

Algebra - Plan for Problem Solving

The video covers the following exercises. Please print this sheet and work along!

Approximate miles from Los Angeles to San Francisco: _____

Approximate legal speed limit on the 101 Freeway: _____

Potential question we could ask: _____

A table could help:

Number of hours	Total miles driven

Division could help:

Number of gallons of gas required from LA to San Francisco: _____

Potential question we could ask: _____

_____ miles in _____ gallon?

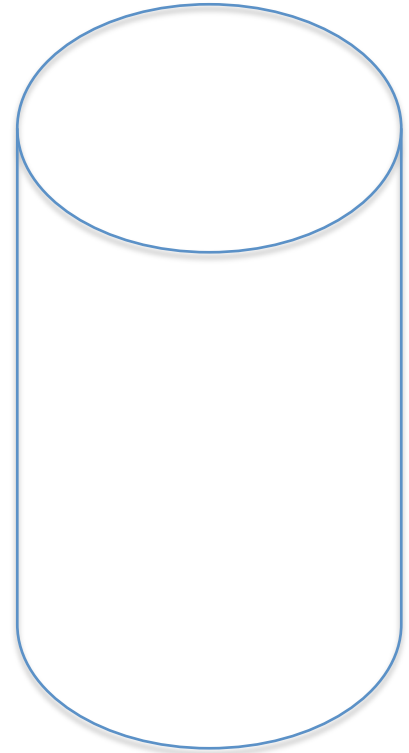
_____ miles in _____ gallons?

_____ miles in _____ gallons?

We have a jug that can hold 1.5 gallons.

What do we ask ourselves, regarding the 9 gallon jug?

“How many times _____
_____?”



9 gallons

We have \$_____, and we want to buy \$_____

\$_____

\$_____

The food adds up to \$_____, so do we have enough money to eat? YES / NO

“One who say it can not be done
should not interrupt one doing it.”
– Chinese Proverb

Name: _____

Date: _____

Chapter 0 – Preparing for Algebra

Welcome to the pre-algebra chapter that'll get you right in the mood for algebra. Thank you for your hard work and dedication. What you do matters.

0-1: Plan for Problem Solving

In this section, and in life, always remember that there are multiple ways to solve problems. How we solve them is our choice, as long as we fully understand, and we can explain our thinking. Please try some of these real world problems.

Ex #1: Once upon a time, people would rent movies on tapes or discs. Suppose one store would rent movies out for \$2.50/night. You bring in a coupon that reads “\$2 off a five-night rental.”

If you went back in time to this historical era, how much would it have cost you to rent your chosen movie for five nights?

Ex #2: I have a cup that holds 6.5 ounces of water, and I want to fill a pitcher that can hold 50 ounces when *completely* full.

I don't want to fill my pitcher all the way to the top, but rather, *mostly* to the top. How many full cups of water will fit into the pitcher?

Ex #3: Which trip will take longer, and how much longer?

- Driving 225 miles at 45 miles per hour
- Driving 330 miles at 60 miles per hour

Algebra - Properties of Real Numbers

The video covers the following information. Please print this sheet and work along!

List of number categories:

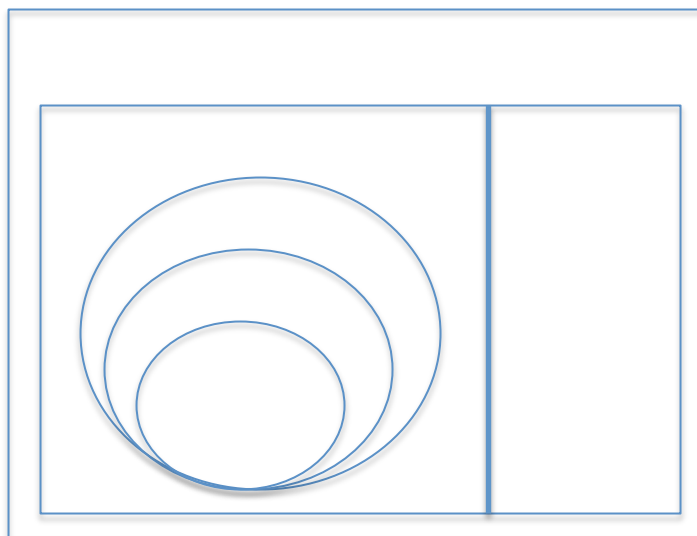
Natural #s –

Whole #s –

Integer #s –

Rational #s –

Irrational #s –



Please list which number categories each of the following are:

5

1.2

$\overline{1.22}$

-3

$\sqrt{36}$

$\sqrt{37}$



Algebra - Real Numbers

The video covers the following exercises. Please print this sheet and work along!

- 1.) What is 0.7 as a fraction? How much money is 0.7 of a dollar?

- 2.) What is 0.14 as a fraction?

- 3.) What is the repeating decimal $0.\overline{4}$ (or, 0.444444...) as a fraction?

- 4.) What special number do we always put in the denominator for repeating decimals?

- 5.) What is the repeating decimal $0.2\overline{9}$ (or, 0.292929...) as a fraction?

- 6.) What is the general definition of a "perfect square?" It's a number times _____.
- 7.) Please list out the perfect squares:

1,

0-2: Real Numbers

Natural Numbers: 1, 2, 3, ...

Whole Numbers: 0, 1, 2, 3, ...

Integers: ... -3, -2, -1, 0, 1, 2, 3, ...

Rational Numbers: Every number in the previous three categories, as well as all fractions, decimals that end (such as 0.23) and decimals that repeat (such as $0.\overline{61}$).

Irrational Numbers: Non-perfect squares (such as $\sqrt{10}$) and π .
Basically, decimals that continue forever, without any pattern.

Real Numbers: All rational and irrational numbers.

Ex #1: Please name the set or sets of numbers that apply to each real number.

(a) 8

(b) $\frac{3}{7}$

(c) -2

(d) $\sqrt{25}$

(e) $3.\overline{14}$

(f) $\sqrt{24}$

Ex #2: Please order the following numbers from *least* to *greatest*.

(a) $\frac{3}{5}, -\frac{1}{5}, \frac{2}{5}, 0, -\frac{3}{5}$

(b) $\sqrt{2}, 0.\overline{8}, -0.7, \frac{3}{10}, -\sqrt{3}$

Ex #3: Please make a list of the first twelve perfect squares. Remember that a *perfect square* is defined as a *number times itself*.

Ex #4: Between which two Natural Numbers are the following square roots located?

For example, $\sqrt{6}$ is more than 2, and less than 3.

(a) $\sqrt{17}$ is more than _____, and less than _____.

(b) $\sqrt{40}$ is more than _____, and less than _____.

(c) $\sqrt{85.5}$ is more than _____, and less than _____.

(Hint: what perfect square is 80-something?)

Ex #5: Please simplify the following square roots.

(a) $\sqrt{1}$

(b) $\sqrt{64}$

(c) $\sqrt{.04}$

(d) $\sqrt{\frac{9}{25}}$

Algebra - Operations with Integers

The video covers the following exercises. Please print this sheet and work along!

$1 + 1 =$

$-2 - 1 =$

$1 - 1 =$

$-2 - 5 =$

$-1 - 1 =$

$-2 + 5 =$

$2 - 5 =$

$2 - (-5) =$

$21 \cdot 3 =$

$-21 \cdot 3 =$

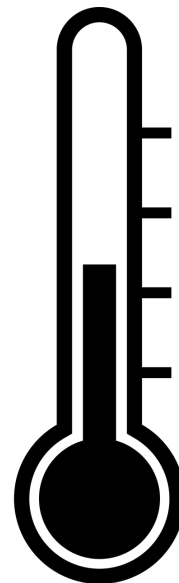
$21 \div 3 =$

$21 \div -3 =$

$-21 \div -3 =$

fill in ↓

By how much does the temperature _____, from -6° to 8° ?



A dolphin is -20 ft below the surface...

... then goes -17 ft from there...

... how far below the surface is it?

0-3: Operations with Integers

Ex #1: Please find each sum or difference.

(a) $4 + 6$

(b) $4 - 6$

(c) $-4 + 6$

(d) $-4 - 6$

(e) $4 - (-6)$

(f) $-80 + 106$

(g) $-43 - 17$

(h) $-43 + 17$

(i) $12 - 36$

(j) $-1 + 53$

Ex #2: Please fill in the blanks.

A **POSITIVE** number multiplied (or divided) by a **POSITIVE** number is always _____.

A **POSITIVE** number multiplied (or divided) by a **NEGATIVE** number is always _____.

A **NEGATIVE** number multiplied (or divided) by a **POSITIVE** number is always _____.

A **NEGATIVE** number multiplied (or divided) by a **NEGATIVE** number is always _____.

Ex #3: Please find each sum or product.

(a) $64 \div -8$

(b) $12(-6)$

(c) $-4 \div -1$

(d) $-300 \div 2$

(e) $-23 \cdot -4$

(f) $-3(2)(-4)$

Ex #4: If you wake up in the morning and it's -3°C (cold!) and by noon it's 9°C , then how much did the temperature increase overall?

Ex #5: A concert organizer distributes 50 promotional-codes, each good for a \$4 discount off of a certain show. What is the total amount of discounts combined, for all the promotional-codes?

Ex #6: Suppose Suzanne makes \$20/hour, and works 12 hours one week. If \$38 is held for taxes, how much does Suzanne receive in total, after taxes?

Algebra - Adding and Subtracting Rational Numbers

The video covers the following exercises. Please print this sheet and work along!

$$\frac{1}{5} + \frac{2}{5}$$

$$\frac{1}{2} + \frac{2}{5}$$

$$\frac{1}{2} + \frac{2}{3}$$

$$\frac{1}{2} - \frac{2}{3}$$

$$\frac{13}{20} - \frac{2}{5}$$

$$\frac{13}{20} + \frac{2}{5}$$

$$\frac{5}{8} + \frac{1}{6}$$

$$-2.9 + -13.4$$

0-4: Adding and Subtracting Rational Numbers

Ex #1: Please write $<$, $>$, or $=$ to create a true statement.

Sometimes it helps to rewrite both numbers using the same format. Thus, either both can be written as fractions with common denominators, or both as decimals.

(a) $-\frac{1}{4}$ 0.001

(b) $\frac{1}{4}$ $\frac{3}{8}$

(c) $-\frac{1}{4}$ $-\frac{3}{8}$

(d) $\frac{2}{5}$ $0.\overline{4}$

(e) $\frac{3}{5}$ 0.55

(f) $\frac{2}{9}$ $0.\overline{2}$

Ex #2: Please find each sum or difference. Always simplify whenever possible.

(a) $\frac{1}{9} + \frac{7}{9}$

(b) $\frac{1}{9} + \frac{5}{9}$

(c) $\frac{1}{4} - \frac{3}{8}$

(d) $-\frac{1}{4} - \frac{3}{8}$

(e) $\frac{3}{7} - \frac{15}{35}$

(f) $\frac{5}{6} + \frac{1}{8}$

(g) $-30 + 17.44$

(h) $-30 - 17.44$

(i) $12.4 - 36.7$

(j) $12.4 - (-36.7)$

Ex #3: According to the US Geological Survey (usgs.gov), three fifths of the human body is composed of water. What fraction of the human body is *not* water then?

Algebra - Multiplying & Dividing Rational Numbers (part 1 of 2)

The video covers the following exercises. Please print this sheet and work along!

$$\frac{2}{3} \text{ of } \$15$$

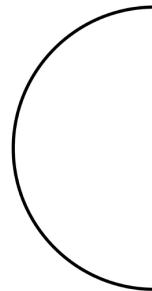
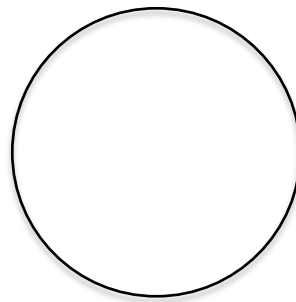
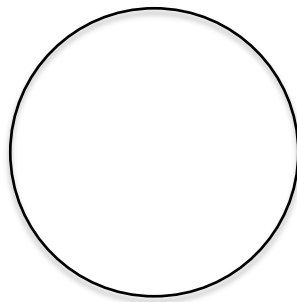
In the magical place called *Math Land*, the word “of” means _____.

Thus, we can calculate $\frac{2}{3}$ of \$15 mathematically, in two different ways:

$$\frac{2}{3} \cdot \frac{15}{1}$$

$$\frac{2}{3} \cdot \frac{15}{1}$$

$$\frac{2}{3} \cdot 2\frac{1}{2}$$



Or, we can turn $2\frac{1}{2}$ to an _____ fraction, and multiply that way:

$$\frac{2}{3} \cdot \frac{\boxed{}}{\boxed{}}$$

What are the reciprocals of:

$$\frac{2}{5}$$

$$1\frac{1}{3}$$

$$6$$

Algebra - Multiplying & Dividing Rational Numbers (part 2 of 2)

The video covers the following exercises. Please print this sheet and work along!

Half of \$50 = _____

$$50 \cdot \boxed{\quad} = 25$$

$$50 \div \boxed{\quad} = 25$$

Thus, dividing by a number is the same as multiplying
by that number's _____.

$$\frac{6}{\cancel{2} / 3}$$

$$\frac{8}{\cancel{1} / 2}$$

0-5: Multiplying and Dividing Rational Numbers

Ex #1: Please multiply. Look for opportunities to simplify before multiplying, by canceling the greatest common factors. Turning fractions into improper may be helpful sometimes.

You may leave your answers as improper fractions. Just please be sure to simplify them.

(a) $\frac{3}{4} \cdot \frac{3}{4}$

(b) $\frac{3}{4} \cdot \frac{4}{3}$

(c) $\frac{3}{4} \cdot \frac{8}{9}$

(d) $\left(\frac{9}{4}\right)\left(-\frac{1}{18}\right)$

(e) $\left(-2\frac{1}{4}\right)\left(-1\frac{1}{2}\right)$

(f) $-\left(\frac{4}{7}\right)\left(\frac{35}{4}\right)$

Ex #2: Please evaluate the following. Calculator suggested. Round to the nearest hundredth, or two decimal places.

(a) $14.2 \cdot 0.65$

(b) $14.2 \div 0.65$

(d) $-92.36 \cdot 1.8$

(e) $-92.36 \div 1.8$

Ex #3: What are the reciprocals of the following numbers?

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

(b) -6

(c) $2\frac{3}{4}$

(d) 0.5 (hint: turn it into a fraction first)

Ex #4: Please divide. Simplify as much as possible.

(a) $\frac{3}{4} \div \frac{1}{4}$

(b) $\frac{3}{4} \div 9$

(c) $\left(-2\frac{1}{4}\right) \div \left(1\frac{1}{2}\right)$

(d) $10 \div \frac{1}{4}$

Ex #5: Suppose you have a string that's 1 foot long (12 inches). How many pieces of string could you cut, if each piece is $1\frac{1}{3}$ inches long?

Algebra - Percents (part 1 of 2)

The video covers the following exercises. Please print this sheet and work along!

$$20\% \text{ of } \underline{\hspace{2cm}} =$$

$$20\% \text{ of } \underline{\hspace{2cm}} =$$

$$15\% \text{ of } \underline{\hspace{2cm}} =$$

$$\frac{2}{5} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}\%$$

$$\frac{63}{100} = \underline{\hspace{1cm}}\%$$

$$\frac{47}{100} = \underline{\hspace{1cm}}\%$$

Algebra - Percents (part 2 of 2)

The video covers the following exercises. Please print this sheet and work along!

$$\frac{4}{25} = \frac{\quad}{\quad} = \quad\%$$

$$\frac{3}{8} = \frac{\quad}{\quad} = \quad\%$$

16 is what % of _____?

21 is 30% of _____?

(using a formula)

What is 400% of _____?

(not using a formula)

What is 400% of _____?

0-6: The Percent Proportion

Ex #1: Please complete the table, by either filling in the missing equivalent fraction, or the missing equivalent percentage. Always be sure to simplify your fractions.

The first row is a given sample.

Fraction	Percentage
$\frac{1}{2}$	50%
	20%
$\frac{41}{100}$	
	42%
$\frac{27}{50}$	
	10%
1	
	1%
$\frac{1}{4}$	
	350%
$\frac{3}{5}$	
	84%
$\frac{2}{40}$	
$\frac{3}{8}$	

Ex #2: Please evaluate the following.

(a) What is 20% of 40?

(b) What is 15% of 40?

(c) 18 is what percent of 60?

(d) 40% of what number is 42?

Ex #3: My neighbor claims to be able to make 90% of her free throws in basketball. So if I challenge her to take 30 shots, by her non-arrogant claim, how many should she be able to hit?

Ex #4: Suppose that when your friend Chris sees his test score, he panics. He says, "I really needed at least an 80% of this test, but I only got a 68 out of 80!" What would your response be to Chris?

(Remember, you're his friend. So you must help him calculate his percentage, then either confirm or refute his initial reaction, without judgement.)

Ex #5: If a parent is 50 years old, and a child is 20 years old, the parent is what percent of the child's age?

Geometry - Perimeter

The video covers the following exercises. Please print this sheet and work along!

Perimeter is informally defined as: _____

The way we calculate it is by: _____

Square, having a side length of _____.



Perimeter of this square:

Formula for the perimeter of a square:

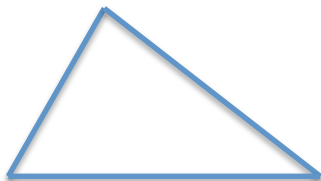
Rectangle, having side lengths _____ and _____.



Perimeter of this rectangle:

Formula for the perimeter of a rectangle:

Perimeter of this triangle:

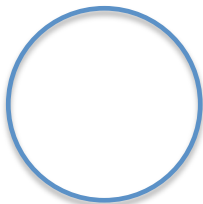


Perimeter of this parallelogram:



The “perimeter” of a circle is called the _____.

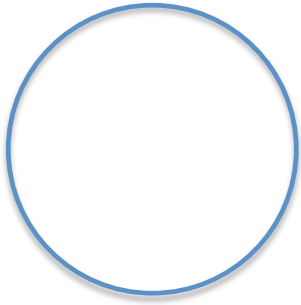
What are some formulas for the _____ of a circle?



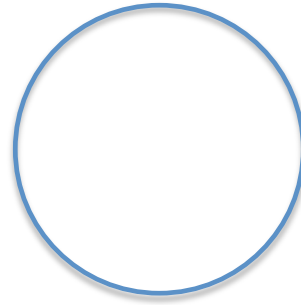
One formula:

Another formula:

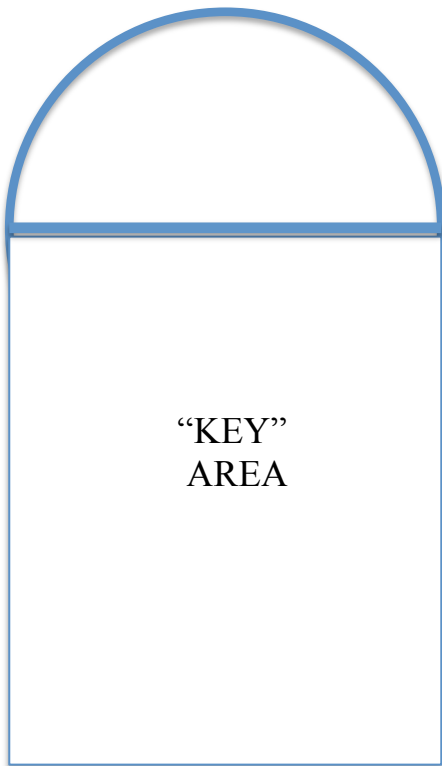
Circumference if diameter = _____?



Circumference if radius = _____?



What is the perimeter of the semicircle that is above the “key” area on the basketball court?



0-7: Perimeter

Perimeter basically means we _____ the lengths of all sides of a shape.

Ex #1: What's the perimeter of a square, if each side measures $4\frac{1}{2}$ inches?

Ex #2: What's the perimeter of a parallelogram having side lengths of 10 cm and 2 cm?

Ex #3: If a triangle is "equilateral," that means that all its sides have the same length. Suppose an equilateral triangle has a perimeter of 15 m. What does each side measure?

Ex #4: What is the circumference of a child's bike tire that has a diameter of 16 in? Please express your answer in two ways:

a.) in terms of π

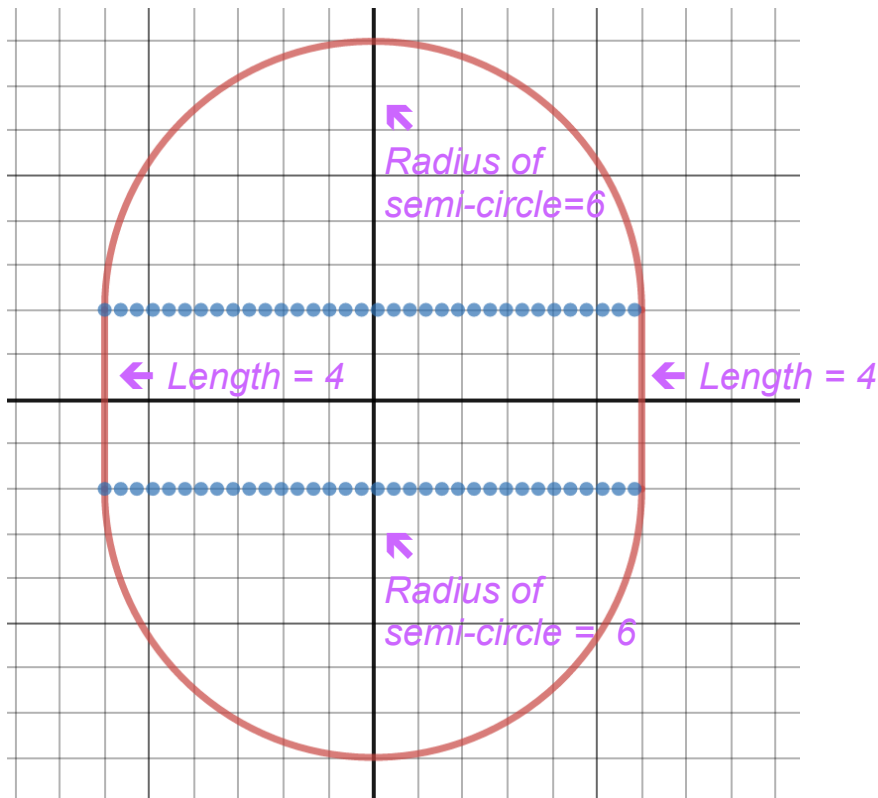
b.) as a decimal rounded to the nearest hundredth (2 decimal places)

c.) What is the distance traveled in 10 revolutions of the tire? Please round to the nearest tenth (1 decimal place).

(Hint: the tire makes one full circumference's worth of contact with the ground every time it rotates.)

Ex #5: What is the perimeter of the given shape?

(Hint: think of it as a full circle, split apart by two lines, each having a length of 4.)



Ex #6: We know that the distance from the surface of the earth to its center is approximately 4,000 miles (*source: universetoday.com*).

If you were to get in a plane and fly one full circumference until you returned to the place your plane originated, how many miles would that journey be? (Please round to the nearest mile.)

Please make a reasonable estimation. You don't need to exactly solve.

- 1) At a recent trip to the movies, parking cost \$2, movie tickets cost \$21.50, popcorn costs \$6.75, and drinks cost \$4.90. Approximately what was the total expenditure?

1) _____

- 2) Suppose I need 7 bundles of hardwood flooring, and each bundle costs \$39.90. Approximately how much will I be spending?

2) _____

Please evaluate.

- 3) How many times can a jug that holds $\frac{1}{4}$ of a gallon of water fill a 4-gallon jug?

3) _____

- 4) How many miles will I travel if my speed is 45 mph, and I drive for 5 hours?

4) _____

- 5) Suppose Abbey's car can hold 15 gallons of gas when full. She'll then be able to drive for 300 miles. Please pose a question based on this information only, and then answer it.

Please complete the table below, by placing a check mark or X to indicate all sets of numbers that apply to the value of each expression.

		I irrational	Q rational	Z integer	W whole	N natural
6)	49					
7)	-49					
8)	0.49					
9)	$\sqrt{49}$					
10)	$\sqrt{50}$					

Please complete the following.

11) $11 + 14$ 11) _____

12) $11 - 14$ 12) _____

13) $-11 + 14$ 13) _____

14) $-11 - 14$ 14) _____

15) $13 \cdot -5$ 15) _____

16) $-13 \div -1$ 16) _____

17) The Dead Sea is the lowest point on earth, measured at 400 meters *below* sea level. Mt. McKinley, the highest peak in the United States, stands at 6200 meters *above* sea level. What is the difference in elevation between the Dead Sea and Mt. McKinley?

17) _____

Please write $<$, $>$, or $=$ to make the statement true. Kindly show work to receive credit.

18) $\frac{1}{4}$ $\frac{3}{7}$

18) _____

19) $\frac{2}{5}$ 0.42

19) _____

Please find each sum or difference.

20) $\frac{1}{4} + \frac{3}{7}$

20) _____

21) $1\frac{1}{2} - \frac{2}{7}$

21) _____

22) $-21.5 - 6.7$

22) _____

23) $-21.5 + 6.7$

23) _____

Please multiply or divide. Remember to simplify all answers.

24) $\frac{10}{9} \cdot \frac{18}{25}$

24) _____

25) $\left(-2\frac{1}{3}\right)\left(1\frac{2}{7}\right)$

25) _____

26) $6 \div \frac{3}{4}$

26) _____

Please evaluate.

27) What is 30% of 110?

27) _____

28) 14 is what percent of 40?

28) _____

29) Which *perimeter* is greater: a triangle with sides 3, 4, 5 OR a square having side = 4?
What is the difference in their perimeters?

29) _____

30) What is the circumference of a circle if the radius = 10 in.? (Please leave your answer in terms of π .)

30) _____