SCC MATH REVIEW SHEET FOR COMPASS TESTING

Use this review sheet and websites to practice your math skills and then take the COMPASS test.

For free help including detailed step-by-step explanations from Basic Math through Calculus go to:
http://www.math.com/

If you prefer to review and practice in Spanish go to: http://www.aaamatematicas.com/

Order of Operations

There are four steps to the order of operations in arithmetic.

1. Do anything inside grouping symbols first.
2. Evaluate any roots or powers next.
3. Multiply and divide (from left to right if there is more than one operation on this level).
4. Add and subtract (from left to right as well).

Example 1:

$$3^2 - 10 \div (14 - 9)$$
$$3^2 - 10 \div 5$$
$$9 - 10 \div 5$$
$$9 - 2$$
$$7$$

Example 2:

$$(5+3)^2 - 4 \times 11$$
$$8^2 - 4 \times 11$$
$$64 - 4 \times 11$$
$$64 - 44$$
$$20$$

Equivalent Fractions

To ***reduce*** (put a fraction in simplest form), divide the top number and the bottom number by a **common factor** (something they are both divisible by).

Example 1: $\frac{36}{48} = \frac{36 \div 12}{48 \div 12} = \frac{3}{4}$

Example 2: $\frac{7}{8}$ is already in simplest form.

To ***build up*** (typically used to find a least common denominator), multiply the top number and the bottom number by a common multiplier. Usually, you will have a denominator that you "need".

Example 1: $\frac{1}{2} = \frac{?}{10} \Rightarrow \frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10}$

Example 2: $\frac{7}{9} = \frac{?}{36} \Rightarrow \frac{7}{9} = \frac{7 \times 4}{9 \times 4} = \frac{28}{36}$

Fraction Arithmetic

Adding and Subtracting Fractions

1. You must have **like** fractions. Build up to a **least common denominator** if necessary.
2. Add and subtract the numerators (top numbers) only. The denominators stay the same.
3. Put the answer in simplest form if necessary.

Example 1: $\frac{5}{8} - \frac{3}{8} = \frac{2}{8} = \frac{1}{4}$

Example 2: $\frac{1}{2} + \frac{1}{3} \Rightarrow \frac{1 \times 3}{2 \times 3} + \frac{1 \times 2}{3 \times 2} \Rightarrow \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

Fraction Arithmetic Continued

Multiplying Fractions

1. You don't need like fractions to multiply. You may reduce prior to multiplying if possible.
2. Multiply the numerators (top numbers), and multiply the denominators as well.
3. If you reduced first, the answer should already be simplified. If you didn't, put the answer in simplest form if necessary.

Example 1: $\frac{3}{5}\times\frac{2}{7}=\frac{3\times 2}{5\times 7}=\frac{6}{35}$

Example 2: $\frac{4}{9}\times\frac{3}{16}\Rightarrow\frac{1}{3}\times\frac{1}{4}=\frac{1\times 1}{3\times 4}=\frac{1}{12}$

Dividing Fractions

1. Transform the division problem into a multiplication problem. Change $\div$ into $\times$, and flip the second fraction (take the ***reciprocal***).
2. Once the division problem is transformed into multiplication, follow the steps for $\times$ above.

Example: $\frac{4}{5}\div\frac{8}{9}\Rightarrow\frac{4}{5}\times\frac{9}{8}\Rightarrow\frac{1}{5}\times\frac{9}{2}=\frac{1\times 9}{5\times 2}=\frac{9}{10}$

Taking a fraction "of" or a percent "of" some other number

In problems that require you to take a fraction "**of**" or a percent "**of**" some other number, the word "**of**" implies **multiplication**.

Example 1: 5% of 900 = $5\%\times 900=0.05\times 900=45$

Example 2: One third of \$180 = $\frac{1}{3}\times\$180=\$60$

Solving Proportions

Proportions are equations that have a fraction on each side of the equal sign. They can be solved by first cross-multiplying, and then dividing both sides of the equation by the resulting coefficient.

Example 1:

$$\frac{5}{8}=\frac{x}{24}$$
$$8\cdot x=5\cdot 24$$
$$8x=120$$
$$\frac{8x}{8}=\frac{120}{8}$$
$$x=15$$

Example 2:

$$\frac{6}{x}=\frac{9}{15}$$
$$9\cdot x=6\cdot 15$$
$$9x=90$$
$$\frac{9x}{9}=\frac{90}{9}$$
$$x=10$$

Percent Problems

Percent problems, especially word problems involving percent, can often be solved using a **percent proportion**. It is necessary to identify the **percent**, the **base**, and the **amount**, and use the formula:

$\frac{a}{b} = \frac{p}{100}$ where a is the amount, b is the base, and p is the percent (written as given in the problem).

The percent is usually the easiest to determine because you only need to look for '%' or the word 'percent'. The base and the amount can only be found by understanding the context of the problem.

Example: John scored 22 out of 25 on a math exam. What percent of the problems did he answer correctly?

The **percent** is the unknown value. On an exam, the **amount** is the *number of questions answered correctly*, and the **base** is the *maximum score possible*. So… p = ?, b = 25, and a = 22.

$$\frac{a}{b} = \frac{p}{100} \Rightarrow \frac{22}{25} = \frac{p}{100} \Rightarrow 25p = 2200 \Rightarrow p = \frac{2200}{25} = 88\%$$

Exponents

Exponents are really just shorthand for repeated multiplication of a number (or a variable) by itself. The main number/variable is called the **base**, and the small number to the upper-right is called the **exponent**. The exponent indicates how many times the base is to be written as a **factor**.

Example 1: $5^3 = 5 \cdot 5 \cdot 5 = 125$ Example 2: $x^7 = x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$

Arithmetic with Signed (Positive and Negative) Numbers

Addition and Subtraction

Addition and subtraction can be visualized using a number line such as the following:

-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 *1 2 3 4 5 6 7 8 9 10 11 12*

The first number in the problem is your starting place on the number line. If your first number is **positive**, you are starting to the **right** of zero. If your first number is **negative**, you are starting to the **left** of zero.

The **operation** and the **sign** of the second number tell you which direction to move on the number line. When you:

- Add a positive number, move to the right.
- Add a negative number, move to the left.
- Subtract a positive number, move to the left.
- Subtract a negative number, move to the right.

Wherever you end up on the number line, that is the answer.

Example 1: $(-4) + 12 = 8$ Example 2: $(-2) + (-5) = -7$

Example 3: $5 - 11 = -6$ Example 4: $(-9) - (-3) = -6$

Arithmetic with Signed (Positive and Negative) Numbers Continued

Multiplication and Division

These two operations follow a couple of simple rules.

f both numbers have the **same** sign, the answer is **positive**.
If the numbers have **different** signs, then the answer is **negative**.

The numerical part of the answer is calculated as usual, independent of the sign.

Example 1: $3\times 8 = 24$

Example 2: $(-5)\times 9 = -45$

Example 3: $\frac{-42}{-6} = 7$

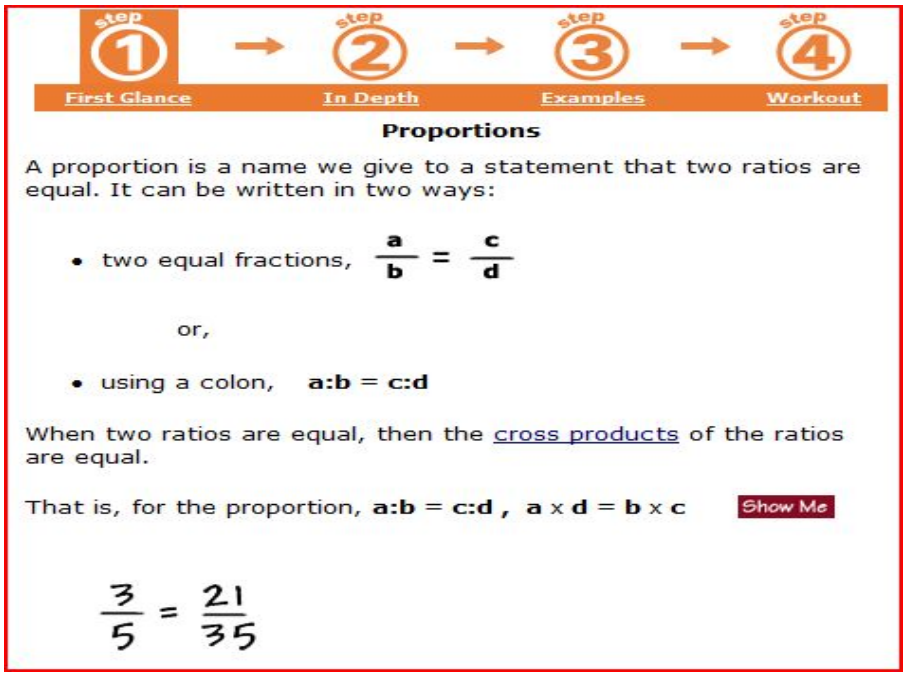
Example 4: $\frac{72}{-8} = -9$

Rules for multiplication and division are not applicable to addition or subtraction. The most commonly misapplied rule "two negatives make a positive" works only for $\times/\div$, not for $+/-$.

Example: $(-4)(-5) = 20$ but $(-4)+(-5) = -9$

In the multiplication problem, 4 times 5 is 20, and the fact that both numbers have the **same** sign means the answer will be **positive** 20. However, in the addition problem, the first number is **negative** 4, which is to the **left** of zero. Then we are **adding a negative** which means we must move further to the **left** on the number line, deeper into the negative numbers. Therefore, the answer has to be negative. The number that is 5 to the left of negative 4 is negative 9.

Still want more help, review and practice?
Here is a sample of what you will find at the free math.com website: http://www.math.com/



At math.com there are four sections ranging from "First Glance" to "Workout". You can test yourself on the very basics of adding and subtracting and move up as many levels as you like before taking the COMPASS test.

When you feel you are ready to take the COMPASS test, please set up your test time by contacting one of SCC's SuCCess Centers.

To take the COMPASS test in:

West Burlington, call: 319-208-5157
Fort Madison, call: 319-376-2286
Keokuk, call: 319-313-1923
Mt. Pleasant, call: 319-385-8012