

Ratios & Proportions



This sheet is designed as a review aid. If you have not previously studied this concept or after reviewing the contents you still don't pass you should enroll in the appropriate math class.

Ratios and proportions are usually expressed as fractions ($\frac{3}{5}$) or with a colon between the proportional units (3:5:6 – read 3 parts to 5 parts to 6 parts).

Below are two problems similar to the types of problems you will find on the COMPASS test:

Problem 1:

There are two regular hexagons. One is smaller than the other. The length of one side of the smaller hexagon is 9 inches. The perimeter length of the smaller hexagon to the larger one is 3:5. What is the length of one side of the larger hexagon?

Notes:

1. On a regular polygon, all the sides are the same length.
2. On a regular polygon, the perimeter and each side will increase at the same ratio.
3. In ratios and proportions, the order of the numbers is important. 3:5 does not equal 5:3. The proportional units must be in the same order as the items they relate to.

Steps:

1. Find the size of a single proportional unit by dividing the length of the known side by the ratio (number of units) for that hexagon.

$$9 \div 3 = 3 \text{ (A single proportional unit is 3.)}$$

2. Multiply the unit size (3) by the ratio number of the other hexagon (5).

$$3 \times 5 = 15 \text{ (This is the length of a single side of the larger hexagon.)}$$

Problem 2:

You are asked to mix ingredients A, B, and C for a special project at a ratio of 2:3:5. If B is 24 ounces, how many ounces is A? How many ounces is C? What will the total amount be in ounces? Express A, B, and C in fractional form.

Notes:

1. In COMPASS, you will only be asked to give a single answer. The questions asked in this problem are representative of the variety of questions that may be asked of the problem presented.
2. To find the amount of a single ration unit for a ratio problem, divide a known amount by its ratio units.
3. To find a total number of units in a ratio problem, add all the separate units together.
4. Unless otherwise specified in the problem, the order of the items specified will be the same as the order of units in the ratio expression. For the above problem the parts are stated in the order A, B, C and the ratio formula is 2:3:5, therefore A = 2, B = 3, and C = 5.

Steps:

1. Calculate the amount of an individual unit by dividing the known ounces for B (24) by the ratio equivalent of B (3):

$$24 \div 3 = 8 \text{ (Each unit is 8 ounces.)}$$

2. Multiply the ratio of each ingredient by 8 (the value of each unit)

$$\text{For A} - 2 \text{ (ratio of A)} \times 8 \text{ (ounces)} = 16. \text{ **A is 16 ounces.**}$$

$$\text{For C} - 5 \text{ (ratio of C)} \times 8 \text{ (ounces)} = 40. \text{ **C is 40 ounces.**}$$

3. Add the ounces for A, B, and C together to find the total amount.

$$16 + 24 + 40 = 80. \text{ **The total amount is 80 ounces.**}$$

4. To express each ratio in fraction form, write the ratio for each ingredient over the total number of units. To find the total number of units, add all the ratios together: 2 (units for A) + 3 (units for B) + 5 (units for C) = 10.

$$\text{In fraction form: } A = \frac{2}{10} \quad B = \frac{3}{10} \quad C = \frac{5}{10}$$

(Note that A and C are reducible fractions, however they should be left as they are to be consistent with B. With ratios expressed as fractions, it is important to keep the denominator of all the parts the same.)