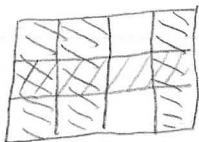


#1. (a)  $\frac{1}{4} \cdot \frac{1}{3} = \frac{1}{12}$

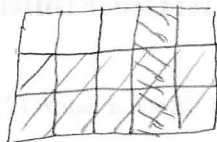
(b)  $\frac{2}{4} \times \frac{3}{5} = \frac{6}{20} = \frac{3}{10}$

#2. (a)



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

(b)



$\frac{2}{3} \cdot \frac{1}{5} = \frac{2}{15}$

#3. (a)  $\frac{49}{65} \cdot \frac{26}{98} = \frac{\overset{1}{\cancel{49}}}{\underset{5}{\cancel{65}}} \cdot \frac{\overset{2}{\cancel{26}}}{\underset{2}{\cancel{98}}} = \frac{1}{5}$

(b)  $\frac{a}{b} \cdot \frac{b^2}{a^2} = \frac{\overset{1}{\cancel{a}}}{\underset{1}{\cancel{b}}} \cdot \frac{\overset{1}{\cancel{b}} \cdot \overset{1}{\cancel{b}}}{\underset{1}{\cancel{a}} \cdot \underset{1}{\cancel{a}}} = \frac{b}{a}$

(c)  $\frac{xy}{z} \cdot \frac{z^2 a}{x^3 y^2} = \frac{\overset{1}{\cancel{xy}}}{\underset{1}{\cancel{z}}} \cdot \frac{\overset{1}{\cancel{z}} \cdot \overset{1}{\cancel{z}} \cdot \overset{1}{\cancel{a}}}{\underset{1}{\cancel{x}} \cdot \underset{1}{\cancel{x}} \cdot \underset{1}{\cancel{y}} \cdot \underset{1}{\cancel{y}}} = \frac{za}{x^2 y}$

#4. (a)  $4\frac{1}{2} \cdot 2\frac{1}{3} = (4\frac{1}{2})(2 + \frac{1}{3})$   
 $= (4\frac{1}{2}) \cdot 2 + (4\frac{1}{2}) \cdot \frac{1}{3}$   
 $= (4 + \frac{1}{2}) \cdot 2 + (4 + \frac{1}{2}) \cdot \frac{1}{3}$   
 $= 4 \cdot 2 + \frac{1}{2} \cdot 2 + 4 \cdot \frac{1}{3} + \frac{1}{2} \cdot \frac{1}{3}$   
 $= 8 + 1 + \frac{4}{3} + \frac{1}{6}$   
 $= 9 + 1\frac{2}{6} + \frac{1}{6}$   
 $= 10\frac{3}{6} = 10\frac{1}{2}$

(b)  $3\frac{1}{3} \cdot 2\frac{1}{2} = (3\frac{1}{3})(2 + \frac{1}{2})$   
 $= (3\frac{1}{3}) \cdot 2 + (3\frac{1}{3}) \cdot \frac{1}{2}$   
 $= (3 + \frac{1}{3}) \cdot 2 + (3 + \frac{1}{3}) \cdot \frac{1}{2}$   
 $= 3 \cdot 2 + \frac{1}{3} \cdot 2 + 3 \cdot \frac{1}{2} + \frac{1}{3} \cdot \frac{1}{2}$   
 $= 6 + \frac{2}{3} + \frac{3}{2} + \frac{1}{6}$   
 $= 6 + \frac{4}{6} + \frac{9}{6} + \frac{1}{6}$   
 $= 6 + \frac{14}{6} = 8\frac{2}{6} = 8\frac{1}{3}$

#5. (a) -3 (b)  $3\frac{1}{3} = \frac{10}{3}$ ;  $\frac{3}{10}$  (c)  $\frac{y}{x}$  (d)  $-\frac{1}{7}$

#6. (a)  $\frac{2}{3}x = \frac{7}{6}$   
 $x = \frac{7}{6} \cdot \frac{3}{2} = \frac{7}{4}$   
 $x = 1\frac{3}{4}$

(b)  $\frac{3}{4} \div x = \frac{1}{2}$   
 $\frac{3}{4} = \frac{1}{2}x$   
 $\frac{3}{4} \cdot \frac{2}{1} = x$   
 $x = \frac{3}{2} = 1\frac{1}{2}$

(c)  $\frac{5}{6} + \frac{2}{3}x = \frac{3}{4}$   
 $\frac{2}{3}x = \frac{9}{12} - \frac{10}{12}$   
 $x = -\frac{1}{12} \cdot \frac{3}{2}$   
 $x = -\frac{1}{8}$

(d)  $\frac{2x}{3} - \frac{1}{4} = \frac{x}{6} + \frac{1}{2}$   
 $\frac{4}{6}x - \frac{1}{6}x = \frac{2}{4} + \frac{1}{4}$   
 $\frac{1}{2}x = \frac{3}{4}$   
 $x = \frac{3}{4} \cdot \frac{2}{1} = \frac{3}{2}$   
 $x = 1\frac{1}{2}$

$$\#7. (a) \frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \cdot \frac{4}{1} = 2$$

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

$$2 \neq \frac{1}{2}$$

$$(b) \left(\frac{1}{4} \div \frac{1}{2}\right) \div \frac{1}{3} = \left(\frac{1}{4} \cdot \frac{2}{1}\right) \div \frac{1}{3} = \frac{1}{2} \div \frac{1}{3}$$

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

$$\frac{1}{4} \div \left(\frac{1}{2} \div \frac{1}{3}\right) = \frac{1}{4} \div \left(\frac{1}{2} \cdot \frac{3}{1}\right) = \frac{1}{4} \div \frac{3}{2}$$

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

$$\frac{3}{2} \neq \frac{1}{6}$$

$$\#8. (a) 3\frac{1}{4} \cdot 8 = \left(3 + \frac{1}{4}\right) \cdot 8$$

$$= 24 + 2$$

$$= 26$$

$$(b) 7\frac{1}{4} \cdot 4 = \left(7 + \frac{1}{4}\right) \cdot 4$$

$$= 28 + 1$$

$$= 29$$

$$(c) 9\frac{1}{5} \cdot 10 = \left(9 + \frac{1}{5}\right) \cdot 10$$

$$= 90 + 2$$

$$= 92$$

$$(d) 8 \cdot 2\frac{1}{4} = 8 \left(2 + \frac{1}{4}\right)$$

$$= 16 + 2$$

$$= 18$$

$$\#13. \frac{5}{8}x = 6000$$

$$x = \frac{6000}{\frac{5}{8}} \cdot \frac{8}{8}$$

$$x = 9600$$

The college has 9600 students.

$$\#14. 1 - \left(\frac{5}{9} + \frac{1}{2} \cdot \frac{5}{9}\right) = 1 - \left(\frac{10}{18} + \frac{5}{18}\right)$$

$$= 1 - \frac{15}{18} = \frac{18}{18} - \frac{15}{18} = \frac{3}{18} = \frac{1}{6}$$

One-sixth of the stock is owned by people other than Alberto or Renatta.

$$\#15. x - \frac{1}{4}x = 180$$

$$\frac{3}{4}x = 180$$

$$x = \frac{180}{\frac{3}{4}} \cdot \frac{4}{4}$$

$$x = 240$$

The original price of the suit was \$240.

$$\#17. \frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2}x\right)\right) = 4$$

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

$$x = 32$$

Al originally had 32 marbles.

$$\#19. (a) \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^7 = \left(\frac{1}{2}\right)^{10}$$

$$(b) \left(\frac{1}{2}\right)^9 \div \left(\frac{1}{2}\right)^6 = \left(\frac{1}{2}\right)^3$$

$$(c) \left(\frac{2}{3}\right)^5 \left(\frac{4}{9}\right)^2 = \left(\frac{2}{3}\right)^5 \left(\frac{2}{3}\right)^4$$

$$(d) \left(\frac{3}{5}\right)^7 \div \left(\frac{3}{5}\right)^7 = 1$$

$$= \left(\frac{2}{3}\right)^9$$

p. 400

#23. (a)  $(\frac{1}{2})^3 > (\frac{1}{2})^4$

(b)  $(\frac{3}{4})^8 > (\frac{3}{4})^{10}$

(c)  $(\frac{4}{3})^{10} > (\frac{4}{3})^8$

(d)  $(\frac{4}{5})^{10} > (\frac{3}{4})^{10}$

p. 404

#24. (a)  $-\frac{3}{16} + \frac{7}{4} = -\frac{3}{16} + \frac{28}{16} = \frac{25}{16} = 1\frac{9}{16}$

(b)  $\frac{1}{6} + (-\frac{4}{9}) + \frac{5}{3} = \frac{3}{18} + (-\frac{8}{18}) + \frac{30}{18} = \frac{25}{18} = 1\frac{7}{18}$

(c)  $\frac{-5}{2^3 \cdot 3^2} - (\frac{-5}{2 \cdot 3^3}) = \frac{-5 \cdot 3}{2^3 \cdot 3^3} + \frac{5 \cdot 4}{2^3 \cdot 3^3} = \frac{-15}{8 \cdot 27} + \frac{20}{8 \cdot 27} = \frac{5}{216}$

(d)  $3\frac{4}{5} = 3\frac{24}{30}$   
 $+ 4\frac{5}{6} = +4\frac{25}{30}$   

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 $7\frac{49}{30} = 8\frac{19}{30}$

(e)  $5\frac{1}{6} = 5\frac{4}{24} = 4\frac{28}{24}$   
 $- 3\frac{5}{8} = -3\frac{15}{24} = -3\frac{15}{24}$   

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 $1\frac{13}{24}$

(f)  $-4\frac{1}{3} = -4\frac{4}{12}$   
 $-5\frac{5}{12} = -5\frac{5}{12}$   

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 $-9\frac{9}{12} = -9\frac{3}{4}$

TIMSS

$\frac{1}{3} \cdot 600 = 200$

The box has 200 red balls.

$6 \div \frac{1}{5} = 6 \cdot 5 = 30$

Thirty scoops of flour are needed to fill a bag.

# Worksheet

$$1. \frac{1}{4} \times \frac{1}{8} = \frac{1}{32} \quad 2. \frac{5}{8} \times 24 = \frac{5}{\cancel{8}_1} \times \frac{24^3}{1} = \frac{5}{1} \times \frac{3}{1} = 15$$

$$3. \frac{2}{5} \div \frac{1}{4} = \frac{2}{5} \times \frac{4}{1} = \frac{8}{5} = 1\frac{3}{5} \quad 4. \frac{9}{10} \div 12 = \frac{9}{10} \times \frac{1}{12} = \frac{3}{40}$$

$$6. 8 \times \frac{3}{8} = \frac{\cancel{8}_1}{1} \times \frac{3}{\cancel{8}_1} = \frac{3}{1} = 3 \quad 8. \frac{7}{8} \div \frac{7}{32} = \frac{7}{\cancel{8}_1} \times \frac{32^4}{7} = \frac{4}{1} = 4$$

$$9. 2\frac{3}{5} \times \frac{3}{4} = \frac{13}{5} \times \frac{3}{4} = \frac{39}{20} = 1\frac{19}{20} \quad 10. 4\frac{1}{2} \times 2\frac{2}{3} = \frac{9}{2} \times \frac{8}{3} = \frac{12}{1} = 12$$

$$13. 2\frac{1}{2} \times 3\frac{3}{4} \times 5\frac{1}{3} = \frac{5}{2} \times \frac{15}{4} \times \frac{16}{3} = \frac{5 \times 5 \times 2}{1} = 50$$

$$14. 1\frac{7}{8} \div \frac{15}{32} = \frac{15}{8} \times \frac{32}{15} = \frac{4}{1} = 4 \quad 15. \frac{7}{10} \div 5\frac{3}{5} = \frac{7}{10} \div \frac{28}{5} = \frac{7}{10} \times \frac{5}{28} = \frac{1}{8}$$

$$17. 4\frac{1}{6} \div 4\frac{3}{8} = \frac{25}{6} \div \frac{35}{8} = \frac{25}{6} \times \frac{8}{35} = \frac{20}{21}$$

$$18. 5\frac{4}{5} \div 2\frac{1}{2} = \frac{29}{5} \div \frac{5}{2} = \frac{29}{5} \times \frac{2}{5} = \frac{58}{25} = 2\frac{8}{25}$$

$$20. 35\frac{1}{2} \div 2\frac{7}{8} = \frac{71}{2} \div \frac{23}{8} = \frac{71}{2} \times \frac{8}{23} = \frac{284}{23} = 12\frac{8}{23}$$

You would need 13 pieces of tile.

$$22. 239\frac{1}{4} \div 14\frac{1}{2} = \frac{957}{4} \div \frac{29}{2} = \frac{957}{4} \times \frac{2}{29} = \frac{957}{58} = 16\frac{29}{58} = 16\frac{1}{2}$$

$$2(14\frac{1}{2} + 16\frac{1}{2}) = 2(30\frac{2}{2}) = 2(31) = 62$$

The perimeter is 62 feet.

$$\begin{array}{r} 12 \\ 23 \overline{) 284} \\ \underline{-23} \phantom{0} \\ 54 \\ \underline{-46} \phantom{0} \\ 8 \end{array}$$

$$\begin{array}{r} 239 \\ \times 4 \\ \hline 956 \\ \phantom{0} 16\frac{29}{58} \\ 58 \overline{) 957} \\ \underline{-58} \phantom{0} \\ 377 \\ \underline{-348} \phantom{0} \\ 29 \end{array}$$