2 \times 2 \times 2 \times 2 = 32$

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 $8 \times 3 = 24$. The correct answer is $8 \times 8 \times 8 = 512$.

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.

$$\begin{aligned} -3 + -2 &= ? \\ |-3| + |-2| &= ? \\ 3 + 2 &= 5, \text{ then make the result negative.} \end{aligned}$$

Answer: -5

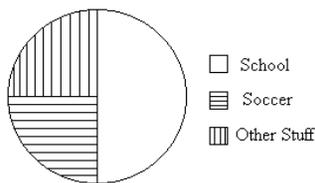
When adding integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value, and give the result the sign of the integer with the greater absolute value.

$$\begin{aligned} -7 + 3 &= ? \\ |-7| = 7 \text{ and } |3| = 3 \text{ (find the absolute values)} \\ 7 - 3 &= ? \text{ (subtract the lesser from the greater)} \\ 7 - 3 &= 4 \\ -7 + 3 &= -4 \text{ (The result is given the sign of the greater integer.)} \end{aligned}$$

Circle Graphs - B

A graph is a visual aid used to show and compare information. A circle graph, or pie chart, is often used to show data given in percentages. 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 the student create a circle graph for the events that typically occur during a normal day. Remind the student that the total for a circle graph or pie chart is always 100% or one whole. So, if he or she spends half of his or her day at school, then half (50%) of the circle would be filled with the title "School." Similarly, if one-quarter (25%) of his or her day is spent at the soccer field, then a quarter of the pie would be titled "Soccer." The following is an example:



Example 1: This circle graph represents how Chelsea spends her time each day. Use the circle graph to answer the question.



How much of her time does Chelsea spend practicing volleyball and shopping?

- (1) Volleyball Practice = 15%, Shopping = 5%
- (2) 15% + 5% = 20%

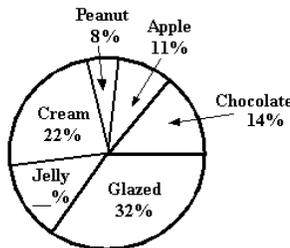
Step 1: According to the circle graph, Chelsea spends 15% of her time at volleyball practice and 5% of

her time shopping.

Step 2: To find the total amount of time, add the percentages together.

Answer: Chelsea spends 20% of her day practicing volleyball and shopping.

Example 2: The circle graph below shows the distribution of types of donuts prepared each morning by a local donut shop. Use the circle graph to answer the question.



What percentage of the prepared donuts contain jelly?

- (1) Glazed = 32%, Chocolate = 14%, Apple = 11%, Peanut = 8%, Cream = 22%
- (2) $32\% + 14\% + 11\% + 8\% + 22\% = 87\%$
- (3) $100\% - 87\% = 13\%$

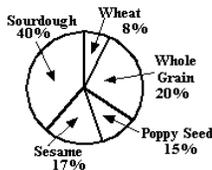
Step 1: List all of the existing percentages shown in the circle graph.

Step 2: Since the percentages in a circle graph must always add up to 100%, begin by adding the existing percentages.

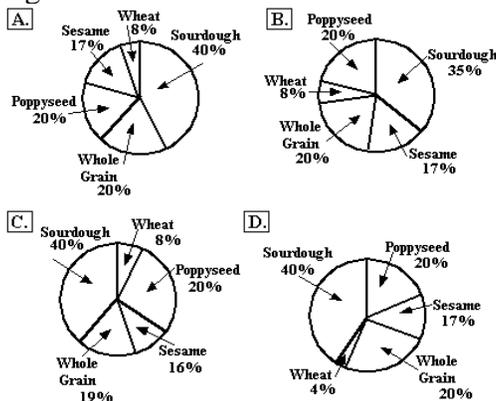
Step 3: Next, subtract the total from step 2 (87%) from 100%.

Answer: 13% of the prepared donuts contain jelly.

Example 3: The circle graph below shows the distribution of the types of dinner rolls served each night at the *Bread Basket Restaurant*. Use the circle graph to answer the question.



If the desire for poppy seed rolls increases by 5%, which of the following graphs could accurately show this change?



Choice (A) is not the answer because although poppy seed increased to 20%, none of the other types decreased. Therefore, the total of the graph is now over 100%.

Choice (B) is the answer because the new percentages reflect the increase in the desire for poppy seed rolls, while there is also a decrease in the desire for sourdough. Therefore the percentages add up to

100%.

Choice (C) is not the answer. Although poppy seed increased to 20%, the others did not adjust accordingly. Therefore, the total of the graph is now over 100%.

Choice (D) is not the answer. Although poppy seed increased to 20%, the others did not adjust accordingly. Therefore, the total of the graph is now over 100%.

Answer: Choice B.

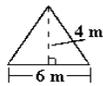
Area of Triangle - A

The area of a triangle 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 triangle:

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

Example 1: Solve for the area of a triangle with base equal to 6 meters and height equal to 4 meters.



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

$$(2) \text{ Area} = 12 \text{ m}^2$$

Step 1: Apply the amounts given in the problem to the formula.

Step 2: Perform the calculations to find the answer.

Answer: 12 square meters

Example 2: What is the height of a triangle that has a base of 12 inches and an area of 204 square inches?

$$(1) \frac{1}{2} \times 12 \times h = 204$$

$$(2) 6 \times h = 204$$

$$(3) h = 34$$

Step 1: Substitute the known amounts into the formula for the area of a triangle.

Step 2: Multiply $\frac{1}{2} \times 12 = 6$ and replace $\frac{1}{2} \times 12$ with 6 in the formula.

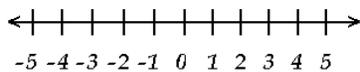
Step 3: Divide both sides of the equation by 6. ($6 \div 6 = 1$ and $204 \div 6 = 34$)

Answer: 34 inches

Subtracting Integers

Integers are the set of positive and negative whole numbers, including zero. To subtract 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.

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.



Subtracting integers is the same as adding the opposite.

$$\begin{aligned}3 - -7 &= ? \\3 + +7 &= 10 \text{ (add the opposite)} \\3 + 7 &= 10\end{aligned}$$

Example 1: $25 - -10 = ?$

Solution: Subtracting a negative number creates a positive, so the problem can be rewritten as:

$$\begin{aligned}25 + 10 &= ? \\25 + 10 &= 35\end{aligned}$$

Answer: 35

Example 2: $-48 - -18 = ?$

Step 1: Rewrite the problem as:

$$-48 + 18 = ?$$

Step 2: Remember the rules for adding integers: To add two integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value. Give the result the sign of the integer with the greater absolute value. So we first find the absolute values.

$$\begin{aligned}|-48| &= 48 \\|18| &= 18\end{aligned}$$

Step 3: Subtract the lesser absolute value from the greater value. $48 - 18 = 30$

Step 4: Give the result the sign of the integer with the greater absolute value. Since 48 is the greater absolute value, we give the result a negative sign.

$$-48 + 18 = -30$$

Answer: -30

Multiplying Integers

Integers are the set of positive and negative whole numbers, including zero. Students should 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 integer 0 is neutral.

To multiply and divide integers, follow these rules.

- The product of two positive integers is positive (Example: $9 \times 4 = 36$).

•The product of a positive integer and a negative integer is negative (Example: $9 \times -4 = -36$).

•The product of two negative integers is positive (Example: $-9 \times -4 = 36$).

Notice from the above examples that when you multiply integers with the same sign, the answer is positive. When multiplying integers with different signs, the answer is negative.

The order of operations must be followed when working with grouping symbols and/or multiple-step operations. The order of operations are as follows:

1. Work inside grouping symbols
2. Multiply and divide from left to right
3. Add and subtract from left to right

Example 1: $(3 \times -5) + 7 = ?$

$$(1) 3 \times -5 = -15$$

$$(2) -15 + 7 = -8$$

Step 1: Using the order of operations, calculate within grouping symbols. $3 \times -5 = -15$, so we can replace the parentheses with the value of -15.

Step 2: Perform the addition.

Answer: -8

Example 2: $8(-3 \times 4) \times (-5 + 7) = ?$

$$(1) -3 \times 4 = -12 \text{ and } -5 + 7 = 2$$

$$(2) 8(-12) \times 2 = ?$$

$$(3) 8(-12) = -96$$

$$(4) -96 \times 2 = -192$$

Step 1: Work inside grouping symbols.

Step 2: Rewrite the problem with the new numbers.

Step 3: Multiply from left to right, $8 \times -12 = -96$

Step 4: Multiply -96 by 2 to get -192.

Answer is: -192

Exponential Notation - C

An exponent is a number that represents how many times the base is used as a factor. The base number 5 to the 3rd power translates to $5 \times 5 \times 5$ which equals 125. 5 to the 3rd power is not 5×3 . To perform operations with exponents, all exponential properties must be understood.

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

$$\begin{array}{l} \text{(1)} \\ 6^2 \text{ (or 6 to the second power)} \\ 6 \times 6 = 36 \\ \text{(2)} \\ 3^3 \text{ (or 3 to the third power)} \\ 3 \times 3 \times 3 = 27 \\ \text{(3)} \\ 2^5 \text{ (or 2 to the fifth power)} \\ 2 \times 2 \times 2 \times 2 \times 2 = 32 \end{array}$$

Scientific Notation:

Scientific notation is based upon exponential properties and is used to communicate very large or very small numbers. Scientific notation deals with significant digits. The most significant digit in a number is the first non-zero digit in the number (reading from left to right). To write a number using scientific notation, place the decimal point to the right of the most significant digit and count the digits between the new placement of the decimal point and the old placement of the decimal point. The number of places that the decimal point moved will be represented by a power of 10.

Example 1: Write 123,000,000 using scientific notation.

$$\begin{array}{ccc} \text{(1)} & \text{(2)} & \text{(3)} \\ 123,000,000.0 & 1.23,000,000.0 & 1.23 \times 10^8 \end{array}$$

Step 1: Determine where the decimal point is in the number to be written using scientific notation.

Step 2: Place the decimal point to the right of the most significant digit and count the number of places the decimal point was moved.

Step 3: Write all of the significant digits (with the decimal in the new position) and multiply by 10 to a power. The power on the ten is the number of places that the decimal point was moved. The power is positive because the decimal point was moved from the right to the left.

Answer: 1.23×10^8

To take a number out of scientific notation, move the decimal point the same number of places as the exponent in the power of ten.

Example 2: $6.29 \times 10^7 = ?$

Answer: 62,900,000 (move the decimal 7 places to the right)

Example 3: Find the equivalent form.

$$\begin{array}{ccc} & (6 \times 10^3) + (2 \times 10^2) & \\ \text{(1)} & \text{(2)} & \text{(3)} \\ (6 \times 10^3) + (2 \times 10^2) & 6,000 + (2 \times 10^2) & 6,000 + 200 \\ 6,000 + (2 \times 10^2) & 6,000 + 200 & 6,200 \end{array}$$

Step 1: Write the number in the first set of parentheses in standard form and rewrite the expression.

Step 2: Write the number in the second set of parentheses in standard form and rewrite the expression.

Step 3: Add 6,000 and 200 to get 6,200.

Answer: 6,200

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 1.23×10 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.

Radicals and Roots

Mastering roots and radicals is an essential step toward learning advanced mathematics concepts. A radical sign looks like a check mark with a line attached to the top. The radical sign is used to communicate square roots.

The following rules are required to perform operations with roots and radicals.

1. If x multiplied by x equals y , then x is a square root of y . For example, 6 multiplied by 6 is 36, so 6 is a square root of 36. In fact, 36 is called a perfect square because its square root, 6, is a whole number. Most algebra text books contain a table of perfect squares.
2. -3 and 3 are both square roots of 9 because $-3 \times -3 = 9$ and $3 \times 3 = 9$. 3 is referred to as the principal square root because it is the positive square root of 9.
3. To find the simplest radical form of a radical expression, factor the number under the radical sign (the radicand). The square root of 45 could be factored to be the square root of 9 multiplied by the square root of 5. The square root of 9 multiplied by the square root of 5 can be simplified further by finding the square root of 9. The result is 3 (the square root of 9) multiplied by the square root of 5.

$$\sqrt{45} = \sqrt{9 \cdot 5} = 3\sqrt{5} = 3\sqrt{5}$$

Example 1: Find the equivalent form.

$$(\sqrt{3})(\sqrt{4})$$

Solution: Multiply the numbers under the radical symbols.

$$(\sqrt{3})(\sqrt{4}) = \sqrt{12}$$

The answer is $\sqrt{12}$

Example 2: What symbol would best replace the $?$ in the given statement?

$$\sqrt{5} + \sqrt{7} ? \sqrt{12}$$

- A. =
B. <
C. >

There are two methods that can be used to solve this problem. Each method is shown and explained below.

Solution Method 1:

$$\begin{aligned} & \sqrt{5} + \sqrt{7} ? \sqrt{12} \\ (1) & \sqrt{5} + \sqrt{7} ? \sqrt{6 \cdot 2} \\ (2) & \sqrt{5} + \sqrt{7} ? \sqrt{3 \cdot 2 \cdot 2} \\ (3) & \sqrt{5} + \sqrt{7} ? 2\sqrt{3} \\ (4) & \sqrt{5} + \sqrt{7} ? \sqrt{3} + \sqrt{3} \\ (5) & \sqrt{5} + \sqrt{7} > \sqrt{3} + \sqrt{3} \end{aligned}$$

Step 1: Simplify the square root of 12 by making it the square root of 6 x 2.

Step 2: Further simplify the square root of 6 x 2 by making it the square root of 3 x 2 x 2. (If you multiply 3 x 2 x 2, you will get 12.)

Step 3: The square root of 3 x 2 x 2 becomes 2 times the square root of 3, because the square root of 2 x 2 is 2 and the 3 must remain under the square root symbol.

Step 4: Two times the square root of 3 can also be written as the square root of 3 plus the square root of 3.

Step 5: Now, we can make a comparison. We know that the larger a number is, the larger that number's square root will be. We can determine that the square root of 5 plus the square root of 7 will be greater than the square root of 3 plus the square root of 3 because 5 and 7 are both larger than 3.

Answer: C

Solution Method 2:

$$\begin{aligned} & \sqrt{5} + \sqrt{7} ? \sqrt{12} \\ (1) & 2.24 + 2.65 ? 3.46 \\ (2) & 4.89 ? 3.46 \\ (3) & 4.89 > 3.46 \end{aligned}$$

Step 1: Estimate the square root of 5, the square root of 7, and the square root of 12. This estimation can be done using a calculator.

Step 2: Add together the 2.24 and the 2.65 to get 4.89.

Step 3: Replace the question mark with the > symbol because 4.89 is greater than 3.46.

Answer: C

Example 3: Solve for the value of x.

$$\begin{aligned} & \sqrt{36} + \sqrt{x} = 14 \\ & \sqrt{36} + \sqrt{x} = 14 \\ (1) & 6 + \sqrt{x} = 14 \\ (2) & \frac{-6}{\sqrt{x}} = \frac{-6}{\sqrt{x}} \\ (3) & \sqrt{64} = 8 \\ (4) & x = 64 \end{aligned}$$

Step 1: The square root of 36 is 6 because 6 x 6 = 36.

Step 2: Subtract 6 from each side of the equation to isolate the square root of x.

Step 3: The square root of x is equal to 8. We can replace the x with 64, since the square root of 64 is 8.

Step 4: Since the square root of 64 equals 8, the value of x is 64.

Answer: x = 64

Mean/Median/Mode/Range - A

The study of statistics involves looking at the measures of central tendency. They are the mean, median, and mode.

The mean of a group of numbers is found by adding the numbers and then dividing the sum by the number of addends (items in the group). It is also referred to as the average.

The median is the middle number, or the average of the two middle numbers, of a group of numbers ordered sequentially.

The mode of a group of numbers is the number that occurs the most often.

The range of a group of numbers is the difference between the highest number and the lowest number.

Example 1: Find the mean of 15, 10, 5, 20, 5.

$$(1) 15 + 10 + 5 + 20 + 5 = 55$$

$$(2) 55 \div 5 = 11$$

Step 1: Find the sum of the numbers.

Step 2: Divide by the total number of addends (items in the group).

The mean is 11.

Example 2: Solve for the median of 9, 1, 3, 5, 0, 7.

$$(1) 0, 1, 3, 5, 7, 9$$

$$(2) 3 \text{ and } 5$$

$$(3) 3 + 5 = 8$$

$$(4) 8 \div 2 = 4$$

Step 1: Put the numbers in order from smallest to largest.

Step 2: Determine the middle number(s). Since there is an even amount of numbers, there are two middle numbers. If there is an odd amount, there will be just one.

Steps 3 and 4: Determine the mean of 3 and 5 by adding the two numbers together and dividing by 2.

The median is 4.

Example 3: Solve for the mode of 0, 6, 7, 9, 6, 4, 3.

The mode is the number which occurs most often in a group. For this group of numbers the mode is 6 because it occurs twice and the other numbers only occur once. NOTE: There can be more than one mode or there can be no mode at all.

Example 4: Find the range of 9, 5, 16, 8, 2, 3.

$$(1) 16 - 2 = 14$$

The range is the difference between the highest number in a group and the lowest number in a group.

$$16 - 2 = 14$$

The range is 14.

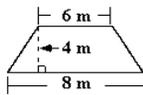
Area of Trapezoid

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.

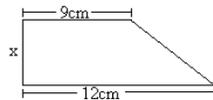
Step 2: Add the numbers within the parentheses.

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 trapezoid is 73.5 centimeters squared.



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

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

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

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

$$147 = 21x$$

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

$$7 = x$$

Step 1: Apply the given values to the formula for the area of a trapezoid. (NOTE: This time you are given the area of the trapezoid.)

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: $x = 7$

Area of Circle

The area of a circle 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 circle:

$$\text{Area} = \pi \times \text{radius}^2$$

Pi is approximately equal to 3.14. The symbol for Pi is π . The radius is the length from the center of the circle to the outside edge. The diameter is the line segment that connects two points on the outside edge of the circle and passes through the center of the circle. The length of the diameter is twice the length of the radius.

Example 1: Solve for the area of a circle with a radius equal to 4 meters.

- (1) $\text{Area} = 3.14 \times (4 \times 4)$
- (2) $\text{Area} = 3.14 \times 16$
- (3) $\text{Area} = 50.24$

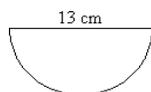
Step 1: Apply the amounts given in the problem to the formula.

Step 2: Multiply the numbers within the parentheses.

Step 3: Perform calculations to find the answer.

A semicircle is half of a circle. The area of a semicircle is exactly half of the area of a circle with the same radius.

Example 2: What is the area of the following semicircle? Round your answer to the nearest hundredth.



(1) diameter = 13
radius = $13 \div 2 = 6.5$

(2) $\text{Area} = 3.14(6.5\text{in})^2$
 $\text{Area} = 3.14(42.25\text{in}^2)$
 $\text{Area} = 132.665\text{in}^2$

(3) $132.665\text{in}^2 \div 2 = 66.3325\text{in}^2$ (4) 66.33in^2

Step 1: The diameter of the semicircle is 13 inches, so the radius is 13 inches divided by 2 (6.5 inches).

Step 2: Determine the area of a circle with radius 6.5 inches.

Step 3: Divide the area of the circle by 2 to find the area of the semicircle with radius 6.5 inches.

Step 4: Round 66.3325 to the nearest hundredth.

The area of the semicircle is 66.33 square inches.

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: $16 \div -4 = -4$.

The quotient of two integers with the same sign is positive. Examples: $16 \div 4 = 4$ and $-16 \div -4 = 4$.

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: $4(-3 \times 2) \div (12 \div 2) = ?$

(1) $-3 \times 2 = -6$ and $12 \div 2 = 6$

(2) $4(-6) \div 6 = ?$

(3) $-24 \div 6 = ?$

(4) $-24 \div 6 = -4$

Step 1: Perform operations within parentheses: ($-3 \times 2 = -6$) and ($12 \div 2 = 6$).

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: $-24 ? 3(10 \div -2)$

(1) $10 \div -2 = -5$

(2) $-24 ? 3(-5)$

(3) $3 \times -5 = -15$

(4) $-24 ? -15$

(5) $-24 < -15$

Step 1: Perform operations within parentheses. $10 \div -2 = -5$.

Step 2: Rewrite the problem with -5 in place of the parentheses.

Step 3: Multiply 3×-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: $-24 < -15$

Equations: Addition/Subtraction

Equations are number sentences which contain equal signs.

Example: $n + 5 = 9$

Expressions are number sentences which do not have equal signs, but need to be evaluated or simplified.

Example: $y - 6$

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

The following are examples of how to solve equations.

Example 1: Solve: $n + 6 = 20$

$$\begin{array}{r} \text{(1)} \\ n + 6 = 20 \end{array} \qquad \begin{array}{r} \text{(2)} \\ n + 6 = 20 \\ \underline{-6 = -6} \\ n + 0 = 14 \end{array}$$

Step 1: Write the equation.

Step 2: Subtract 6 from both sides of the equation.

Answer: $n = 14$

Example 2: Solve for x.

$$16.6 = 5.5 + x - 8.2$$

$$\begin{array}{r} 16.6 = 5.5 + x - 8.2 \\ \text{(1)} \quad \underline{+8.2 \qquad +8.2} \\ 24.8 = 5.5 + x \\ \text{(2)} \quad \underline{-5.5 \quad -5.5} \\ 19.3 = x \end{array}$$

Step 1: Begin to isolate the variable on one side of the equation by adding 8.2 to both sides.

Step 2: Subtract 5.5 from both sides to completely isolate the variable.

Answer: $x = 19.3$

Equations: Multiplication/Division

Equations are number sentences which contain equal signs:

Example: $n + 5 = 9$

Expressions are number sentences which do not have equal signs, but need to be evaluated or simplified:

Example: $y - 6$

A common mistake among students first learning to multiply and divide equations is the failure to use inverse operations. For instance, in the equation $3x = 8$, the student might multiply 3 to both sides of the equal sign. The correct procedure is to use the inverse operation and divide 3 from both sides ($x = 8/3$). By applying the inverse operation, the student can isolate the x.

Example 1: Solve: $5n = 75$

$$\frac{5n}{5} = 75$$

Step 1: In the equation, solve for the value of n.

Step 2: 5n is the same as 5 x n. Divide both sides of the equation by 5.

Step 3: $75 \div 5 = 15$

Answer: $n = 15$

Example 2: Solve for t .

$$\frac{4t}{16} = 32$$
$$\begin{array}{l} (1) \\ 16 \times \frac{4t}{16} = 32 \times 16 \\ 4t = 512 \end{array}$$
$$\begin{array}{l} (2) \\ \frac{4t}{4} = \frac{512}{4} \\ t = 128 \end{array}$$

Step 1: Multiply both sides of the equation by 16 to eliminate the fraction.

Step 2: Divide both sides of the equation by 4 to isolate the variable t .

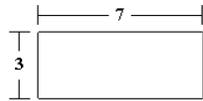
Answer: $t = 128$.

Area of Rectangle - D

The area measurement of a figure refers to the number of square units needed to cover the surface of the figure. Some of the many real world applications for finding the area of figures include household projects, construction work, sewing, and mowing the lawn.

The formula for calculating the area of a square or rectangle is: Area = length x width.

Example 1: A figure has a width of 3 inches and a length of 7 inches. What is the area of the figure?



Step 1: Multiply the width and the length.

$$\text{Area} = 7 \times 3 = 21$$

Answer: 21 square inches

Example 2: What is the value of x ?

Area = 500 m^2

A diagram of a rectangle. The right vertical side is labeled 20 m. The top horizontal side is labeled with a dimension line and the letter x.

$$\begin{array}{l} (1) \ 500\text{m}^2 = 20\text{m} \cdot x \\ (2) \ \frac{500\text{m}^2}{20\text{m}} = \frac{20\text{m} \cdot x}{20\text{m}} \\ (3) \ x = 25\text{m} \end{array}$$

Step 1: The area of a rectangle can be found using the following formula: Area = length x width. The area and width are known, so substitute them into the formula for area.

Step 2: Divide each side of the equation by 20m to isolate the x on one side of the equal sign.

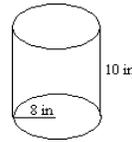
Step 3: 500 divided by 20 equals 25.

Answer: $x = 25 \text{ m}$

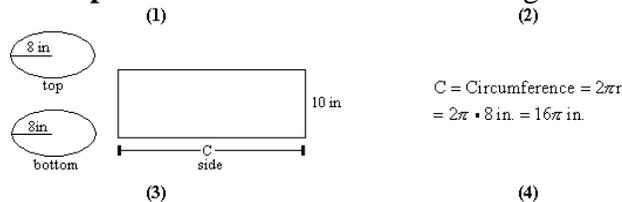
It may be useful to use graph paper to develop figures. Help the student determine the area of various figures drawn on the graph paper.

Surface Area of a Cylinder

The surface area of a solid figure is the sum of the areas of all the surfaces. A cylinder is a solid figure with two bases that are circles. A face is one side of a solid figure. When trying to find the surface area of a figure, first find the area of each face, then add those areas together.



Example: Find the surface area of the figure.



Area of Circle = πr^2 , $\pi \approx 3.14$

$$\text{Area of top} = 3.14(8\text{in})^2 = 3.14(64\text{in}^2) = 200.96\text{in}^2$$

$$\text{Area of Bottom} = 3.14(8\text{in})^2 = 3.14(64\text{in}^2) = 200.96\text{in}^2$$

$$\text{Area of Rectangle} = L \cdot W = 16\pi \text{in} \cdot 10\text{in} = 502.4\text{in}^2$$

$$\begin{array}{r} 200.96\text{in}^2 \\ 200.96\text{in}^2 \\ + 502.40\text{in}^2 \\ \hline 904.32\text{in}^2 \end{array}$$

Step 1: Every cylinder has 3 faces: two circles and one rectangle. One way to illustrate this is to roll a rectangular piece of paper into a tube. Each end of the tube is a circle and the tube itself is a rectangle. The top and bottom of the cylinder look like ovals when they are drawn, but they are actually circles. Draw the three faces of the cylinder and label the known parts.

Step 2: The length of the rectangle is not known. It can be found by determining the circumference of the circles. (Circumference is the distance around the circle.) The length of the rectangle is 16π in. **Step 3:** Determine the area of each face of the cylinder.

Step 4: Find the sum of the three faces of the cylinder.

The surface area of the cylinder is 904.32 square inches.

Equations: Systems

A system of equations contains at least two equations that may be linear, non-linear, or a combination of the two types. A graphical interpretation of the solution of a system of equations is that point (or points) where the graphs of the equations intersect. One method of finding the solution(s) of a system of equations involves adding the two equations together.

Example 1:

Starting Point			
$3x + y = 13 \quad 2x - 4y = 18$			
(1) $3x + y = 13$ $+2x - 4y = 18$	(2) $12x + 4y = 52$ $+2x - 4y = 18$	(3) $12x + 4y = 52$ $+2x - 4y = 18$ <hr/> $14x + 0y = 70$	(4) $\frac{14x}{14} = \frac{70}{14}$ $x = 5$
(5) $2(5) - 4y = 18$ $10 - 4y = 18$	(6) $10 - 4y = 18$ $-10 \quad -10$ <hr/> $-4y = 8$	(7) $\frac{-4y}{-4} = \frac{8}{-4}$ $y = -2$	
Check Your Work			
$3(5) + (-2) = 13$		$2(5) - 4(-2) = 18$	
$15 - 2 = 13$		$10 + 8 = 18$	
$13 = 13$		$18 = 18$	

- Step 1:** Write the equations in a vertical format, aligning the x-terms, y-terms, equal signs, and constant terms.
- Step 2:** The objective is to add the corresponding parts of the two equations together and eliminate either the x- or y-term. Multiplying each term in the top equation by 4 will create the necessary conditions for eliminating the y-term.
- Step 3:** Add like terms in the two equations, and notice the resulting y-term will have a coefficient of zero and be eliminated.
- Step 4:** Solve the resulting equation for x. In this case, that means divide both sides of the equation by 14. This results with $x = 5$.
- Step 5:** To solve for y, substitute the value of x (5) in either of the original equations. The second equation was chosen for this example.
- Step 6:** Subtract 10 from both sides of the equation.
- Step 7:** Solve the resulting equation for y. In this case, that means divide both sides of the equation by -4. This results with $y = -2$.

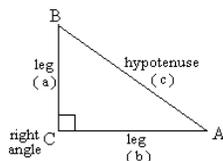
As with all other equations, substitute the values of x and y into the original equations to ensure they are correct solutions.

Both values check out. Therefore, the solution to the system of equations are $x = 5$ and $y = -2$. This can be interpreted as the ordered pair (5, -2) of the point of intersection of the graphs of these two equations.

Pythagorean Theorem

The Pythagorean theorem is used to find the lengths of the sides and hypotenuse of a right triangle.

The Pythagorean theorem states that the square of the hypotenuse (the longest side) of a right triangle (a triangle with one 90 degree angle) is equal to the sum of the squares of the legs of that triangle (the two shorter sides).



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

Looking at the diagram above, we can note that a and b always denote legs of a right triangle and c always denotes the hypotenuse of a right triangle.

Spring Packet 8th Grade
06/09/2021

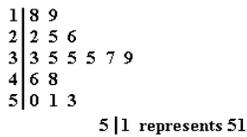
Student Name: _____

Class: _____

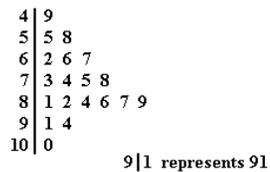
Date: _____

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. How many people made 35 baskets during the week?



- A. 3 players
B. 0 players
C. 6 players
D. 1 players
2. The stem-and-leaf plot below shows the test scores from students in Ms. Bauer's class. In which of the following ranges did **most** students score?



- A. between 50 and 59
B. between 70 and 79
C. between 90 and 99
D. between 80 and 89

3. 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
4. The stem-and-leaf plot below shows the number of different species of fish living in the Washington County rivers. What is the maximum number of fish species in the rivers?

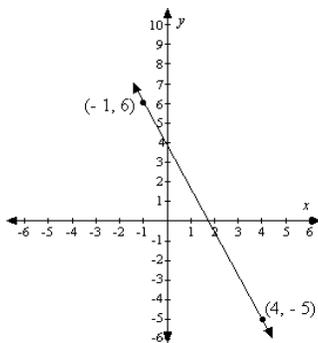
```

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

```

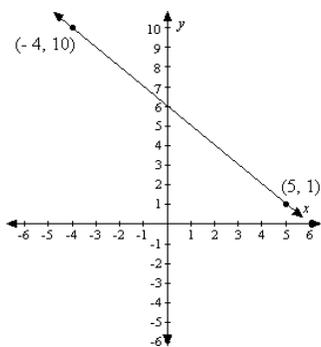
4|1 represents 41

- A. 79 species
 B. 9 species
 C. 53 species
 D. 500,233 species
5. Calculate the slope of the line between the points $(-1, 6)$ and $(4, -5)$.

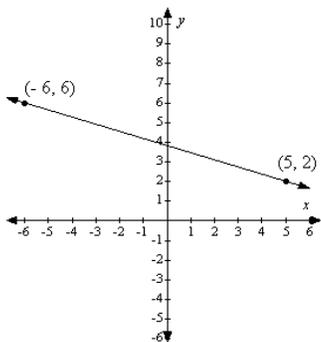


- A. $\frac{-11}{3}$
 B. $\frac{5}{11}$
 C. $\frac{11}{5}$
 D. $-\frac{11}{5}$

6. Calculate the slope of the line between the points $(-4, 10)$ and $(5, 1)$.

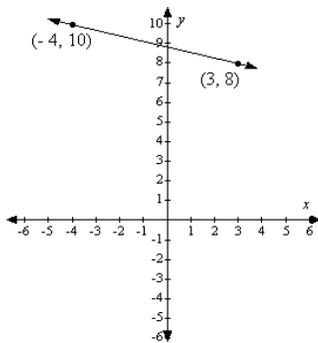


- A. $\frac{10}{9}$
B. $\frac{9}{10}$
C. 1
D. - 1
7. Calculate the slope of the line between the points $(-6, 6)$ and $(5, 2)$.



- A. $\frac{4}{11}$
B. 4
C. $\frac{8}{11}$
D. $-\frac{4}{11}$

8. Calculate the slope of the line between the points $(-4, 10)$ and $(3, 8)$.



- A. 2
B. $\frac{2}{7}$
C. $\frac{7}{2}$
D. $-\frac{2}{7}$
9. 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. $7\frac{1}{5}$

10. Multiply. Reduce your answer to lowest terms.

$$5\frac{5}{6} \times 4 =$$

- A. $20\frac{5}{6}$
B. $23\frac{1}{3}$
C. $9\frac{5}{6}$
D. $16\frac{2}{3}$

11. Multiply. Reduce your answer to lowest terms.

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

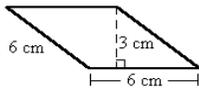
- A. $1\frac{4}{9}$
- B. $\frac{9}{13}$
- C. $35\frac{2}{9}$
- D. $36\frac{1}{9}$

12. Multiply. Reduce your answer to lowest terms.

$$8 \times 2\frac{9}{20} =$$

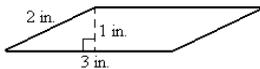
- A. $3\frac{13}{49}$
- B. $\frac{49}{160}$
- C. $16\frac{9}{20}$
- D. $19\frac{3}{5}$

13. Find the area of the parallelogram.



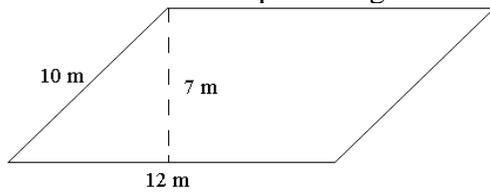
- A. 27 cm^2
- B. 36 cm^2
- C. 9 cm^2
- D. 18 cm^2

14. Find the area of the parallelogram.

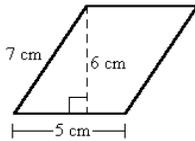


- A. 2 in.^2
- B. 1.5 in.^2
- C. 6 in.^2
- D. 3 in.^2

15. Find the area of the parallelogram.



- A. 84 m^2
B. 19 m^2
C. 70 m^2
D. 120 m^2
16. Find the area of the parallelogram.



- A. 15 cm^2
B. 42 cm^2
C. 35 cm^2
D. 30 cm^2
17. $28 \overline{)123.97}$
- A. 4.42
B. 4.42 R75
C. 4.4275
D. 44,275

18. $0.8 \overline{)5.992}$
- A. 74.9
B. 79.40
C. 0.749
D. 7.49

19. Divide.

$$9.9 \div 4.4 =$$

- A. 2.25
- B. 0.229
- C. 2.29
- D. 0.225

20. Divide.

$$4.4 \overline{)7.7}$$

- A. 0.179
- B. 0.175
- C. 1.79
- D. 1.75

21. Wendell worked for 19 hours. He earned \$137.75.

How much money did Wendell earn per hour?

- A. \$7.25
- B. \$118.75
- C. \$2,617.25
- D. \$6.15

22. A club has 1234.8 gallons of water to fill their 5 duck pools for the county fair.

How many gallons of water will go in each pool?

- A. 2,499.6 gallons
- B. 2,469.96 gallons
- C. 246.96 gallons
- D. 24.696 gallons

23. Edward paid \$204.25 for a rental car while he was in Tahiti. The car cost \$40.85 a day. How many days was Edward in Tahiti?

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

24. Whitney School collected 170.1 pounds of food during their annual food drive. If each class donated 18.9 pounds of food, how many classes participated in the food drive?
- A. 11 classes
 - B. 10 classes
 - C. 8 classes
 - D. 9 classes

25. Reduce all fractions to lowest terms.

$$\begin{array}{r} 9\frac{5}{8} \\ + 4\frac{2}{3} \\ \hline \end{array}$$

- A. $4\frac{5}{6}$
- B. $14\frac{7}{24}$
- C. $13\frac{30}{24}$
- D. $13\frac{1}{24}$

26. Reduce answer to lowest terms.

$$5\frac{3}{7} + 2\frac{7}{12} =$$

- A. $8\frac{1}{84}$
- B. $7\frac{10}{19}$
- C. $7\frac{5}{6}$
- D. $7\frac{75}{84}$

27. Reduce your answer to lowest terms.

$$\begin{array}{r} 10\frac{6}{7} \\ + 8\frac{5}{9} \\ \hline \end{array}$$

- A. $18\frac{11}{16}$
- B. $18\frac{11}{63}$
- C. $19\frac{8}{9}$
- D. $19\frac{26}{63}$

28. Reduce all fractions to lowest terms.

$$\begin{array}{r} 5\frac{2}{3} \\ + 1\frac{6}{15} \\ \hline \end{array}$$

- A. $6\frac{16}{15}$
- B. $7\frac{1}{15}$
- C. $6\frac{8}{18}$
- D. $7\frac{15}{16}$

29. Linda swam $8\frac{7}{8}$ miles. Jorge swam $7\frac{8}{9}$ miles. How much farther did Linda swim than Jorge? Reduce your answer to lowest terms.

- A. $1\frac{1}{8}$ miles
- B. $16\frac{55}{72}$ miles
- C. $\frac{71}{72}$ of a mile
- D. $1\frac{1}{72}$ miles

30. Justin jumped $3\frac{5}{6}$ feet. Douglas jumped $2\frac{4}{9}$ feet. How many more feet did Justin jump? Reduce your answer to lowest terms.

- A. $1\frac{1}{3}$ feet
- B. $2\frac{4}{9}$ feet
- C. $1\frac{7}{18}$ feet
- D. $\frac{7}{18}$ of a foot

31. Graciela has $3\frac{5}{12}$ cups of flour. To make a double batch of muffins she needs $8\frac{7}{18}$ cups of flour and $5\frac{4}{13}$ cups of sugar. How much more flour does Graciela need to make a double batch of muffins?

- A. $4\frac{35}{36}$
- B. $5\frac{2}{6}$
- C. $5\frac{1}{36}$
- D. $1\frac{139}{156}$



32. A farmer plants $15\frac{5}{6}$ rows of corn in his garden. A deer eats $3\frac{8}{9}$ rows. How many rows are left for harvest?

- A. $11\frac{1}{8}$ rows
- B. $11\frac{17}{18}$ rows
- C. $12\frac{1}{8}$ rows
- D. $12\frac{17}{18}$ rows

33. Reduce answer to lowest terms.

$$\frac{48}{24} + \frac{101}{37} =$$

A. $\frac{1776}{2424}$

B. $\frac{149}{1776}$

C. $\frac{222}{303}$

D. $\frac{74}{101}$

34. Reduce answer to lowest terms.

$$\frac{14}{30} + \frac{16}{8} =$$

A. $\frac{7}{30}$

B. $\frac{112}{480}$

C. $\frac{30}{8}$

D. $\frac{30}{38}$

35. Reduce your answer to lowest terms.

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

A. $\frac{7}{10}$

B. $\frac{5}{14}$

C. $\frac{10}{7}$

D. $\frac{14}{5}$

36. Reduce answer to lowest terms.

$$\frac{13}{25} + \frac{12}{10} =$$

A. $\frac{78}{125}$

B. $\frac{39}{62}$

C. $\frac{13}{30}$

D. $\frac{26}{60}$

37. What is another way to write:

$$10^2$$

- A. 10×10
- B. 2×10
- C. $2 \times 2 \times 2$
- D. $10 \times 10 \times 10$

38. What is another way to write:

$$10^5$$

- A. $10 \times 5 \times 5$
- B. $10 \times 10 \times 10 \times 10 \times 10$
- C. $5 \times 5 \times 5$
- D. $10 \times 10 \times 10 \times 10$

39. What does 3^{10} equal?

- A. 3×10
- B. $10 \times 10 \times 10$
- C. $3 \times 3 \times 3$
- D. $3 \times 3 \times 3$

40. What is another way to write:

$$7^2$$

- A. 7×7
- B. 7×0
- C. 7×10
- D. 7×1

41. $-4 + -7 =$

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

42. $-5 + -23 =$

- A. -28
- B. 18
- C. -18
- D. 28

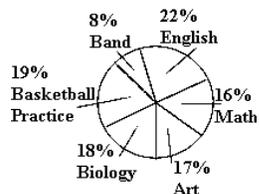
43. Add.
 $19 + (-34) =$

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

44. Add.
 $-37 + -99 =$

- A. 136
- B. 62
- C. -136
- D. -62

45. This circle graph represents the amount of time Gabriella spends on her homework and extra-curricular activities. Use the circle graph to answer the question.



Which two activities does Gabriella spend the most time doing?

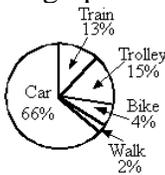
- A. biology and English
- B. basketball practice and biology
- C. English and basketball practice
- D. math and English

46. This circle graph represents how Brett spent his allowance last year. Use the circle graph to answer the question.

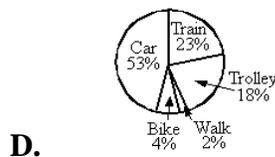
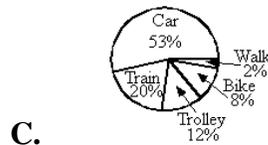
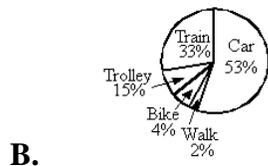
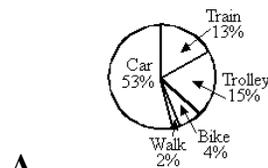


What percent of his allowance did Brett spend on gifts and snacks?

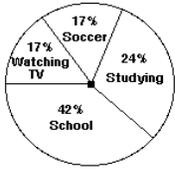
- A. 33%
 B. 43%
 C. 50%
 D. 39%
47. The circle graph below shows the responses of 50 people when they were asked how they get to work.



If the cost of gasoline increased and 13% fewer people (out of the 50 polled) drove their cars to work, which graph might represent this change?

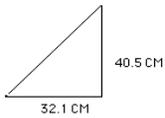


48. This circle graph represents how Jim spends his time each day. Use the circle graph to answer the question.



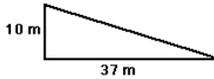
What percent of his time does Jim spend at school?

- A. 24%
 - B. 17%
 - C. 66%
 - D. 42%
49. What is the area of the triangle?



- A. 1,300.05 square centimeters
- B. 145.2 square centimeters
- C. 650.025 square centimeters
- D. 36.056 square centimeters

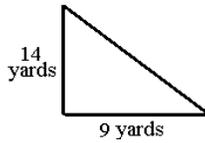
Find the area.



HINT: $A = \frac{1}{2} \times b \times h$

- 50.
- A. 185 square meters
 - B. 23.5 square meters
 - C. 740 square meters
 - D. 94 square meters

Find the area of the triangle. $\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$



51.

- A. 23 yds²
- B. 252 yds²
- C. 126 yds²
- D. 63 yds²

52. What is the height of a triangle that has an area of 120 square feet and a base of 12 feet?

- A. 20 feet
- B. 720 feet
- C. 50 feet
- D. 10 feet

53. $-29 - 14 =$

- A. 43
- B. -43
- C. -15
- D. 15

54. $18 - -9 =$

- A. 9
- B. -9
- C. -27
- D. 27

55. $-78 - 57 =$

- A. -21
- B. -135
- C. 135
- D. 21

56. Subtract.

$$-175 - (-12) =$$

- A. -187
- B. 163
- C. -163
- D. 187

57. Multiply.

$$(-18)(-73)$$

- A. 1,314
- B. -1,314
- C. -180
- D. 180

58. $8 \times (-3 + 6 + -2) =$

- A. 160
- B. 8
- C. -160
- D. -8

59. $-17 \cdot 13 =$

- A. 221
- B. -221
- C. -30
- D. 30

60. Multiply.

$$(-301)(-24)$$

- A. 1,806
- B. 7,224
- C. -7,224
- D. -1,806

61. Find the equivalent form.

$$10^7$$

- A. $7 \times 7 \times 7$
- B. 10×7
- C. $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$
- D. 10×700

62. Find the equivalent form.

$$(9 \times 10^4) + (7 \times 10^5) =$$

- A. 9,007
- B. 97,000
- C. 90,070
- D. 90,700

63. Find the equivalent form.

$$(7 \times 10^2) + (8 \times 10^3) - (1 \times 10^2)$$

- A. 8,800
- B. 8,600
- C. 7,700
- D. 7,900

64. Find the equivalent form.

$$3^2$$

- A. 32
- B. 9
- C. 6
- D. 12

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

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

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

66. Find the value of the $\underline{\quad}$ in the given statement.

$$9.8 \times 10^5 = ?$$

- A. 98,000
- B. 980,000
- C. 9,800,000
- D. 980

67. 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

68. Find the value of the $\underline{\quad}$ in the given statement.

$$520 = 5.2 \times 10^{\underline{\quad}}$$

- A. 2
- B. 1
- C. 10
- D. 3

69. Fill in the blank.

The square root of 50 is _____.

- A. less than 7
- B. between 5 and 7
- C. between 7 and 8
- D. greater than 8

70. Find the equivalent form.

$$\sqrt{100}$$

- A. 1,000
- B. 50
- C. 100
- D. 10

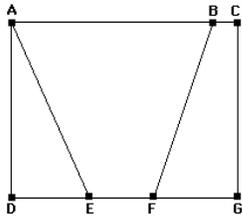
71. What is $\sqrt[3]{-729}$?
- A. - 27
 - B. - 9
 - C. 27
 - D. 9
72. Solve for the value of x.
- $\sqrt{63} = x$
- A. $x = 8$
 - B. $x = 31.5$
 - C. $31 < x < 32$
 - D. $7 < x < 8$
73. The temperature in Austin was 45°F this morning and 83°F at noon. What is the range of these temperatures?
- A. 42°F
 - B. 38°F
 - C. 36°F
 - D. 48°F
74. What is the mode of the group of numbers?
- 24, 76, 78, 32, 43, 76, 12, 54, 59, 23, 61, 2
- A. 540
 - B. 45
 - C. 38
 - D. 76
75. Marcus woke up on Saturday morning with a temperature of 100.2°F . By the afternoon, his temperature was 103°F . By late Saturday night Marcus' parents were able to bring his body temperature down to a normal 98.6°F . What was the range of Marcus' temperature throughout the day?
- A. 203.2°F
 - B. 1.7°F
 - C. 4.4°F
 - D. 301.8°F

76. What is the mode of this set of data?

{98, 79, 85, 79, 98, 89, 79}

- A. 87
- B. 85
- C. 79
- D. 19

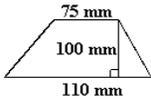
77. In the figure, AB is equal to 14 meters, BC is equal to 4 meters, AD is equal to 13 meters, DE is equal to 5 meters, EF is equal to 6 meters and FG is equal to 7 meters.



What is the area of the trapezoid ACGE?

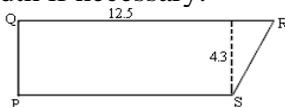
- A. 201.5 square meters
- B. 130 square meters
- C. 49 square meters
- D. 343 square meters

78. What is the area of the trapezoid?



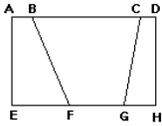
- A. 3,750 square millimeters
- B. 18,500 square millimeters
- C. 9,250 square millimeters
- D. 11,000 square millimeters

79. 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.



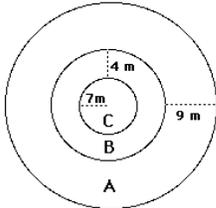
- A. side PS = 6.59 cm
- B. side PS = 5.5 cm
- C. side PS = 12.5 cm
- D. side PS = 7 cm

80. Segment $DH = 10$ centimeters
 Segment $CD = 4$ centimeters
 Segment $GH = 9$ centimeters
 Segment $CG = 12$ centimeters



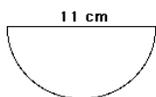
What is the area of trapezoid $CDHG$?

- A. 130 square centimeters
 B. 2,160 square centimeters
 C. 65 square centimeters
 D. 110 square centimeters
81. What is the area of Circle B?



Round your answer to the nearest hundredth.

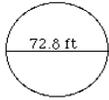
- A. 1,256 square meters
 B. 50.24 square meters
 C. 34.54 square meters
 D. 379.94 square meters
82. What is the area of the semicircle?



Round your answer to the nearest hundredth.

- A. 189.97 square centimeters
 B. 69.08 square centimeters
 C. 47.49 square centimeters
 D. 34.54 square centimeters

83. What is the area of the circle?



Round your answer to the nearest hundredth.

- A. 228.59 square feet
 - B. 114.3 square feet
 - C. 16,641.5 square feet
 - D. 4,160.37 square feet
84. What is the area of a circle with a diameter of 9.2 centimeters?

Round your answer to the nearest hundredth.

- A. 66.44 square centimeters
 - B. 265.77 square centimeters
 - C. 28.89 square centimeters
 - D. 21.16 square centimeters
85. Choose the symbol that replaces the question mark.

$$-2080 \div -65 \quad ? \quad -1748 \div 23$$

- A. =
 - B. >
 - C. <
86. $63 \div -9 =$
- A. -567
 - B. -7
 - C. 7
 - D. 567

87. Divide.
- $$-144 \div 12 =$$

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

88. Divide.

$$138 \div (-6) =$$

- A. 22
- B. -23
- C. -22
- D. 23

89. Solve for a.

$$a - 6 = 12$$

- A. $a = 6$
- B. $a = -6$
- C. $a = 18$
- D. $a = -18$

90. Solve for m.

$$-6 + m = 22$$

- A. $m = 28$
- B. $m = -28$
- C. $m = 16$
- D. $m = -16$

91. Solve for y.

$$y + -6 = 30$$

- A. $y = 24$
- B. $y = 36$
- C. $y = -5$
- D. $y = -180$

92. What is the value of x?

$$x + 5.1 + 9.4 = 18.2$$

- A. 32.7
- B. 14.5
- C. 3.7
- D. 4.3

93. What is the value of a?

$$\frac{a}{6} = 24$$

- A. 144
- B. 4
- C. 30
- D. 72

94. Solve for t.

$$7t = -56$$

- A. $t = -392$
- B. $t = 392$
- C. $t = -8$
- D. $t = 8$

95. Solve.

$$\frac{z}{6} = -8$$

- A. $z = 48$
- B. $z = 2$
- C. $z = -2$
- D. $z = -48$

96. What is the value of c?

$$55c = 11$$

- A. -44
- B. 605
- C. 5
- D. 0.2

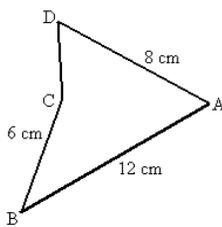
97. Four families bought a parcel of land. Two of the families received parcels with an area equal to 2,450 square meters. The other two families received parcels that were twice that size.

What was the total area of the original parcel of land?

- A. 9,800 square meters
 - B. 14,700 square meters
 - C. 4,998 square meters
 - D. 19,600 square meters
98. What is the area of a rectangle that is 12.77 feet long and 12.22 feet wide?

Round your answer to the nearest whole number.

- A. 312 square feet
 - B. 156 square feet
 - C. 50 square feet
 - D. 144 square feet
99. The perimeter of the figure is 30 cm. What is the length of side CD?



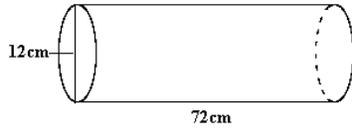
- A. 12 cm
 - B. 8 cm
 - C. 5 cm
 - D. 4 cm
100. What is the area of a rectangle that is 11.24 centimeters long and 61.8 centimeters wide?
- A. 347.316 square centimeters
 - B. 73.04 square centimeters
 - C. 694.632 square centimeters
 - D. 146.08 square centimeters

101. A cylinder has a radius of 10 meters and a height of 100 meters.

What is the surface area of the cylinder?

- A. 6594 square meters
- B. 6908 square meters
- C. 3768 square meters
- D. 3454 square meters

102. What is the surface area of the figure?



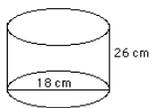
- A. 1,582.56 square centimeters
- B. 1,431.84 square centimeters
- C. 2,939.04 square centimeters
- D. 2,750.64 square centimeters

103. A cylinder has a diameter of 2 meters. The height of the cylinder is 12 meters.

What is the surface area of the cylinder?

- A. 87.92 square meters
- B. 157 square meters
- C. 100.48 square meters
- D. 81.64 square meters

104. What is the surface area of the cylinder?



- A. 1,978.2 square centimeters
- B. 1,723.86 square centimeters
- C. 3,504.24 square centimeters
- D. 1,469.52 square centimeters

105. The first step toward solving these equations by addition could be:

$$\begin{aligned} 3x + 8y &= 2 \\ -3x - 4y &= 6 \end{aligned}$$

- A. add $3x$ and $-3x$
- B. multiply $-3x + 4y = 6$ by 3
- C. divide 8 by 4
- D. plugging $y = 2$ into the equation $3x + 8y = 2$

106. A possible step toward solving these equations by addition could be:

$$\begin{aligned} 8y + 3x &= 7 \\ -3x + 4y &= 2 \end{aligned}$$

- A. subtract 3 from 8
- B. adding $8y$ and $4y$
- C. multiplying $4y - 3x = 2$ by -1
- D. subtracting 2 from 7

107. A large publishing company charges a one-time screen fee of \$50.00 to print a yearbook cover, plus \$3.00 per yearbook. A local store charges a printing fee of \$5.00 per yearbook for the first 20 books, and then \$4.00 per yearbook thereafter. Which printing facility would be the least expensive for the school to use to print 100 yearbooks?

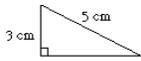
- A. The local store will be the least expensive.
- B. Both options will cost the same amount.
- C. The large publishing company will be the least expensive.

108. A step toward solving these equations by addition could be:

$$\begin{aligned} 12x - 3y &= 4 \\ -2 - 2y &= -4x \end{aligned}$$

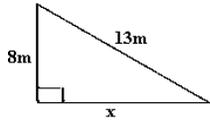
- A. multiplying $12x - 3y = 4$ by 2
- B. add $12x$ and $-4x$
- C. adding $24x$ to $12x$
- D. multiply $-2 - 2y = -4x$ by -3

109. What is the area of the right triangle?



- A. 6 square centimeters
- B. 7.5 square centimeters
- C. 10 square centimeters
- D. 15 square centimeters

110. What is the approximate value of x?



- A. 10 m
- B. 21 m
- C. 5 m
- D. 15 m

111. A triangle has sides which are 12, 15, and 17 centimeters wide. Which applied equation proves that this triangle **is or is not** a right triangle?

- A. $12^2 + 15^2 = \sqrt{17}$
- B. $\sqrt{12} + \sqrt{15}$
- C. $12^2 + 15^2 = 289$
- D. $12 + 15 = 80 + 289$

112. A triangle has sides which are 9, 40, and 41 millimeters long. How could you determine if this triangle **is or is not** a right triangle?

- A. $\sqrt{9} + \sqrt{40}$
- B. $9^2 + 41^2$
- C. $\sqrt{9} + \sqrt{40} = 41$
- D. $9^2 + 40^2 = 41^2$