Math 3, Classwork 23

WARM UP

Make friends with parenthesis.

1. OPEN parenthesis and SIMPLIFY

a) $a – (b – c) + (b – c) – (2d – 3a) =$ _____

b) $(a +4b) – (a + 3c) – (4b - 3c) =$ _____

c) $3x – (5y + 2z) – (2x – 3z + 4y) =$_____

2. OPEN parenthesis and SIMPLIFY

a) $3(7 + a) – 4(c – 3) =$ _____

b) $15(c – d) + 5(a + d – c) =$ _____

c) $4(x – 9) – 2(2x –19) =$_____

3. INSERT parenthesis the most convenient way and SOLVE

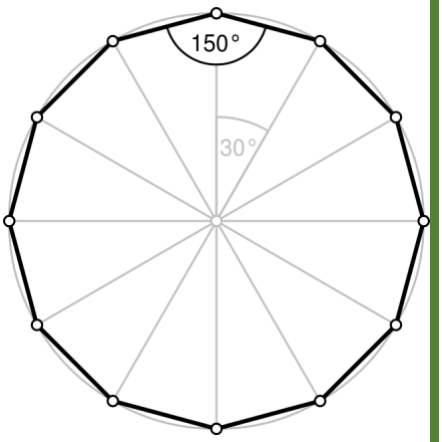
a) $305 – 25 - 75 – 105 =$ _____

b) $979 – 41 + 21 - 59 =$ _____

c) $135 + 92 – 33 + 82 – 42 - 67 =$_____

REVIEW Homework

4. The measure of the interior angles of dodecagon (any 12-sided polygon) add up to 1,800 degrees. If dodecagon has 3 right angles and the other 9 angles are all equal, what is the degree measure of the nine equal angles?



REVIEW Fractions

5. a) Mark and label the points 1/4, 2/4, 3/4, and 4/4 on the number line. Be as exact as possible. Use a ruler or a compass.

b) Mark and label the point 2/3 on the number line. Be as exact as possible.

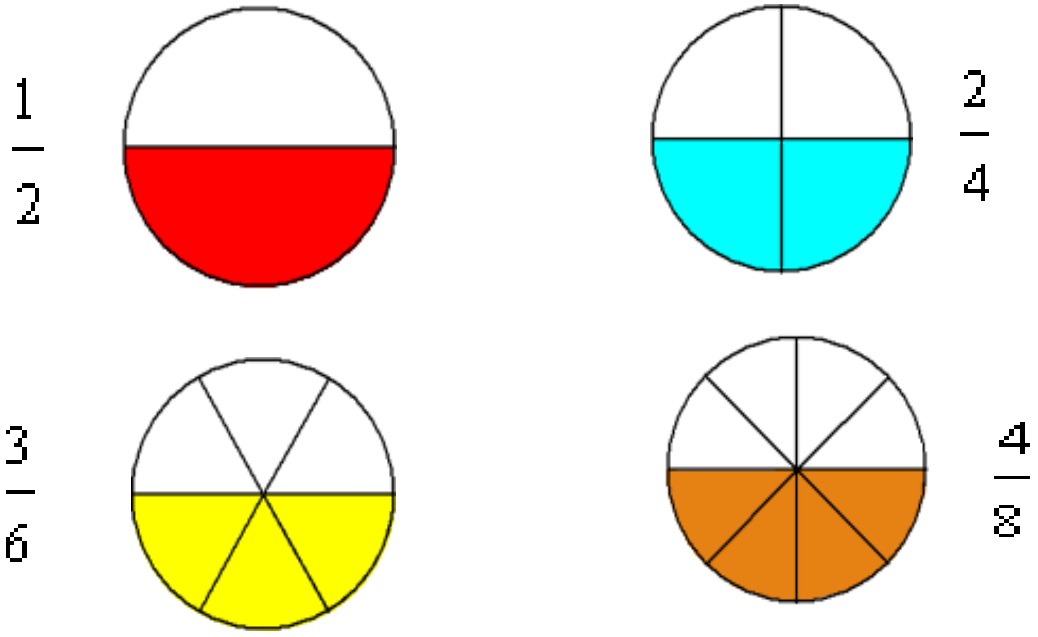
c) Mark and label the points 1/2, 1/3, 1/4, and 1/5 on the number line. Be as exact as possible.

NEW MATERIAL

6. What fraction of the rectangle below is shaded?

Steven says that $\frac{1}{4}$ of the rectangle is shaded. Charley says that $\frac{3}{12}$ of the rectangle is shaded. Who do you think is correct? Explain by using the picture above.

Example: $\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}$



That is called ***Simplifying***, or ***Reducing*** the Fraction

7. *Example:* Victoria ate four-eighths of a pie and Julia ate six-twelfths of a pie. If both pies are the same size, then which girl ate more pie? We need to compare these 2 fractions.

$\frac{4}{8}$ ..... $\frac{6}{12}$

We need to simplify these fractions in order to compare them more easily.
The numerator and denominator of a fraction are called its **terms.** By simplifying a fraction, we are simply reducing it to lowest terms.
Reducing a fraction to lowest terms will not change its value; the reduced fraction will be an equivalent fraction. All we need to do is divide the numerator and the denominator by the same non-zero whole number. This is shown below.

$$\frac{4}{8} = \frac{4 \div 4}{8 \div 4} = \frac{1}{2}$$

$$\frac{6}{12} = \frac{6 \div 6}{12 \div 6} = \frac{1}{2}$$

Answer: Since four-eighths and six-twelfths can both be reduced to one-half, these fractions are equivalent. Therefore, Victoria and Julia both ate the same amount of pie (one-half).

8. Reduce to the lowest terms (or simplified) the fractions:

a) $\frac{20}{40} =$ _____

b) $\frac{5}{10} =$ _____

c) $\frac{18}{27} =$ _____

Adding Fractions with the same denominator

9. To add or subtract items, the units must be the same. For example, look at the items being added below:

2 apples + 3 apples = 5 apples

6 oranges + 3 oranges = 9 oranges

2 quarters + 5 quarters = 7 quarters

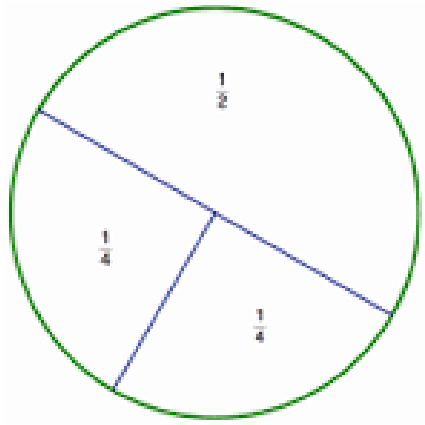
2 nickels + 3 nickels = 5 nickels

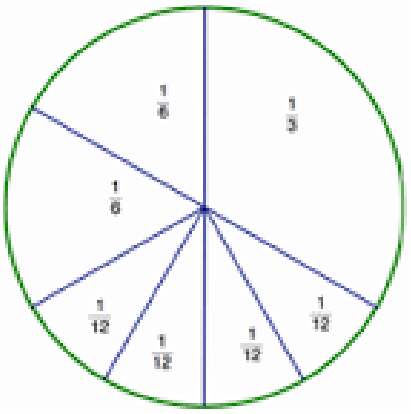
We cannot add apples and oranges unless we call them "fruits". Similarly, we cannot add quarters and nickels unless we call them "cents".

In the name of a fraction, the unit is the denominator. For example, in the fraction "two/fifth", the unit is the denominator, *fifth*. Therefore, 2/fifth + 1/fifth = 3/ fifth.

10. Using the diagram below, find the sum of the following fractions and simplify them:

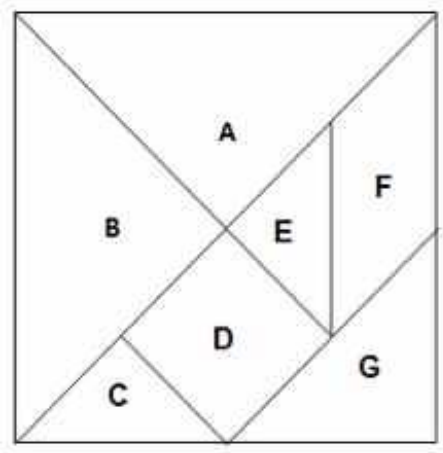
a) ¼ + ¼ = _____ b) 1/6 + 1/6 = _____ c) 1/12 + 3/12 = _____





11. Tangram Fractions. Fractions as Part of the Whole.

The Tangram is a simple set of seven geometric shapes made up of five triangles (two small triangles, one medium triangle, and two large triangles), a square, and a parallelogram. Tangram pieces are widely used to solve puzzles that require the making of a specified shape using all seven pieces.
Another special aspect of the pieces is that all seven fit together to form a square.



a) What part of the whole tangram is triangle A and triangle B. A = ____ B = _____

b) What part is A + B = _____

c) What part of tangram is C + D + E + F + G = _____

Did you know …

The Tangram Puzzle is the most famous of all the Chinese puzzle has a truly spectacular legend behind it. Reputed to have been invented during the Song Dynasty by a master glassmaker who had been commissioned to construct a pane of glass for the royal palace – as the first window for the King.

This pane was significant not only as it was the first window of the royal palace but also as it was a perfect square, sumptuously worked by the skilled hands of the sage. Transporting the pane was a great responsibility, as such it was wrapped in protective layers of the finest silks, leather and canvas in all the land– supposedly assuring the panes successful arrival at the palace unbroken during its arduous journey.
The artisan carefully travelled the barren planes of ancient China in pursuit of the glorious royal palace. After many days of travel the artisan finally came upon the edge of a mountain, with the castle within the hazy distance. With the royal palace now within site the artisans focus waned for an instant. While peering off into the distance in awe of the castle, he didn't notice the tiniest pebble, upon which he stumbled and fell. Before the artisan realized he was tumbling head first down the mountain, wrapped pane in tow.

When he stopped at the base, he urgently unwrapped the pane finding to his astonishment that the pane had magically broken into 7 clean breaks. There was one square, one parallelogram and five triangles.

The sage tried to fit the pieces back together in the shape of the original square. At first he made a rectangle. Next he came up with a parallelogram. Finally, after many attempts, he was able to slide the pieces into the perfect square. He then realized the infinite amount of combinations and interesting shapes that could be made by arranging the pieces.

He dragged the remaining segments across the desert until he finally arrived at the palace, exhausted. Upon arriving at the palace presented the pane, but not as the perfect square piece that had been commissioned, but instead he used the pieces of broken glass, and its infinite possibilities, to illustrate his journey.

The king was astounded at the creation and spent the coming days arranging the glass himself back to a perfect square, without ever placing the pane as the first window in his castle. Soon the puzzle was reincarnated in wood, shell and metal and spread across the land. Its popularity as a puzzle grew until it was known as the most popular puzzle in the land.

This, sadly is a piece of pure fiction, apart from the popularity of Tangram which are indeed exceptionally popular to this day.

The puzzle was originally popularized in Europe thanks to the “Eighth Book of Tan”, which was released in 1818, a year after the first tangram had reached the shores of the US. Arriving on canton and clipper ships. The fad exploded and was soon popular across Europe, much like the Rubik’ cube in more recent times – thanks mainly to the release of the “The Fashionable Chinese Puzzle” book and its solutions.

One of the key reasons for the exploding popularity of Tangrams was that the Catholic Church, did not allow for recreational activities on the Sabbath, but did allow for puzzles to be played.

The tangram puzzles consists of seven flat pieces and a collection of simple outline diagrams and silhouettes and have been popularized not just as puzzles, but also as tables, dishes and seating arrangements in design.