While summertime is a time for relaxation and less structure, it is also a time to refresh, review, and enrich. Studies show that an hour a week is all that it takes to strengthen math skills and say goodbye to the summer learning loss.

The summer work file contains several review concepts and skills that are essential for success in both grade level and advanced math classes next year. You will need to download this file and print it. You will need to clearly answer the questions and show the work associated with your answers. Work should be easily identifiable with the problem it is for and readable!

This packet is broken into two sections: Part 1 and Part 2. Part 1 must be completed by all students regardless of their math placement. Part 2 must be completed by all advanced math students, and anyone desiring to have the opportunity to join the advanced math class.

Calculators should not be used unless working with percent concepts.

These packets will be collected by the math teachers on Friday, August 25, 2023.

Mathematical foundational skills are essential life skills no matter what math class you are in. We recommend that you also start (and keep) a math journal whenever you use problems solving skills or logical skills as you are using math. You'd be surprised at all the places you use math without realizing you are using math!

St. Bonaventure Math Teachers

MATH
REVIEW PACKET
FOR
6$^{\text{TH}}$ into 7$^{\text{TH}}$ GRADE

While summertime is a time for relaxation and less structure it is also a time to refresh, review, and enrich. This file contains several review concepts and skills that are essential for success in both grade level and advanced math classes next year. You will need to print this file.

This packet is broken into two sections: Part 1 and Part 2. Part 1 must be completed by all students regardless of their math placement. Part 2 must be completed by all advanced math students, and anyone desiring to have the opportunity to join the advanced math class.

<u>Calculators should not be used unless working with percent concepts. All work should be shown and easy to read, with answers clearly identified</u>.

<u>These packets will be collected by the math teachers at the end of the first week of school.</u>

Studies show that an hour a week is all that it takes to strengthen math skills and say goodbye to summer learning loss. Mathematical foundational skills are essential no matter what math class you are in.

Summer Math Packet

Part 1

Find the sum. Write your answer in simplest form.

1. $\dfrac{1}{4} + \dfrac{1}{2}$

2. $\dfrac{2}{5} + \dfrac{1}{3}$

3. $\dfrac{7}{15} + \dfrac{3}{10}$

4. $\dfrac{11}{28} + \dfrac{4}{7}$

5. $\dfrac{3}{4} + \dfrac{1}{12}$

6. $\dfrac{9}{10} + \dfrac{13}{20}$

7. $4\dfrac{15}{16} + 7\dfrac{3}{4}$

8. $2\dfrac{16}{25} + 3\dfrac{18}{20}$

9. $3\dfrac{2}{5} + 9\dfrac{1}{10}$

10. $6\dfrac{1}{42} + 4\dfrac{5}{6}$

11. $18\dfrac{7}{9} + 16$

12. $4\dfrac{7}{8} + \dfrac{1}{3}$

Find the difference. Write your answer in simplest form.

13. $\dfrac{7}{8} - \dfrac{1}{4}$

14. $\dfrac{13}{15} - \dfrac{1}{3}$

15. $\dfrac{7}{9} - \dfrac{2}{6}$

16. $\dfrac{21}{24} - \dfrac{3}{8}$

17. $\dfrac{3}{14} - \dfrac{1}{7}$

18. $\dfrac{9}{10} - \dfrac{1}{2}$

19. $9\dfrac{1}{6} - 4\dfrac{1}{12}$

20. $12\dfrac{18}{25} - 8\dfrac{4}{5}$

21. $5\dfrac{8}{9} - 3\dfrac{2}{3}$

22. $8\dfrac{12}{16} - 7\dfrac{31}{32}$

23. $10\dfrac{3}{4} - 6\dfrac{4}{5}$

24. $13\dfrac{7}{8} - \dfrac{10}{12}$

Find the product. Write your answer in simplest form

25. $\frac{1}{8} \cdot \frac{1}{7}$

26. $\frac{2}{9} \cdot \frac{12}{14}$

27. $\frac{7}{12} \cdot \frac{8}{14}$

28. $\frac{9}{24} \cdot \frac{16}{81}$

29. $\frac{3}{14} \cdot \frac{21}{33}$

30. $\frac{1}{2} \cdot \frac{9}{13}$

31. $2\frac{1}{6} \cdot \frac{3}{5}$

32. $8\frac{4}{5} \cdot 1\frac{5}{11}$

33. $2\frac{1}{2} \cdot \frac{2}{5}$

34. $9\frac{2}{3} \cdot 6$

35. $13\frac{1}{3} \cdot 2\frac{1}{10}$

36. $7 \cdot \frac{1}{3}$

Find the quotient. Write your answer in simplest form

37. $\frac{5}{6} \div \frac{1}{4}$

38. $\frac{1}{2} \div \frac{1}{4}$

39. $\frac{3}{4} \div \frac{9}{12}$

40. $\frac{21}{35} \div \frac{7}{25}$

41. $\frac{6}{7} \div 3$

42. $\frac{2}{11} \div \frac{1}{33}$

43. $1\frac{1}{4} \div 2\frac{1}{3}$

44. $5\frac{3}{6} \div 3$

45. $10\frac{1}{4} \div \frac{2}{5}$

46. $3\frac{2}{3} \div 1\frac{1}{7}$

47. $4\frac{3}{8} \div \frac{9}{10}$

48. $8 \div \frac{3}{4}$

Find the sum or difference.

49. $6.2 + 3.4$ 50. $8.04 - 6.8$ 51. $12.4 + 0.899$ 52. $12.9 - 2.043$

53. $163.29 + 13.987$ 54. $13 - 6.7$ 55. $3.91 + 1.93$ 56. $34.2 - 29.027$

Find the product.

57. 9.2×3.1 58. $(14.1)(2.7)$ 59. 91×4.5 60. $(82.04)(1.2)$

61. $(1.1)(6.78)$ 62. 45×0.1 63. 0.010×13.9 64. $(2.34)(5.6)$

Find the quotient.

65. $2\overline{)8.4}$ 66. $13\overline{)1.56}$ 67. $2\overline{)7.45}$ 68. $8\overline{)9}$

69. $3.4\overline{)68}$ 70. $0.2\overline{)9.4}$ 71. $0.15\overline{)0.045}$ 72. $0.3\overline{)4}$

Geometry

Area Formulas: (remember area = the space inside a figure)

Area of Rectangle $= length \times width$

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

Area of Circle $= \pi \cdot radius^2$

Area of Parallelogram $= base \times height$

Perimeter: (remember perimeter = the distance around a figure)

Perimeter of any polygon: add up all the sides

Circumference of Circle $= 2 \cdot \pi \cdot radius$

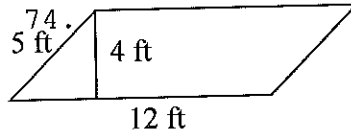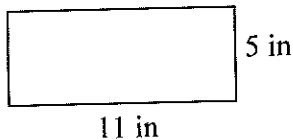## Volume: (remember volume = the capacity of a 3D figure)

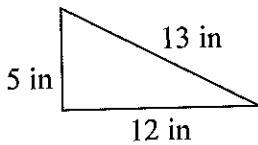Volume of Rectangular Prism $= length \times width \times height$
$\pi \cdot diameter$

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

73.
5 in
11 in
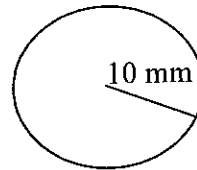
74.
5 ft 4 ft
12 ft

75.
13 in
5 in
12 in

76.
10 mm

Find the volume:

77.
5 yd
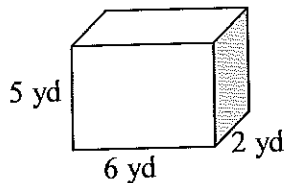6 yd
2 yd

Solve the word problem:

78. Danny is installing a fence around his rectangular yard. His yard is 20 feet long by 45 feet wide. If the fencing he picked out costs $25 per foot, how much money will Danny spend on the fence?

79. Tameka wants to put a carpet in her rectangular bedroom. Her room is 22 feet long by 18 feet wide. How much carpeting will Tameka need?

80. Don wants to bring some sand home from his vacation at the beach. He has a box that is 3 inches wide, 4 inches long, and 2 inches tall. How much sand can he fit in the box?

Solving One-step Equations

Addition Equations:

$$x + 3 = 9$$

Subtract the number on the same side of the equal sign as the variable from each side of the equation

$$
\begin{array}{r}
x + 3 = 9 \\
-3 \quad -3 \\
\hline
x = 6
\end{array}
$$

Subtraction Equations:

$$14 = x - 7$$

Add the number on the same side of the equal sign as the variable to each side of the equation

$$
\begin{array}{r}
14 = x - 7 \\
+7 \quad\quad +7 \\
\hline
21 = x
\end{array}
$$

Multiplication Equations:

$$5m = 105$$

Divide each side of the equation by the number on the same side of the equal sign as the variable

$$
\frac{5m}{5} = \frac{105}{5}
$$
$$m = 21$$

Division Equations:

$$\frac{y}{13} = 5$$

Multiply each side of the equation by the number on the same side of the equal sign as the variable

$$13 \times \frac{y}{13} = 5 \times 13$$
$$y = 65$$

Solve for the given variable:

81. $x + 18 = 32$ 82. $18f = 720$ 83. $h - 56 = 57$ 84. $\dfrac{b}{6} = 12$

85. $12 = r - 76$ 86. $33 + d = 65$ 87. $14m = 42$ 88. $10c = 5$

89. $38 = 19j$ 90. $w + 65 = 100$ 91. $r - 7 = 9$ 92. $x \div 12 = 9$

93. $14 + x = 18$ 94. $\dfrac{p}{22} = 7$ 95. $47 = x - 5$ 96. $k + 16 = 76$

97. $2 = 6m$ 98. $t - 8 = 14$ 99. $\dfrac{h}{19} = 11$ 100. $47 = 18 + b$

Name _____ Date _____

Evaluate the expression.

1. $9 - 6 \div 3$

2. $36 - 7(2)$

3. $(5 + 1) \div 2$

4. $8 + (10 - 4) - 3^2$

5. $(3 + 5)^2 \div 4 + 19$

6. $12(3 + 3) \div 18$

7. $\dfrac{(2^2 + 1)}{5}$

8. $\dfrac{2(3 + 1)}{8}$

9. $\dfrac{10^2 \div 4}{3 + 2}$

10. You and three friends go to a restaurant for dinner. You share three appetizers that cost $6 each. You also share two desserts that cost $3 each. You split the total bill evenly. How much does each person pay?

Name _____ Date _____

Find the GCF of the numbers using lists of factors.

1. 9, 15

2. 11, 19

3. 8, 28

4. 60, 70

5. 40, 56

6. 35, 72

Find the GCF of the numbers using prime factorizations.

7. 4, 10

8. 5, 11

9. 6, 8

10. 14, 42

11. 45, 63

12. 60, 90

13. You are making identical gift bags using 24 candles and 36 bottles of lotion.
    What is the greatest number of gift bags you can make with no items left over?

Find the LCM of the numbers using lists of multiples.

1. 3, 8

2. 8, 14

3. 7, 21

4. 5, 11

5. 8, 20

6. 14, 20

Find the LCM of the numbers using prime factorizations.

7. 12, 36

8. 5, 12

9. 3, 17

10. 10, 12

11. 20, 30

12. 32, 40

13. A music store gives every 20th customer a $5 gift card. Every 50th customer gets a $10 gift card. Which customer will be the first to receive both types of gift cards?

Determine which is the better buy.

1.

Iced Tea	A	B
Cost (dollars)	3	4
Refills	2	3

2.

Lunch Meat	A	B
Cost (dollars)	10	6
Pounds	2	1

3.

Movie Rental	A	B
Cost (dollars)	12	11
Rentals	4	3

4.

Buns	A	B
Cost (dollars)	6	5
Packages	3	2

5.

CDs	A	B
Cost (dollars)	60	72
CDs	6	8

6.

Flash Drive	A	B
Cost (dollars)	18	35
Flash Drives	3	5

7. You are making cookies. One recipe calls for 4 cups of chocolate morsels for 3 batches of cookies. A second recipe calls for 5 cups of chocolate morsels for 4 batches of cookies. Which cookies will contain more chocolate morsels?

Name _____ Date _____

Write the word sentence as an inequality.

1. A number n is at least 4.

2. A number x is less than 12.

Tell whether the given value is a solution of the inequality.
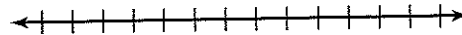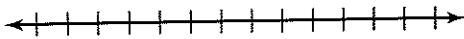
3. $4x \leq 20$; $x = 2$
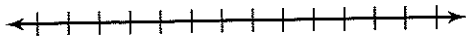
4. $y + 5 > 8$; $y = 1$

Graph the inequality on a number line.

5. $x < 5$

6. $w \geq -\dfrac{1}{4}$

7. You buy tickets to a professional football game. You are allowed to buy at most 4 tickets. Write and graph an inequality to represent the number of tickets you are allowed to buy.

Summer Math Packet

Part 2

Operations with Integers

Adding Integers

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

    ex: -5 + (-9) → 5 + 9 = 14 → answer: $\boxed{-14}$

- **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.

    ex: -7 + 12 → 12 - 7 = 5 → 12 > 7, so answer is positive → answer: $\boxed{5}$

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

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.

    ex: -3 - 9 → -3 + (-9) = $\boxed{-12}$

    ex: 15 - (-8) → 15 + 8 = $\boxed{23}$

    ex: -6 - (-4) → -6 + 4 = $\boxed{-2}$

Multiplying & Dividing Integers

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

- Negative · or ÷ Negative = Positive
- Negative · or ÷ Positive (or Positive · or ÷ Negative) = Negative

    ex: -3 · (-5) → 3 · 5 = 15 → neg · neg = pos → answer: $\boxed{15}$

    ex: 48 ÷ (-6) → 48 ÷ 6 = 8 → pos ÷ neg = neg → answer: $\boxed{-8}$

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 ÷ 12

14. -194 ÷ (-2)

15. 88 · (-2)

16. -12 · 10

17. -10 · (-11)

18. 90 ÷ (-6)

19. 3 · (-59)

20. -7 · (-2)

21. -28 · (-22) ÷ (-88)

22. -56 · 140 ÷ (-80)

23. 108 ÷ (-12) · (-12)

24. -84 · (-17) ÷ 42

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

25. -78 + (-2) · (-56)

26. -65 + 6 ÷ (-3) + 40

27. -94 - (84 - 10)

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

29. -15 - (-11) + 5 · (-4)

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

31. -84 ÷ 4 + (-20)

32. -56 + (-50) + (-10) · (-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.

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

- **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.

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

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.

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

- **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.

  ex: $-5.2 \div 0.2$ $\longrightarrow$ neg ÷ pos = neg $\longrightarrow$ $0.2\overline{)52.}^{\,26.}$ $\longrightarrow$ answer: $\boxed{-26}$

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

  ex: $-1\frac{3}{4} \cdot \frac{6}{14}$ $\longrightarrow$ neg · pos = neg $\longrightarrow$ $\dfrac{\cancel{7}^{1}}{\cancel{4}_{2}} \cdot \dfrac{\cancel{6}^{3}}{\cancel{14}_{2}} = \frac{3}{4}$ $\longrightarrow$ answer: $\boxed{-\frac{3}{4}}$

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

  ex: $-\frac{1}{2} \div \left(-\frac{3}{8}\right)$ $\longrightarrow$ neg ÷ neg = pos $\longrightarrow$ $\dfrac{1}{\cancel{2}_{1}} \cdot \dfrac{\cancel{8}^{4}}{3} = \frac{4}{3}$ $\longrightarrow$ answer: $\boxed{1\frac{1}{3}}$

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!

ex: $6x = -18$ $\longrightarrow$ $\dfrac{6x}{6} = \dfrac{-18}{6}$ $\longrightarrow$ answer: $\boxed{x = -3}$

ex: $y + 23 = -9$ $\longrightarrow$ $\begin{array}{c} y + 23 = -9 \\ -23 \quad -23 \end{array}$ $\longrightarrow$ answer: $\boxed{y = -32}$

ex: $\dfrac{h}{3} = 4$ $\longrightarrow$ $3 \cdot \dfrac{h}{3} = 4 \cdot 3$ $\longrightarrow$ answer: $\boxed{h = 12}$

ex: $w - 13 = -5$ $\longrightarrow$ $\begin{array}{c} w - 13 = -5 \\ +13 \quad +13 \end{array}$ $\longrightarrow$ answer: $\boxed{w = 8}$

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)

ex: $7x - 4 = -32$ $\longrightarrow$ $\begin{array}{c} 7x - 4 = -32 \\ +4 \quad +4 \end{array}$ $\longrightarrow$ $\dfrac{7x}{7} = \dfrac{-28}{7}$ $\longrightarrow$ answer: $\boxed{x = -4}$

ex: $\dfrac{j}{5} + 13 = 15$ $\longrightarrow$ $\begin{array}{c} \dfrac{j}{5} + 13 = 15 \\ -13 \quad -13 \end{array}$ $\longrightarrow$ $5 \cdot \dfrac{j}{5} = 2 \cdot 5$ $\longrightarrow$ answer: $\boxed{j = 10}$

ex: $\dfrac{b + 7}{3} = -2$ $\longrightarrow$ $3 \cdot \dfrac{b + 7}{3} = -2 \cdot 3$ $\longrightarrow$ $\begin{array}{c} b + 7 = -6 \\ -7 \quad -7 \end{array}$ $\longrightarrow$ answer: $\boxed{b = -13}$

Solve the one-step equation.

57. $19 + j = -34$

58. $m - 26 = 13$

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

60. $12f = 216$

61. $g - (-31) = -7$

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: $\dfrac{5}{b}=\dfrac{4}{10}$ $\longrightarrow$ $5 \cdot 10 = 4b$ $\longrightarrow$ $\dfrac{50}{4}=\dfrac{4b}{4}$ $\longrightarrow$ answer: $\boxed{b = 12.5}$

Solving Percent Problems with Proportions

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

  ex: 25 is what percent of 500? $\longrightarrow$ $\dfrac{x}{100}=\dfrac{25}{500}$ $\longrightarrow$ answer: x = $\boxed{5\%}$

  ex: What is 15% of 88? $\longrightarrow$ $\dfrac{15}{100}=\dfrac{x}{88}$ $\longrightarrow$ answer: x = $\boxed{13.2}$

  ex: 18 is 30% of what number? $\longrightarrow$ $\dfrac{30}{100}=\dfrac{18}{x}$ $\longrightarrow$ answer: x = $\boxed{60}$

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? $\longrightarrow$ $20 = 0.4x$ $\longrightarrow$ answer: x = $\boxed{50}$

  ex: 8 is what percent of 32? $\longrightarrow$ $8 = 32x$ $\longrightarrow$ $x = 0.25$ $\longrightarrow$ answer: $\boxed{25\%}$

  ex: What is 25% of 88? $\longrightarrow$ $x = 0.25 \cdot 88$ $\longrightarrow$ answer: x = $\boxed{22}$

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. $\dfrac{h}{6} = \dfrac{20}{24}$

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

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

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

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

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

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

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

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 $33.\overline{3}$ % 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.

Try the following problems.

1) $6(4n - 2)$

2) $16(2n + 4)$

3) $-10(n - 5)$

4) $-2(-n - 8)$

5) $2(2n - 4)$

6) $-5(n - 10)$

7) $7(3n - 1)$

8) $3(2n - 4)$

9) $-8(n + 4)$

10) $19(3n + 2)$

REVIEW: Simplifying Expressions

Name _____

Key Concept and Vocabulary

Combine variable terms.

$2x + 4 + 3x - 1 = 5x + 3$

Combine numerical terms.

Simplifying Expressions

Visual Model

Algebra Tiles
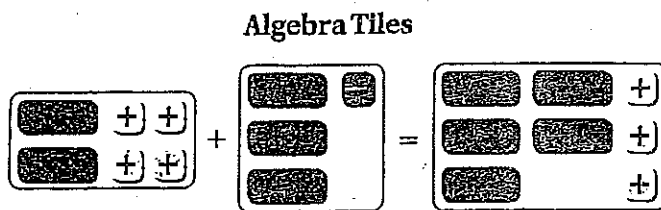
Skill Examples

1. $2x + 5x = 7x$

2. $1 + n + 4 = n + 5$

3. $(2x + 3) - (x + 2) = x + 1$

4. $2(y - 1) + 3(y + 2) = 5y + 4$

Application Example

5. The original cost of a shirt is x dollars. The shirt is on sale for 30% off. Write a simplifed expression for the sale cost.

$$x - 0.3x = 0.7x$$

The sale cost is $0.7x$.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Simplify the expression. *(Remove parentheses and combine like terms.)*

6. $4x + 6x =$ _____

7. $3n + 5 - 2n =$ _____

8. $9x + 3 - 6x - 2 =$ _____

9. $3(x + 2) =$ _____

10. $7m - 2m + 5m =$ _____

11. $2 - (x + 1) =$ _____

12. $(3x + 6) - x =$ _____

13. $5 - (1 - n) =$ _____

14. $(x + 6) - (x + 6) =$ _____

15. $(4x - 2) + 3(x + 1) =$ _____

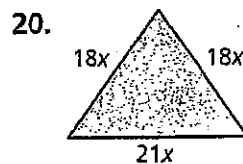16. $(5x + 4) - 2(x + 1) =$ _____

17. $5(x + 2) - 2(x + 2) =$ _____

Write a simplified expression for the perimeter of the rectangle or triangle.

18.

$7x$

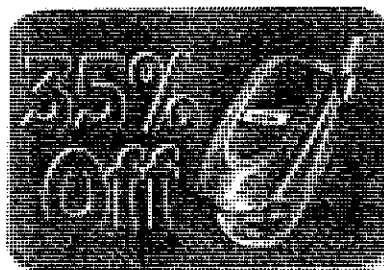$8x$

Perimeter = _____

19.

$5n$

$9n$

Perimeter = _____

20.

$18x$ $18x$

$21x$
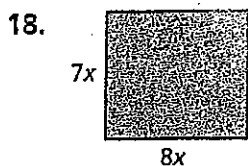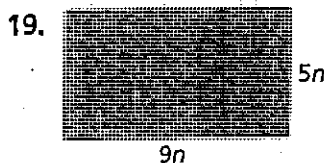
Perimeter = _____

21. The original cost of a cell phone is x dollars. The phone is on sale for 35% off. Write a simplified expression for the sale cost. _____

REVIEW: Evaluating Expressions

Name _____

Key Concept and Vocabulary

variable

Evaluating Expressions

Expression: $2x^2 + 3x - 6$

Evaluate when $x = 2$.

$2(2^2) + 3(2) - 6 = 8 + 6 - 6$
$= 8$

Visual Model

x	2x + 3	Value of Expression
1	2(1) + 3	5
2	2(2) + 3	7
3	2(3) + 3	9
4	2(4) + 3	11

Skill Examples

1. When $x = 5$, $3x + 4$ is $3(5) + 4 = 19$.

2. When $x = -1$, $5x + 7$ is $5(-1) + 7 = 2$.

3. When $x = 3$, $4x^2$ is $4(3^2) = 36$.

4. When $x = 4$, $x^3 + 1$ is $4^3 + 1 = 65$.

Application Example

5. For a Celsius temperature C the Fahrenheit temperature F is $\frac{9}{5}C + 32$. Find F when $C = 25°$.

$\frac{9}{5}C + 32 = \frac{9}{5}(25) + 32$
$= 45 + 32$
$= 77$

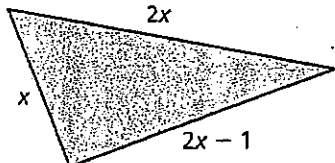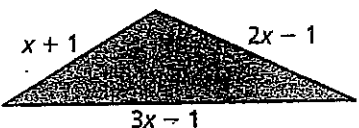∴ The Fahrenheit temperature is 77°.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Evaluate the expression.

6. When $x = 2$, $3x - 1 =$ _____.

7. When $x = -1$, $3x + 9 =$ _____.

8. When $x = 4$, $x^2 - 5 =$ _____.

9. When $x = \frac{1}{2}$, $3x^2 =$ _____.

10. When $x = 3.1$, $5x + 0.5 =$ _____.

11. When $x = 0$, $4x^2 + 5 =$ _____.

12. When $x = 10$, $x^2 - 8x + 11 =$ _____.

13. When $x = 2\frac{1}{2}$, $6x + 3 =$ _____.

Evaluate the perimeter when $x = 3$.

14. $P =$ _____

2x
x
2x − 1

15. $P =$ _____

x + 1
2x − 1
3x − 1

16. **CARDINAL** The weight of the cardinal (in ounces) is $0.6x + 11$ after its eats x ounces of bird seed. How much does it weigh after it eats 2 ounces of bird seed? _____

REVIEW: Writing Expressions and Equations

Key Concept and Vocabulary

Phrase: Two more than a number

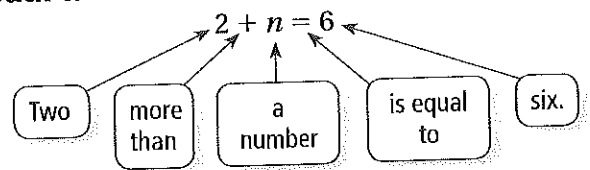Expression: $2 + n$

Sentence: Two more than a number is equal to six.

Equation: $2 + n = 6$

Writing Expressions

Visual Model

$$2 + n = 6$$

| Two | more than | a number | is equal to | six. |

Skill Examples

1. Five times a number: $5n$

2. Six less than three times a number: $3n - 6$

3. The sum of a number and one: $n + 1$

4. A number divided by three: $n \div 3$

Application Example

5. Write an equation for the following.
   "The price of $15 is the wholesale cost plus a markup of fifty percent."

   Let C be the wholesale cost.

   50% of C is $0.5C$.

   ∴ An equation is $15 = C + 0.5C$.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Write the verbal phrase as a mathematical expression.

6. The product of a number and two

   _____

7. 10 subtracted from a number

   _____

8. 19 less than twice a number

   _____

9. The sum of a number and three, divided by four

   _____

10. Five times the sum of a number and two

    _____

11. Seven less than four times a number

    _____

Write the sentence as an equation.

12. Three times a number equals nine.

    _____

13. The difference of a number and nine is four.

    _____

14. Twelve divided by a number is four.

    _____

15. The sum of a number and seven is eighteen.

    _____

16. The volume of a cone is one-third the area of the base times the height. A cone has a volume of 20π cubic inches. Write an equation that can be used to solve for the height of the cone.

    _____

h

$B = 4\pi$ in.^{2}

Topic 17.2
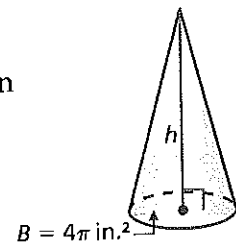
REVIEW: Writing and Graphing Inequalities

Name _____

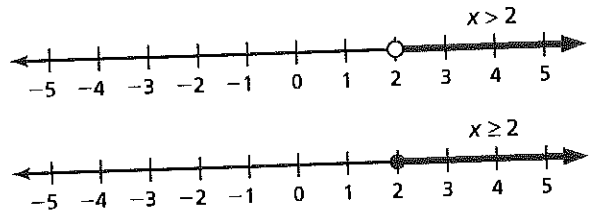## Key Concept and Vocabulary

$x > 2$: All numbers greater than 2

$x \geq 2$: All numbers greater than or equal to 2

$x < 2$: All numbers less than 2

$x \leq 2$: All numbers less than or equal to 2

Inequalities

Visual Model

$x > 2$

```
←——+——+——+——+——+——+——○——+——+——+——→
  -5  -4  -3  -2  -1   0   1   2   3   4   5
```

$x \geq 2$

```
←——+——+——+——+——+——+——●——+——+——+——→
  -5  -4  -3  -2  -1   0   1   2   3   4   5
```

Skill Examples

1. $x > 0$: All positive numbers

2. $x \geq 0$: All nonnegative numbers

3. $x < 0$: All negative numbers

4. $x \leq 0$: All nonpositive numbers

Application Example

5. A sign at a clothing store reads "Savings up to 70%." Let S represent the percent of savings. Write an inequality to describe S.

   S can be equal to 70%.
   Or S can be less than 70%.

   ∴ An inequality is $S \leq 70\%$.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Write an inequality for the statement.

6. All numbers that are less than 24

   _____

8. All numbers greater than 10
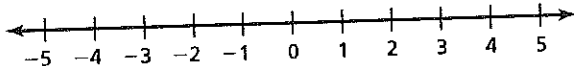
   _____

10. All numbers that are at least 11

   _____

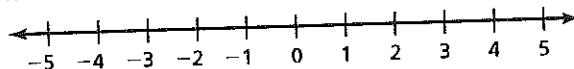7. All numbers that are at most 3

   _____

9. All numbers that are no more than 5

   _____

11. All numbers less than or equal to 8
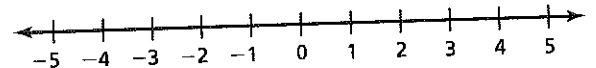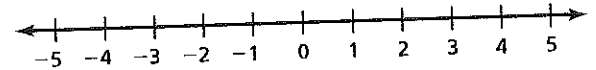
   _____

Graph the inequality.

12. $x > -1$

```
←——+——+——+——+——+——+——+——+——+——+——→
  -5  -4  -3  -2  -1   0   1   2   3   4   5
```

14. $x \leq 3$

```
←——+——+——+——+——+——+——+——+——+——+——→
  -5  -4  -3  -2  -1   0   1   2   3   4   5
```

13. $x < 4$

```
←——+——+——+——+——+——+——+——+——+——+——→
  -5  -4  -3  -2  -1   0   1   2   3   4   5
```

15. $x \geq 0$

```
←——+——+——+——+——+——+——+——+——+——+——→
  -5  -4  -3  -2  -1   0   1   2   3   4   5
```
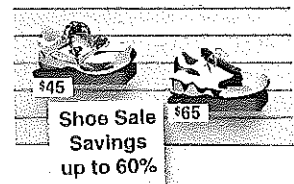
16. A sign at a shoe store reads "Savings up to 60%." Let P represent the percent of savings. Write an inequality to describe P.

   _____

$45

Shoe Sale $65
Savings
up to 60%

Topic 17.4

NAME

Order and Properties of Operations

Evaluate $\frac{8(1.2 + 1.8)}{6}$.

$\frac{8(1.2 + 1.8)}{6}$

$\frac{8(3)}{6}$

$\frac{24}{6} = 4$

Remember, multiply or divide first. Then add or subtract.

Do the operations inside ( ) first.

Then do the operations above or below the division bar.

Divide.

Compute.

1. $6 + 4(-3) =$ _____

2. $5(2 + 3) =$ _____

3. $\frac{5 + 2}{7} + 0 =$ _____

4. $\frac{5 + 3}{2} =$ _____

5. $\frac{2.1 + 3.9}{2} + \frac{26.7 - 2.7}{4} =$ _____

6. $\frac{55}{5} - 5 =$ _____

7. $12(\frac{1}{2} + 2 + \frac{3}{2}) - 2 =$ _____

8. $\frac{4}{3}(2\frac{1}{3} + 3\frac{2}{3}) =$ _____

9. $22 - 21(1) - 1 =$ _____

10. $\frac{0.7(2 + 3)}{5} =$ _____

11. $1 + (-0.6 + 0.5) =$ _____

12. $\frac{9 - (-10 + 4)}{2 + 5} =$ _____

13. $\frac{-1.4 + (-0.6)}{(-2)(-2)} =$ _____

14. $(\frac{-3}{8})(-4) + 5(\frac{-3}{8}) =$ _____

REVIEW: Proportions

Name _____

Key Concept and Vocabulary

Proportion: "2 is to 3 as 4 is to 6."

$$\frac{2}{3} = \frac{4}{6}$$

$2 \cdot 6 = 3 \cdot 4$ ← Cross products are equal.

Visual Model

The ratio "2 to 3" is equal to the ratio "4 to 6."

Skill Examples

1. $\frac{3}{5} = \frac{12}{20}$ is a proportion because the cross products are equal.

2. $\frac{1}{7} = \frac{7}{48}$ is *not* a proportion because the cross products are not equal.

3. $\frac{10}{2} = \frac{5}{1}$ is a proportion because the cross products are equal.

Application Example

4. You spend $5 for 3 tennis balls. Your friend spends $6.25 for 4 tennis balls. Are the two rates proportional?

$$\frac{\$5}{3 \text{ balls}} \overset{?}{=} \frac{\$6.25}{4 \text{ balls}} \qquad 5(4) \neq 3(6.25)$$

∴ The rates are *not* proportional.

PRACTICE MAKES *PURR-FECT*™

Check your answers at BigIdeasMath.com.

Decide whether the statement is a proportion.

5. $\frac{3}{7} = \frac{6}{14}$ _____

6. $\frac{1}{4} = \frac{4}{1}$ _____

7. $\frac{3}{2} = \frac{9}{4}$ _____

8. $\frac{1.25}{3} = \frac{5}{12}$ _____

9. $\frac{6}{18} = \frac{120}{360}$ _____

10. $\frac{4}{5} = \frac{4+4}{5+5}$ _____
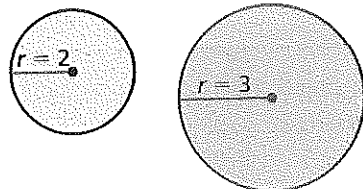
Complete the proportion.

11. $\frac{2}{5} = \frac{\square}{10}$
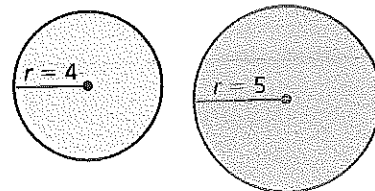
12. $\frac{1}{6} = \frac{4}{\square}$

13. $\frac{3}{\square} = \frac{9}{24}$

Write the proportion that compares the circumference to the radii of the two circles.
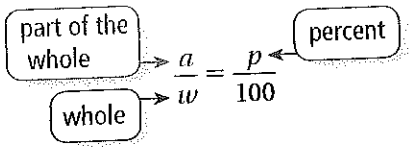
14.

_____

15.

_____

16. **COMPARING RATES** You spend $20 for 5 T-shirts. Your friend spends $15 for 3 T-shirts. Are the two rates proportional? _____
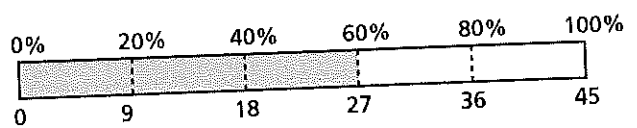
Topic 18.3

REVIEW: Percents and Proportions

Key Concept and Vocabulary

To represent "a is p percent of w," use a proportion.

Proportion

part of the whole $\rightarrow a$
whole $\rightarrow w$ $= \dfrac{p}{100} \leftarrow$ percent

Visual Model

0%	20%	40%	60%	80%	100%
0	9	18	27	36	45

27 is 60% of 45.

Skill Examples

1. $\dfrac{36}{50} = \dfrac{p}{100}$

   $100 \cdot \dfrac{36}{50} = 100 \cdot \dfrac{p}{100}$

   $72 = p$

   ∴ So, 36 is 72% of 50.

2. $\dfrac{a}{36} = \dfrac{20}{100}$

   $36 \cdot \dfrac{a}{36} = 36 \cdot \dfrac{20}{100}$

   $a = 7.2$

   ∴ So, 7.2 is 20% of 36.

Application Example

3. A basketball player makes 45%, or 9 shots, of her attempted shots. How many shots did the basketball player attempt?

   $\dfrac{9}{w} = \dfrac{45}{100}$

   $9 \cdot 100 = w \cdot 45$

   $900 = 45w$

   $\dfrac{900}{45} = \dfrac{45w}{45}$

   $20 = w$

   ∴ The basketball player attempted 20 shots.

PRACTICE MAKES *PURR-FECT*™

Check your answers at BigIdeasMath.com.

Write and solve a proportion to answer the question.

4. 68 is what percent of 80?

   _____

5. What number is 25% of 116?

   _____

6. 36 is 16% of what number?

   _____

7. 48 is what percent of 128?

   _____

8. What number is 64% of 40?

   _____

9. 77 is 55% of what number?

   _____

10. **PLAY** Students are auditioning for a play. Of the 60 students auditioning, 12 will get a part in the play. What percent of the students who audition will get a part in the play?

   _____

11. **HOMEWORK** You have completed 60% of your English homework. The assignment has 25 questions. How many questions are left? _____
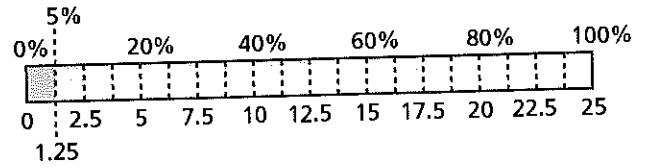
Topic 18.5

Name _____

Key Concept and Vocabulary

To find the sales tax on an item, write the percent as a decimal or fraction and multiply it by the price of the item.

Sales Tax

Visual Model

5%

0%   20%   40%   60%   80%   100%

0   2.5   5   7.5   10   12.5   15   17.5   20   22.5   25
1.25

Using a sales tax of 5%, the sales tax on a $25 shirt is $1.25.

Application Examples

1. A DVD costs $20 before tax. The sales tax is 7%.

   Estimate: Round 7% to 5%.
   $$0.05 \times 20 = 1$$
   ∴ The estimate for the sales tax is $1.

   Actual: $0.07 \times 20 = 1.4$
   ∴ The actual sales tax is $1.40.

2. A bicycle costs $115 before tax. The sales tax is 9%.

   Estimate: Round 9% to 10% and 115 to 120.
   $$0.1 \times 120 = 12$$
   ∴ The estimate for the sales tax is $12.

   Actual: $0.09 \times 115 = 10.35$
   ∴ The actual sales tax is $10.35.

PRACTICE MAKES PURR-FECT™

Check your answers at BigIdeasMath.com.

Estimate the sales tax. Then find the actual sales tax.

3. **BASEBALL CARDS** The pack of baseball cards costs $3.75 before tax. The sales tax is 4%.

   _____

4. **TELEVISION** A television costs $400 before tax. The sales tax is 8%.

   _____

5. **MP3 PLAYER** An MP3 player costs $89 before tax. The sales tax is 6%.

   _____

6. **COUCH** A couch costs $675 before tax. The sales tax is 5%.

   _____

7. **GUITAR** A guitar costs $299 before tax. The sales tax is 9%.

   _____

8. **TABLE** A table costs $50 before tax. The sales tax is 4.5%.

   _____

9. **JEANS** A pair of jeans costs $39 before tax. The sales tax is 5.5%.

   _____