

June 2019



Summer Work - Students Entering Grade 8

Dear Students :

I hope you have a wonderful summer. The material that was covered in Grade 7 was excellent preparation for the Grade 8 curriculum. It is very important that you maintain a strong grasp of this material.

Please complete the attached assignment. Record all answers to the first 100 questions on the answer sheet. Complete the computation on tablet paper and labeled with the number of the problem. Work and answers for the three skills pages should be done on the worksheet. Staple all work to the answer sheet. Work will be collected on the first day of school.

Also, study the math vocabulary. We will be having a quiz on these words when we return in September.

I look forward to a great 8th grade year. Stay safe.

Have a happy and healthy summer!

Mrs. Drivick

8th Grade Math Vocabulary

1. Proportion: An equation that states that two ratios are equivalent.
2. Ratio: A comparison by two quantities by division.
3. Equivalent Ratio: Ratios that name the same comparison.
4. Unit Rate: A rate in which the second quantity in the comparison is one unit.
5. Scale Factor: The ratio used to enlarge or reduce similar figures.
6. Ordered Pair: A pair of numbers that can be used to locate a point on a coordinate plane.
7. Coordinate Plane: A plane formed by the intersections of a horizontal number line called the x-axis and a vertical number line called the y-axis.
8. Constant of Proportionality: A constant ratio of two variables related proportionality.
9. Rational Number: Any number that can be expressed as a ratio of two integers.
10. Integer: The set of whole numbers and their opposites.
11. Positive Integer: Any integer greater than zero.
12. Negative Integer: An integer less than zero.
13. Absolute Value: The distance of a number from zero on a number line.
14. Additive Inverse: The opposite of a number.
15. Expression: A mathematical phrase that contains operations, numbers and/or variables.
16. Coefficient: The number that is multiplied by a variable in an algebraic expression.

17. Variable: A symbol used to represent a quantity that can change.
18. Evaluate: To find the value of a numerical or algebraic expression.
19. Commission: A fee paid to a person for making a sale.
20. Percent of Increase: Calculated by increase in price over original amount.
21. Simple Interest: A fixed percent of the principal.
22. Measure of Central Tendency: A measure used to describe the middle of a data set; the mean, median and mode are measures of central tendency.
23. Outlier: A value much greater or much less than the others in a data set.
24. Random Sample: A sample in which each individual or object in the entire population has an equal chance of being selected.
25. Frequency: The number of times the value appears in the data set.
26. Compound Events: An event made up of two or more simple events.
27. Supplementary Angles: two angles whose measures have a sum of 180° .
28. Complementary Angles: Two angles whose measures add up to 90° .
29. Adjacent Angles: Angles in the same plane that has a common vertex and a common side.
30. Vertical Angles: A pair of opposite congruent angles formed by intersecting lines.

Name _____

St. Christopher's School

Grade 7 Going into 8 – Summer Work - 2018

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Operations with Integers

Adding Integers

- Negative + Negative: Add the absolute values of the two numbers and make the answer negative.

$$\text{ex: } -5 + (-9) \longrightarrow 5 + 9 = 14 \longrightarrow \text{answer: } (-14)$$

- Negative + Positive (or Positive + Negative): Subtract the absolute values of the two numbers (larger minus smaller) and take the sign of the number with the greater absolute value.

$$\text{ex: } -7 + 12 \longrightarrow 12 - 7 = 5 \longrightarrow 12 > 7, \text{ so answer is positive} \longrightarrow \text{answer: } (5)$$

$$\text{ex: } 6 + (-9) \longrightarrow 9 - 6 = 3 \longrightarrow 9 > 6, \text{ so answer is negative} \longrightarrow \text{answer: } (-3)$$

Subtracting Integers

- Keep the first number the same, change the subtraction sign to an addition sign, and change the sign of the second number. Then use the integer addition rules.

$$\text{ex: } -3 - 9 \longrightarrow -3 + (-9) = (-12)$$

$$\text{ex: } 15 - (-8) \longrightarrow 15 + 8 = (23)$$

$$\text{ex: } -6 - (-4) \longrightarrow -6 + 4 = (-2)$$

Multiplying & Dividing Integers

Ignore the signs and multiply or divide as usual. Then determine the sign of the answer using the following rules:

- Negative \cdot or \div Negative = Positive
- Negative \cdot or \div Positive (or Positive \cdot or \div Negative) = Negative

$$\text{ex: } -3 \cdot (-5) \longrightarrow 3 \cdot 5 = 15 \longrightarrow \text{neg} \cdot \text{neg} = \text{pos} \longrightarrow \text{answer: } (15)$$

$$\text{ex: } 48 \div (-6) \longrightarrow 48 \div 6 = 8 \longrightarrow \text{pos} \div \text{neg} = \text{neg} \longrightarrow \text{answer: } (-8)$$

Order of Operations

Parentheses

Exponents

Multiplication & Division (left to right)

Addition & Subtraction (left to right)

Find the sum or difference.

1. $-80 + 77$

2. $77 + 160$

3. $-64 + (-33)$

4. $104 - (-92)$

5. $-105 - (-122)$

6. $185 - (-154)$

7. $-53 - (-59)$

8. $-6 + (-35)$

9. $15 - (-26) - (-39)$

10. $-93 + 191 + (-179)$

11. $18 + (-34) + 52$

12. $-50 - (-93) + (-17)$

Find the product or quotient.

13. $60 \div 12$

14. $-194 \div (-2)$

15. $88 \cdot (-2)$

16. $-12 \cdot 10$

17. $-10 \cdot (-11)$

18. $90 \div (-6)$

19. $3 \cdot (-59)$

20. $-7 \cdot (-2)$

21. $-28 \div (-88) \cdot (-22)$

22. $-56 \cdot 140 \div (-80)$

23. $108 \div (-11) \cdot (-11)$

24. $-84 \cdot (-17) \div 42$

Evaluate the numerical expression. (Be sure to use the order of operations!)

25. $-78 + (-2) \cdot (-56)$

26. $-65 + 6 \div (-3) + 40$

27. $-94 - (84 - 10)$

28. $43 + (-23) - (-57)$

29. $-15 - (-11) + 5 \cdot (-4)$

30. $-26 - (-64) + (-93)$

31. $-84 \div 4 + (-20)$

32. $-56 + (-50) + (-10) \cdot (-9)$

Operations with Rational Numbers

Adding & Subtracting Rational Numbers

Determine whether you should add or subtract using integer rules. Then add or subtract.

- Decimals: Line up the decimal points. Then add or subtract and bring the decimal point down. Use integer rules to determine the sign of the answer.

$$\text{ex: } -9.8 + 6.24 \longrightarrow \text{neg} + \text{pos: subtract} \longrightarrow \begin{array}{r} 9.80 \\ -6.24 \\ \hline 3.56 \end{array} \longrightarrow \text{answer: } (-3.56)$$

- Fractions/Mixed Numbers: Find a common denominator and then add or subtract. Borrow or convert an improper fraction answer, if necessary. Use integer rules to determine the sign of the answer.

$$\text{ex: } 5\frac{3}{4} - (-3\frac{7}{8}) \longrightarrow 5\frac{3}{4} + 3\frac{7}{8} \longrightarrow \text{pos} + \text{pos: add} \longrightarrow \begin{array}{r} 5\frac{3}{4} = \frac{6}{8} \\ + 3\frac{7}{8} = \frac{7}{8} \\ \hline 8\frac{13}{8} \end{array} \longrightarrow \text{answer: } (9\frac{5}{8})$$

Multiplying & Dividing Rational Numbers

Determine the sign of the answer using integer rules. Then multiply or divide.

- Multiplying Decimals: Ignore the decimal points. Multiply the numbers. Then count the decimal places in the problem to determine the location of the decimal point in the answer.

$$\text{ex: } -9.23 \cdot (-1.1) \longrightarrow \text{neg} \cdot \text{neg} = \text{pos} \longrightarrow \begin{array}{r} 9.23 \\ \times 1.1 \\ \hline 923 \\ 9230 \\ \hline 10153 \end{array} \longrightarrow \text{answer: } (10.153)$$

- Dividing Decimals: Move the decimal in the divisor to the end of the number. Move the decimal in the dividend the same number of places and then bring it straight up in quotient.

$$\text{ex: } -5.2 \div 0.2 \longrightarrow \text{neg} \div \text{pos} = \text{neg} \longrightarrow 02 \overline{) 52.} \longrightarrow \text{answer: } (-26)$$

- Multiplying Fractions: Convert mixed numbers to improper fractions. Then cross-simplify. Multiply the numerators and multiply the denominators. Simplify if necessary.

$$\text{ex: } -1\frac{3}{4} \cdot \frac{6}{14} \longrightarrow \text{neg} \cdot \text{pos} = \text{neg} \longrightarrow \frac{1\cancel{7}}{2} \cdot \frac{\cancel{6}^3}{\cancel{14}_2} = \frac{3}{4} \longrightarrow \text{answer: } (-\frac{3}{4})$$

- Dividing Fractions: Convert mixed numbers to improper fractions. Then flip the second fraction to its reciprocal and multiply the two fractions. Simplify if necessary.

$$\text{ex: } -\frac{1}{2} \div (-\frac{3}{8}) \longrightarrow \text{neg} \div \text{neg} = \text{pos} \longrightarrow \frac{1}{2} \cdot \frac{8}{3} = \frac{4}{3} \longrightarrow \text{answer: } (1\frac{1}{3})$$

Find the sum, difference, product, or quotient.

33. $38.61 + 36.841$

34. $1.755 - 1.23$

35. $0.71 \cdot 9.2$

36. $13.12 \div 0.1$

37. $3.651 - (-12.63)$

38. $-3.9 + (-7.6)$

39. $17.6 \cdot 4.3$

40. $6 \cdot (-16.7)$

41. $26.474 - 14.527$

42. $-2.1 + 3.78$

43. $-6.15 \div (-8.2)$

44. $-12.8 \cdot (-4.88)$

Find the sum, difference, product, or quotient.

45. $15 \frac{1}{2} + 15 \frac{1}{4}$

46. $18 \frac{11}{20} - 17 \frac{1}{2}$

47. $2 \frac{1}{4} \cdot 1 \frac{4}{5}$

48. $3 \frac{1}{2} \div 1 \frac{3}{7}$

49. $3 \frac{1}{3} - 5 \frac{1}{9}$

50. $5 \cdot (-1 \frac{2}{5})$

51. $-4 \frac{2}{3} + (-1 \frac{3}{4})$

52. $-\frac{5}{6} \div (-2 \frac{1}{6})$

53. $9 \div (-4 \frac{1}{2})$

54. $-18 + 3 \frac{4}{5}$

55. $-5 \frac{2}{3} \cdot (-2 \frac{5}{6})$

56. $-5 \frac{3}{4} - (-3 \frac{7}{8})$

Solving Equations

Solving One-Step Equations

- Cancel out the number on the same side of the equation as the variable by using the inverse operation. (Addition/Subtraction; Multiplication/Division). Be sure to do the same thing to both sides of the equation!

$$\text{ex: } 6x = -18 \rightarrow \frac{\cancel{6}x = -18}{\cancel{6} \quad \cancel{6}} \rightarrow \text{answer: } (x = -3)$$

$$\text{ex: } y + 23 = -9 \rightarrow y + \cancel{23} = -9 \rightarrow \text{answer: } (y = -32)$$

$\quad \quad \quad -23 \quad -23$

$$\text{ex: } \frac{h}{3} = 4 \rightarrow \cancel{3} \cdot \frac{h}{\cancel{3}} = 4 \cdot 3 \rightarrow \text{answer: } (h = 12)$$

$$\text{ex: } w - 13 = -5 \rightarrow w - \cancel{13} = -5 \rightarrow \text{answer: } (w = 8)$$

$\quad \quad \quad +13 \quad +13$

Solving Two-Step Equations

- Undo operations using inverse operations one at a time using the order of operations in reverse. (i.e.: undo addition/subtraction before undoing multiplication/division)

$$\text{ex: } 7x - 4 = -32 \rightarrow 7x - \cancel{4} = -32 \rightarrow \frac{\cancel{7}x = -28}{\cancel{7} \quad \cancel{7}} \rightarrow \text{answer: } (x = -4)$$

$\quad \quad \quad +4 \quad +4$

$$\text{ex: } \frac{j}{5} + 13 = 15 \rightarrow \frac{j}{5} + \cancel{13} = 15 \rightarrow \cancel{5} \cdot \frac{j}{\cancel{5}} = 2 \cdot 5 \rightarrow \text{answer: } (j = 10)$$

$\quad \quad \quad -13 \quad -13$

$$\text{ex: } \frac{b+7}{3} = -2 \rightarrow \cancel{3} \cdot \frac{b+7}{\cancel{3}} = -2 \cdot 3 \rightarrow b + \cancel{7} = -6 \rightarrow \text{answer: } (b = -13)$$

$\quad \quad \quad -7 \quad -7$

Solve the one-step equation.

57. $19 + j = -34$

58. $m - 26 = 13$

59. $\frac{x}{5} = -3$

60. $12f = 216$

61. $g - (-3) = -7$

62. $\frac{h}{9} = 13$

63. $b + (-3) = -9$

64. $-4w = -280$

Solve the two-step equation.

65. $5m - 3 = 27$

66. $7 + \frac{y}{2} = -3$

67. $4 + 3r = -8$

68. $\frac{1}{2}p - 4 = 7$

69. $\frac{k+8}{3} = -2$

70. $\frac{f}{5} - (-13) = 12$

71. $-15 - \frac{g}{3} = -5$

72. $-8 + 4m = 2$

73. $-18 - \frac{3}{4}v = 3$

74. $\frac{-5+n}{4} = -1$

75. $3.5m + 0.75 = -6.25$

76. $2y + 3 = 19$

Proportions and Percent

Solving Proportions

- Set cross-products equal to each other and then solve the one-step equation for the given variable.

ex: $\frac{5}{b} = \frac{4}{10} \rightarrow 5 \cdot 10 = 4b \rightarrow \frac{50}{4} = \frac{4b}{4} \rightarrow$ answer: $b = 12.5$

Solving Percent Problems with Proportions

- Set up and solve a proportion as follows: $\frac{\%}{100} = \frac{\text{part}}{\text{whole}}$

ex: 25 is what percent of 500? $\rightarrow \frac{x}{100} = \frac{25}{500} \rightarrow$ answer: $x = 5\%$

ex: What is 15% of 88? $\rightarrow \frac{15}{100} = \frac{x}{88} \rightarrow$ answer: $x = 13.2$

ex: 18 is 30% of what number? $\rightarrow \frac{30}{100} = \frac{18}{x} \rightarrow$ answer: $x = 60$

Solving Percent Problems with Equations

- Translate the question to an equation and then solve. (Be sure to convert percents to decimals or fractions.)

ex: 20 is 40% of what number? $\rightarrow 20 = 0.4x \rightarrow$ answer: $x = 50$

ex: 8 is what percent of 32? $\rightarrow 8 = 32x \rightarrow x = 0.25 \rightarrow$ answer: 25%

ex: What is 25% of 88? $\rightarrow x = 0.25 \cdot 88 \rightarrow$ answer: $x = 22$

Real-World Percent Problems

(This is just one way of many to solve real-world percent problems)

- Tax: Find the amount of tax using a proportion or equation. Then add the tax to the original amount to find the total cost.
- Discount: Find the amount of the discount using a proportion or equation. Then subtract the amount of discount from the original price to find the sale price.

Solve the proportion.

77. $\frac{h}{6} = \frac{20}{24}$

78. $\frac{5}{7} = \frac{c}{14}$

79. $\frac{6}{8} = \frac{21}{b}$

80. $\frac{30}{j} = \frac{26}{39}$

81. $\frac{5}{k} = \frac{15}{20}$

82. $\frac{32}{112} = \frac{a}{14}$

83. $\frac{16}{7} = \frac{18}{g}$

84. $\frac{w}{60} = \frac{15}{200}$

Solve the percent problem.

85. Find 15% of 85.

86. 6 is 75% of what number?

87. 40 is what percent of 320?

88. What is 20% of 45?

89. 70 is what percent of 350?

90. Find 33. $\bar{3}$ % of 81.

91. A \$58 camera is on sale for 20% off. Find the sale price.

92. Find the total price of a \$14.00 shirt including the 7% sales tax.

Geometry

Geometry Basics

- Perimeter is the distance around a polygon
- Circumference is the distance around a circle
- Area is the space inside a figure
- Volume is the capacity of a 3-dimensional figure
- Surface Area is the sum of the areas of all the faces on a 3-dimensional figure

2-Dimensional Geometry Formulas

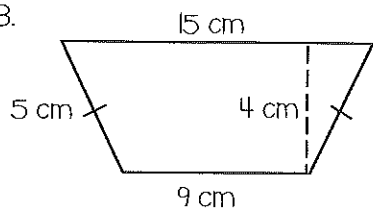
- Perimeter of Any Figure: sum of side lengths
- Circumference = $\pi \cdot \text{diameter}$
- Area of Parallelogram = base \cdot height
- Area of Triangle = $\frac{1}{2} \cdot \text{base} \cdot \text{height}$
- Area of Trapezoid = $\frac{1}{2} \cdot \text{height}(\text{base}_1 + \text{base}_2)$
- Area of Circle = $\pi \cdot \text{radius}^2$

3-Dimensional Geometry Formulas

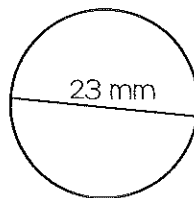
- Volume of Rectangular Prism = length \cdot width \cdot height
- Volume of Cylinder = $\pi \cdot \text{radius}^2 \cdot \text{height}$
- Surface Area of Rectangular Prism = $2 \cdot \text{length} \cdot \text{width} + 2 \cdot \text{length} \cdot \text{height} + 2 \cdot \text{height} \cdot \text{width}$
- Surface Area of Cylinder = $2 \cdot \pi \cdot \text{radius}^2 + 2 \cdot \pi \cdot \text{radius} \cdot \text{height}$

Find the perimeter (or circumference) and area. Use 3.14 for pi.

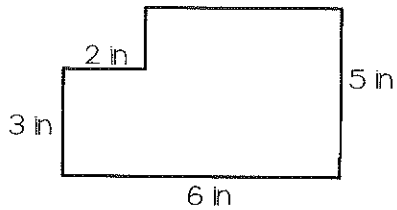
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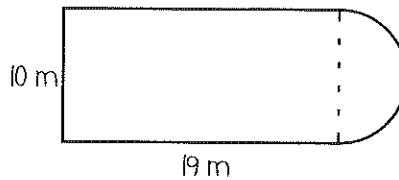
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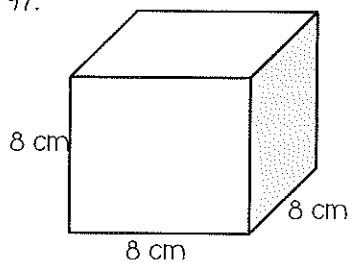


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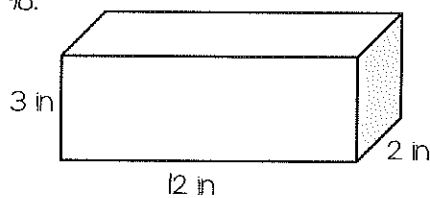


Find the surface area and volume.

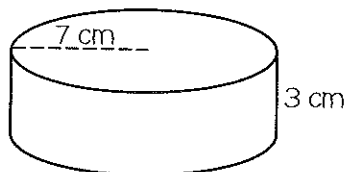
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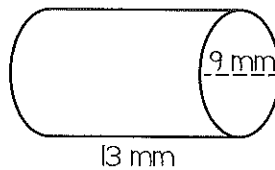
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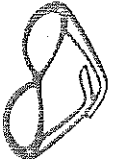
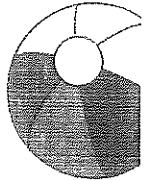




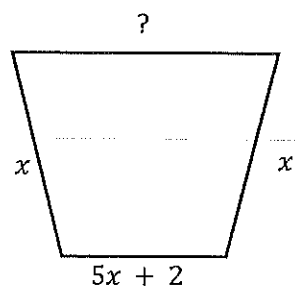
EXPRESSIONS AND EQUATIONS

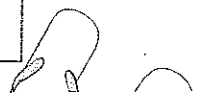
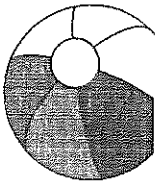
Skills Practice

Use the Distributive Property to rewrite each expression.	
1. $2(x + 9)$	2. $3(-3x - 4)$
Solve each equation. Check your solution.	
3. $a - 5 = -12$	4. $-4(x + 2) = -40$



Problem Solving

5. Nora needs at least \$115 for a new cell phone. She has already saved \$45. She earns \$7 an hour at her job. Write and solve an inequality to find how many hours she will need to work to buy the phone.	6. The perimeter of the garden shown is $8x + 5$ units. Find the length of the missing side. 
7. Gloria needs $\frac{2}{5}$ yard of ribbon to make each bow. Write and solve an equation to find how many bows she can make with 8 yards of ribbon.	8. The area of a rectangular rug is $(3x + 9)$ square units. Factor $(3x + 9)$ to find possible dimensions of the rug.

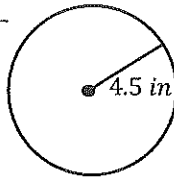


GEOMETRY

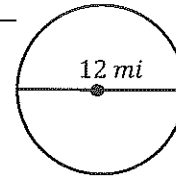
Skills Practice

Find the circumference and area of each circle. Use 3.14 for π . Round to the nearest hundredth if necessary.

1. circumference = _____
area = _____

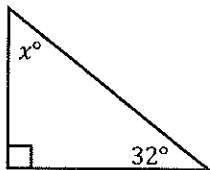


2. circumference = _____
area = _____

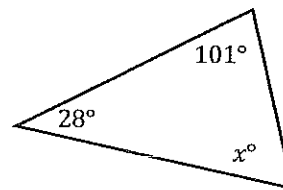


Find the value of x .

3.



4.



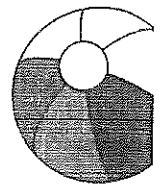
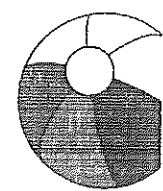
Problem Solving

5. On a map, the distance from Langhorne to Tannersville measures 2 centimeters. What is the actual distance if the scale of the map shows that 1 centimeter is equal to 30 kilometers?

6. $\angle A$ and $\angle B$ are complementary angles. The measure of $\angle B$ is 65° . What is the value of x ?

7. Container A is 13 inches by 19 inches by 25 inches. Container B is 13 inches by 13 inches by 31 inches. In cubic inches, how much greater is the volume of Container A.

8. Sara purchased a porcelain sculpture that is in the shape of a square pyramid. The slant height is 6.1 inches and the base 6.4 inches. Find the surface area. Round to the nearest tenth.



STATISTICS AND PROBABILITY

Skills Practice

Ten cards numbered 1 through 10 are mixed together and then one card is drawn. Find the probability of each event.

1. $P(7)$

2. $P(\text{greater than } 7)$

Use the Fundamental Counting Principle to find the total number of outcomes in each situation.

3. choosing from 5 flavors and 2 sizes of juice

4. tossing 4 coins

Problem Solving

5. A survey showed that 60% of students would select bumper cars as their favorite ride at an amusement park. Out of 4,000 students, predict how many would select roller coasters as their favorite ride?

6. Mr. Jennings put student names in a hat and selected four names without looking. What type of sample did he form?

- biased sample
- convenience sample
- simple random sample
- systematic random sample

7. Roger wishes to determine the average high temperature for any given day in his city. To do this, he records the high temperature for every day in December, January, and February. He then adds the temperatures together and divides the sum by the number of days in his sample size. Explain why his data would not provide relevant results for what he was trying to accomplish.

8. A laundry basket contains 8 white t-shirts and 6 black t-shirts. What is the probability of randomly picking 2 black socks from the basket?

