

ADD OR SUBTRACT THE FOLLOWING MIXED NUMBERS. FIRST CHANGE EACH MIXED NUMBER TO AN EQUIVALENT IMPROPER

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WHEN WORKING WITH MIXED NUMBERS IN ADDITION OR SUBTRACTION PROBLEMS, A CRUCIAL STEP IS TO CONVERT EACH MIXED NUMBER INTO AN EQUIVALENT IMPROPER FRACTION. THIS CONVERSION SIMPLIFIES THE PROCESS BY ALLOWING YOU TO PERFORM OPERATIONS DIRECTLY ON FRACTIONS WITHOUT DEALING WITH THE MIXED NUMBER FORMAT. ONCE CONVERTED, YOU CAN FIND COMMON DENOMINATORS, PERFORM THE NECESSARY ADDITION OR SUBTRACTION, AND THEN, IF NEEDED, CONVERT THE RESULT BACK INTO A MIXED NUMBER. MASTERING THIS PROCESS ENSURES ACCURACY AND EFFICIENCY IN SOLVING PROBLEMS INVOLVING MIXED NUMBERS.

UNDERSTANDING MIXED NUMBERS AND IMPROPER FRACTIONS

WHAT IS A MIXED NUMBER?

A MIXED NUMBER COMBINES A WHOLE NUMBER AND A PROPER FRACTION. FOR EXAMPLE, $3\frac{1}{2}$ REPRESENTS THREE WHOLE UNITS AND ONE-HALF OF A UNIT. MIXED NUMBERS ARE OFTEN USED IN EVERYDAY CONTEXTS, SUCH AS MEASUREMENTS, COOKING, OR CONSTRUCTION.

WHAT IS AN IMPROPER FRACTION?

AN IMPROPER FRACTION IS A FRACTION WHERE THE NUMERATOR (TOP NUMBER) IS GREATER THAN OR EQUAL TO THE DENOMINATOR (BOTTOM NUMBER). FOR EXAMPLE, $\frac{7}{4}$ IS AN IMPROPER FRACTION BECAUSE 7 IS GREATER THAN 4. IMPROPER FRACTIONS ARE OFTEN EASIER TO MANIPULATE MATHEMATICALLY THAN MIXED NUMBERS.

CONVERTING MIXED NUMBERS TO IMPROPER FRACTIONS

STEP-BY-STEP CONVERSION PROCESS

TO CONVERT A MIXED NUMBER TO AN IMPROPER FRACTION:

1. MULTIPLY THE WHOLE NUMBER PART BY THE DENOMINATOR OF THE FRACTIONAL PART.
2. ADD THIS RESULT TO THE NUMERATOR OF THE FRACTIONAL PART.
3. WRITE THE SUM OVER THE ORIGINAL DENOMINATOR.

EXAMPLE CONVERSIONS

- CONVERT $2\frac{1}{3}$ TO AN IMPROPER FRACTION:

- $2 \times 3 = 6$

- $6 + 1 = 7$

- So, $2\frac{1}{3} = 7/3$

- CONVERT $4\frac{5}{8}$ TO AN IMPROPER FRACTION:

- $4 \times 5 = 20$

- $20 + 5 = 25$

- So, $4\frac{5}{8} = 25/8$

- CONVERT $1\frac{1}{4}$ TO AN IMPROPER FRACTION:

- $1 \times 4 = 4$

- $4 + 1 = 5$

- So, $1\frac{1}{4} = 5/4$

ADDING AND SUBTRACTING MIXED NUMBERS USING IMPROPER FRACTIONS

STEP 1: CONVERT MIXED NUMBERS TO IMPROPER FRACTIONS

AS SHOWN ABOVE, CONVERT EACH MIXED NUMBER IN THE PROBLEM TO ITS IMPROPER FRACTION EQUIVALENT.

STEP 2: FIND COMMON DENOMINATORS

TO ADD OR SUBTRACT FRACTIONS, THEIR DENOMINATORS MUST BE THE SAME. FIND THE LEAST COMMON DENOMINATOR (LCD) OF THE DENOMINATORS.

- IF DENOMINATORS ARE ALREADY THE SAME, PROCEED TO THE NEXT STEP.
- IF NOT, FIND THE LCD AND CONVERT EACH FRACTION TO AN EQUIVALENT FRACTION WITH THAT DENOMINATOR.

STEP 3: PERFORM THE ADDITION OR SUBTRACTION

ONCE THE FRACTIONS HAVE A COMMON DENOMINATOR:

- ADD OR SUBTRACT THE NUMERATORS.
- KEEP THE DENOMINATOR THE SAME.

STEP 4: SIMPLIFY THE RESULT

REDUCE THE RESULTING IMPROPER FRACTION TO ITS SIMPLEST FORM IF POSSIBLE.

STEP 5: CONVERT BACK TO A MIXED NUMBER (IF REQUIRED)

IF THE ANSWER IS AN IMPROPER FRACTION, CONVERT IT BACK INTO A MIXED NUMBER:

1. DIVIDE THE NUMERATOR BY THE DENOMINATOR.
2. THE QUOTIENT BECOMES THE WHOLE NUMBER.
3. THE REMAINDER OVER THE ORIGINAL DENOMINATOR IS THE FRACTIONAL PART.

WORKED EXAMPLES OF ADDING AND SUBTRACTING MIXED NUMBERS

EXAMPLE 1: ADDITION OF MIXED NUMBERS

ADD $3\frac{1}{2}$ AND $2\frac{1}{3}$.

1. CONVERT TO IMPROPER FRACTIONS:

$$\circ 3\frac{1}{2} = (3 \times 2 + 1)/2 = (6 + 1)/2 = 7/2$$

$$\circ 2\frac{1}{3} = (2 \times 3 + 1)/3 = (6 + 1)/3 = 7/3$$

2. FIND THE LCD OF 2 AND 3, WHICH IS 6.

3. CONVERT FRACTIONS:

$$\circ 7/2 = (7 \times 3)/(2 \times 3) = 21/6$$

$$\circ 7/3 = (7 \times 2)/(3 \times 2) = 14/6$$

4. ADD THE FRACTIONS:

- $21/6 + 14/6 = (21 + 14)/6 = 35/6$

5. CONVERT BACK TO A MIXED NUMBER:

- DIVIDE 35 BY 6: $6 \times 5 = 30$, REMAINDER 5

- ANSWER: $5 \frac{5}{6}$

EXAMPLE 2: SUBTRACTION OF MIXED NUMBERS

SUBTRACT $4 \frac{5}{8}$ FROM $6 \frac{3}{4}$.

1. CONVERT TO IMPROPER FRACTIONS:

- $4 \frac{5}{8} = (4 \times 8 + 5)/8 = (32 + 5)/8 = 37/8$

- $6 \frac{3}{4} = (6 \times 4 + 3)/4 = (24 + 3)/4 = 27/4$

2. FIND THE LCD OF 8 AND 4, WHICH IS 8.

3. CONVERT FRACTIONS:

- $37/8 = (37 \times 1)/8 = 37/8$

- $27/4 = (27 \times 2)/(4 \times 2) = 54/8$

4. SUBTRACT THE FRACTIONS:

- $37/8 - 54/8 = (37 - 54)/8 = -17/8$

5. SIMPLIFY:

- $-17/8 = -(7 \times 2 + 3)/8 = -1 \frac{3}{8}$

6. CONVERT BACK TO A MIXED NUMBER:

- $7 \div 4 = 1 \text{ R } 3$

- ANSWER: $1 \frac{3}{4}$

TIPS FOR SUCCESS WHEN WORKING WITH MIXED NUMBERS

1. ALWAYS CONVERT FIRST

CONVERTING MIXED NUMBERS TO IMPROPER FRACTIONS ENSURES CONSISTENCY AND SIMPLIFIES CALCULATIONS.

2. FIND THE LEAST COMMON DENOMINATOR

THIS MINIMIZES THE NEED FOR REDUCING FRACTIONS LATER AND MAKES CALCULATIONS EASIER.

3. SIMPLIFY BEFORE AND AFTER CALCULATIONS

ALWAYS CHECK IF YOUR FRACTIONS CAN BE SIMPLIFIED TO REDUCE ERRORS AND MAKE THE ANSWER CLEARER.

4. CONVERT BACK TO MIXED NUMBERS CAREFULLY

WHEN CONVERTING IMPROPER FRACTIONS BACK, PERFORM DIVISION CAREFULLY TO IDENTIFY THE WHOLE NUMBER AND FRACTIONAL PARTS.

5. PRACTICE WITH DIFFERENT PROBLEMS

THE MORE PROBLEMS YOU SOLVE, THE MORE COMFORTABLE YOU'LL BECOME WITH THE PROCESS.

CONCLUSION

ADDING OR SUBTRACTING MIXED NUMBERS IS A FUNDAMENTAL SKILL IN ARITHMETIC THAT INVOLVES A CLEAR UNDERSTANDING OF CONVERTING BETWEEN MIXED NUMBERS AND IMPROPER FRACTIONS. THIS CONVERSION SIMPLIFIES THE PROCESS, MAKING IT EASIER TO MANIPULATE FRACTIONS DIRECTLY. BY MASTERING THIS PROCESS—CONVERTING MIXED NUMBERS, FINDING COMMON DENOMINATORS, PERFORMING THE OPERATION, AND THEN CONVERTING BACK—YOU CAN CONFIDENTLY HANDLE A WIDE RANGE OF PROBLEMS INVOLVING MIXED NUMBERS. REGULAR PRACTICE AND ATTENTION TO DETAIL WILL IMPROVE YOUR PROFICIENCY AND ACCURACY IN THESE CALCULATIONS, WHICH ARE ESSENTIAL SKILLS IN MATHEMATICS AND REAL-WORLD APPLICATIONS.

FREQUENTLY ASKED QUESTIONS

HOW DO I CONVERT A MIXED NUMBER TO AN IMPROPER FRACTION BEFORE ADDING OR SUBTRACTING?

MULTIPLY THE WHOLE NUMBER BY THE DENOMINATOR, THEN ADD THE NUMERATOR TO GET THE NEW NUMERATOR, KEEPING THE SAME DENOMINATOR.

WHAT IS THE FIRST STEP WHEN ADDING MIXED NUMBERS?

CONVERT EACH MIXED NUMBER TO AN IMPROPER FRACTION, THEN FIND A COMMON DENOMINATOR BEFORE ADDING.

How do I subtract mixed numbers after converting them to improper fractions?

Ensure both fractions have the same denominator, then subtract the numerators. Convert back to a mixed number if needed.

Can I add or subtract mixed numbers directly without converting?

It's best to convert to improper fractions first, as direct addition or subtraction of mixed numbers can be confusing.

What should I do if the improper fractions have different denominators?

Find the least common denominator (LCD), convert both fractions to equivalent fractions with that denominator, then perform the addition or subtraction.

How do I simplify my answer after adding or subtracting mixed numbers?

Convert the improper fraction back to a mixed number by dividing the numerator by the denominator, then simplify if possible.

What is an example of converting a mixed number to an improper fraction?

For example, $3 \frac{1}{4}$: multiply 3 by 4 to get 12, add 1 to get 13, so $3 \frac{1}{4} = \frac{13}{4}$.

Why is it important to convert mixed numbers to improper fractions before adding or subtracting?

Because improper fractions make it easier to perform calculations accurately and ensure proper handling of fractional parts.

After converting mixed numbers to improper fractions, how do I perform the addition or subtraction?

Align the fractions with a common denominator, then add or subtract the numerators, and simplify the result if needed.

Additional Resources

Mastering Mixed Number Operations: Adding and Subtracting by Converting to Improper Fractions

When it comes to working with fractions, especially mixed numbers, many students find themselves facing a common hurdle: how to efficiently add or subtract these numbers. The key to simplifying these operations lies in understanding the process of converting mixed numbers into improper fractions before performing the addition or subtraction. This approach not only streamlines calculations but also enhances conceptual understanding of fractions. In this comprehensive guide, we'll explore the step-by-step method of converting mixed numbers to improper fractions, performing the arithmetic, and then converting back if needed, with detailed explanations, tips, and illustrative examples.

UNDERSTANDING MIXED NUMBERS AND IMPROPER FRACTIONS

BEFORE DIVING INTO THE METHODS, IT'S ESSENTIAL TO CLARIFY WHAT MIXED NUMBERS AND IMPROPER FRACTIONS ARE, AND WHY CONVERTING BETWEEN THEM IS A FOUNDATIONAL SKILL IN FRACTION OPERATIONS.

WHAT ARE MIXED NUMBERS?

MIXED NUMBERS COMBINE A WHOLE NUMBER AND A PROPER FRACTION. THEY ARE OFTEN USED IN REAL-LIFE CONTEXTS, SUCH AS MEASURING OR COOKING, BECAUSE THEY PROVIDE A MORE INTUITIVE WAY TO EXPRESS QUANTITIES THAT ARE NOT WHOLE.

EXAMPLE OF MIXED NUMBERS:

- $3 \frac{1}{4}$
- $5 \frac{2}{7}$
- $0 \frac{3}{8}$ (WHICH SIMPLIFIES TO JUST $\frac{3}{8}$, BUT SOMETIMES WRITTEN AS A MIXED NUMBER FOR CLARITY)

KEY POINT: THE FRACTIONAL PART OF A MIXED NUMBER IS ALWAYS A PROPER FRACTION (THE NUMERATOR IS LESS THAN THE DENOMINATOR).

WHAT ARE IMPROPER FRACTIONS?

AN IMPROPER FRACTION IS A FRACTION WHERE THE NUMERATOR IS EQUAL TO OR GREATER THAN THE DENOMINATOR, SUCH AS $\frac{9}{4}$ OR $\frac{7}{7}$. THESE ARE VERY USEFUL FOR CALCULATIONS BECAUSE THEY ARE EASIER TO MANIPULATE ALGEBRAICALLY.

EXAMPLE OF IMPROPER FRACTIONS:

- $\frac{9}{4}$
- $\frac{14}{3}$
- $\frac{7}{7}$ (WHICH SIMPLIFIES TO 1)

WHY CONVERT? WHEN ADDING OR SUBTRACTING MIXED NUMBERS, CONVERTING THEM INTO IMPROPER FRACTIONS SIMPLIFIES THE PROCESS, ALLOWING YOU TO PERFORM THE OPERATION DIRECTLY ON THE NUMERATORS AND DENOMINATORS.

THE STEP-BY-STEP METHOD FOR ADDING OR SUBTRACTING MIXED NUMBERS

PERFORMING ADDITION OR SUBTRACTION WITH MIXED NUMBERS INVOLVES A SYSTEMATIC PROCESS. THE CORE CONCEPT IS TO FIRST CONVERT EACH MIXED NUMBER INTO AN IMPROPER FRACTION, THEN PERFORM THE OPERATION, AND FINALLY CONVERT BACK TO A MIXED NUMBER IF NECESSARY.

STEP 1: CONVERT EACH MIXED NUMBER TO AN IMPROPER FRACTION

HOW TO CONVERT:

FOR EACH MIXED NUMBER, USE THE FOLLOWING FORMULA:

$$\left[\frac{\text{WHOLE NUMBER} \times \text{DENOMINATOR} + \text{NUMERATOR}}{\text{DENOMINATOR}} \right]$$

EXAMPLE:

CONVERT $(3 \frac{1}{4})$:

$$(3 \times 4) + 1 = 12 + 1 = 13$$

So,

$$3 \frac{1}{4} = \frac{13}{4}$$

SIMILARLY, CONVERT $(5 \frac{2}{7})$:

$$(5 \times 7) + 2 = 35 + 2 = 37$$

$$5 \frac{2}{7} = \frac{37}{7}$$

TIP: ALWAYS WRITE THE IMPROPER FRACTIONS WITH THE SAME DENOMINATOR IF YOU PLAN TO ADD OR SUBTRACT MULTIPLE FRACTIONS.

STEP 2: FIND A COMMON DENOMINATOR

TO ADD OR SUBTRACT FRACTIONS, THEY MUST HAVE THE SAME DENOMINATOR. FIND THE LEAST COMMON DENOMINATOR (LCD) OF THE DENOMINATORS INVOLVED.

HOW TO FIND THE LCD:

- LIST THE MULTIPLES OF EACH DENOMINATOR.
- THE SMALLEST MULTIPLE COMMON TO ALL DENOMINATORS IS THE LCD.

EXAMPLE:

DENOMINATORS: 4 AND 7

- MULTIPLES OF 4: 4, 8, 12, 16, 20, 24, 28, ...
- MULTIPLES OF 7: 7, 14, 21, 28, 35, ...

THE LCD IS 28.

STEP 3: CONVERT THE IMPROPER FRACTIONS TO EQUIVALENT FRACTIONS WITH THE LCD

ADJUST EACH FRACTION TO HAVE THE COMMON DENOMINATOR:

$$\left[\frac{A}{B} = \frac{A \times (\text{LCD} / B)}{\text{LCD}} \right]$$

EXAMPLE:

$$\left[\frac{13}{4} = \frac{13 \times 7}{4 \times 7} = \frac{91}{28} \right]$$

$$\left[\frac{37}{7} = \frac{37 \times 4}{7 \times 4} = \frac{148}{28} \right]$$

STEP 4: PERFORM THE ADDITION OR SUBTRACTION

ONCE THE FRACTIONS HAVE THE SAME DENOMINATOR, PROCEED WITH THE OPERATION:

- ADDITION: ADD THE NUMERATORS, KEEP THE DENOMINATOR.
- SUBTRACTION: SUBTRACT THE NUMERATORS, KEEP THE DENOMINATOR.

EXAMPLE (ADDITION):

$$\left[\frac{91}{28} + \frac{148}{28} = \frac{91 + 148}{28} = \frac{239}{28} \right]$$

STEP 5: SIMPLIFY THE RESULT (IF POSSIBLE)

CHECK WHETHER THE RESULTING IMPROPER FRACTION CAN BE SIMPLIFIED BY DIVIDING NUMERATOR AND DENOMINATOR BY THEIR GREATEST COMMON DIVISOR (GCD).

EXAMPLE:

$$\left[\frac{239}{28} \right]$$

SINCE 239 AND 28 SHARE NO COMMON FACTORS OTHER THAN 1, THE FRACTION IS ALREADY IN SIMPLEST FORM.

STEP 6: CONVERT BACK TO A MIXED NUMBER (IF DESIRED)

DIVIDE THE NUMERATOR BY THE DENOMINATOR:

$$\left[239 \div 28 = 8 \text{ WITH A REMAINDER OF } 15 \right]$$

So,

$$\left[\frac{239}{28} = 8 \frac{15}{28} \right]$$

THIS IS THE FINAL ANSWER IN MIXED NUMBER FORM.

PRACTICAL EXAMPLES AND APPLICATIONS

TO CEMENT THIS METHOD, LET'S EXPLORE A FEW COMPREHENSIVE EXAMPLES INVOLVING ADDITION AND SUBTRACTION OF MIXED NUMBERS.

EXAMPLE 1: ADDING MIXED NUMBERS

CALCULATE:

$$\left[2 \frac{3}{4} + 3 \frac{2}{3} \right]$$

STEP 1: CONVERT TO IMPROPER FRACTIONS

$$\left[2 \frac{3}{4} = \frac{(2 \times 4) + 3}{4} = \frac{8 + 3}{4} = \frac{11}{4} \right]$$

$$\left[3 \frac{2}{3} = \frac{(3 \times 3) + 2}{3} = \frac{9 + 2}{3} = \frac{11}{3} \right]$$

STEP 2: FIND THE LCD OF 4 AND 3

MULTIPLES OF 4: 4, 8, 12, 16...

MULTIPLES OF 3: 3, 6, 9, 12...

LCD = 12

STEP 3: CONVERT TO EQUIVALENT FRACTIONS

$$\left[\frac{11}{4} = \frac{11 \times 3}{4 \times 3} = \frac{33}{12} \right]$$

$$\left[\frac{11}{3} = \frac{11 \times 4}{3 \times 4} = \frac{44}{12} \right]$$

STEP 4: ADD THE FRACTIONS

$$\left[\frac{33}{12} + \frac{44}{12} = \frac{77}{12} \right]$$

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STEP 5: CONVERT BACK TO A MIXED NUMBER

$$\begin{aligned} & \backslash[\\ & 77 \div 12 = 6 \text{ WITH A REMAINDER OF } 5 \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ & \frac{77}{12} = 6 \frac{5}{12} \\ & \backslash] \end{aligned}$$

RESULT:

$$\begin{aligned} & \backslash[\\ & 2 \frac{3}{4} + 3 \frac{2}{3} = 6 \frac{5}{12} \\ & \backslash] \end{aligned}$$

EXAMPLE 2: SUBTRACTING MIXED NUMBERS

CALCULATE:

$$\begin{aligned} & \backslash[\\ & 4 \frac{1}{2} - 2 \frac{2}{3} \\ & \backslash] \end{aligned}$$

STEP 1: CONVERT TO IMPROPER FRACTIONS

$$\begin{aligned} & \backslash[\\ & 4 \frac{1}{2} = \frac{(4 \times 2) + 1}{2} = \frac{8 + 1}{2} = \frac{9}{2} \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ & 2 \frac{2}{3} = \frac{(2 \times 3) + 2}{3} = \frac{6 + 2}{3} = \frac{8}{3} \\ & \backslash] \end{aligned}$$

STEP 2: FIND THE LCD OF 2 AND 3

$$\text{LCD} = 6$$

STEP 3: CONVERT TO EQUIVALENT FRACTIONS

$$\begin{aligned} & \backslash[\\ & \frac{9}{2} = \frac{9 \times 3}{2 \times 3} = \frac{27}{6} \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ & \frac{8}{3} = \frac{8 \times 2}{3 \times 2} = \frac{16}{6} \\ & \backslash] \end{aligned}$$

STEP 4: SUBTRACT THE FRACTIONS

$$\begin{aligned} & \backslash[\\ & \frac{27}{6} - \frac{16}{6} = \frac{}{} \end{aligned}$$

Add Or Subtract The Following Mixed Numbers First Change Each Mixed Number To An Equivalent Improper

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