

Adding and Subtracting Fractions

There are four main operations that we can do with numbers: addition (+), subtraction (-), multiplication (x), and division (\div). You will be assessed on your ability to add and subtract fractions.

In order to add or subtract, fractions must have common denominators.

ADDING FRACTIONS

1. Adding with Common Denominators

To add fractions, if the denominators are the same, we simply add the numerators and keep the same denominators.

e.g. $\text{Add } \frac{1}{12} \text{ and } \frac{5}{12}$

Since the denominators are common, simply add the numerators. $\frac{1}{12} + \frac{5}{12} = \frac{6}{12}$

Notice that we must reduce the answer, if possible. $= \frac{1}{2}$

2. Adding When One Denominator is a Multiple of the Other

e.g. $\text{Add } \frac{2}{9} \text{ and } \frac{5}{27}$

Notice that the denominators are not common. Also notice that 27 is a multiple of 9 (since $9 \times 3 = 27$). So, we make the lowest common denominator (LCM) 27.

$$\frac{2}{9} (\times 3) = \frac{6}{27}$$

Therefore: $\frac{2}{9} + \frac{5}{27}$ is the same as $\frac{6}{27} + \frac{5}{27}$

We can now add the top 2 numbers, so the answer is = $\frac{11}{27}$

3. **Adding Any Fraction**

$$\text{Add } \frac{7}{12} \text{ and } \frac{13}{15}$$

We must find a common denominator by examining multiples of the largest denominator. In the example above we find that the LCD = 60.

$$\begin{aligned} \frac{7}{12}(x5) + \frac{13}{15}(x4) &= \frac{35}{60} + \frac{52}{60} \\ &= \frac{87}{60} \text{ Then simplify } = 1 \frac{9}{20} \end{aligned}$$

When adding mixed numbers, add the whole numbers and the fractions separately. Find common denominators and add.

$$\text{Add } 1 \frac{5}{6} \text{ and } 2 \frac{3}{8}$$

$$1 \frac{5}{6} (= 1 \frac{20}{24}) + 2 \frac{3}{8} (= 2 \frac{9}{24}) \text{ total equals } 3 \frac{29}{24}$$

If an improper fraction occurs in the answer, change it to a common fraction by doing the following.

$$3 \frac{29}{24} = 3 + 1 \frac{5}{24} = 4 \frac{5}{24}$$

SUBTRACTING FRACTIONS

1. Common Fractions

As in addition, we must have common denominators in order to subtract. Find the LCD; change the fractions to equivalent fraction with the LCD as the denominator. Then subtract the numerators, but keep the same denominator.

$$\frac{5}{8} - \frac{3}{8} = \frac{2}{8} \text{ or } \frac{1}{4}$$

$$\frac{2}{3} - \frac{3}{8} = \frac{16}{24} - \frac{9}{24} = \frac{7}{24}$$

2. Mixed Numbers

When subtracting whole numbers, subtract the whole numbers, and then subtract the fractions separately.

$$3\frac{5}{9} - 1\frac{3}{9} = 2\frac{2}{9}$$

However, if the common fraction we are subtracting is smaller than the other common fraction, we must borrow the number “1” from the large whole number.

i.e. $4\frac{2}{7} = 3 + \frac{7}{7} + \frac{2}{7}$, or $3\frac{9}{7}$

$$4\frac{2}{7} - 2\frac{5}{7} = 3\frac{9}{7} - 2\frac{5}{7} = 1\frac{4}{7}$$

To subtract $1\frac{3}{4}$ **from** $6\frac{2}{3}$, first change the common fractions to equivalent

fractions with the LCD. Since $\frac{8}{12}$ is smaller than $\frac{9}{12}$, borrow from 6. -

$$6\frac{2}{3} - 1\frac{3}{4} = 6\frac{8}{12} - 1\frac{9}{12}$$

$$6\frac{8}{12} = 5\frac{12}{12} + \frac{8}{12} = 5\frac{20}{12}$$

$$5\frac{20}{12} - 1\frac{9}{12} = 4\frac{11}{12}$$

ADDING AND SUBTRACTING FRACTIONS WITH FEET AND INCHES

The most important thing to remember when you are working with feet and inches is that they do NOT follow the decimal system. Your measurements will not be correct if you try to make an inch into a decimal or vice versa.

There are 12 inches (") in 1 foot (')

You will be asked to calculate measurements in feet and inches; for example, in the practice test, you were asked to calculate the length of a board that has been cut into 3 pieces. The pieces measured:

$3' 1\frac{3}{6}$ ", $6' 3\frac{4}{6}$ " and $7' 4\frac{1}{3}$ ". You are also told that $\frac{1}{6}$ " is used up for each saw cut (kerf)

So, you need to calculate:

$$3' 1\frac{3}{6} + 6' 3\frac{4}{6} + 7' 4\frac{1}{3} + \frac{1}{6} + \frac{1}{6}$$

Add the feet first: $3' + 6' + 7' = 16'$

Now add the inches: $1'' + 3'' + 4'' = 8''$

Now add the fraction of inches: $\frac{3''}{6} + \frac{4''}{6} + \frac{1''}{3} + \frac{1''}{6} + \frac{1''}{6}$

We know that we have to make all of these fractions have the same denominator before we can add them. The only one that is different is $\frac{1''}{3}$. To convert this into sixths, we can multiply the top and bottom by 2. $\frac{1''}{3} (x2) = \frac{2''}{6}$

$$\text{So, } \frac{3''}{6} + \frac{4''}{6} + \frac{2''}{6} + \frac{1''}{6} + \frac{1''}{6} = \frac{11''}{6}$$

The final answer is $16' + 8'' + \frac{11''}{6} = 16' 9\frac{2}{6}''$

Practice 1: Adding Fractions

a) Add the following:

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

2) $\frac{4}{5} + \frac{3}{5}$

3) $\frac{4}{9} + \frac{2}{9}$

4) $\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$

5) $\frac{2}{3} + \frac{1}{9}$

6) $\frac{1}{2} + \frac{3}{8}$

7) $\frac{1}{4} + \frac{5}{16}$

8) $\frac{2}{3} + \frac{4}{15}$

9) $3\frac{1}{2} + 4\frac{1}{4}$

10) $9\frac{2}{3} + 3\frac{1}{6}$

11) $8\frac{1}{2} + 4\frac{4}{5}$

12) $2\frac{3}{4} + 6\frac{1}{2}$

13) $4\frac{1}{3} + 6\frac{5}{6}$

14) $6\frac{1}{3} + 8\frac{3}{4}$

15) $7\frac{2}{3} + \frac{4}{5}$

16) $8\frac{2}{3} + 6\frac{1}{4} + 1\frac{3}{8}$

Practice 2: Subtracting Fractions

a) Subtract the following:

1) $\frac{9}{12} - \frac{1}{8}$

2) $\frac{14}{15} - \frac{1}{6}$

3) $\frac{5}{6} - \frac{3}{8}$

4) $\frac{7}{9} - \frac{2}{3}$

5) $9\frac{2}{3} - 6\frac{1}{6}$

6) $4\frac{1}{2} - 1\frac{1}{4}$

7) $\frac{3}{4} - \frac{5}{8}$

8) $\frac{11}{12} - \frac{2}{3}$

9) $6\frac{1}{3} - 2\frac{2}{3}$

10) $13\frac{1}{4} - 5\frac{3}{4}$

11) $5\frac{5}{7} - 4\frac{6}{7}$

12) $4\frac{3}{4} - 1\frac{11}{12}$

Answers on the next page

Answers:

Remember that your answers may be slightly different from those given below, because of rounded decimals and the route you took to reach your answer.

If you find any errors on the study material, please email assessments@viu.ca

Practice 1: Adding Fractions

- 1) $\frac{3}{5}$ 2) $\frac{7}{5}$ or $1\frac{2}{5}$ 3) $\frac{2}{3}$ 4) $\frac{9}{4}$ or $2\frac{1}{4}$ 5) $\frac{7}{9}$ 6) $\frac{7}{8}$ 7) $\frac{9}{16}$ 8) $\frac{14}{15}$ 9) $7\frac{3}{4}$ 10) $12\frac{5}{6}$
- 11) $13\frac{3}{10}$ 12) $9\frac{1}{4}$ 13) $11\frac{1}{6}$ 14) $15\frac{1}{12}$ 15) $8\frac{7}{15}$ 16) $16\frac{7}{24}$

Practice 2: Subtracting Fractions

- 1) $\frac{5}{8}$ 2) $\frac{23}{30}$ 3) $\frac{11}{24}$ 4) $\frac{1}{9}$ 5) $3\frac{1}{2}$ 6) $3\frac{1}{4}$ 7) $\frac{1}{8}$ 8) $\frac{1}{4}$ 9) $3\frac{2}{3}$ 10) $7\frac{1}{2}$
- 11) $\frac{6}{7}$ 12) $2\frac{5}{6}$