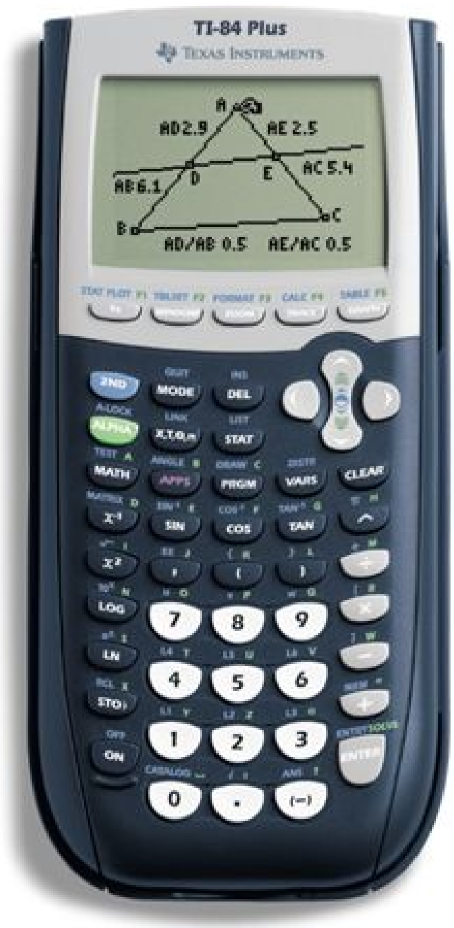
# Summer Math Packet for students entering Pre-Algebra 7

1. Dividing Decimals (1-4)
2. Subtraction of Integers (5-8)
3. Scale Factor (9-12)
4. Proportional Relationships (13-16)
5. Combining Like Terms (17-20)
6. Distributive Property (21-26)
7. Calculating and Using Percents (27-31)




**All PreAlgebra students are required to have a TI 84-Plus Graphing Calculator for this course.**

**The calculator will be used throughout this course and in future math courses.**

This packet will be collected when you return to school. You must <u>SHOW ALL WORK</u> in order to get full credit. Do not wait until the days before school starts to complete this all at once. Spread out the work over the summer.

# OPERATIONS WITH DECIMALS 2.1.1

**DIVIDING DECIMALS:** When dividing a decimal by a whole number, place the decimal point in the answer space directly above the decimal point in the number being divided. Divide as with whole numbers. Sometimes it is necessary to add zeros to the number being divided to complete the division.

When dividing decimals or whole numbers by a decimal, the divisor must be multiplied by a power of ten to make it a whole number. The dividend must be multiplied by the same power of ten. Then divide following the same rules for division by a whole number.

For additional information, see the Math Notes boxes in Lessons 3.3.2 and 3.3.3 of the *Core Connections, Course 2* text.

### Example 5

Divide 32.4 by 8.

```
    4.05
8)32.40
  32
  ----
   0 40
     40
     ---
      0
```

### Example 6

Divide 27.42 by 1.2. First multiply each number by $10^1$ or 10.

```
                                 22.85
1.2)27.42 ⇒ 12)274.2 ⇒ 12)274.20
                          24
                          --
                           34
                           24
                           --
                           10 2
                            9 6
                            ---
                              60
                              60
                              --
                               0
```

**Now, it's your turn! No Calculator. Show all work under the problem on the packet! Pay attention to where the decimal point goes.**

1. 53.6 ÷ 0.004
2. 25.46 ÷ 5.05
3. 420 ÷ 0.05
4. 100.32 ÷ 24

If you want more practice….. Dividing decimals

## OPERATIONS WITH INTEGERS — 3.2.1, 3.2.2, and 3.2.5

### SUBTRACTION OF INTEGERS

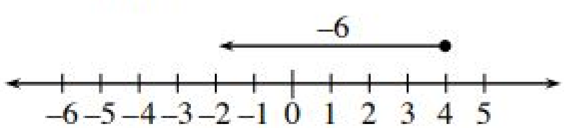
Subtraction of integers may also be represented using the concrete models of number lines and (+) and (–) tiles. Subtraction is the opposite of addition so it makes sense to do the opposite actions of addition.

When using the number line, adding a positive integer moves to the right so subtracting a positive integer moves to the left. Adding a negative integer move to the left so subtracting a negative integer moves to the right.

When using the tiles, addition means to place additional tile pieces into the picture and look for zeros to simplify. Subtraction means to remove tile pieces from the picture. Sometimes you will need to place zero pairs in the picture before you have a sufficient number of the desired pieces to remove. For additional information, see the Math Notes box in Lesson 3.2.2 of the *Core Connections, Course 2* text.

**Example 1**

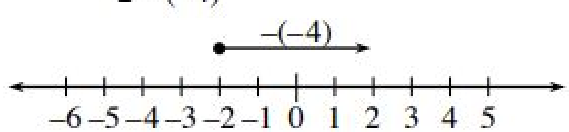
$4 - 6$




$4 - 6 = -2$

**Example 2**

$-2 - (-4)$




$-2 - (-4) = 2$

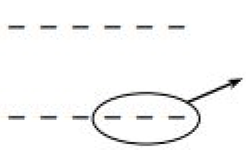
**Example 3**

$-6 - (-3)$

Build the first integer.

Remove three negatives.

Three negatives are left.



$-6 - (-3) = -3$

**Example 4**

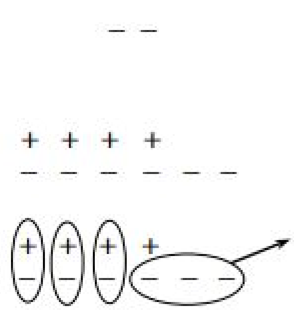
$-2 - (-3)$

Build the first integer.

It is not possible to remove three negatives so add some zeros.

Now remove three negatives and circle any zeros.

One positive remains.



$-2 - (-3) = 1$

**Now, it's your turn! No Calculator. Draw a diagram. Show all work under the problem on the packet!**

5. –6 – (–2)　　6. 2 – (–3)　　7. 6 – (–3)　　8. 3 – 7

For more practice on this… subtracting integers

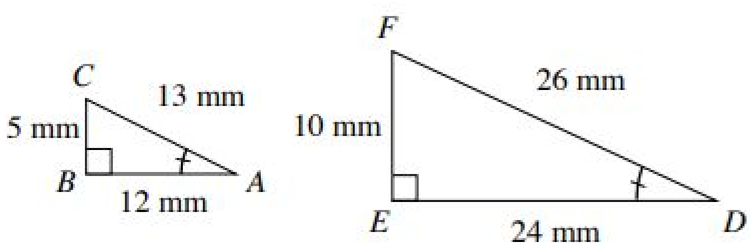
## SCALING FIGURES AND SCALE FACTOR 4.1.1 and 4.1.2

Geometric figures can be reduced or enlarged. When this change happens, every length of the figure is reduced or enlarged equally (proportionally), and the measures of the corresponding angles stay the same.

The ratio of any two corresponding sides of the original and new figure is called a scale factor. The scale factor may be written as a percent or a fraction. It is common to write new figure measurements over their original figure measurements in a scale ratio, that is, $\frac{\text{NEW}}{\text{ORIGINAL}}$.

For additional information, see the Math Notes box in Lesson 4.1.2 of the *Core Connections, Course 2* text.

### Example 1 using a 200% enlargement




original triangle　　new triangle

Side length ratios:

$\frac{DE}{AB} = \frac{24}{12} = \frac{2}{1}$

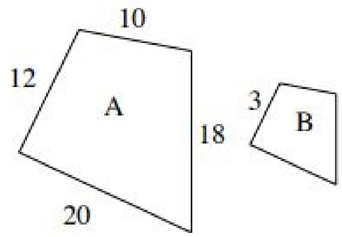
$\frac{FD}{CA} = \frac{26}{13} = \frac{2}{1}$

$\frac{FE}{CB} = \frac{10}{5} = \frac{2}{1}$

The scale factor for length is 2 to 1.

**Example 2**

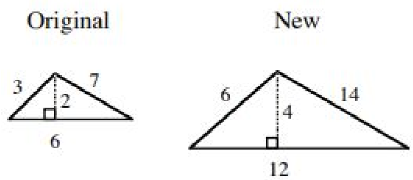
Figures A and B at right are similar. Assuming that Figure A is the original figure, find the scale factor and find the lengths of the missing sides of Figure B.



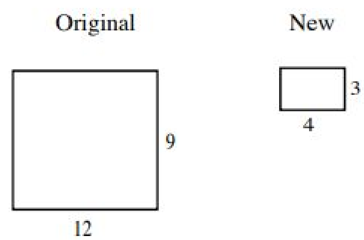

The scale factor is $\frac{3}{12} = \frac{1}{4}$. The lengths of the missing sides of Figure B are: $\frac{1}{4}(10) = 2.5$, $\frac{1}{4}(18) = 4.5$, and $\frac{1}{4}(20) = 5$.

**Now, it's your turn! Show all work under the problem on the packet!**
**Determine the scale factor for each pair of similar figures.**

9.




10.




11. A triangle has sides 5, 12, and 13. The triangle was enlarged by a scale factor of 300%.
   a. What are the lengths of the sides of the new triangle?
   b. What is the ratio of the perimeter of the new triangle to the perimeter of the original triangle?

12. A rectangle has a length of 60 cm and a width of 40 cm. The rectangle was reduced by a scale factor of 25%.
   a. What are the dimensions of the new rectangle?
   b. What is the ratio of the perimeter of the new rectangle to the perimeter of the original rectangle?

For more practice with scale factor……. [Enlarging and reducing with scale factor]

## PROPORTIONAL RELATIONSHIPS 4.2.1, 4.2.2, and 4.2.4

A **proportion** is an equation stating the two ratios (fractions) are equal. Two values are in a proportional relationship if a proportion may be set up to relate the values.

For more information, see the Math Notes boxes in Lessons 4.2.3, 4.2.4, and 7.2.2 of the *Core Connections, Course 2* text. For additional examples and practice, see the *Core Connections, Course 2* Checkpoint 9 materials.

### Example 1

The average cost of a pair of designer jeans has increased $15 in 4 years. What is the unit growth rate (dollars per year)?

Solution: The growth rate is $\frac{15 \text{ dollars}}{4 \text{ years}}$. To create a unit rate we need a denominator of "one."

$\frac{15 \text{ dollars}}{4 \text{ years}} = \frac{x \text{ dollars}}{1 \text{ year}}$. Using a Giant One: $\frac{15 \text{ dollars}}{4 \text{ years}} = \frac{4}{4} \cdot \frac{x \text{ dollars}}{1 \text{ year}} \Rightarrow 3.75 \frac{\text{dollars}}{\text{year}}$.

### Example 2

Ryan's famous chili recipe uses 3 tablespoons of chili powder for 5 servings. How many tablespoons are needed for the family reunion needing 40 servings?

Solution: The rate is $\frac{3 \text{ tablespoons}}{5 \text{ servings}}$ so the problem may be written as a proportion: $\frac{3}{5} = \frac{t}{40}$.

One method of solving the proportion is to use the Giant One:

$$\frac{3}{5} = \frac{t}{40} \Rightarrow \frac{3}{5} \cdot \frac{8}{8} = \frac{24}{40} \Rightarrow t = 24$$

Another method is to use cross multiplication:

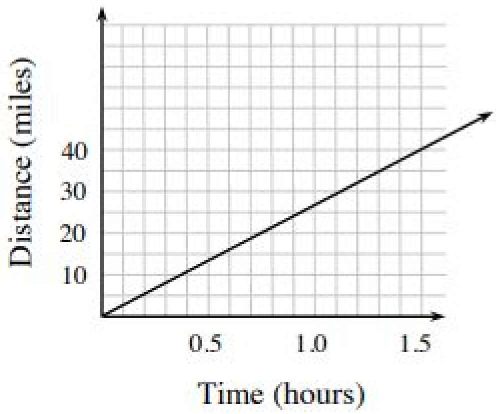
$$\frac{3}{5} = \frac{t}{40}$$
$$\frac{3}{5} \times \frac{t}{40}$$
$$5 \cdot t = 3 \cdot 40$$
$$5t = 120$$
$$t = 24$$

Finally, since the unit rate is $\frac{3}{5}$ tablespoon per serving, the equation $t = \frac{3}{5}s$ represents the general proportional situation and one could substitute the number of servings needed into the equation: $t = \frac{3}{5} \cdot 40 = 24$. Using any method the answer is 24 tablespoons.

**Now, it's your turn! Show all work under the problem on the packet!**

13. What is the unit rate? Reading 258 pages in 86 minutes (pages per minute)

14. For the graph, what is the rate in miles per hour?




15. . The tax on a $600 vase is $54. What should be the tax on a $1700 vase?

16. On his afternoon jog, Chris took 42 minutes to run 3 3/4 miles. How many miles can he run in 60 minutes?

For more practice on solving proportions……… solving proportions

## COMBINING LIKE TERMS 4.3.1

Algebraic expressions can also be simplified by combining (adding or subtracting) terms that have the same variable(s) raised to the same powers, into one term. The skill of combining like terms is necessary for solving equations. For additional information, see the Math Notes box in Lesson 4.3.2 of the *Core Connections, Course 2* text. For additional examples and practice, see the *Core Connections, Course 2* Checkpoint 7A materials.

### Example 1

Combine like terms to simplify the expression $3x + 5x + 7x$.

All these terms have $x$ as the variable, so they are combined into one term, $15x$.

## Example 2

Simplify the expression $3x + 12 + 7x + 5$.

The terms with $x$ can be combined. The terms without variables (the constants) can also be combined.

$3x + 12 + 7x + 5$

$3x + 7x + 12 + 5$

$10x + 17$

Note that in the simplified form the term with the variable is listed before the constant term.

## Example 3

Simplify the expression $5x + 4x^2 + 10 + 2x^2 + 2x - 6 + x - 1$.

$5x + 4x^2 + 10 + 2x^2 + 2x - 6 + x - 1$

$4x^2 + 2x^2 + 5x + 2x + x + 10 - 6 - 1$

$6x^2 + 8x + 3$

Note that terms with the same variable but with different exponents are not combined and are listed in order of decreasing power of the variable, in simplified form, with the constant term last.

## Example 5

Sometimes it is helpful to take an expression that is written horizontally, circle the terms with their signs, and rewrite *like* terms in vertical columns before you combine them:

$(2x^2 - 5x + 6) + (3x^2 + 4x - 9)$

$\textcircled{2x^2} - \textcircled{5x} + \textcircled{6} + \textcircled{3x^2} + \textcircled{4x} - \textcircled{9}$

$$\begin{array}{rrr} 2x^2 & -5x & +6 \\ +\ 3x^2 & +4x & -9 \\ \hline 5x^2 & -\ x & -3 \end{array}$$

This procedure may make it easier to identify the terms as well as the sign of each term.

**Now, it's your turn! Show all work under the problem on the packet!**

17. $(2x^2 + 6x + 10) + (4x^2 + 2x + 3)$

18. $(5x + 6) + (-5x^2 + 6x - 2)$

19. $3c^2 + 4c + 7x - 12 + (-4c^2) + 9 - 6x$

20. $2a^2 + 3a^3 - 4a^2 + 6a + 12 - 4a + 2$

For more practice on combining like terms…… video on clt    practice on CLT

## DISTRIBUTIVE PROPERTY 4.3.2

The Distributive Property shows how to express sums and products in two ways: $a(b + c) = ab + ac$. This can also be written $(b + c)a = ab + ac$.

| Factored form | Distributed form | Simplified form |
|---|---|---|
| $\boldsymbol{a(b + c)}$ | $\boldsymbol{a(b) + a(c)}$ | $\boldsymbol{ab + ac}$ |

To simplify: Multiply each term on the inside of the parentheses by the term on the outside. Combine terms if possible.

For additional information, see the Math Notes box in Lesson 4.3.3 of the *Core Connections, Course 2* text.

**Example 1**

$$2(47) = 2(40+7)$$
$$= (2 \cdot 40) + (2 \cdot 7)$$
$$= 80 + 14 = 94$$

**Example 2**

$$3(x+4) = (3 \cdot x) + (3 \cdot 4)$$
$$= 3x + 12$$

**Example 3**

$$4(x+3y+1) = (4 \cdot x) + (4 \cdot 3y) + 4(1)$$
$$= 4x + 12y + 4$$

When the Distributive Property is used to reverse, it is called factoring. Factoring changes a sum of terms (no parentheses) to a product (with parentheses).

$$ab + ac = a(b + c)$$

To factor: Write the common factor of all the terms outside of the parentheses. Place the remaining factors of each of the original terms inside of the parentheses.

**Example 4**

$$4x + 8 = 4 \cdot x + 4 \cdot 2$$
$$= 4(x+2)$$

**Example 5**

$$6x^2 - 9x = 3x \cdot 2x - 3x \cdot 3$$
$$= 3x(2x - 3)$$

**Example 6**

$$6x + 12y + 3 = 3 \cdot 2x + 3 \cdot 4y + 3 \cdot 1$$
$$= 3(2x + 4y + 1)$$

**Now, it's your turn! Show all work under the problem on the packet!**

21. $5(x + 7)$

22. $8(x - 4)$

23. $-3(y - 5)$

24. . $-(x + 6)$

**Factor each expression below by using the Distributive Property in reverse.**

25. $8m + 24$

26. $2x^2 - 10x$

For more practice on the distributive property…….. Distributive property

## CALCULATING AND USING PERCENTS 9.2.1 – 9.2.4

Students also calculate percentages by composition and decomposition, that is, breaking numbers into parts, and then adding or subtracting the results. This method is particularly useful for doing mental calculations. A percent ruler is also used for problems when you need to find the percent or the whole.

For additional information, see the Math Notes box in Lesson 9.2.4 of the *Core Connections, Course 1* text.

Knowing quick methods to calculate 10% of a number and 1% of a number will help you to calculate other percents by composition. Use the fact that $10\% = \frac{1}{10}$ and $1\% = \frac{1}{100}$.

### Example 1

To calculate 32% of 40, you can think of 3(10% of 40) + 2(1% of 40).

$10\%$ of $40 \Rightarrow \frac{1}{10}$ of $40 = 4$ and $1\%$ of $40 \Rightarrow \frac{1}{100}$ of $40 = 0.4$ so

$32\%$ of $40 \Rightarrow 3(4) + 2(0.4) \Rightarrow 12 + 0.8 = 12.8$

### Example 2

To calculate 9% of 750, you can think of 10% of 750 – 1% of 750.

10% of 750 $\Rightarrow \frac{1}{10}$ of 750 = 75 and 1% of 750 $\Rightarrow \frac{1}{100}$ of 750 = 7.5 so

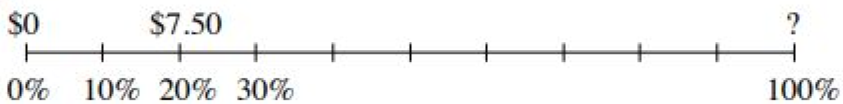
9% of 750 $\Rightarrow$ 75 – 7.5 = 67.5

Other common percents such as 50% = $\frac{1}{2}$, 25% = $\frac{1}{4}$, 75% = $\frac{3}{4}$, 20% = $\frac{1}{5}$ may also be used.

Students also use a percent ruler to find missing parts in percent problems.

### Example 3

Jana saved $7.50 of the original price of a sweater when it was on sale for 20% off. What was the original price of the sweater?




If every 20% is $7.50, the other four 20% parts $(4 \cdot 7.50 + 7.50)$ find that 100% is $37.50.

### Example 4

To calculate 17% of 123.4 convert the percent to a decimal and then use direct computation by hand or with a calculator.

17% of 123.4 $\Rightarrow \frac{17}{100}(123.4) \Rightarrow 0.17(123.4) = 20.978$

**Now, it's your turn! Show all work under the problem on the packet!**

27. What is 22% of 60?

28. 45 is 30% of what number?

29. $1.50 is 25% of what amount?

30. What is 15% of 32

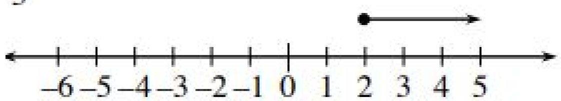
31. $10 is what percent of 25?

For more practice….. [percents]

# Answer sheet for Summer Packet

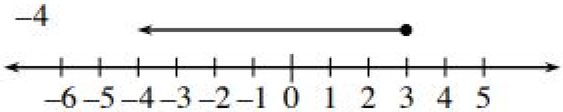
1. 13,400
2. 5.04
3. 8400
4. 4.18
5. $-4$

6. 5




7. 9

8. $-4$




9. $\frac{2}{1}$
10. $\frac{1}{3}$
11. a. 15, 36, 39 b. $\frac{3}{1}$
12. a. 15 cm and 10 cm b. $\frac{1}{4}$
13. $3 \frac{\text{pages}}{\text{minute}}$
14. $\approx 27 \frac{\text{miles}}{\text{hour}}$
15. $153
16. $\approx 5.36$ miles
17. $6x^2 + 8x + 13$
18. $-5x^2 + 11x + 4$

19. $-c^2 + 4c + x - 3$
20. $3a^3 - 2a^2 + 2a + 14$
21. 5x+35
22. 8x-32
23. -3y+15
24. -x-6
25. 8(m + 3)
26. 2x(x – 5)
27. 13.2
28. 150
29. $6.00
30. 4.8
31. 40%