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5-8 Multiplying Mixed Numbers - Practice and Problem Solving

Multiply. Write in simplest form.

7. $\frac{3}{4} \times 2\frac{5}{6}$

$$\begin{aligned}\frac{3}{4} \times \left(2\frac{5}{6}\right) &= \frac{3}{4} \times \frac{17}{6} \\ &= \frac{\overset{1}{\cancel{3}} \times 17}{4 \times \underset{2}{\cancel{6}}} \\ &= \frac{1 \times 17}{4 \times 2} \\ &= \frac{17}{8} \\ &= 2\frac{1}{8}\end{aligned}$$

9. $1\frac{4}{5} \times \frac{5}{6}$

$$\begin{aligned}\left(1\frac{4}{5}\right) \times \frac{5}{6} &= \frac{9}{5} \times \frac{5}{6} \\ &= \frac{\overset{3}{\cancel{9}} \times \overset{1}{\cancel{5}}}{\underset{1}{\cancel{5}} \times \underset{2}{\cancel{6}}} \\ &= \frac{3 \times 1}{1 \times 2} \\ &= \frac{3}{2} \\ &= 1\frac{1}{2}\end{aligned}$$

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11. $\frac{3}{10} \times 2\frac{5}{6}$

$$\begin{aligned}\frac{3}{10} \times \left(2\frac{5}{6}\right) &= \frac{3}{10} \times \frac{17}{6} \\ &= \frac{\overset{1}{\cancel{3}} \times 17}{10 \times \underset{2}{\cancel{6}}} \\ &= \frac{1 \times 17}{10 \times 2} \\ &= \frac{17}{20}\end{aligned}$$

13. $3\frac{1}{5} \times 3\frac{1}{6}$

$$\begin{aligned}\left(3\frac{1}{5}\right) \times \left(3\frac{1}{6}\right) &= \frac{16}{5} \times \frac{19}{6} \\ &= \frac{\overset{8}{\cancel{16}} \times 19}{5 \times \underset{3}{\cancel{6}}} \\ &= \frac{8 \times 19}{5 \times 3} \\ &= \frac{152}{15} \\ &= 10\frac{2}{15}\end{aligned}$$

15. $4\frac{1}{2} \times 2\frac{5}{6}$

$$\begin{aligned}\left(4\frac{1}{2}\right) \times \left(2\frac{5}{6}\right) &= \frac{9}{2} \times \frac{17}{6} \\ &= \frac{\overset{3}{\cancel{9}} \times 17}{2 \times \underset{2}{\cancel{6}}} \\ &= \frac{3 \times 17}{2 \times 2} \\ &= \frac{51}{4} \\ &= 12\frac{3}{4}\end{aligned}$$

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17. $3\frac{3}{5} \times 5\frac{5}{12}$

$$\begin{aligned}\left(3\frac{3}{5}\right) \times \left(5\frac{5}{12}\right) &= \frac{18}{5} \times \frac{65}{12} \\ &= \frac{\overset{3}{\cancel{18}} \times \overset{13}{\cancel{65}}}{\underset{1}{\cancel{5}} \times \underset{2}{\cancel{12}}} \\ &= \frac{3 \times 13}{1 \times 2} \\ &= \frac{39}{2} \\ &= 19\frac{1}{2}\end{aligned}$$

ALGEBRA Evaluate each expression if $a = \frac{2}{3}$, $b = 3\frac{1}{2}$, and $c = 1\frac{3}{4}$.

19. $\frac{1}{2}c$

$$\begin{aligned}\frac{1}{2}c &= \frac{1}{2} \times 1\frac{3}{4} \\ &= \frac{1}{2} \times \frac{7}{4} \\ &= \frac{1 \times 7}{2 \times 4} \\ &= \frac{7}{8}\end{aligned}$$

21. $\frac{1}{8}a$

$$\begin{aligned}\frac{1}{8}a &= \frac{1}{8} \times \frac{2}{3} \\ &= \frac{1 \times \overset{1}{\cancel{2}}}{\underset{4}{\cancel{8}} \times 3} \\ &= \frac{1}{12}\end{aligned}$$

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23. **ANIMALS** A three-toed sloth can travel at a speed of $\frac{3}{20}$ mile per hour. At this rate, how far can a three-toed sloth travel in $2\frac{1}{2}$ hours?

Distance = speed \times time

$$\begin{aligned}\frac{3}{20} \times 2\frac{1}{2} &= \frac{3}{20} \times \frac{5}{2} \\ &= \frac{3 \times \overset{1}{\cancel{5}}}{\underset{4}{\cancel{20}} \times 2} \\ &= \frac{3}{8}\end{aligned}$$

The sloth will travel $\frac{3}{8}$ mi.

Multiply. Write in simplest form.

25. $1\frac{1}{2} \times \frac{2}{3} \times \frac{3}{5}$

$$\begin{aligned}1\frac{1}{2} \times \frac{2}{3} \times \frac{3}{5} &= \frac{3}{2} \times \frac{2}{3} \times \frac{3}{5} \\ &= \frac{\overset{1}{\cancel{3}} \times \overset{1}{\cancel{2}} \times 3}{\underset{1}{\cancel{2}} \times \underset{1}{\cancel{3}} \times 5} \\ &= \frac{3}{5}\end{aligned}$$

27. $\frac{1}{7} \times 5\frac{5}{6} \times 1\frac{1}{4}$

$$\begin{aligned}\frac{1}{7} \times 5\frac{5}{6} \times 1\frac{1}{4} &= \frac{1}{7} \times \frac{35}{6} \times \frac{5}{4} \\ &= \frac{1}{\underset{1}{\cancel{7}}} \times \frac{\overset{5}{\cancel{35}}}{6} \times \frac{5}{4} \\ &= \frac{1 \times 5 \times 5}{1 \times 6 \times 4} \\ &= \frac{25}{24} \\ &= 1\frac{1}{24}\end{aligned}$$

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ASTRONOMY Use the table and the following information.

Earth is about $92\frac{9}{10}$ million miles from the Sun.

Planet	Approximate Number of Times as Far from the Sun as Earth
Venus	$\frac{3}{4}$
Mars	$1\frac{1}{2}$
Jupiter	$5\frac{1}{4}$
Saturn	$9\frac{1}{2}$

- 29.** How far is Venus from the Sun?

$$\begin{aligned}92\frac{9}{10} \times \frac{3}{4} &= \frac{929}{10} \times \frac{3}{4} \\&= \frac{2787}{40} \\&= 69\frac{27}{40}\end{aligned}$$

Venus is about 69 million miles from the Sun.

- 31.** How far is Jupiter from the Sun?

$$\begin{aligned}92\frac{9}{10} \times 5\frac{1}{4} &= \frac{929}{10} \times \frac{21}{4} \\&= \frac{19509}{40} \\&= 487\frac{29}{40}\end{aligned}$$

Jupiter is about 488 million miles from the Sun.

- 33. FIND THE DATA** Refer to the Data File on pages 16-19. Choose some data and write a real-world problem in which you would multiply mixed numbers.

See students' work.

ALGEBRA Evaluate each expression if $g = 5\frac{3}{4}$, $k = 2\frac{1}{3}$, and $h = 1\frac{7}{8}$.

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35. gkh

$$\begin{aligned} gkh &= 5\frac{3}{4} \times 2\frac{1}{3} \times 1\frac{7}{8} \\ &= \frac{23}{4} \times \frac{7}{\cancel{3}_1} \times \frac{\overset{5}{\cancel{15}}}{8} \\ &= \frac{23 \times 7 \times 5}{4 \times 1 \times 8} \\ &= \frac{805}{32} \\ &= 25\frac{5}{32} \end{aligned}$$

37. **OPEN ENDED** Find two positive mixed numbers, each greater than 1 and less than 2, with a product greater than 1 and less than 2.

Sample answer: $1\frac{1}{5} \times 1\frac{1}{2} = 1\frac{4}{5}$

39. **CHALLENGE** Determine if the product of two mixed numbers is *always*, *sometimes*, or *never* less than 1. Explain your reasoning.

Sample answer: If $a = 3\frac{1}{2}$ and $b = 2\frac{1}{2}$, then $ab = 8\frac{3}{4}$ and $a + b = 6$; since $ab > a + b$, the statement is true. If $a = 1\frac{1}{4}$ and $b = 1\frac{3}{4}$, then $ab = 2\frac{3}{16}$ and $a + b = 3$; since $a + b > ab$, the statement is false.

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41. The table shows some ingredients needed to make Tex-mex lasagna.

mozallrella cheese	chopped onion	tomato sauce
$3\frac{1}{2}$ cups	$\frac{1}{4}$ cup	$2\frac{2}{3}$ cups

If you make four times the recipe, how many cups of tomato sauce are needed?

A $9\frac{3}{4}$ c

B $10\frac{1}{2}$ c

C $10\frac{2}{3}$ c

D $5\frac{1}{3}$ c

$$\begin{aligned}4 \times 2\frac{2}{3} &= 4 \times \frac{8}{3} \\&= \frac{4}{1} \times \frac{8}{3} \\&= \frac{4 \times 8}{1 \times 3} \\&= \frac{32}{3} \\&= 10\frac{2}{3}\end{aligned}$$

The answer is C.

Multiply. Write in simplest form.

43. $\frac{5}{7} \times \frac{3}{4}$

$$\begin{aligned}\frac{5}{7} \times \frac{3}{4} &= \frac{5 \times 3}{7 \times 4} \\&= \frac{15}{28}\end{aligned}$$

45. $\frac{3}{8} \times \frac{2}{5}$

$$\begin{aligned}\frac{3}{8} \times \frac{2}{5} &= \frac{3 \times \cancel{2}^1}{\cancel{8}_4 \times 5} \\&= \frac{3}{20}\end{aligned}$$

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47. **RECREATION** There are about 300 million people who visit a national park in the United States. If about $\frac{2}{5}$ come from overseas, about how many visitors come from abroad?

$$\frac{2}{5} \times 300 \text{ or about 120 million visitors come from abroad.}$$

PREREQUISITE SKILL Multiply. Write in simplest form.

49. $\frac{1}{4} \times \frac{3}{8}$

$$\begin{aligned}\frac{1}{4} \times \frac{3}{8} &= \frac{1 \times 3}{4 \times 8} \\ &= \frac{3}{32}\end{aligned}$$

51. $\frac{1}{2} \times \frac{1}{6}$

$$\begin{aligned}\frac{1}{2} \times \frac{1}{6} &= \frac{1 \times 1}{2 \times 6} \\ &= \frac{1}{12}\end{aligned}$$