Euclidiad Olympiad Training LEVEL 1
Day 3 – Fractions and Ratios

Notes

- If $a:b:c = 1:2:3$, then $a = k, b = 2k, c = 3k$, where k is a constant.

- Multiplication or division with a constant can be done in a ratio.

  If $a:b:c = x:y:z$, then $a:b:c = xk:yk:zk$.

  If $a:b:c = x:y:z$, then $a:b:c = \frac{x}{k}:\frac{y}{k}:\frac{z}{k}$.

- Addition or subtraction with a constant cannot be done in a ratio

  If $a:b:c = x:y:z$, then $a:b:c = (x+k):(y+k):(z+k)$ is NOT correct.

  If $a:b:c = x:y:z$, then $a:b:c = (x-k):(y-k):(z-k)$ is NOT correct.

Examples given in class

1. A whole number m is subtracted from the numerator of $\frac{41}{55}$. At the same time, m is added to its denominator, and the fraction now becomes $\frac{3}{5}$ in its simplest form. What is m?

2. The ratio of boys to girls in Euclidiad Math class is 3:4. There are 84 students in the class. How many girls are there in the class?

3. Htoo Htoo has a bag that holds only green marbles and red marbles. The ratio of green marbles to the total number of marbles in the bag is $\frac{2}{5}$. If Htoo Htoo adds 4 green marbles and takes out 10 red marbles, there will be twice as many green marbles in the bag as red marbles. How many marbles were in the original bag?

4. It is given that $A:B = 2:3$ and $B:C = 6:5$. The average of A, B and C is 45. Find B.

5. In a water fountain show, the height of water changes several times. The ratio of its original height to its second height is 24 to 5. The ratio of its second height to its third height is 1 to 12. The ratio of its original height to its fourth height is 16 to 1. The tallest of these four heights is 10 feet. What is the shortest height?

6. A number of students from Fibonacci Middle School are taking part in a community service project. The ratio of 8th-graders to 6th graders is 5:3, and the ratio of 8th-graders to 7th – graders is 8:5. What is the smallest number of students that could be participating in the project?

7. The ratio of men to women in Smalltown is 3:2. The population of big town is three times as large as that of Smalltown, and the ratio of men to women in Bigtown is 2:3. If Smalltown and Bigtown are combined, what is the ratio of men to women in the combination?

8. Dick and Nick share their food with Albert. Dick has 5 loaves of bread and Nick has 3 loaves. The three share the bread equally. Albert gives Dick and Nick 8 dollars, which they agree to share fairly. How should Dick and Nick divide the eight dollars between them?

9. Two jars each contain the same number of marbles, and every marble is either blue or green. In Jar 1, the ratio of blue to green marbles is $9:1$, and the ratio of blue to green marbles in Jar 2 is $8:1$. There are 95 green marbles in all. How many more blue marbles are in Jar 1 than in Jar 2?

10. Given that $yz:zx:xy = 1:2:3$ and $\frac{x}{yz}:\frac{y}{zx} = 1:k$, find k.

Euclidiad Olympiad Class LEVEL 1
Day 3 – Fractions and Ratios

Homework

Homework code: **HWA101**
Issued on: 18th January 2021
Submit before: 1st February 2021

Submit the solutions (with workings) to at least 6 of the following homework problems.
Extra credit will be given to those who got more than 6 correct.
Each challenge problem is worth 10 points, and the rest are worth 5 points each.

1. My basketball team won $\frac{2}{9}$ of its games in this season. If we lost 15 more games than we won, how many games did we play this year?

2. Alicia had two containers. The first was $\frac{5}{6}$ full of water and the second was empty. She poured all the water from the first container into the second container, at which point the second container was $\frac{3}{4}$ full of water. What is the ratio of the volume of the first container to the volume of the second container?

3. Two-thirds of the people in a room are seated in three-fourths of the chairs. The rest of the people are standing. If there are 6 empty chairs, how many people are in the room?

4. In a shop, there are only there colors of balls, red, white and black with a total of 136 balls. The ratio of the number of red balls to white balls is $1:2$. The ratio of the number of white balls to black balls is $3:4$. How many red balls are there?

5. 4500 new books arrive at the Central Library. $\frac{4}{5}$ of these books are distributed to 3 Branch Libraries, A, B and C, in the ratio of $1:3:5$. How many books does Branch C receive?

6. U Chit is planting pea plants in his backyard. Some of the plants are tall and the rest are short. Some of the plants are yellow and the rest are green. The number of different plant types are in the ratio

   Tall green : Tall yellow : Short green : Short Yellow $=\ 8:\ 5:\ 2:\ 1.$

   If there are 1080 green plants, how many total plants are in U Chit's yard?

7. What is the ratio of x to y if

$$\frac{10x-3y}{13x-2y}=\frac{3}{5}\ ?$$

8. In the recent election for mayor, there were three candidates, Smith, Williams, and Krzyzewski. The ratio of Krzyzewski voters to Smith voters is the same as the ratio of Smith voters to Williams voters. If there are 800 Krzyzewski voters and 200 Williams voters in my town, how many people voted in my town (assuming these were the only 3 choices)?

9. A number of students from B.E.H.S (6) Pathein took part in OMMO. Their average score was 66 marks. The average score for girls was 70 marks and the average score for boys was 63 marks. What is the ratio of the number of girl participants to boy particpants?

10. Two 600 ml jars contain orange juice. One jar is $\frac{1}{3}$ full and the other jar is $\frac{2}{5}$ full. Water is added to fill each pitcher completely, then both jars are poured into one large container. Find the ratio of orange juice to water in the large container.

Challenge Problems

1. The Red Lamp Brigade patrols the 3600 sectors of the galaxy along with their better known counterparts, the Green Lantern Corps. Each sector has either one Corps member or one Brigadier. In the first 2400 sectors, the ratio of Corps members to Brigadiers is 3 : 1. If there are an equal number of Brigadiers and Corps members in the galaxy, what is the ratio of Corps members to Brigadiers in the other sectors?

2. Joe and Joann each bought 12 ounces of coffee in a 16-ounce cup. Joe drank 2 ounces of his coffee and then added 2 ounces of cream. Joann added 2 ounces of cream, stirred the coffee well, and then drank 2 ounces. What is the resulting ratio of the amount of cream in Joe's coffee to that in Joann's coffee?

3. Al, Bert, and Carl are the winners of a school drawing for a pile of Halloween candy, which they are to divide in a ratio of 3 : 2 : 1, respectively. Due to some confusion, they come at different times to claim their prizes, and each assumes he is the first to arrive. If each takes what he believes to be his correct share of candy, what fraction of the candy goes unclaimed?