

Finding Unit Rates When Quantities Are Fractions

Grade 7 math · Worksheet Answer Key · Standards: 7.RP.A.1

Each solution below shows the division, the multiplication by the reciprocal and the simplified result, with the final answer in bold. Compare every step with your own work and look for slips in reciprocals and units.

Standards: 7.RP.A.1 · **Level:** Grade 7

Problem 1 Reading a Complex Fraction

(a) $\frac{4}{5}^{\frac{1}{6}}$ miles per hour.

(b) $\frac{4}{5} \div \frac{1}{6} = \frac{4}{5} \times 6 = \frac{24}{5} = 4 \frac{4}{5}$.

Answer: **4 $\frac{4}{5}$ miles per hour**

Problem 2 Hose Filling a Bucket

$\frac{5}{6} \div \frac{2}{9} = \frac{5}{6} \times \frac{9}{2} = \frac{45}{12} = \frac{15}{4}$.

Answer: **3 $\frac{3}{4}$ gallons per minute**

Problem 3 Sugar per Batch

$\frac{5}{8} \div \frac{1}{4} = \frac{5}{8} \times 4 = \frac{20}{8} = \frac{5}{2}$.

Answer: **2 $\frac{1}{2}$ cups per batch**

Problem 4 Hiking Speed

$\frac{9}{10} \div \frac{3}{5} = \frac{9}{10} \times \frac{5}{3} = \frac{45}{30} = \frac{3}{2}$.

Check: $\frac{3}{2} \times \frac{3}{5} = \frac{9}{10}$.

Answer: **1 $\frac{1}{2}$ miles per hour**

Problem 5 Price of Cashews

$$\$6.75 \div \frac{3}{4} = \$6.75 \times \frac{4}{3} = \$27.00 \div 3 = \$9.00.$$

$$\text{Check: } 9 \times 0.75 = 6.75.$$

Answer: **\$9.00 per pound**

Problem 6 Toy Car Both Ways

$$(a) \frac{3}{5} \div \frac{1}{10} = \frac{3}{5} \times 10 = 6 \text{ feet per second.}$$

$$(b) \frac{1}{10} \div \frac{3}{5} = \frac{1}{10} \times \frac{5}{3} = \frac{5}{30} = \frac{1}{6} \text{ second per foot.}$$

Answer: **6 feet per second; $\frac{1}{6}$ second per foot**

Time (seconds)	1/10	1
Distance (feet)	3/5	6

Both values are multiplied by 10.

Problem 7 Which Hiker Is Faster

$$A: \frac{3}{4} \times 3 = \frac{9}{4} = 2 \frac{1}{4} \text{ mph.}$$

$$B: \frac{2}{3} \times 4 = \frac{8}{3} = 2 \frac{2}{3} \text{ mph.}$$

$$2 \frac{2}{3} > 2 \frac{1}{4} \text{ because } \frac{8}{12} > \frac{3}{12}.$$

Answer: **Hiker B is faster ($2 \frac{2}{3}$ mph vs. $2 \frac{1}{4}$ mph)**

Problem 8 Better Paint Buy

$$X: 12 \div \frac{2}{3} = 12 \times \frac{3}{2} = \$18.00 \text{ per gallon.}$$

$$Y: 14.25 \div \frac{3}{4} = 14.25 \times \frac{4}{3} = 57 \div 3 = \$19.00 \text{ per gallon.}$$

$$19 - 18 = 1.$$

Answer: **Brand X costs \$1.00 less per gallon**

Problem 9 Conveyor Belt Units

$$\text{Yards per minute: } \frac{5}{6} \times \frac{7}{3} = \frac{35}{18}.$$

1 yard = 3 feet, so $\frac{35}{18} \times 3 = \frac{35}{6} = 5 \frac{5}{6}$.

Answer: **5 $\frac{5}{6}$ feet per minute**

Problem 10 Minutes to Hours

$2 \frac{1}{2} = \frac{5}{2}$. Miles per minute: $\frac{3}{8} \times \frac{2}{5} = \frac{6}{40} = \frac{3}{20}$.

Per hour: $\frac{3}{20} \times 60 = 9$.

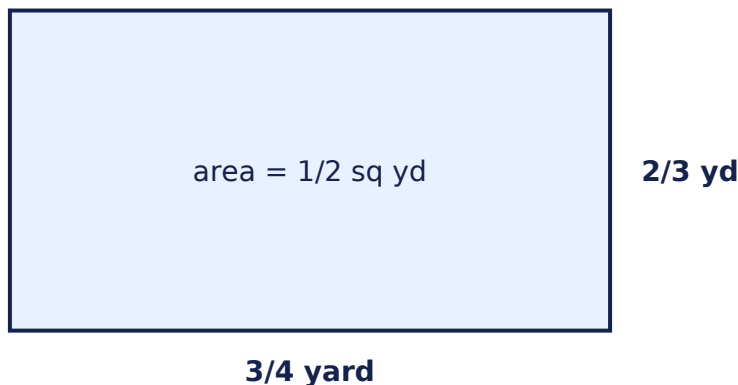
Answer: **9 miles per hour**

Problem 11 Painting a Panel

Area = $\frac{3}{4} \times \frac{2}{3} = \frac{6}{12} = \frac{1}{2}$ square yard.

$\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times 6 = 3$.

Answer: **3 square yards per hour**



The area comes first, then the division by $\frac{1}{6}$ hour.

Problem 12 Filling a Pool

(a) $\frac{1}{6} \div \frac{3}{4} = \frac{1}{6} \times \frac{4}{3} = \frac{4}{18} = \frac{2}{9}$ pool per hour.

(b) $1 \div \frac{2}{9} = \frac{9}{2} = 4 \frac{1}{2}$ hours. (Also $\frac{3}{4} \times 6 = \frac{18}{4}$.)

Answer: **$\frac{2}{9}$ pool per hour; $4 \frac{1}{2}$ hours**

Problem 13 Distance at a Steady Pace

Rate: $\frac{5}{6} \times 4 = \frac{20}{6} = \frac{10}{3}$ mph.

Distance: $\frac{10}{3} \times \frac{3}{2} = \frac{30}{6} = 5$.

Answer: **5 miles**

Problem 14 Rate Table for a Model Train

Rate: $\frac{7}{8} \times 4 = \frac{28}{8} = 3 \frac{1}{2}$ feet per minute.

$\frac{1}{2}$ min: $3 \frac{1}{2} \times \frac{1}{2} = 1 \frac{3}{4}$ ft. 1 min: $3 \frac{1}{2}$ ft. $2 \frac{1}{2}$ min: $\frac{7}{2} \times \frac{5}{2} = \frac{35}{4} = 8 \frac{3}{4}$ ft.

Answer: **$3 \frac{1}{2}$ ft per min; $1 \frac{3}{4}$ ft, $3 \frac{1}{2}$ ft, $8 \frac{3}{4}$ ft**

Problem 15 Mural Painting Time

Area = $\frac{5}{2} \times \frac{6}{5} = \frac{30}{10} = 3$ square feet.

Painted: $\frac{3}{8} \times 3 = \frac{9}{8}$ sq ft in $\frac{3}{2}$ h.

(a) $\frac{9}{8} \div \frac{3}{2} = \frac{9}{8} \times \frac{2}{3} = \frac{18}{24} = \frac{3}{4}$ sq ft per hour.

(b) Remaining: $3 - \frac{9}{8} = \frac{15}{8}$ sq ft. $\frac{15}{8} \div \frac{3}{4} = \frac{15}{8} \times \frac{4}{3} = \frac{60}{24} = \frac{5}{2}$.

Answer: **$\frac{3}{4}$ square foot per hour; $2 \frac{1}{2}$ more hours**

Problem 16 Trail Schedule

Speed: $\frac{9}{4} \div \frac{3}{4} = \frac{9}{4} \times \frac{4}{3} = 3$ mph.

Hiking time: $\frac{27}{4} \div 3 = \frac{9}{4} = 2 \frac{1}{4}$ h. Add lunch: $2 \frac{1}{4} + \frac{1}{2} = 2 \frac{3}{4}$ h = 2 h 45 min.

8:15 AM + 2 h 45 min = 11:00 AM.

Answer: **11:00 AM**

Problem 17 Printer Race

A: $\frac{3}{4} \times 8 = 6$ pages per minute. B: $\frac{5}{2} \times 2 = 5$ pages per minute.

A needs $45 \div 6 = 7 \frac{1}{2}$ min. B needs $45 \div 5 = 9$ min.

$9 - 7 \frac{1}{2} = 1 \frac{1}{2}$.

Answer: **A: $7 \frac{1}{2}$ min; B: 9 min; A finishes $1 \frac{1}{2}$ minutes sooner**

Problem 18 Storm Rainfall

(a) $\frac{5}{8} \times 2 = \frac{10}{8} = 1 \frac{1}{4}$ in per hour.

(b) $\frac{15}{4} \div \frac{5}{4} = \frac{15}{4} \times \frac{4}{5} = 3$ hours.

(c) 12 inches = 1 foot: $\frac{5}{4} \div 12 = \frac{5}{48}$ foot per hour.

Answer: **1 $\frac{1}{4}$ in/h; 3 hours; $\frac{5}{48}$ ft/h**

Problem 19 Mixing Paint Tint

$\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$ cup per gallon.

$\frac{8}{9} \times \frac{9}{2} = \frac{72}{18} = 4$.

Answer: **$\frac{8}{9}$ cup per gallon; 4 cups for 4 $\frac{1}{2}$ gallons**

Problem 20 Three Athletes Compared

Leo: $\frac{3}{2} \times 4 = 6$ mph.

Nia: $\frac{3}{10} \div 3 = \frac{1}{10}$ mi per min; $\times 60 = 6$ mph.

Omar: $\frac{5}{8} \div 6 = \frac{5}{48}$ mi per min; $\times 60 = \frac{300}{48} = 6 \frac{1}{4}$ mph.

Answer: **Omar (6 $\frac{1}{4}$ mph) is fastest; Leo and Nia tie at 6 mph**