



Mission: Fix the Fraction Errors

Date Created: September 11, 2026
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Name: _____

Date: _____

Lesson:

Read the passages and examples below to learn about adding and subtracting fractions with unequal denominators that refer to the same whole. Study each incorrect calculation, its error, and the corrected fraction solution.

Fractions can be added or subtracted only when their denominators describe equal-sized parts of the same whole. An area model makes this visible: two same-size solar panels represent equal wholes, and each panel must be divided into the same number of equal sections. To create a common denominator, multiply or divide both the numerator and denominator by the same whole number. For example, sixths can represent both halves and thirds because $\frac{1}{2} = \frac{3}{6}$ and $\frac{1}{3} = \frac{2}{6}$.

Adding the bottom numbers changes the size of the pieces, so the answer no longer matches the picture. In $\frac{1}{2} + \frac{1}{3}$, the expression $\frac{2}{5}$ is incorrect because halves and thirds cannot become fifths by addition. Using sixths gives $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$. Mixed-number subtraction may also require regrouping one whole into fractional parts before subtracting the numerators.

Fraction bars

$\frac{1}{2}$



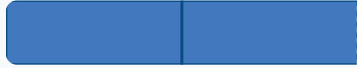
$\frac{1}{3}$



$\frac{3}{6}$



$\frac{2}{6}$



$\frac{1}{2}$ and $\frac{1}{3}$ rewritten as sixths: $\frac{3}{6}$ and $\frac{2}{6}$.

Incorrect work: A space-station plan combines $1\frac{1}{2}$ panels and $1\frac{1}{3}$ panels. The calculation $1\frac{1}{2} + 1\frac{1}{3} = 2\frac{2}{5}$ is incorrect. In two same-size area models, divide each whole panel into sixths: $1\frac{1}{2} = 1\frac{3}{6}$ and $1\frac{1}{3} = 1\frac{2}{6}$. Correct solution: $1\frac{3}{6} + 1\frac{2}{6} = 2\frac{5}{6}$ panels. The incorrect work added unequal-sized parts and treated them as fifths.

Incorrect work: A lunar-rover route calculation shows $3\frac{1}{4} - 1\frac{2}{3} = 2\frac{5}{12}$. First use twelfths: $3\frac{1}{4} = 3\frac{3}{12}$ and $1\frac{2}{3} = 1\frac{8}{12}$. The work is incorrect because $\frac{3}{12}$ is less than $\frac{8}{12}$, so the fractional parts cannot be subtracted without regrouping. Regroup one whole: $3\frac{3}{12} = 2\frac{15}{12}$. Correct solution: $2\frac{15}{12} - 1\frac{8}{12} = 1\frac{7}{12}$.

Instructions:

Check each incorrect calculation. Use a common denominator, regroup when needed, and write the correct value as a fraction or mixed number.

1. A communications dish has $\frac{1}{4}$ of its surface painted silver and $\frac{2}{5}$ painted white. A student adds $\frac{1}{4} + \frac{2}{5} = \frac{3}{9}$. What fraction of the dish's same-size surface is painted?

Fraction bars

$\frac{1}{4}$



$\frac{2}{5}$



$\frac{1}{4}, \frac{2}{5}$

Work space:

Answer: _____

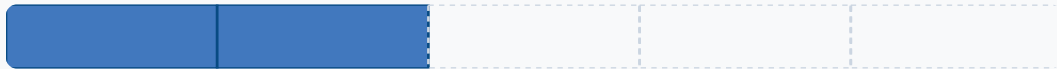
2. A rover used $\frac{3}{4}$ of a full battery charge, then recovered $\frac{2}{5}$ of that same full charge. A student writes, " $\frac{3}{4} - \frac{2}{5} = \frac{1}{1} = 1$." What fraction of a full charge has been used, net of the recovery?

Fraction bars

$\frac{3}{4}$



$\frac{2}{5}$



$\frac{3}{4}, \frac{2}{5}$

Work space:

Answer: _____

3. Two oxygen supplies hold $1\frac{2}{5}$ tanks and $2\frac{1}{2}$ tanks of the same size. A student writes $1\frac{2}{5} = 1\frac{4}{10}$, $2\frac{1}{2} = 2\frac{1}{10}$, and totals $3\frac{5}{10}$ tanks. How many tanks of oxygen are there in all?

Work space:

Answer: _____

4. A telescope's storage holds $2\frac{3}{8}$ units of images and $1\frac{1}{4}$ units of recordings. A student correctly changes $1\frac{1}{4}$ to $1\frac{2}{8}$ but then writes $2\frac{3}{8} + 1\frac{2}{8} = 3\frac{5}{16}$ units. How many units of storage are used?

Work space:

Answer: _____

5. An astronaut planned $4\frac{1}{5}$ hours of training and completed $2\frac{3}{4}$ hours. A student avoids regrouping and writes $2\frac{11}{20}$ hours remaining. How many hours remain?

Work space:

Answer: _____

6. A meteorite bin is $\frac{5}{6}$ full, and scientists remove $\frac{1}{3}$ of the same bin's capacity. A student adds the denominators, rewrites the fractions as $\frac{5}{9}$ and $\frac{1}{9}$, and gets $\frac{4}{9}$. What fraction of the bin remains full?

Fraction bars

$\frac{5}{6}$



$\frac{1}{3}$



The two amounts in the subtraction: $\frac{5}{6}$ full, and the $\frac{1}{3}$ that is removed. The student's $\frac{5}{9}$ and $\frac{1}{9}$ are not shown because ninths do not equal these amounts.

Work space:

Answer: _____

7. A habitat begins with $1\frac{3}{10}$ tanks of water, receives $\frac{4}{5}$ of a tank, and uses $\frac{1}{4}$ of a tank. A student calculates $\frac{4}{5} - \frac{1}{4} = \frac{3}{1}$ and reports $4\frac{3}{10}$ tanks. How much water remains?

Work space:

Answer: _____



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(Answer Key)

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1. A communications dish has $\frac{1}{4}$ of its surface painted silver and $\frac{2}{5}$ painted white. A student adds $\frac{1}{4} + \frac{2}{5} = \frac{3}{9}$. What fraction of the dish's same-size surface is painted?

Hint: Divide the whole dish surface into twentieths before adding.

Correct Answer: $\frac{13}{20}$ (0.65)

Explanation: The denominator cannot be found by adding $4 + 5$. Using twentieths, $\frac{1}{4} = \frac{5}{20}$ and $\frac{2}{5} = \frac{8}{20}$, so the correct value is $\frac{13}{20}$.

2. A rover used $\frac{3}{4}$ of a full battery charge, then recovered $\frac{2}{5}$ of that same full charge. A student writes, " $\frac{3}{4} - \frac{2}{5} = \frac{1}{1} = 1$." What fraction of a full charge has been used, net of the recovery?

Hint: Rewrite both fractions with equal-sized parts before subtracting.

Correct Answer: $\frac{7}{20}$ (0.35)

Explanation: The student's straight-across method is invalid because denominators describe the sizes of the parts and cannot be subtracted. Also, $4 - 5$ equals -1 , not 1 , so the written $\frac{1}{1}$ does not follow even from that invalid operation. Using twentieths, $\frac{3}{4} = \frac{15}{20}$ and $\frac{2}{5} = \frac{8}{20}$; therefore, $\frac{15}{20} - \frac{8}{20} = \frac{7}{20}$.

3. Two oxygen supplies hold $1\frac{2}{5}$ tanks and $2\frac{1}{2}$ tanks of the same size. A student writes $1\frac{2}{5} = 1\frac{4}{10}$, $2\frac{1}{2} = 2\frac{1}{10}$, and totals $3\frac{5}{10}$ tanks. How many tanks of oxygen are there in all?

Hint: Check whether both parts of $\frac{1}{2}$ were multiplied by 5.

Correct Answer: $3\frac{9}{10}$ (3.9)

Explanation: The student changed only the denominator of $\frac{1}{2}$; multiplying both parts by 5 gives $\frac{5}{10}$, so $1\frac{4}{10} + 2\frac{5}{10} = 3\frac{9}{10}$ tanks.

4. A telescope's storage holds $2\frac{3}{8}$ units of images and $1\frac{1}{4}$ units of recordings. A student correctly changes $1\frac{1}{4}$ to $1\frac{2}{8}$ but then writes $2\frac{3}{8} + 1\frac{2}{8} = 3\frac{5}{16}$ units. How many units of storage are used?

Hint: Once the denominators match, keep that denominator.

Correct Answer: $3\frac{5}{8}$ (3.625)

Explanation: The common denominator stays 8 because all sections are equal eighths, so $2\frac{3}{8} + 1\frac{2}{8} = 3\frac{5}{8}$ units. The student's $3\frac{5}{16}$ is incorrect because changing the denominator to 16 after the denominators already match changes the size of the parts.

5. An astronaut planned $4\frac{1}{5}$ hours of training and completed $2\frac{3}{4}$ hours. A student avoids regrouping and writes $2\frac{11}{20}$ hours remaining. How many hours remain?

Hint: Use twentieths, then compare the fractional parts.

Correct Answer: $1\frac{9}{20}$ (1.45)

Explanation: Using twentieths gives $4\frac{4}{20} - 2\frac{15}{20}$. Regrouping makes $3\frac{24}{20} - 2\frac{15}{20} = 1\frac{9}{20}$ hours.

6. A meteorite bin is $\frac{5}{6}$ full, and scientists remove $\frac{1}{3}$ of the same bin's capacity. A student adds the denominators, rewrites the fractions as $\frac{5}{9}$ and $\frac{1}{9}$, and gets $\frac{4}{9}$. What fraction of the bin remains full?

Hint: Adding denominators does not create equivalent fractions.

Correct Answer: $\frac{1}{2}$ (0.5)

Explanation: Ninths do not preserve the original amounts. Since $\frac{1}{3} = \frac{2}{6}$, the correct calculation is $\frac{5}{6} - \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$.

7. A habitat begins with $1\frac{3}{10}$ tanks of water, receives $\frac{4}{5}$ of a tank, and uses $\frac{1}{4}$ of a tank. A student calculates $\frac{4}{5} - \frac{1}{4} = \frac{3}{1}$ and reports $4\frac{3}{10}$ tanks. How much water remains?

Hint: Use twentieths for all three fractional amounts.

Correct Answer: $1\frac{17}{20}$ (1.85)

Explanation: Subtracting numerators and denominators straight across changes the amounts. Using twentieths gives $1\frac{6}{20} + \frac{16}{20} - \frac{5}{20} = 1\frac{17}{20}$ tanks.