LESSON 20, LESSON PRACTICE

a. **Four cubed**
$4 \cdot 4 \cdot 4 = \mathbf{64}$

b. **One half squared**
$\frac{1}{2} \cdot \frac{1}{2} = \mathbf{\frac{1}{4}}$

c. **Ten to the sixth power**
$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = \mathbf{1{,}000{,}000}$

d. **Base is 10; exponent is 3**

e. $2^3 \cdot 2^2 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
$= 2^5$

f. $\frac{2^6}{2^2} = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2}$
$= \frac{64}{4} = 16 = 2 \cdot 2 \cdot 2 \cdot 2 = 2^4$

g. **10**

h. **20**

i. **15**

j. Area $= 15 \text{ m} \times 10 \text{ m}$
$= \mathbf{150 \text{ m}^2}$

k. Area $= 2 \text{ in.} \times 5 \text{ in.}$
$= \mathbf{10 \text{ in.}^2}$

l. Area $= 4 \text{ cm} \times 4 \text{ cm}$
$= \mathbf{16 \text{ cm}^2}$

m. $20 \text{ cm} \div 4 = 5 \text{ cm}$
Area $= 5 \text{ cm} \times 5 \text{ cm} = \mathbf{25 \text{ cm}^2}$

n. Area $= 100 \text{ yards} \times 100 \text{ yards}$
$= \mathbf{10{,}000 \text{ square yards}}$

LESSON 20, MIXED PRACTICE

1. $4D = 628$

$$4\overline{)628}\quad \begin{array}{r} 157 \\ 4 \\ \hline 22 \\ 20 \\ \hline 28 \\ 28 \\ \hline 0 \end{array}$$

157 students

2. $P - 36 = 46$
46 parrots
$+$ 36 parrots
82 parrots

3. $225 + N_T = 600$
600 fish
$-$ 225 fish
375 fish

4. $21{,}050 + 48{,}972 = T$
21,050
$+$ 48,972
70,022

5. $k = 2^6 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
$= \mathbf{64}$

6. (a) $\mathbf{-2, -\frac{1}{2}, 0, \frac{1}{3}, 1}$

(b) $\mathbf{\frac{1}{3}, -\frac{1}{2}}$

7. **B.** $\mathbf{33\frac{1}{3}\%}$

8. **Side *DC*** (or **side *CD***) and **side *AB*** (or **side *BA***)

9. (a) $\left(\frac{1}{3}\right)^3 = \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \mathbf{\frac{1}{27}}$

(b) $10^4 = 10 \cdot 10 \cdot 10 \cdot 10$
$= \mathbf{10{,}000}$

(c) $\sqrt{12^2} = \sqrt{144} = \mathbf{12}$

10. (a) $\frac{2}{9} \cdot \frac{4}{4} = \mathbf{\frac{8}{36}}$

(b) $\frac{3}{4} \cdot \frac{9}{9} = \mathbf{\frac{27}{36}}$

11. (a) **1, 2, 5, 10**

(b) **1, 7**

(c) **1**

12. 2 feet = 24 inches
24 inches ÷ 4 = **6 inches**

13.
$$\begin{array}{r} 54 \\ -\ 36 \\ \hline 18 \end{array}$$
a = **18**

14.
$$\begin{array}{r} 46 \\ -\ 20 \\ \hline 26 \end{array}$$
w = **26**

15.
$$\begin{array}{r} 12 \\ 5\overline{)60} \\ 5 \\ \hline 10 \\ 10 \\ \hline 0 \end{array}$$
x = **12**

16.
$$\begin{array}{r} 100 \\ -\ 64 \\ \hline 36 \end{array}$$
m = **36**

17. $5^4 \cdot 5^2 = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 5^6$
n = **6**

18.
$$\begin{array}{r} 15 \\ 4\overline{)60} \\ 4 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$
y = **15**

19. $1\frac{8}{9} + 1\frac{7}{9} = 2\frac{15}{9} = 3\frac{6}{9} = \mathbf{3\frac{2}{3}}$

20. $\frac{5}{2} \cdot \frac{5}{6} = \frac{25}{12} = \mathbf{2\frac{1}{12}}$

21.
$$\begin{array}{r} \mathbf{705} \\ 9\overline{)6345} \\ 63 \\ \hline 04 \\ 0 \\ \hline 45 \\ 45 \\ \hline 0 \end{array}$$

22.
$$\begin{array}{r} 360 \\ \times\ 25 \\ \hline 1800 \\ 720 \\ \hline \mathbf{9000} \end{array}$$

23. $\frac{3}{4} - \left(\frac{1}{4} + \frac{2}{4}\right) = \frac{3}{4} - \left(\frac{3}{4}\right) = \mathbf{0}$

24. $\left(\frac{3}{4} - \frac{1}{4}\right) + \frac{2}{4} = \frac{2}{4} + \frac{2}{4}$
$= \frac{4}{4} = \mathbf{1}$

25. (a) $\frac{3}{10} + \frac{3}{10} = \frac{6}{10} = \mathbf{\frac{3}{5}}$

(b) $\frac{3}{10} \cdot \frac{3}{10} = \mathbf{\frac{9}{100}}$

26. $\frac{1}{2} \cdot \frac{5}{5} = \frac{5}{10}$
$\frac{5}{10} + \frac{3}{10} = \frac{8}{10} = \mathbf{\frac{4}{5}}$

27. $1\frac{4}{5} = \frac{9}{5}$
$\frac{9}{5} \cdot \frac{1}{3} = \frac{9}{15} = \mathbf{\frac{3}{5}}$

28. **Identity property of multiplication**

29. (a) Perimeter = 12 in. + 12 in. + 12 in. + 12 in. = **48 in.** or **4 ft**

(b) Area = 12 in. × 12 in. = **144 in.^{2}** or **1 ft^2**

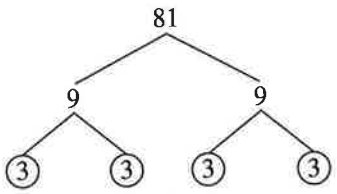
30. Missing length = 10 in. − 5 in. = 5 in.
Missing height = 8 in. − 4 in. = 4 in.
Perimeter = 10 in. + 4 in. + 5 in. + 4 in. + 5 in. + 8 in.
= **36 in.**

LESSON 21, LESSON PRACTICE

a. **2, 3, 5, 7, 11, 13, 17, 19, 23, 29**

b. **Composite number**

c.

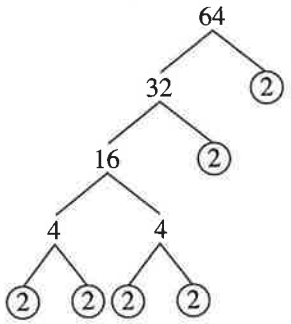


$81 = \mathbf{3 \cdot 3 \cdot 3 \cdot 3}$

d. $360 = \mathbf{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5}$

$$\begin{array}{r} 1 \\ 5\overline{)5} \\ 3\overline{)15} \\ 3\overline{)45} \\ 2\overline{)90} \\ 2\overline{)180} \\ 2\overline{)360} \end{array}$$

e.



$64 = \mathbf{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$

$\sqrt{64} = 8 = \mathbf{2 \cdot 2 \cdot 2}$

LESSON 21, MIXED PRACTICE

1. $\frac{2}{3} + N_G = \frac{3}{3}$

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

2. $7Q = 343$

$$\begin{array}{r} 49 \\ 7\overline{)343} \\ \underline{28} \\ 63 \\ \underline{63} \\ 0 \end{array}$$

49 quills

3. $2{,}000{,}000{,}000 - 21{,}000{,}000 = D$

$$\begin{array}{r} 2{,}000{,}000{,}000 \\ -\quad 21{,}000{,}000 \\ \hline 1{,}979{,}000{,}000 \end{array}$$

One billion, nine hundred seventy-nine million

4. $\$14{,}289 + \$824 = N$

$$\begin{array}{r} \$14{,}289 \\ +\quad \$824 \\ \hline \$15{,}113 \end{array}$$

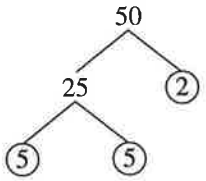
5. (a) $3\frac{12 \div 3}{21 \div 3} = \mathbf{3\frac{4}{7}}$

(b) $\frac{12 \div 12}{48 \div 12} = \mathbf{\frac{1}{4}}$

(c) $12\% = \frac{12}{100} \div \frac{4}{4} = \mathbf{\frac{3}{25}}$

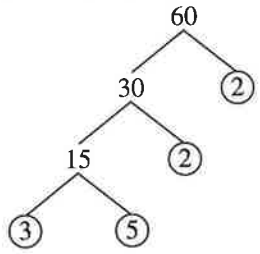
6. **53, 59**

7. (a) $50 = \mathbf{2 \cdot 5 \cdot 5}$



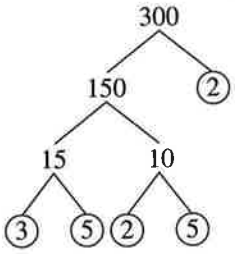
$50 = 2 \cdot 5 \cdot 5$

(b) $60 = \mathbf{2 \cdot 2 \cdot 3 \cdot 5}$



$60 = 2 \cdot 2 \cdot 3 \cdot 5$

(c) $300 = \mathbf{2 \cdot 2 \cdot 3 \cdot 5 \cdot 5}$



$300 = 2 \cdot 2 \cdot 3 \cdot 5 \cdot 5$

8. **Point *C*; The tick mark between points *B* and *C* is halfway between 1000 and 2000, which is 1500, so points *A* and *B* are eliminated. Point *C* is closer to 1500 than 2000, so *C* is the best choice. Point *D* is too close to 2000 to represent 1610.**

9. (a) $\frac{2}{3} \cdot \frac{5}{5} = \mathbf{\frac{10}{15}}$

(b) $\frac{3}{5} \cdot \frac{3}{3} = \mathbf{\frac{9}{15}}$

(c) $\frac{8 \div 4}{12 \div 4} = \mathbf{\frac{2}{3}}$

10. (a) **3**

(b) **9**

11. 12 inches ÷ 4 = 3 inches
Area = 3 inches × 3 inches
= **9 square inches**

12.

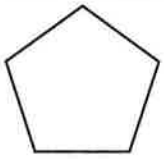


(a) $2 \times \frac{3}{4}$ in. $= \frac{6}{4}$ in. $= \mathbf{1\frac{1}{2}}$ **in.**

(b) Perimeter $= \frac{3}{4}$ in. $+ \frac{3}{4}$ in. $+ 1\frac{1}{2}$ in.
$+ 1\frac{1}{2}$ in. $= \frac{6}{4}$ in. $+ 2\frac{2}{2}$ in.
$= \frac{6}{4}$ in. $+ \frac{6}{2}$ in. $= \frac{6}{4}$ in.
$+ \frac{12}{4}$ in. $= \frac{18}{4}$ in. $= \mathbf{4\frac{1}{2}}$ **in.**

13. Missing length = 3 in. + 12 in. = 15 in.
Missing height = 8 in. − 5 in. = 3 in.
Perimeter = 8 in. + 15 in. + 5 in.
+ 12 in. + 3 in. + 3 in.
= **46 in.**

14. **Check polygon for five sides; one possibility:**



15. $1 - \frac{3}{5} = \frac{5}{5} - \frac{3}{5} = \frac{2}{5}$

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

16. $1 \cdot \frac{5}{3}$

$q = \mathbf{\frac{5}{3}}$

17.
$$\begin{array}{r} 25 \\ \times\ 50 \\ \hline 1250 \end{array}$$
$w = \mathbf{1250}$

18. $\frac{5}{6} - \frac{1}{6} = \frac{4}{6}$

$f = \mathbf{\frac{4}{6}}$ or $\mathbf{\frac{2}{3}}$

19. $1\frac{2}{3} + 3\frac{2}{3} = 4\frac{4}{3} = 5\frac{1}{3}$

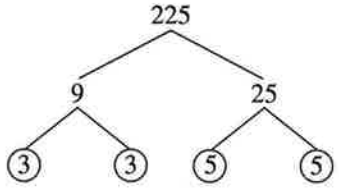
$m = \mathbf{5\frac{1}{3}}$

20.
$$\begin{array}{r} \mathbf{17} \\ 3\overline{)51} \\ \underline{3} \\ 21 \\ \underline{21} \\ 0 \end{array}$$
$c = \mathbf{17}$

21. $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{6}{3} = \mathbf{2}$

22. $\left(\frac{2}{3}\right)^3 = \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3} = \mathbf{\frac{8}{27}}$

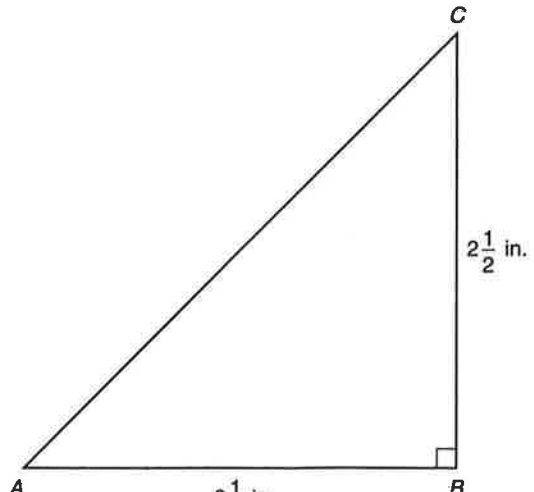
23. (a) $225 = \mathbf{3 \cdot 3 \cdot 5 \cdot 5}$



(b) $\sqrt{225} = 15$
$15 = \mathbf{3 \cdot 5}$

24. **If we divide the numerator and the denominator of a fraction by their GCF, we reduce the fraction to lowest terms in one step.**

25.



m ∠A = **45°**

26. $1\frac{3}{4} = \frac{7}{4}$

$\frac{7}{4} \times \frac{3}{2} = \frac{21}{8} = \mathbf{2\frac{5}{8}}$

27. (a) $\overline{CB}$ (or $\overline{BC}$)

(b) $\overline{AB}$ (or $\overline{BA}$)

(c) $\overline{MC}$ and $\overline{MB}$

(d) $\angle ABC$ (or $\angle CBA$)

28. $\frac{1 \cancel{\text{quart}}}{4 \cancel{\text{quarts}}} = \frac{1}{4}, \frac{1}{4} \cdot \frac{25}{25} = \frac{25}{100} = \mathbf{25\%}$

29. (a) $a + b = b + a$

(b) **Commutative property of addition**

30. (a) ΔKLJ

(b) ΔDEF

(c) $\angle S$

Lesson 22, Lesson Practice

a.–b.

60 pumpkins

$\frac{1}{4}$ were not ripe: 15 pumpkins, 15 pumpkins

$\frac{3}{4}$ were ripe: 15 pumpkins, 15 pumpkins

a. 3 × 15 pumpkins = **45 pumpkins**

b. **15 pumpkins**

c.–d.

20 tomatoes

$\frac{3}{5}$ were green: 4 tomatoes, 4 tomatoes, 4 tomatoes

$\frac{2}{5}$ were not green: 4 tomatoes, 4 tomatoes

c. 100% − 60% = 40%

$40\% = \frac{40}{100} \div \frac{20}{20} = \mathbf{\frac{2}{5}}$

d. 3 × 4 tomatoes = **12 tomatoes**

e. **See student work.**

Lesson 22, Mixed Practice

1. $28 + 30 + 23 = T$

28 students
30 students
+ 23 students
81 students

2. $3R = 81$

$3\overline{)81}$ → 27

6
21
21
0

27 students

3. $126{,}000 - L = 79{,}000$

126,000
− 79,000
47,000

4. $10{,}313 - 2700 = D$

10,313
− 2 700
7 613

Seven thousand, six hundred thirteen

5.

36 spectators

$\frac{5}{9}$ were happy: 4 spectators, 4 spectators, 4 spectators, 4 spectators, 4 spectators

$\frac{4}{9}$ were not happy: 4 spectators, 4 spectators, 4 spectators, 4 spectators

(a) 5 × 4 spectators = **20 spectators**

(b) 4 × 4 spectators = **16 spectators**

6.

36 eggs	
$\frac{3}{4}$ were not cracked.	9 eggs
	9 eggs
	9 eggs
$\frac{1}{4}$ were cracked.	9 eggs

$$25\% = \frac{25}{100} \div \frac{25}{25}$$

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

(a) $\frac{4}{4} - \frac{1}{4} = \mathbf{\frac{3}{4}}$

(b) 3×9 eggs $= \mathbf{27}$ **eggs**

7. (a) $\mathbf{\frac{2}{5}}$

(b) $\frac{6}{10} = \frac{6}{10} \times \frac{10}{10} = \frac{60}{100} = \mathbf{60\%}$

8. (a) **4**

(b) $4 \times 3 = \mathbf{12}$

9. (a) **0**

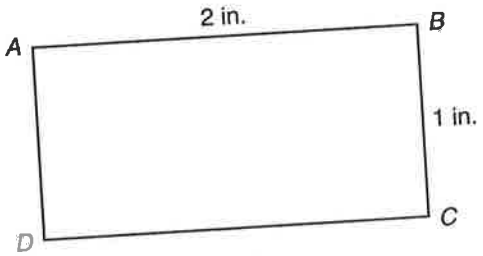
(b) **Property of zero for multiplication**

10. $\frac{3}{3} - \left(\frac{1}{3} \cdot \frac{3}{1}\right) = \frac{3}{3} - \left(\frac{3}{3}\right) = 0$

$$\left(\frac{3}{3} - \frac{1}{3}\right) \cdot \frac{3}{1} = \left(\frac{2}{3}\right) \cdot \frac{3}{1} = \frac{6}{3} = 2$$

$\mathbf{0 < 2}$

11.

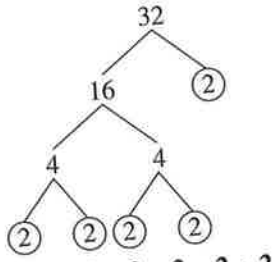


(a) Perimeter $= 2$ in. $+ 2$ in. $+ 1$ in. $+ 1$ in. $= \mathbf{6}$ **in.**

(b) Area $= 2$ in. $\times 1$ in. $= \mathbf{2}$ **in.**^{2}

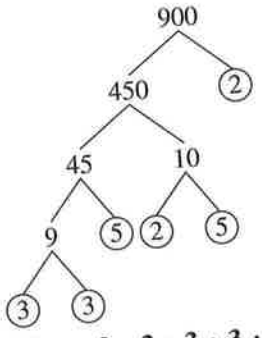
(c)
$$\begin{array}{r} 90^\circ \\ 90^\circ \\ 90^\circ \\ +\ 90^\circ \\ \hline \mathbf{360^\circ} \end{array}$$

12. (a)



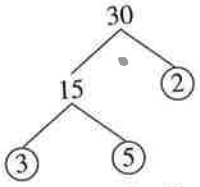
$32 = \mathbf{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$

(b)



$900 = \mathbf{2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5}$

(c) $\sqrt{900} = 30$



$30 = \mathbf{2 \cdot 3 \cdot 5}$

13. (a) $\frac{5}{6} \cdot \frac{10}{10} = \mathbf{\frac{50}{60}}$

(b) $\frac{3}{5} \cdot \frac{12}{12} = \mathbf{\frac{36}{60}}$

(c) $\frac{7}{12} \cdot \frac{5}{5} = \mathbf{\frac{35}{60}}$

14. $\frac{50}{60} + \frac{36}{60} + \frac{35}{60} = \frac{121}{60} = \mathbf{2\frac{1}{60}}$

15. (a) $\mathbf{-2, -\frac{2}{3}, 0, 1, \frac{3}{2}}$

(b) $\mathbf{1, \frac{3}{2}}$

16. $\frac{11}{12} - \frac{5}{12} = \frac{6}{12}$

$a = \mathbf{\frac{6}{12}}$ or $\mathbf{\frac{1}{2}}$

17.
$$\begin{array}{r} 10 \\ 90\overline{)900} \\ \underline{90} \\ 00 \\ \underline{0} \\ 0 \end{array}$$
$c = \mathbf{10}$

18.
$$\begin{array}{r} 11 \\ 11\overline{)121} \\ \underline{11} \\ 11 \\ \underline{11} \\ 0 \end{array}$$
$x = \mathbf{11}$

19. $2\frac{2}{3} + 1\frac{1}{3} = 3\frac{3}{3} = 4$
$y = \mathbf{4}$

20. $10^2 \cdot 10^5 =$
$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$
$= 10^7$
$n = \mathbf{7}$

21. $\frac{5}{6} + \frac{5}{6} + \frac{5}{6} = \frac{15}{6} = \mathbf{2\frac{1}{2}}$

22. $\frac{15}{2} \cdot \frac{10}{3} = \frac{150}{6} = \mathbf{25}$

23. $\left(\frac{5}{6}\right)^2 = \frac{5}{6} \cdot \frac{5}{6} = \mathbf{\frac{25}{36}}$

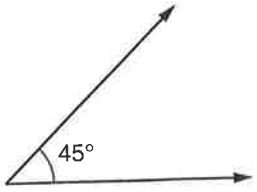
24. **30**

25. $\mathbf{\frac{9}{5}}$

26. $1\frac{1}{2} = \frac{3}{2}, 1\frac{2}{3} = \frac{5}{3}$
$\frac{3}{2} \times \frac{5}{3} = \frac{15}{6} = \mathbf{2\frac{1}{2}}$

27. 1 lb = 16 oz
16 oz + 5 oz = **21 oz**

28.



29. $\frac{1}{10} \times \frac{1}{10} = \mathbf{\frac{1}{100}}$

30. **−1**

LESSON 23, LESSON PRACTICE

a.
$$\begin{array}{r} 7 \\ -\ 2\frac{1}{3} \\ \hline \end{array} \longrightarrow \begin{array}{r} 6\frac{3}{3} \\ -\ 2\frac{1}{3} \\ \hline 4\frac{2}{3} \end{array}$$

b.
$$\begin{array}{r} 6\frac{2}{5} \\ -\ 1\frac{4}{5} \\ \hline \end{array} \xrightarrow{5 + \frac{5}{5} + \frac{2}{5}} \begin{array}{r} 5\frac{7}{5} \\ -\ 1\frac{4}{5} \\ \hline \mathbf{4\frac{3}{5}} \end{array}$$

c.
$$\begin{array}{r} 5\frac{1}{6} \\ -\ 1\frac{5}{6} \\ \hline \end{array} \xrightarrow{4 + \frac{6}{6} + \frac{1}{6}} \begin{array}{r} 4\frac{7}{6} \\ -\ 1\frac{5}{6} \\ \hline 3\frac{2}{6} \end{array}$$

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

d.
$$\begin{array}{r} 100\% \\ -\ 12\frac{1}{2}\% \\ \hline \end{array} \longrightarrow \begin{array}{r} 99\frac{2}{2}\% \\ -\ 12\frac{1}{2}\% \\ \hline \mathbf{87\frac{1}{2}\%} \end{array}$$

e.
$$\begin{array}{r} 83\frac{1}{3}\% \\ -\ 16\frac{2}{3}\% \\ \hline \end{array} \xrightarrow{\left(82 + \frac{3}{3} + \frac{1}{3}\right)\%} \begin{array}{r} 82\frac{4}{3}\% \\ -\ 16\frac{2}{3}\% \\ \hline \mathbf{66\frac{2}{3}\%} \end{array}$$

LESSON 23, MIXED PRACTICE

1. $18 \times 36 = E$

$$\begin{array}{r} 18 \\ \times\ 36 \\ \hline 108 \\ 54 \\ \hline 648 \end{array}$$

648 exposures

2. $50{,}000{,}000 - 250{,}000 = D$

$$\begin{array}{r} 50{,}000{,}000 \\ -\ \ 250{,}000 \\ \hline 49{,}750{,}000 \end{array}$$

Forty-nine million, seven hundred fifty thousand

3. $259 + 269 + 307 = T$

$$\begin{array}{r} 259 \text{ people} \\ 269 \text{ people} \\ +\ 307 \text{ people} \\ \hline \textbf{835 people} \end{array}$$

4. $16P = \$14.24$

$$\begin{array}{r} \$0.89 \\ 16\overline{)\$14.24} \\ 12\,8 \\ \hline 1\,44 \\ 1\,44 \\ \hline 0 \end{array}$$

89¢ per pound

5.

56 restaurants

$\frac{3}{8}$ were closed.	7 restaurants, 7 restaurants, 7 restaurants
$\frac{5}{8}$ were open.	7 restaurants, 7 restaurants, 7 restaurants, 7 restaurants, 7 restaurants

(a) 3×7 restaurants = **21 restaurants**

(b) 5×7 restaurants = **35 restaurants**

6. $40\% = \frac{40}{100} \div \frac{20}{20} = \frac{\mathbf{2}}{\mathbf{5}}$

30 students

$\frac{3}{5}$ were girls.	6 students, 6 students, 6 students
$\frac{2}{5}$ were boys.	6 students, 6 students

(a) 2×6 students = 12 students; **12 boys.**

(b) $\frac{5}{5} - \frac{2}{5} = \frac{3}{5}$

3×6 students = 18 students; **18 girls**

7. 1 yard = 36 inches

$$\begin{array}{r} 115 \\ 36\overline{)4140} \\ 36 \\ \hline 54 \\ 36 \\ \hline 180 \\ 180 \\ \hline 0 \end{array}$$

115 yards

8. (a) **5**

(b) $5 \times 3 =$ **15**

9. **Express the mixed number as an improper fraction. Then switch the numerator and the denominator of the improper fraction.**

10. (a) $\frac{2}{3} \cdot \frac{3}{2} = \frac{5}{5}$

(b) $\frac{12}{36} < \frac{12}{24}$

11. $2\frac{1}{4} = \frac{9}{4}$, $3\frac{1}{3} = \frac{10}{3}$

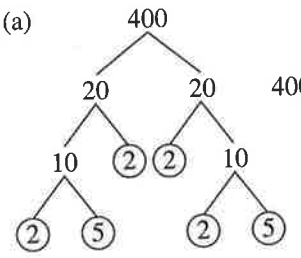
$\frac{9}{4} \times \frac{10}{3} = \frac{90}{12} = \frac{15}{2} = 7\frac{\mathbf{1}}{\mathbf{2}}$

12. (a) $\frac{3}{4} \cdot \frac{10}{10} = \frac{\mathbf{30}}{40}$

(b) $\frac{2}{5} \cdot \frac{8}{8} = \frac{\mathbf{16}}{40}$

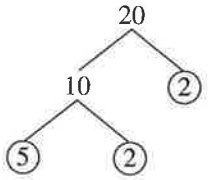
(c) $\frac{15 \div 5}{40 \div 5} = \frac{\mathbf{3}}{8}$

13. (a)



$400 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5$
$= \mathbf{2^4 \cdot 5^2}$

(b) $\sqrt{400} = 20$



$20 = 2 \cdot 2 \cdot 5$
$= \mathbf{2^2 \cdot 5}$

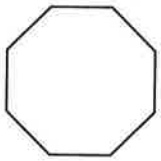
14. (a) **Acute angle**

(b) **Right angle**

(c) **Obtuse angle**

(d) $\overrightarrow{DC}$

15. **Check polygon for eight sides; one possibility:**



16.
$$7\overline{)105}\quad 15$$
$$\underline{7}$$
$$35$$
$$\underline{35}$$
$$0$$
$w = \mathbf{15}$

17. $2x = 100, 100 \div 2 = 50$
$x = \mathbf{50}$

18. $6\frac{3}{4} - 1\frac{1}{4} = 5\frac{2}{4}$
$x = \mathbf{5\frac{2}{4}}$ or $\mathbf{5\frac{1}{2}}$

19. $1\frac{5}{8} + 4\frac{1}{8} = 5\frac{6}{8}$
$x = \mathbf{5\frac{6}{8}}$ or $\mathbf{5\frac{3}{4}}$

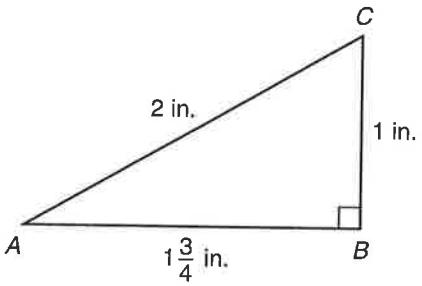
20.
$$5 \longrightarrow 4\tfrac{3}{3}$$
$$-\ 3\tfrac{1}{3} \qquad -\ 3\tfrac{1}{3}$$
$$\mathbf{1\frac{2}{3}}$$

21.
$$83\tfrac{1}{3}\% \xrightarrow{\left(82 + \frac{3}{3} + \frac{1}{3}\right)\%} 82\tfrac{4}{3}\%$$
$$-\ 66\tfrac{2}{3}\% \qquad -\ 66\tfrac{2}{3}\%$$
$$\mathbf{16\frac{2}{3}\%}$$

22. $\frac{7}{12} + \left(\frac{1}{4} \cdot \frac{1}{3}\right) = \frac{7}{12} + \left(\frac{1}{12}\right)$
$= \frac{8}{12} = \mathbf{\frac{2}{3}}$

23. $\frac{7}{8} - \left(\frac{3}{4} \cdot \frac{1}{2}\right) = \frac{7}{8} - \left(\frac{3}{8}\right) = \frac{4}{8} = \mathbf{\frac{1}{2}}$

24.



$\overline{AC}$ is about 2 inches long.

Perimeter $= 2$ in. $+ 1$ in. $+ 1\frac{3}{4}$ in.
$= 4\frac{3}{4}$ in.

The perimeter is about $4\frac{3}{4}$ inches.

25. **About 30°**

26. Perimeter $= 14$ ft $+ 14$ ft $+ 12$ ft $+ 12$ ft
$= \mathbf{52}$ **ft**

27. $\frac{3}{4} \times \frac{1}{3} = \frac{3}{12} = \mathbf{\frac{1}{4}}$

28. $\frac{3}{4} \cdot \frac{3}{3} = \frac{9}{12}$
$\frac{2}{3} \cdot \frac{4}{4} = \frac{8}{12}$
$\frac{9}{12} - \frac{8}{12} = \mathbf{\frac{1}{12}}$

29. (a) $\mathbf{4^3, 5^3}$

(b) $4^3 = 4 \cdot 4 \cdot 4 = 64$
$5^3 = 5 \cdot 5 \cdot 5 = 125$
64, 125

30. (a) $\overline{AB}$ (or $\overline{BA}$)

(b) $\angle CMB$ (or $\angle BMC$)

(c) $\angle ACB$ (or $\angle BCA$)

LESSON 24, LESSON PRACTICE

a. $\frac{48}{144} = \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{3}}}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{3}} \cdot 3} = \mathbf{\frac{1}{3}}$

b. $\frac{90}{324} = \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{3}} \cdot \overset{1}{\cancel{3}} \cdot 5}{\underset{1}{\cancel{2}} \cdot 2 \cdot \underset{1}{\cancel{3}} \cdot \underset{1}{\cancel{3}} \cdot 3 \cdot 3} = \mathbf{\frac{5}{18}}$

c. $90 = 2 \cdot 3 \cdot 3 \cdot 5$
$324 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
$\text{GCF} = 2 \cdot 3 \cdot 3 = \mathbf{18}$

d. $\frac{\overset{1}{\cancel{5}}}{8} \cdot \frac{3}{\underset{2}{\cancel{10}}} = \mathbf{\frac{3}{16}}$

e. $\frac{\overset{1}{\cancel{2}}\cancel{8}}{\underset{1}{\cancel{3}}\cancel{15}} \cdot \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{3}}\cancel{12}} \cdot \frac{\overset{1}{\cancel{3}}\cancel{9}}{\underset{5}{\cancel{10}}} = \mathbf{\frac{1}{5}}$

f. $\frac{\overset{1}{\cancel{8}}}{\underset{1}{\cancel{3}}} \cdot \frac{\overset{1}{\cancel{2}}\cancel{6}}{7} \cdot \frac{5}{\underset{1}{\cancel{2}}\cancel{16}} = \mathbf{\frac{5}{7}}$

g. $\frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{3}} \cdot \overset{1}{\cancel{3}}}{\underset{1}{\cancel{3}} \cdot \underset{1}{\cancel{3}} \cdot \underset{1}{\cancel{5}}} \cdot \frac{\overset{1}{\cancel{5}} \cdot 5}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot 2 \cdot 3} = \mathbf{\frac{5}{6}}$

LESSON 24, MIXED PRACTICE

1. $\mathbf{3026 - 2895 = D}$

3026 miles
− 2895 miles
131 miles

2. $\mathbf{15 \times 24 = M}$

15
× 24
60
30
360 **360 microprocessors**

3. $75\% = \frac{75}{100} \div \frac{25}{25} = \frac{3}{4}$

$\frac{1}{4}$ not spent, $\frac{3}{4}$ spent

$30.00
$ 7.50
$ 7.50
$ 7.50
$ 7.50

(a) $\mathbf{\frac{3}{4}}$

(b) $7.50
× 3
$22.50

4. Diameter = 2 × radius
1 yard = 36 inches
36 inches = 2 × radius
Radius = 36 inches ÷ 2 = **18 inches**

5. 30 steps ÷ 3 = 10 steps
10 steps × 2 = **20 steps**

6. (a) **8**

(b) $8 \times 3 = \mathbf{24}$

7. (a) $\mathbf{\frac{1}{3}}$

(b) $\mathbf{\frac{1}{3}}$

8. (a) $\frac{540}{600} = \frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{3}} \cdot 3 \cdot 3 \cdot \overset{1}{\cancel{5}}}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot 2 \cdot \underset{1}{\cancel{3}} \cdot \underset{1}{\cancel{5}} \cdot 5} = \mathbf{\frac{9}{10}}$

(b) $2 \cdot 2 \cdot 3 \cdot 5 = \mathbf{60}$

9. (a) **Acute angle**

(b) **Right angle**

(c) **Obtuse angle**

10. **Equivalent fractions are formed by multiplying or dividing a fraction by a fraction equal to 1. To change from fifths to thirtieths, multiply $\frac{3}{5}$ by $\frac{6}{6}$.**

11. (a) $10{,}000 = 1000 \cdot 10$

$1000 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5$

$10 = 2 \cdot 5$

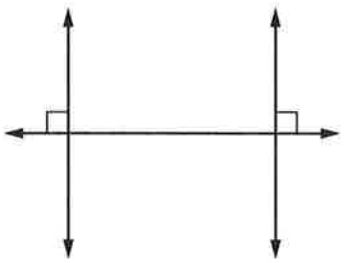
$1000 \cdot 10 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5 \cdot 2 \cdot 5$

$= \mathbf{2^4 \cdot 5^4}$

(b) $\sqrt{10{,}000} = 100$

$100 = 2 \cdot 2 \cdot 5 \cdot 5 = \mathbf{2^2 \cdot 5^2}$

12. (a)



(b) **Right angles**

13. (a) 1 yard = 36 inches

36 inches ÷ 4 = **9 inches**

(b) Area = 9 inches × 9 inches

= **81 square inches**

14. **Commutative property**

15. $4\frac{7}{12} - 1\frac{1}{12} = 3\frac{6}{12} = 3\frac{1}{2}$

$x = \mathbf{3\frac{1}{2}}$

16. $2\frac{3}{4} + 3\frac{3}{4} = 5\frac{6}{4} = 6\frac{1}{2}$

$w = \mathbf{6\frac{1}{2}}$

17.
$$\begin{array}{r} 12 \\ 8\overline{)100} \\ \underline{8} \\ 20 \\ \underline{16} \\ 4 \\ \underline{0} \\ 4 \end{array}$$

$12\frac{4}{8} = 12\frac{1}{2}$

$m = \mathbf{12\frac{1}{2}}$

18.
$$\begin{array}{r} \$0.28 \\ \times \quad 12 \\ \hline 56 \\ \underline{28} \\ \$3.36 \end{array}$$

$n = \mathbf{\$3.36}$

19. $\frac{10^5}{10^2} = \frac{\cancel{10} \cdot \cancel{10} \cdot 10 \cdot 10 \cdot 10}{\cancel{10} \cdot \cancel{10}}$

$= 10 \cdot 10 \cdot 10 = \mathbf{10^3}$ or $\mathbf{1000}$

20. $\sqrt{9} - \sqrt{4^2} = 3 - 4 = \mathbf{-1}$

21.
$$\begin{array}{r} 100\% \\ -\ 66\frac{2}{3}\% \\ \hline \end{array} \longrightarrow \begin{array}{r} 99\frac{3}{3}\% \\ -\ 66\frac{2}{3}\% \\ \hline \mathbf{33\frac{1}{3}\%} \end{array}$$

22.
$$\begin{array}{r} 5\frac{1}{8} \\ -\ 1\frac{7}{8} \\ \hline \end{array} \xrightarrow{4 + \frac{8}{8} + \frac{1}{8}} \begin{array}{r} 4\frac{9}{8} \\ -\ 1\frac{7}{8} \\ \hline 3\frac{2}{8} \end{array}$$

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

23. $\left(\frac{5}{6}\right)^2 = \frac{5}{6} \cdot \frac{5}{6} = \mathbf{\frac{25}{36}}$

24. $\frac{\cancel{2}^{1}}{\cancel{4}_{1}} \cdot \frac{1}{\cancel{2}_{1}} \cdot \frac{\cancel{8}^{1}}{\cancel{9}_{3}} = \mathbf{\frac{1}{3}}$

25. **Heptagon**

26. (a) $10 \cdot 100 = \mathbf{1000}$

(b) $10 - 100 = \mathbf{-90}$

(c) $\frac{10}{100} = \mathbf{\frac{1}{10}}$

27. Missing length = 10 yards + 10 yards

= 20 yards

Missing height = 25 yards − 20 yards

= 5 yards

Perimeter = 25 yards + 10 yards + 5 yards + 10 yards + 20 yards + 20 yards

= **90 yards**

28. $\frac{1}{4} \cdot \frac{3}{3} = \frac{3}{12}$, $\frac{1}{6} \cdot \frac{2}{2} = \frac{2}{12}$

$\frac{3}{12} + \frac{2}{12} = \mathbf{\frac{5}{12}}$

29. $\angle DAC$ and $\angle BCA$ (or $\angle CAD$ and $\angle ACB$); $\angle DCA$ and $\angle BAC$ (or $\angle ACD$ and $\angle CAB$)

30. (a) $\mathbf{-1, -\frac{1}{2}, 0, \frac{1}{2}, 1}$

(b) $1 + \frac{1}{2} = 1\frac{1}{2}$

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

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

$\mathbf{1\frac{1}{2}, 2, 2\frac{1}{2}}$

Lesson 25, Lesson Practice

a. $1 \div \frac{2}{3} = \frac{3}{2}$

$\frac{3}{4} \div \frac{2}{3} = \frac{3}{4} \times \frac{3}{2} = \frac{9}{8} = \mathbf{1\frac{9}{8}}$

b. $1 \div \frac{3}{4} = \frac{4}{3}$

$3 \div \frac{3}{4} = 3 \times \frac{4}{3} = \frac{12}{3} = \mathbf{4}$

c. **Instead of dividing by the divisor, multiply by the reciprocal of the divisor.**

d. **Pressing this key changes the number previously entered to its reciprocal (in decimal form).**

e. $1 \div \frac{2}{3} = \frac{3}{2}$

$\frac{3}{5} \div \frac{2}{3} = \frac{3}{5} \times \frac{3}{2} = \mathbf{\frac{9}{10}}$

f. $1 \div \frac{1}{4} = \frac{4}{1}$

$\frac{7}{8} \div \frac{1}{4} = \frac{7}{\cancel{8}_2} \times \frac{\cancel{4}^1}{1} = \frac{7}{2} = \mathbf{3\frac{1}{2}}$

g. $1 \div \frac{2}{3} = \frac{3}{2}$

$\frac{5}{6} \div \frac{2}{3} = \frac{5}{\cancel{6}_2} \times \frac{\cancel{3}^1}{2} = \frac{5}{4} = \mathbf{1\frac{1}{4}}$

Lesson 25, Mixed Practice

1. $6B = 324$

$6\overline{)324}$ **54 boxes**

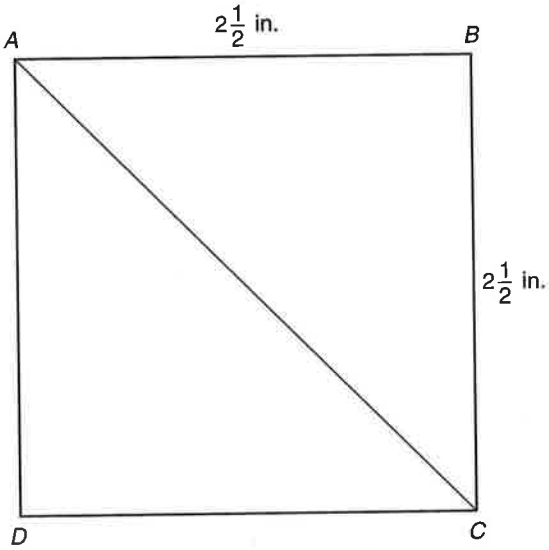
30

24

24

0

2.



(a) Perimeter $= 2\frac{1}{2}$ in. $+ 2\frac{1}{2}$ in. $+ 2\frac{1}{2}$ in. $+ 2\frac{1}{2}$ in.

$= 8\frac{4}{2}$ in. $=$ **10 in.**

(b) **90°**

(c) $180° - 90° = 90°$

$90° \div 2 = \mathbf{45°}$

(d) $90° + 45° + 45° = \mathbf{180°}$

3. 56 relatives ÷ 2 = **28 relatives**

4.
$$\begin{array}{r} 28 \text{ players} \\ -\ 7 \text{ players} \\ \hline \textbf{21 players} \end{array}$$

5. 28 players ÷ 2 = **14 players**

6. $70\% = \frac{70}{100} \div \frac{10}{10} = \frac{7}{10}$

310 pages

$\frac{7}{10}$ have been read.	31 pages
	31 pages
	31 pages
	31 pages
	31 pages
	31 pages
	31 pages
$\frac{3}{10}$ have not been read.	31 pages
	31 pages
	31 pages

(a) 7 × 31 pages = **217 pages**

(b) 3 × 31 pages = **93 pages**

7. (a) $1 \div \frac{3}{4} = \mathbf{\frac{4}{3}}$

(b) $\frac{7}{8} \div \frac{3}{4} = \frac{7}{\cancel{8}_{2}} \times \frac{\overset{1}{\cancel{4}}}{3} = \frac{7}{6} = \mathbf{1\frac{1}{6}}$

8. C. $\mathbf{\frac{2}{5}}$

A little less than half is shaded. We eliminate $\frac{2}{3}$, which is more than $\frac{1}{2}$. Since $\frac{2}{4}$ equals $\frac{1}{2}$, and $\frac{2}{5}$ is a little less than $\frac{1}{2}$, we choose $\frac{2}{5}$.

9. $84 = 2 \cdot 2 \cdot 3 \cdot 7$

$210 = 2 \cdot 3 \cdot 5 \cdot 7$

$$\frac{\overset{1}{\cancel{2}} \cdot 2 \cdot \overset{1}{\cancel{3}} \cdot \overset{1}{\cancel{7}}}{\underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{3}} \cdot 5 \cdot \underset{1}{\cancel{7}}} = \mathbf{\frac{2}{5}}$$

10. (a) $\mathbf{\frac{10}{9}}$

(b) $\mathbf{\frac{1}{8}}$

(c) $2\frac{3}{8} = \frac{19}{8}, \mathbf{\frac{8}{19}}$

11. $\frac{3}{4} \cdot \frac{5}{5} = \frac{15}{20}, \frac{4}{5} \cdot \frac{4}{4} = \frac{16}{20}$

$\frac{15}{20} + \frac{16}{20} = \frac{31}{20} = \mathbf{1\frac{11}{20}}$

12. $640 = 40 \cdot 16 = 2^3 \cdot 5 \cdot 16$

$= 2 \cdot 2 \cdot 2 \cdot 5 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$= \mathbf{2^7 \cdot 5}$

13. $2\frac{2}{3} = \frac{8}{3}, 2\frac{1}{4} = \frac{9}{4}$

$\frac{\overset{2}{\cancel{8}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{3}{\cancel{9}}}{\underset{1}{\cancel{4}}} = \mathbf{6}$

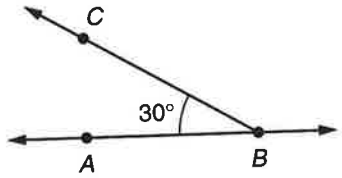
14. (a) A: $4\frac{4}{6} = \mathbf{4\frac{2}{3}}$

B: $5\frac{3}{6} = \mathbf{5\frac{1}{2}}$

(b) $5\frac{3}{6} \xrightarrow{4 + \frac{6}{6} + \frac{3}{6}} 4\frac{9}{6}$

$$\begin{array}{r} 4\frac{9}{6} \\ -\ 4\frac{4}{6} \\ \hline \mathbf{\frac{5}{6}} \end{array}$$

15. (a)



(b) **Acute angle**

16. $3 \longrightarrow 2\frac{12}{12}$

$$\begin{array}{r} 2\frac{12}{12} \\ -\ 1\frac{7}{12} \\ \hline y = \mathbf{1\frac{5}{12}} \end{array}$$

17. $5\frac{7}{8} + 4\frac{5}{8} = 9\frac{12}{8} = 10\frac{4}{8} = 10\frac{1}{2}$

$x = \mathbf{10\frac{1}{2}}$

18.
$$\begin{array}{r} 45^\circ \\ 8\overline{)360^\circ} \\ \underline{32} \\ 40 \\ \underline{40} \\ 0 \end{array}$$
$n = \mathbf{45^\circ}$

19. $1^3 = 1 \cdot 1 \cdot 1 = 1, \frac{3}{4}$

$m = \mathbf{\frac{3}{4}}$

20. $6\frac{1}{6} + 1\frac{5}{6} = 7\frac{6}{6} = \mathbf{8}$

21. $\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}} \cdot \frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{9}}} \cdot \frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{15}}} = \mathbf{\frac{2}{9}}$

22. $1 \div \frac{2}{1} = \frac{1}{2}$

$\frac{4}{5} \div \frac{2}{1} = \frac{\overset{2}{\cancel{4}}}{5} \times \frac{1}{\underset{1}{\cancel{2}}} = \mathbf{\frac{2}{5}}$

23. $1 \div \frac{6}{5} = \frac{5}{6}$

$\frac{8}{5} \div \frac{6}{5} = \frac{\overset{4}{\cancel{8}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{6}}} = \frac{4}{3} = \mathbf{1\frac{1}{3}}$

24. $1 \div \frac{5}{6} = \frac{6}{5}$

$\frac{3}{7} \div \frac{5}{6} = \frac{3}{7} \times \frac{6}{5} = \mathbf{\frac{18}{35}}$

25.
$$\begin{array}{r} 12 \\ 8\overline{)100} \\ \underline{8} \\ 20 \\ \underline{16} \\ 4 \\ \underline{0} \\ 4 \end{array}$$
$12\frac{4}{8}\% = \mathbf{12\frac{1}{2}\%}$

26. $\mathbf{\frac{5}{3}}$

27. (a) $2^2 \cdot 2^3 = 4 \cdot 8$

$\mathbf{4 \cdot 8 = 8 \cdot 4}$ or

$\mathbf{32 = 32}$

(b) **2**

28. Perimeter = 6 inches + 6 inches + 6 inches + 6 inches + 6 inches + 6 inches = 36 inches

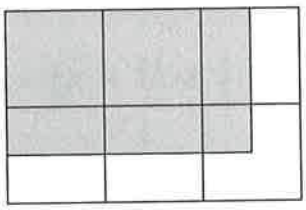
36 inches ÷ 12 = **3 feet**

29. Perimeter = 4 in. + 2 in. + 2 in. + 2 in. + 2 in. + 4 in. = **16 in.**

30. Third prime number = 5, **−5**

LESSON 26, LESSON PRACTICE

a.



Area $= 2 \text{ in.}^2 + \frac{3}{2} \text{ in.}^2 + \frac{1}{4} \text{ in.}^2$

$= 2 \text{ in.}^2 + \frac{6}{4} \text{ in.}^2 + \frac{1}{4} \text{ in.}^2$

$= 2\frac{7}{4} \text{ in.}^2 = \mathbf{3\frac{3}{4} \text{ in.}^2}$

check: $1\frac{1}{2} \text{ in.} \times 2\frac{1}{2} \text{ in.}$

$= \frac{3}{2} \text{ in.} \times \frac{5}{2} \text{ in.} = \frac{15}{4} \text{ in.}^2$

$= 3\frac{3}{4} \text{ in.}^2$

b. $6\frac{2}{3} \times \frac{3}{5} = \frac{\overset{4}{\cancel{20}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{5}}} = \mathbf{4}$

c. $2\frac{1}{3} \times 3\frac{1}{2} = \frac{7}{3} \times \frac{7}{2} = \frac{49}{6} = \mathbf{8\frac{1}{6}}$