Dividing Unit Fractions by Whole Numbers

Dividing Unit Fractions by Whole Numbers: Apply, Compare, and Design

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

A unit fraction is one equal part of a whole, such as $\frac{1}{7}$. Sharing that part equally makes smaller pieces. Count how many pieces of that new size would fit in the whole.

Worked example

Compute $\frac{1}{7} \div 4$. Explain whether the answer counts groups or gives one share.

1. Divide the whole into 7 equal parts. Start with one of those parts.
2. Split that part into 4 equal shares: the whole would have $7 \times 4 = 28$ equal pieces.
3. Each share is $\frac{1}{28}$ of the whole. Check: $4 \times \frac{1}{28} = \frac{1}{7}$.
Answer: $\frac{1}{28}$.

Practice Problems

Show your thinking.

1. Two plans share the same $\frac{1}{2}$ L of juice. Plan A splits it among 4 campers; Plan B among 6. Which share is bigger, and by how much?

2. Five children share $\frac{1}{3}$ m of ribbon equally. Two combine their pieces for a collage. Find the length available for the collage.

3. A $\frac{1}{4}$ kg sample is split equally into 4 bags or 5 bags. A lab requires at least $\frac{1}{18}$ kg per bag. Which plan works?

4. Each of two separate $\frac{1}{7}$ m cords is cut into 3 equal pieces. How many pieces are made altogether, and how long is one piece?

5. A student predicts that sharing $\frac{1}{6}$ L equally among 5 students gives more per student than sharing $\frac{1}{5}$ L among 6, because 5 students is fewer. Test the claim.

6. A worker cuts $\frac{1}{3}$ m of tape into equal $\frac{1}{24}$ m pieces. Test whether 8 people can each get a piece with no tape left.

7. Half of a 1 m ribbon and half of a 2 m ribbon are each split among 4 people. Are the shares the same fraction of their original ribbons? Are they the same length?

8. A class splits $\frac{1}{8}$ L of paint evenly among 4 groups. One group splits its own share evenly between two students. How much paint does each of those two get?

Answer Key

1. Plan A by $\frac{1}{24}$ L per camper.
2. $\frac{2}{15}$ m.
3. Only the 4-bag plan.
4. 6 pieces, each $\frac{1}{21}$ m.
5. The shares are equal: $\frac{1}{30}$ L each.
6. Yes; all 8 receive $\frac{1}{24}$ m.
7. Each is $\frac{1}{8}$ of its ribbon; the lengths are $\frac{1}{8}$ m and $\frac{1}{4}$ m.
8. $\frac{1}{64}$ L per student.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. A: halving the whole first and then splitting into fourths gives $\frac{1}{2\times4} = \frac{1}{8}$ L.
2. B: split one half into six equal shares: $\frac{1}{2\times6} = \frac{1}{12}$ L.
3. Compare equal-sized parts: $\frac{1}{8} - \frac{1}{12} = \frac{3}{24} - \frac{2}{24} = \frac{1}{24}$ L.

Problem 2

1. Each third splits into 5 shares, so the whole meter would have $3 \times 5 = 15$ pieces.
2. One child has $\frac{1}{15}$ m.
3. Two shares total $\frac{1}{15} + \frac{1}{15} = \frac{2}{15}$ m.

Problem 3

1. Four shares: $4 \times 4 = 16$ equal parts per whole kg, so $\frac{1}{16}$ kg per bag.
2. Five shares: $4 \times 5 = 20$ parts per kg, so $\frac{1}{20}$ kg per bag.
3. With unit fractions the larger denominator gives a smaller amount: $\frac{1}{16} > \frac{1}{18} > \frac{1}{20}$.

Problem 4

1. One seventh splits into 3, making $7 \times 3 = 21$ equal lengths per meter.
2. Each piece is $\frac{1}{21}$ m; two cords make $2 \times 3 = 6$ pieces.
3. Check the combined length: $6 \times \frac{1}{21} = \frac{2}{7}$ m.

Problem 5

1. In the first plan one sixth is split into five, making $6 \times 5 = 30$ parts in a liter.
2. In the second plan one fifth is split into six, making $5 \times 6 = 30$ parts.
3. Both give $\frac{1}{30}$ L. The first plan started with less liquid.

Problem 6

1. One third of a meter is $\frac{8}{24}$ m.
2. Eight pieces use $8 \times \frac{1}{24} = \frac{8}{24}$ m.
3. This equals $\frac{1}{3}$ m, so all pieces fit exactly.

Problem 7

1. Each original is halved, then one half is divided into 4, so each share is $\frac{1}{2\times4} = \frac{1}{8}$ of its own original.
2. For the 1 m ribbon, $1 \times \frac{1}{8} = \frac{1}{8}$ m.
3. For the 2 m ribbon, $2 \times \frac{1}{8} = \frac{1}{4}$ m. The fractions match, but the wholes differ.

Problem 8

1. Splitting one eighth among 4 groups makes $8 \times 4 = 32$ equal pieces per liter.
2. The group share is $\frac{1}{32}$ L. Split that share in half: $32 \times 2 = 64$ pieces per liter.
3. Each student gets $\frac{1}{64}$ L; two of those pieces make $\frac{1}{32}$ L.

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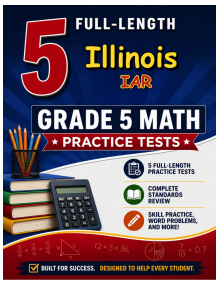

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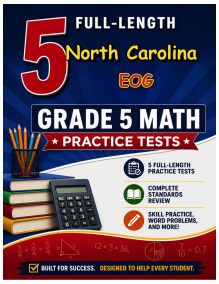

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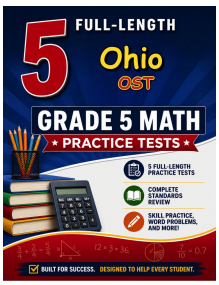

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