



2019 SUMMER MATH PACKET INCOMING 8TH GRADERS

This math packet belongs to:

Summer 2019

To Students entering 6-8th grade at New Richmond Middle School for the 2019-2020 School Year,

Greetings! This upcoming school year will be an exciting and challenging year in math. To help you get started on the right foot, the math department has put together a packet to review those skills you learned in your previous math class and will therefore serve as the building blocks for math next year. It is due the first full week of school to your math teacher. If you feel you need extra practice beyond that provided in this packet there are several resources available online. The intent of the packet is to work on it throughout the summer so that you have ongoing practice.

In order to receive credit for this packet, you must show ALL work where applicable. You may complete your work in the packet or on a separate piece of paper as long as you label each problem with the page, problem number and final answer. Calculators should be used only when needed for the 7th and 8th grade packets. Incoming 6th grade packets should be completed without a calculator. Answers with no work will receive no credit.

We hope you enjoy your summer and we look forward to meeting you in September!

Sincerely,
New Richmond Middle School Math Teachers

A paper copy or an additional copy are available in the front office of New Richmond Middle School or you can go on the school's website at www.newrichmond.k12.wi.us to print.

If you have any questions, feel free to contact any of the middle school math teachers:

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Operations with Integers

Adding Integers

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

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

- 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.

$$\text{ex: } -7 + 12 \rightarrow 12 - 7 = 5 \rightarrow 12 > 7, \text{ so answer is positive} \rightarrow \text{answer: } \textcircled{5}$$

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

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.

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

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

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

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

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

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

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.

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

- 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.

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

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.

$$\text{ex: } -9.23 \cdot (-1.1) \rightarrow \text{neg} \cdot \text{neg} = \text{pos} \rightarrow \begin{array}{r} 923 \\ \times 11 \\ \hline 9230 \\ 9230 \\ \hline 10153 \end{array} \rightarrow \text{answer: } (10.153)$$

- 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.

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

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

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

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

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

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. $-18 - 3\frac{1}{4}v = 3$

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

75. $35m + 0.75 = -6.25$

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 realworld 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. $\frac{32}{12} = \frac{a}{14}$

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

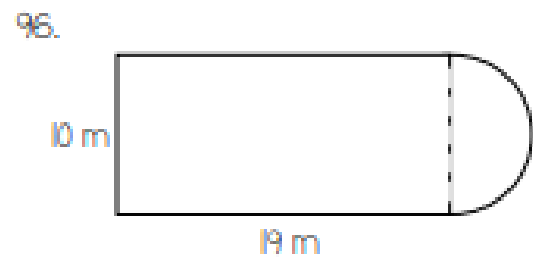
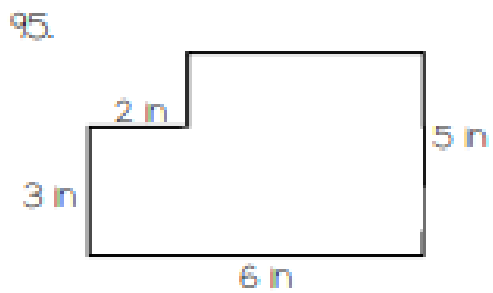
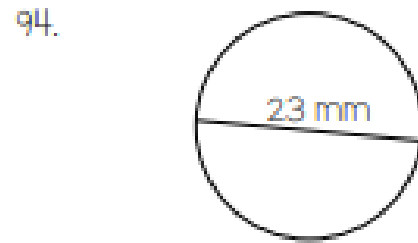
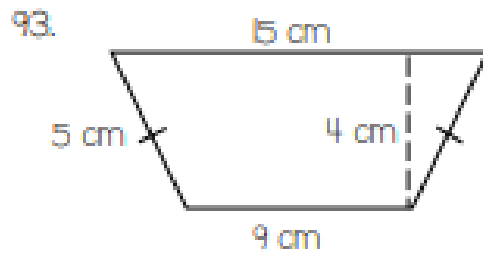
2-Dimensional Geometry Formulas

- 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.



Find the surface area and volume.

