

Practice Problems

1. Add or subtract, simplify if possible:

(a) $\frac{2}{5} + \frac{4}{5} = \frac{6}{5}$
 $= 1\frac{1}{5}$

(b) $\frac{7}{9} - \frac{4}{9} = \frac{3}{9}$
 $= \frac{1}{3}$

(c) $\frac{5}{4} + \frac{7}{4} + \frac{3}{4} = \frac{15}{4}$
 $= 3\frac{3}{4}$

(d) $9 - \frac{7}{12} = 8\frac{12}{12} - \frac{7}{12}$
 $= 8\frac{5}{12}$

(e) $\frac{3}{4} + \frac{1}{6} = \frac{9}{12} + \frac{2}{12}$
 $= \frac{11}{12}$

(f) $\frac{7}{15} - \frac{3}{10} = \frac{14}{30} - \frac{9}{30}$
 $= \frac{5}{30} = \frac{1}{6}$

(g) $\frac{3}{5} - \frac{1}{6} = \frac{18}{30} - \frac{5}{30}$
 $= \frac{13}{30}$

(h) $3 - \frac{5}{6} = 2\frac{6}{6} - \frac{5}{6}$
 $= 2\frac{1}{6}$

(i) $\frac{1}{9} + \frac{1}{6} + \frac{1}{4}$
 $= \frac{4}{36} + \frac{6}{36} + \frac{9}{36}$
 $= \frac{19}{36}$

(j) $\frac{5}{18} + \frac{9}{48}$ $18=6 \cdot 3$
 $48=6 \cdot 8$
 $= \frac{40}{144} + \frac{27}{144}$
 $= \frac{67}{144}$

(k) $\frac{1}{2} + \frac{3}{4} + \frac{5}{8}$
 $= \frac{4}{8} + \frac{6}{8} + \frac{5}{8}$
 $= \frac{15}{8} = 1\frac{7}{8}$

(l) $3\frac{1}{3} - 2\frac{2}{5}$
 $= 3\frac{5}{15} - 2\frac{6}{15}$
 $= 2\frac{20}{15} - 2\frac{6}{15} = \frac{14}{15}$

2. Sarah needs to make a cake and some cookies. The cake requires $\frac{3}{8}$ cup of sugar and the cookies require $\frac{3}{5}$ cup of sugar. Sarah has $\frac{15}{16}$ cup of sugar, does she have enough sugar? If not, how much more does she need?

$$\frac{15}{16} - \left(\frac{3}{8} + \frac{3}{5}\right) = \frac{75}{80} - \frac{30}{80} - \frac{48}{80} = -\frac{3}{80}$$

Sarah needs $\frac{3}{80}$ cup more sugar.

3. Multiply. Mark your simplifications. Rewrite the problem before you begin to simplify.

(a) $\frac{4}{5} \cdot \frac{5}{12}$
 $= \frac{1}{3}$

(b) $\frac{16}{1} \cdot \frac{3}{8}$
 $= \frac{6}{1} = 6$

(c) $\frac{12}{5} \cdot \frac{9}{8}$
 $= \frac{27}{10}$
 $= 2\frac{7}{10}$

(d) $\frac{17}{18} \cdot \frac{3}{5}$
 $= \frac{17}{30}$

(e) $\frac{2}{3}$ of 21
 $= \frac{2}{3} \cdot \frac{21}{1}$
 $= \frac{14}{1} = 14$

(f) $2\frac{3}{4} \cdot \frac{8}{11}$
 $= \frac{11}{4} \cdot \frac{8}{11}$
 $= \frac{2}{1} = 2$

(g) $\frac{18}{1} \cdot \frac{5}{6}$
 $= \frac{15}{1}$
 $= 15$

(h) $\frac{12}{9} \cdot \frac{6}{5} \cdot \frac{3}{10}$
 $= \frac{2}{25}$

(i) $\frac{5}{6} \cdot \frac{3}{20} \cdot \frac{2}{9}$
 $= \frac{1}{36}$

4. Add or Subtract as indicated. Give your answer in simplest form.

$$\begin{aligned} \text{(a)} \quad \frac{3}{4} + \frac{5}{6} \\ = \frac{9}{12} + \frac{10}{12} \\ = \frac{19}{12} = 1\frac{7}{12} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad \frac{15}{16} - \frac{5}{12} \\ = \frac{45}{48} - \frac{20}{48} \\ = \frac{25}{48} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad 3\frac{1}{2} + \frac{3}{8} + 2\frac{5}{12} \\ = 3\frac{12}{24} + \frac{9}{24} + 2\frac{10}{24} \\ = 5\frac{31}{24} \\ = 6\frac{7}{24} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad 28 - 12\frac{5}{8} \\ = 27\frac{8}{8} - 12\frac{5}{8} \\ = 15\frac{3}{8} \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad \frac{7}{24} + \frac{5}{36} \\ = \frac{21}{72} + \frac{10}{72} \\ = \frac{31}{72} \end{aligned}$$

$$\begin{aligned} \text{(f)} \quad 3\frac{1}{4} - 1\frac{5}{8} \\ = 3\frac{2}{8} - 1\frac{5}{8} \\ = 2\frac{10}{8} - 1\frac{5}{8} \\ = 1\frac{5}{8} \end{aligned}$$

$$\begin{aligned} \text{(g)} \quad \frac{7}{10} + \frac{3}{4} + 2\frac{5}{12} \\ = \frac{42}{60} + \frac{45}{60} + 2\frac{25}{60} \\ = 2\frac{112}{60} = 3\frac{52}{60} \\ = 3\frac{13}{15} \end{aligned}$$

$$\begin{aligned} \text{(h)} \quad 23\frac{1}{2} - 5\frac{5}{14} \\ = 23\frac{7}{14} - 5\frac{5}{14} \\ = 18\frac{2}{14} \\ = 18\frac{1}{7} \end{aligned}$$

5. On a map, $\frac{1}{3}$ inch represents 15 miles. The distance between two rivers on the map is $3\frac{2}{3}$ inches. How many miles are actually between the two rivers?

Method I

$$3\frac{2}{3} \div \frac{1}{3} = \frac{11}{3} \cdot \frac{3}{1} = 11$$

$$15(11) = 165$$

The distance is 165 miles.

Method II

$$\frac{15}{\frac{1}{3}} = \frac{n}{3\frac{2}{3}}$$

$$n = \frac{15}{1} \cdot \frac{11}{3} \cdot \frac{3}{1} = 165$$

6. At the beginning of an experiment, a plant is 3 inches tall. Each week it grows another three-quarters of an inch. After 12 weeks, how tall is the plant?

$$3 + \frac{3}{4} \cdot \frac{12}{1} = 3 + 9 = 12$$

The plant is 12 inches tall after 12 weeks.

7. A Lego block is $1\frac{3}{8}$ of an inch long. If 7 of these blocks are snapped together in a line to form a wall in a Lego city, how long will the resulting wall be?

$$1\frac{3}{8} \times 7 = \frac{11}{8} \cdot \frac{7}{1} = \frac{77}{8} = 9\frac{5}{8}$$

The wall will be $9\frac{5}{8}$ inches long.

8. Jessica had \$75. She spent $\frac{1}{3}$ of it at the mall and $\frac{2}{5}$ of the remainder on groceries. How much does she have left?

$$\frac{75}{1} \cdot \frac{2}{5} \cdot \frac{2}{5} = 30$$

Jessica has \$30 left.

9. $4\frac{1}{2} \div \frac{3}{4} = 6$. If this represents the situation in which there are $4\frac{1}{2}$ cups of oatmeal ready to serve and you want to serve each person $\frac{3}{4}$ of a cup of oatmeal, what does the 6 represent?

The 6 represents the number of people that can be served.

10. Divide. Write all answers in simplest form.

(a) $\frac{2}{3} \div 1\frac{7}{9}$

$$= \frac{2}{3} \div \frac{16}{9}$$

$$= \frac{2}{3} \cdot \frac{9}{16} = \frac{3}{8}$$

(b) $\frac{3}{4} \div 1\frac{1}{8}$

$$= \frac{3}{4} \div \frac{9}{8}$$

$$= \frac{3}{4} \cdot \frac{8}{9}$$

$$= \frac{2}{3}$$

(c) $6\frac{2}{3} \div \frac{5}{9}$

$$= \frac{20}{3} \cdot \frac{9}{5}$$

$$= \frac{12}{1}$$

$$= 12$$

(d) $2\frac{1}{2} \div 1\frac{1}{4}$

$$= \frac{5}{2} \div \frac{5}{4}$$

$$= \frac{5}{2} \cdot \frac{4}{5}$$

$$= \frac{2}{1} = 2$$

11. A gasoline can holds $\frac{7}{8}$ liter. How much will the can hold when it is $\frac{1}{2}$ full?

$$\frac{1}{2} \cdot \frac{7}{8} = \frac{7}{16}$$

The gasoline can will hold $\frac{7}{16}$ liter when half full.

12. Do the indicated arithmetic. Show all your work and give your final answer in simplest form.

(a) $\frac{7}{8} + \frac{2}{3}$

$$= \frac{21}{24} + \frac{16}{24}$$

$$= \frac{37}{24} = 1\frac{13}{24}$$

(b) $\frac{9}{10} - \frac{3}{4}$

$$= \frac{18}{20} - \frac{15}{20}$$

$$= \frac{3}{20}$$

(c) $\frac{9}{10} \div \frac{3}{20}$

$$= \frac{39}{10} \cdot \frac{20}{3}$$

$$= \frac{6}{1}$$

$$= 6$$

(d) $\frac{2}{9} \cdot \frac{3}{16}$

$$= \frac{1}{24}$$

$$\begin{aligned}
 \text{(e)} \quad & 3\frac{3}{5} \div 2\frac{2}{5} \\
 & = \frac{18}{5} \div \frac{12}{5} \\
 & = \frac{18}{5} \cdot \frac{5}{12} \\
 & = \frac{3}{2} = 1\frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{(f)} \quad & \frac{2}{3} + \left(\frac{7}{12} - \frac{1}{2} \right) \\
 & = \frac{8}{12} + \frac{7}{12} - \frac{6}{12} \\
 & = \frac{9}{12} = \frac{3}{4}
 \end{aligned}$$

$$\begin{aligned}
 \text{(g)} \quad & 8 - 2\frac{1}{3} \\
 & = 7\frac{3}{3} - 2\frac{1}{3} \\
 & = 5\frac{2}{3}
 \end{aligned}$$

$$\begin{aligned}
 & \frac{19}{13} \\
 & \frac{19}{57} \\
 & \frac{19}{247} \\
 \text{(h)} \quad & 9\frac{1}{2} \cdot 6\frac{1}{2} \\
 & = \frac{19}{2} \cdot \frac{13}{2} \\
 & = \frac{247}{4} \\
 & = 61\frac{3}{4}
 \end{aligned}$$

13. It takes $\frac{2}{3}$ yard of ribbon to make a bow. How much ribbon is needed to make 5 bows.

$$\frac{5}{1} \cdot \frac{2}{3} = \frac{10}{3} = 3\frac{1}{3}$$

It takes $3\frac{1}{3}$ yards of ribbon to make a bow.

14. A landscaper uses $\frac{2}{3}$ pound of peat moss for a rosebush. How much will be needed for 21 rosebushes?

$$\frac{21}{1} \cdot \frac{2}{3} = 14$$

The landscaper needs 14 pounds of peat moss.

15. A recipe calls for $\frac{3}{4}$ cups of chocolate chips. If I want to make half a recipe, how many cups of chocolate chips do I need?

$$\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$$

I need $\frac{3}{8}$ cup of chocolate chips.

16. How much salmon will be needed to serve 30 people if each person gets $\frac{2}{5}$ pound?

$$\frac{30}{1} \cdot \frac{2}{5} = 12$$

Twelve pounds of salmon will be needed.

17. A rancher owns a square mile of land. He gives $\frac{4}{5}$ of it to his daughter and she in turn gives $\frac{2}{3}$ of her share to her son. How much land goes to the son (the rancher's grandson)?

$$\frac{2}{3} \cdot \frac{4}{5} = \frac{8}{15}$$

The rancher's grandson receives $\frac{8}{15}$ square mile of land.

18. A standard pencil is $6\frac{3}{32}$ inches long. If 25 pencils are arranged end-to-end, how long is the line of pencils?

$$25 \left(6\frac{3}{32} \right) = \frac{25}{1} \cdot \frac{195}{32} = 152\frac{11}{32}$$

$$\begin{array}{r} 152 \\ 32 \overline{) 4875} \\ \underline{-32} \\ 167 \\ \underline{-160} \\ 75 \\ \underline{64} \\ 11 \end{array}$$

$$\begin{array}{r} 195 \\ 25 \\ \hline 975 \\ 390 \\ \hline 4875 \end{array}$$

The line of pencils is $152\frac{11}{32}$ inches long.

19. Mary has $5\frac{1}{4}$ cups of yogurt. Each tart requires $\frac{1}{2}$ cup of yogurt. How many tarts can she make?

$$5\frac{1}{4} \div \frac{1}{2} = \frac{21}{4} \cdot \frac{2}{1} = \frac{21}{2} = 10\frac{1}{2}$$

She can make 10 tarts. [Note: It is possible to have one extra $\frac{1}{2}$ -size tart.]

20. A resort hotel uses $\frac{3}{4}$ of its extra land for recreational purposes. Of that, $\frac{1}{2}$ is used for swimming pools. What part of the ^{extra} land is used for swimming pools?

$$\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$$

The resort hotel uses $\frac{3}{8}$ of its extra land for swimming pools.

21. Do the following as fraction arithmetic. Write all answers in simplest form.

(a) $\frac{11}{12} + \frac{7}{10} + \frac{3}{4}$

$$= \frac{55}{60} + \frac{42}{60} + \frac{45}{60}$$

$$= \frac{142}{60} = \frac{71}{30}$$

$$= 2\frac{11}{30}$$

(b) $2\frac{3}{5} \cdot 3\frac{3}{4}$

$$= \frac{13}{5} \cdot \frac{15}{4}$$

$$= \frac{39}{4}$$

$$= 9\frac{3}{4}$$

(c) $\frac{8}{15} \div \frac{3}{10}$

$$= \frac{8}{15} \cdot \frac{10}{3}$$

$$= \frac{16}{9} = 1\frac{7}{9}$$

(d) $4\frac{1}{2} - 2\frac{5}{8}$

$$= 4\frac{4}{8} - 2\frac{5}{8}$$

$$= 3\frac{12}{8} - 2\frac{5}{8}$$

$$= 1\frac{7}{8}$$

(e) $8\frac{3}{6} \div 3\frac{2}{5}$

$$= 8\frac{1}{2} \div \frac{17}{5}$$

$$= \frac{17}{2} \cdot \frac{5}{17}$$

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

$$= 2\frac{1}{2}$$

(f) $27 - 2\frac{3}{14} = 26\frac{14}{14} - 2\frac{3}{14}$

$$= 24\frac{11}{14}$$

22. A family has an annual income of \$27,000. Of this $\frac{1}{4}$ is spent for food, $\frac{1}{5}$ for housing, $\frac{1}{10}$ for clothing, $\frac{1}{9}$ for savings, $\frac{1}{4}$ for taxes, and the rest for other expenses.

(a) What fractional part is spent for other expenses?

$$1 - \left(\frac{1}{4} + \frac{1}{5} + \frac{1}{10} + \frac{1}{9} + \frac{1}{4} \right) = \frac{180}{180} - \left(\frac{45}{180} + \frac{36}{180} + \frac{18}{180} + \frac{20}{180} + \frac{45}{180} \right)$$

$$= \frac{180}{180} - \frac{164}{180} = \frac{16}{180} = \frac{4}{45}$$

The family has $\frac{4}{45}$ of their income for other expenses.

- (b) What dollar amount is this?

$$\frac{4}{45} \cdot \frac{27000}{1} = 2400$$

The family has \$2,400 for other expenses.

23. The weight of water is $62\frac{1}{2}$ pounds per cubic foot. How many cubic feet would be occupied by $265\frac{5}{8}$ pounds of water?

$$265\frac{5}{8} \div 62\frac{1}{2} = \frac{2125}{8} \div \frac{125}{2}$$

$$= \frac{2125}{8} \cdot \frac{2}{125} = \frac{17}{4} = 4\frac{1}{4}$$

$$\begin{array}{r} 17 \\ 125 \overline{) 2125} \\ \underline{-125} \\ 875 \\ \underline{-875} \\ 0 \end{array}$$

The water would occupy $4\frac{1}{4}$ cubic feet.

24. Kim ate five-twelfths of a pizza and Pat ate four-ninths of it.

- (a) What part of the pizza did they eat together?

$$\frac{5}{12} + \frac{4}{9} = \frac{15}{36} + \frac{16}{36} = \frac{31}{36}$$

Kim and Pat ate $\frac{31}{36}$ of a pizza together.

- (b) How much of the pizza is remaining?

$$1 - \frac{31}{36} = \frac{36}{36} - \frac{31}{36}$$

$$= \frac{5}{36}$$

There is $\frac{5}{36}$ of the pizza remaining.

25. Jan has five and three-eighths yards of material. She needs three and five-sixths yards to make outfits for her and her daughter. How much material will she have left after making the outfits?

$$5\frac{3}{8} - 3\frac{5}{6} = 5\frac{9}{24} - 3\frac{20}{24}$$

$$= 4\frac{33}{24} - 3\frac{20}{24}$$

$$= 1\frac{13}{24}$$

Jan would have $1\frac{13}{24}$ yards left.

26. In training for a marathon, Dana keeps an accurate record of the training miles ran each week. One week, Dana ran fifteen and a half miles on Sunday, six and two-thirds miles on Monday, twelve and three-eighths miles on Tuesday, five and five-sixths miles on Wednesday, nine and one-fourth miles on Thursday, two and five-eighths miles on Friday, and six and two-tenths miles on Saturday. How many miles did Dana run that week?

$$15\frac{1}{2} + 6\frac{2}{3} + 12\frac{3}{8} + 5\frac{5}{6} + 9\frac{1}{4} + 2\frac{5}{8} + 6\frac{2}{10}$$

$$= 15\frac{60}{120} + 6\frac{80}{120} + 12\frac{45}{120} + 5\frac{100}{120} + 9\frac{30}{120} + 2\frac{75}{120} + 6\frac{24}{120}$$

$$= 55\frac{414}{120} = 58\frac{54}{120} = 58\frac{9}{20} \quad \text{Dana ran } 58\frac{9}{20} \text{ miles that week.}$$

27. Three-fourths of a pan of brownies was sitting on the kitchen table. Jerry and Terry ate two-thirds of that partial pan of brownies.

- (a) What portion of a pan of brownies did they eat?

$$\frac{2}{3} \cdot \frac{3}{4} = \frac{1}{2} \quad \text{They ate } \frac{1}{2} \text{ of a pan of brownies.}$$

- (b) How much of the pan of brownies is remaining?

$$\frac{3}{4} - \frac{1}{2} = \frac{3}{4} - \frac{2}{4} = \frac{1}{4}$$

One-fourth of a pan of brownies is remaining.

28. Lynn is making dresses for her wedding. She assumes that it will take one-sixth as much material to make a dress for the flower girl as that needed for a bridesmaid. If the dress pattern requires three and three-fourths yards of material to make a dress for a bridesmaid, how much material must Lynn buy to make dresses for a flower girl and four bridesmaids?

$$4\frac{1}{6} \cdot 3\frac{3}{4} = \frac{25}{6} \cdot \frac{15}{4}$$

$$= \frac{375}{24}$$

$$= 15\frac{15}{24} = 15\frac{5}{8}$$

Lynn needs $15\frac{5}{8}$ yards of material.

$$24 \overline{) 375} \\ \underline{-24} \\ 135 \\ \underline{-120} \\ 15$$

$$\begin{array}{r} 25 \\ \times 15 \\ \hline 125 \\ +250 \\ \hline 375 \end{array}$$

29. You need to lay tile across a wall. Each side of a square tile measures two and five-eighths inches. If the wall is thirty-five inches wide, how many pieces of tile are needed?

$$35 \div 2\frac{5}{8} = \frac{35}{1} \cdot \frac{8}{21}$$

$$= \frac{35 \cdot 8}{21}$$

$$= \frac{280}{21}$$

$$= 13\frac{7}{21} = 13\frac{1}{3}$$

You would need 14 tiles.

30. The directions for a herbicide recommend mixing two and two-thirds ounces of concentrate for every gallon of water.

(a) How much herbicide concentrate is needed to mix with one-fourth of a gallon of water?

$$\frac{1}{4} \cdot 2\frac{2}{3} = \frac{1}{4} \cdot \frac{8}{3} = \frac{2}{3}$$

We need $\frac{2}{3}$ ounce of concentrate.

(b) How many gallons of mixture can be made if the bottle of herbicide concentrate contains thirty-two and a half ounces?

$$32\frac{1}{2} \div 2\frac{2}{3} = \frac{65}{2} \div \frac{8}{3}$$

$$= \frac{65}{2} \cdot \frac{3}{8} = \frac{195}{16} = 12\frac{3}{16}$$

We can make $12\frac{3}{16}$ gallons of mixture.

31. Add or subtract, simplify if possible:

(a) $\frac{2}{9} + \frac{4}{15}$

$$= \frac{10}{45} + \frac{12}{45}$$

$$= \frac{22}{45}$$

(b) $\frac{8}{25} - \frac{3}{20}$

$$= \frac{32}{100} - \frac{15}{100}$$

$$= \frac{17}{100}$$

(c) $2 - \frac{3}{7}$

$$= 1\frac{7}{7} - \frac{3}{7}$$

$$= 1\frac{4}{7}$$

(d) $\frac{1}{90} + \frac{1}{60} + \frac{1}{40}$

$$= \frac{4}{360} + \frac{6}{360} + \frac{9}{360}$$

$$= \frac{19}{360}$$

(e) $\frac{1}{10} + \frac{4}{5} - \frac{3}{20}$

$$= \frac{2}{20} + \frac{16}{20} - \frac{3}{20}$$

$$= \frac{15}{20} = \frac{3}{4}$$

(f) $7\frac{1}{2} - 5\frac{3}{8}$

$$= 7\frac{4}{8} - 5\frac{3}{8}$$

$$= 2\frac{1}{8}$$

32. You need $\frac{4}{5}$ cup of water for a recipe. You accidentally put $\frac{1}{3}$ cup of water into the mixing bowl with the dry ingredients. How much more water do you need to add?

$$\frac{4}{5} - \frac{1}{3} = \frac{12}{15} - \frac{5}{15}$$

$$= \frac{7}{15}$$

You need $\frac{7}{15}$ cup more of water.

33. Multiply.

$$(a) \frac{\overset{1}{\cancel{8}}}{\underset{2}{\cancel{10}}} \cdot \frac{\overset{1}{\cancel{5}}}{\underset{2}{\cancel{6}}} \\ = \frac{1}{4}$$

$$(b) 24 \cdot \frac{3}{8} \\ = \frac{\overset{3}{\cancel{24}}}{\cancel{1}} \cdot \frac{\cancel{3}}{\cancel{1}} \\ = \frac{9}{1} \\ = 9$$

$$(c) \frac{12}{5} \cdot 3\frac{1}{3} \\ = \frac{\overset{4}{\cancel{12}}}{\cancel{1}} \cdot \frac{\overset{10^2}{\cancel{10}}}{\cancel{3}} \\ = \frac{8}{1} \\ = 8$$

$$(d) \frac{\overset{1}{\cancel{11}}}{\underset{2}{\cancel{18}}} \cdot \frac{\overset{1}{\cancel{9}}}{\underset{1}{\cancel{11}}} \\ = \frac{1}{2}$$

$$(e) \frac{3}{5} \text{ of } 25 \\ = \frac{\cancel{3}}{\cancel{1}} \cdot \frac{\overset{5}{\cancel{25}}}{\cancel{1}} \\ = \frac{15}{1} \\ = 15$$

$$(f) 5\frac{1}{4} \cdot \frac{2}{7} \\ = \frac{\overset{3}{\cancel{21}}}{\underset{2}{\cancel{4}}} \cdot \frac{\overset{1}{\cancel{2}}}{\cancel{1}} \\ = \frac{3}{2} = 1\frac{1}{2}$$

$$(g) 24 \cdot \frac{5}{6} \\ = \frac{\overset{4}{\cancel{24}}}{\cancel{1}} \cdot \frac{\cancel{5}}{\cancel{6}} \\ = \frac{20}{1} \\ = 20$$

$$(h) \frac{\overset{1}{\cancel{7}}}{\underset{3}{\cancel{9}}} \cdot \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{14}}} \cdot \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{15}}} \\ = \frac{1}{45}$$

$$(i) \frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{9}}} \cdot \frac{\overset{1}{\cancel{3}}}{\underset{5}{\cancel{25}}} \cdot \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{9}}} \\ = \frac{1}{27}$$

34. Add or Subtract as indicated. Give your answer in simplest form.

$$(a) \frac{1}{4} + \frac{7}{8} \\ = \frac{2}{8} + \frac{7}{8} \\ = \frac{9}{8} \\ = 1\frac{1}{8}$$

$$(b) \frac{15}{18} - \frac{5}{12} \\ = \frac{30}{36} - \frac{15}{36} \\ = \frac{15}{36} = \frac{5}{12}$$

$$(c) 3\frac{1}{4} + \frac{5}{8} + 2\frac{5}{12} \\ = 3\frac{6}{24} + \frac{15}{24} + 2\frac{10}{24} \\ = 5\frac{31}{24} \\ = 6\frac{7}{24}$$

$$(d) 15 - 12\frac{5}{8} \\ = 14\frac{8}{8} - 12\frac{5}{8} \\ = 2\frac{3}{8}$$

$$(e) \frac{11}{24} + \frac{13}{36} \\ = \frac{33}{72} + \frac{26}{72} \\ = \frac{59}{72}$$

$$(f) 5\frac{1}{4} - 1\frac{3}{8} \\ = 5\frac{2}{8} - 1\frac{3}{8} \\ = 4\frac{10}{8} - 1\frac{3}{8} \\ = 3\frac{7}{8}$$

$$(g) \frac{9}{10} + \frac{1}{4} + 3\frac{7}{12} \\ = \frac{54}{60} + \frac{15}{60} + 3\frac{35}{60} \\ = 3\frac{104}{60} = 3\frac{26}{15} \\ = 4\frac{11}{15}$$

$$(h) 9\frac{1}{2} - 2\frac{13}{20} \\ = 9\frac{10}{20} - 2\frac{13}{20} \\ = 8\frac{30}{20} - 2\frac{13}{20} \\ = 6\frac{17}{20}$$

35. A scale on a map states that every $\frac{1}{4}$ inch represents 20 miles. If two cities are $3\frac{1}{4}$ inches apart, how many miles are actually between the two cities?

$$\frac{n}{3\frac{1}{4}} = \frac{20}{\frac{1}{4}}; \quad n = 3\frac{1}{4} \cdot 20 \div \frac{1}{4}$$

$$= \frac{13}{4} \cdot \frac{20}{1} \cdot \frac{4}{1}$$

$$= 260$$

The cities are 260 miles apart.

36. How many $\frac{2}{3}$ cup size sugar bowls can be filled from 16 cups of sugar?

$$16 \div \frac{2}{3} = \frac{16}{1} \cdot \frac{3}{2} = 24$$

We can fill 24 sugar bowls.

37. A cake recipe calls for $\frac{1}{2}$ cup sugar. If the only measuring cup available is an $\frac{1}{8}$ cup, how many of these will have to be filled with sugar to fulfill the recipe

$$\frac{1}{2} \div \frac{1}{8} = \frac{1}{2} \cdot \frac{8}{1} = \frac{4}{1} = 4$$

We would need 4 of the $\frac{1}{8}$ cups.

38. A recipe calls for $1\frac{2}{3}$ cups of flour. How much flour is needed if you want to quadruple the recipe?

$$4 \cdot 1\frac{2}{3} = \frac{4}{1} \cdot \frac{5}{3} = \frac{20}{3} = 6\frac{2}{3}$$

You would need $6\frac{2}{3}$ cups of flour.

39. Do the arithmetic. Show your work. Give your final answer in simplest form.

(a) $\frac{3}{4} + \frac{3}{8} - \frac{1}{5}$

$$= \frac{30}{40} + \frac{15}{40} - \frac{8}{40}$$

$$= \frac{37}{40}$$

(b) $12 - 3\frac{5}{8}$

$$= 11\frac{8}{8} - 3\frac{5}{8}$$

$$= 8\frac{3}{8}$$

(c) $6\frac{2}{3} \div \frac{5}{9}$

$$= \frac{4}{1} \cdot \frac{20}{3} \cdot \frac{9}{5}$$

$$= \frac{12}{1} = 12$$

(d) $3\frac{1}{2} \cdot 5\frac{1}{3}$

$$= \frac{7}{2} \cdot \frac{16}{3}$$

$$= \frac{56}{3} = 18\frac{2}{3}$$

(e) $\frac{3}{4} \cdot \left(\frac{2}{5} + \frac{2}{3}\right)$

$$= \frac{3}{4} \cdot \left(\frac{6}{15} + \frac{10}{15}\right)$$

$$= \frac{3}{4} \cdot \frac{16}{5} = \frac{4}{5}$$

(f) $4\frac{13}{15} - 2\frac{4}{5}$

$$= 4\frac{13}{15} - 2\frac{12}{15}$$

$$= 2\frac{1}{15}$$

(g) $\frac{27}{32} \div 1\frac{1}{8}$

$$= \frac{27}{32} \div \frac{9}{8}$$

$$= \frac{27}{32} \cdot \frac{8}{9} = \frac{3}{4}$$

(h) $5\frac{3}{7} \cdot 2\frac{7}{11}$

$$= \frac{38}{7} \cdot \frac{29}{11}$$

$$= \frac{1102}{77}$$

$$= 14\frac{24}{77}$$

$$\begin{array}{r} 38 \\ 29 \\ \hline 342 \\ 76 \\ \hline 1102 \\ 77 \overline{)1102} \\ \underline{-77} \\ 332 \\ \underline{-308} \\ 24 \end{array}$$

40. If $\frac{1}{4}$ teaspoon is equal to 1 milliliter (ml), then how many milliliters are in 6 teaspoons?

$$6 \div \frac{1}{4} = \frac{6}{1} \cdot \frac{4}{1} = 24$$

There are 24 ml in 6 teaspoons.

41. If each piece of pie is $\frac{1}{6}$ of a pie, how much of the pie is $\frac{1}{2}$ of a piece?

$$\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$$

A half piece is $\frac{1}{12}$ of a pie.

42. A gasoline can holds $\frac{7}{8}$ liter. How much will the can hold when it is $\frac{1}{2}$ full?

$$\frac{1}{2} \cdot \frac{7}{8} = \frac{7}{16}$$

A half full can holds $\frac{7}{16}$ liter.

43. Harry needs to stack 36 pieces of lumber. Each piece is $\frac{3}{4}$ of an inch high. If he stacks all 36 pieces in one stack, how tall will the stack be?

$$36 \cdot \frac{3}{4} = \frac{36}{1} \cdot \frac{3}{4} = 27$$

The stack will be 27 inches tall.

44. How many test tubes, each containing $\frac{3}{5}$ ml, can a nursing student fill from a container of 60 ml?

$$60 \div \frac{3}{5} = \frac{60}{1} \cdot \frac{5}{3} = 100$$

The nursing student can fill 100 test tubes.

45. Compute

(a) $2\frac{1}{2} + 5\frac{3}{4}$

$$= 2\frac{2}{4} + 5\frac{3}{4}$$

$$= 7\frac{5}{4}$$

$$= 8\frac{1}{4}$$

(b) $5 - 2\frac{7}{11}$

$$= 4\frac{11}{11} - 2\frac{7}{11}$$

$$= 2\frac{4}{11}$$

(c) $1\frac{3}{4} \div \frac{5}{8}$

$$= \frac{7}{4} \cdot \frac{8}{5}$$

$$= \frac{14}{5} = 2\frac{4}{5}$$

$$(d) \quad 4\frac{1}{2} \times 2\frac{2}{3}$$

$$= \frac{3\cancel{9} \cdot \cancel{8}^4}{\cancel{2} \cdot \cancel{3}} = \frac{12}{1} = 12$$

$$(e) \quad 8\frac{1}{6} - 2\frac{3}{4}$$

$$= 8\frac{2}{12} - 2\frac{9}{12}$$

$$= 7\frac{14}{12} - 2\frac{9}{12}$$

$$= 5\frac{5}{12}$$

$$(f) \quad 3 \div 2\frac{1}{2}$$

$$= 3 \div \frac{5}{2}$$

$$= \frac{3}{1} \cdot \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$$

$$(g) \quad \frac{1}{2} \cdot \frac{4^2}{5}$$

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

$$(h) \quad \frac{3}{4} + \frac{7}{8}$$

$$= \frac{6}{8} + \frac{7}{8}$$

$$= \frac{13}{8} = 1\frac{5}{8}$$

$$(i) \quad \frac{3}{4} \div \frac{3}{8}$$

$$= \frac{3}{4} \cdot \frac{8}{3}$$

$$= \frac{2}{1} = 2$$

$$(j) \quad 4 - \frac{2}{3}$$

$$= 3\frac{3}{3} - \frac{2}{3}$$

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

$$(k) \quad 1\frac{4}{5} \cdot 1\frac{1}{5}$$

$$= \frac{9}{5} \cdot \frac{6}{5}$$

$$= \frac{54}{25}$$

$$= 2\frac{4}{25}$$

$$(l) \quad 7\frac{1}{2} - 2\frac{5}{8}$$

$$= 7\frac{4}{8} - 2\frac{5}{8}$$

$$= 6\frac{12}{8} - 2\frac{5}{8}$$

$$= 4\frac{7}{8}$$

$$(m) \quad 3\frac{3}{4} \div \frac{5}{7}$$

$$= \frac{15}{4} \cdot \frac{7}{5}$$

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

$$(n) \quad \frac{2}{3} + \frac{1}{3} \cdot \frac{1}{2}$$

$$= \frac{2}{3} + \frac{1}{6}$$

$$= \frac{4}{6} + \frac{1}{6}$$

$$= \frac{5}{6}$$

46. A resort hotel uses $\frac{3}{4}$ of its extra land for recreational purposes. Of that, $\frac{1}{2}$ is used for swimming pools. What part of the land is used for swimming pools?

$$\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$$

The resort uses $\frac{3}{8}$ of its extra land for swimming pools.

47. A recipe calls for $\frac{3}{4}$ cup cornmeal. A chef is making $\frac{1}{2}$ of the recipe. How much cornmeal should the chef use?

chef use?

$$\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$$

The chef should use $\frac{3}{8}$ cup of cornmeal.

