UNITS
1-4

Simply Good and Beautiful

MATH 7

ANSWERS & SOLUTIONS

The Good and the Beautiful
CURRICULUM

Note to Parents

Math 7 Answers and Solutions **includes detailed solutions for all problems in the course book. Final answers are boxed for easy reference. Solutions are not included for the Video Notes section of each lesson. Parents do not need to check this section. Students complete notes along with the video instructor and try problems on their own that are then checked in the video. Student answers may not be correct in this section, and that is OK. Mastery is not expected in the Video Notes section.**

Table of Contents

Writing Decimals, Estimating, and Rounding

WARM-UP

a. $45 \div 15 = 3$

b. $16 \bullet 4 = 64$

c. $56 \div 8 = 7$

PRACTICE

1. a. 19 is close to 20.
Estimate: $20 \div 5 = 4$

b. 47 is close to 45.
Estimate: $45 \div 15 = 3$

2.

Problem	Answer Terminates	Answer Repeats
$8.52 \bullet 4.09$	✓	
$103 \div 3$		✓
$39 \div 3$	✓	
$68.6868 \bullet 4.44$	✓	
$56 \div 3$		✓

3. a. $33 \div 13 = 2.\overline{538461}$
$33 \div 13 \approx 2.5385$

b. $4.56 \bullet 2.6398 = 12.037488$
$4.56 \bullet 2.6398 \approx 12.0375$

c. $8.623 \bullet 5.01 = 43.20123$
$8.623 \bullet 5.01 \approx 43.2012$

4. a. $98 \div 15 = 6.53333\ldots = 6.5\overline{3}$

b. $65 \div 12 = 5.4166\ldots = 5.41\overline{6}$

c. $134 \div 11 = 12.181818\ldots = 12.\overline{18}$

5. a. 34 is close to 35.
Estimate: $35 \div 5 = 7$

b. Since $34 < 35$,
the quotient will be less than the estimate.

6. $\$34 \div 5$

$$\begin{array}{r} 6.8 \\ 5\overline{)34.0} \\ -30 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

$\$6.80$

7. $34 \text{ cm} \div 5$

$$\begin{array}{r} 6.8 \\ 5\overline{)34.0} \\ -30 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

6.8 cm

8. 34 students ÷ 5

$$
\begin{array}{r}
6.8 \\
5\overline{)34.0} \\
-30 \\
\hline
40 \\
-40 \\
\hline
0
\end{array}
$$

Since there cannot be 0.8 of a car, 7 cars are needed.

7 cars

9.

$65 \div 6$	$11.\overline{5}$	12.6
$63 \div 5$	$115 \div 10$	$38 \div 3$
$10.8\overline{3}$	$1266 \div 100$	$10.\overline{83}$
$11.\overline{56}$	12.66	12.7
$254 \div 20$	11.5	$1145 \div 99$
$104 \div 9$	$12.\overline{6}$	$1073 \div 99$

REVIEW

1. O = 30

5	×	6	=	30
6	×	5	=	30
30	÷	5	=	6
30	÷	6	=	5

2. T = 4, R = 24

4	×	6	=	24
6	×	4	=	24
24	÷	4	=	6
24	÷	6	=	4

3. S = 54, E = 9

6	×	9	=	54
9	×	6	=	54
54	÷	6	=	9
54	÷	9	=	6

4. D = 7, I = 63

7	×	9	=	63
9	×	7	=	63
63	÷	7	=	9
63	÷	9	=	7

5. M = 36

3	×	12	=	36
12	×	3	=	36
36	÷	3	=	12
36	÷	12	=	3

6. H = 22

2	×	11	=	22
11	×	2	=	22
22	÷	2	=	11
22	÷	11	=	2

7. C = 72

8	×	9	=	72
9	×	8	=	72
72	÷	8	=	9
72	÷	9	=	8

8. N = 70

7	×	10	=	70
10	×	7	=	70
70	÷	7	=	10
70	÷	10	=	7

Why didn't the dime roll down the mountain with the nickel?

Because IT HAD MORE CENTS!

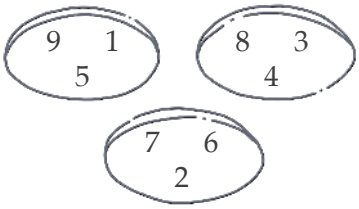
Logic Lesson 1

Logic puzzles can be approached in many different ways. The solutions here may not represent all possible methods or answers.

Hole 1: Answers may vary. An example is given.

$9+8+7+65+4+3+2+1$

Hole 2: Answers may vary. An example is given.



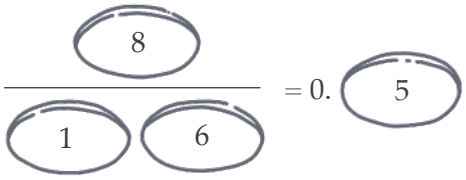
Sum of each hole: 15

Hole 3:

$99 \div 5\frac{1}{2} = 99 \div 5.5 = 18$

18 years old

Hole 4: Answers may vary. An example is given.



8 divided by 16 is 0.5.

Hole 5:

Person A: 8 handshakes

Person B: 7 handshakes (already counted handshake with Person A)

Person C: 6 handshakes (already counted handshakes with Person A and Person B)

Person D: 5 handshakes

Person E: 4 handshakes

Person F: 3 handshakes

Person G: 2 handshakes

Person H: 1 handshake

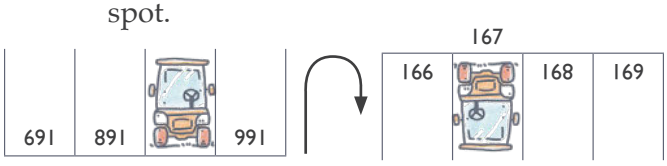
Person I: 0 handshakes (already shook hands with everyone else)

36 handshakes

Hole 6: Answers may vary. An example is given.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ } \\ 147 \\ 263 \\ +\ 589 \\ \hline 999 \end{array}$$

Hole 7: 167 The numbers are upside down. They are viewed as if pulling into the parking spot.



Hole 8:

1. $9 = 9 \bullet 1$

   $1 \_\_ \_\_ 9$

2. $\frac{2}{\cancel{3}_{1}} \bullet \frac{\overset{3}{\cancel{9}}}{1} = 6$

   $1 \_\_ 6\ 9$

3. $\frac{2}{\cancel{3}_{1}} \bullet \frac{\overset{2}{\cancel{6}}}{1} = 4$

Mystery number: 1469

Hole 9: Information that can be gathered from each clue is shown below. A check is placed in a box when the answer is known for certain, and an X is placed in a box if it cannot be the answer. When a check is placed in a box, Xs can be placed in the rest of the boxes in the row and column for that section.

		Course				Number of Holes Played			
		Greenfield Golf	Putter's Paradise	Par for the Course	The Cart Club	9	18	27	36
Family	Stewart	X	✓	X	X	✓	X	X	X
	Lin	X	X	X	✓	X	X	X	✓
	Miller	✓	X	X	X	X	✓	X	X
	O'Brien	X	X	✓	X	X	X	✓	X
Number of Holes Played	9	X	✓	X	X				
	18	✓	X	X	X				
	27	X	X	✓	X				
	36	X	X	X	✓				

1. The Millers cannot have played 9 holes because they played more than the Stewarts, and they cannot have played 36 holes because they played less than the O'Briens. The Stewarts cannot have played 36 holes because the Millers played more than them, and the O'Briens did not play 9 holes because the Millers played fewer than them.
2. The family who played Putter's Paradise course cannot have played 36 holes.
3. A check mark can be placed in the box for playing 27 holes at Par for the Course.
4. The O'Briens played 27 or 36 holes.
5. 36 is the only value that is four times another, so the Lins played 36 holes, and the Stewarts played 9 holes. This information, along with Clue 4, means that the Millers played 18 holes and the O'Briens played 27 holes. This means that the O'Briens played Par for the Course (Clue 3).
6. Since the Millers did not play at Putter's Paradise, the Stewarts or Lins must have played this course. However, the family who played Putter's Paradise played 9 or 18 holes. The Lins played 36 holes, so they could not have played Putter's Paradise. The Stewarts played 9 holes, so they played Putter's Paradise.
7. The only options left for Greenfield Golf are 18 or 36 holes. Since the family who played this course played 9 or 18 holes, they must have played 18 holes. Therefore the family who played The Cart Club played 36 holes. The rest of the answers can now be found based on the available options, but two additional clues are given.
8. The Lin family played 36 holes at The Cart Club.
9. The Miller family played at Greenfield Golf.

Unit 1 Review

1. $200 \bullet 4 = 800$
$250 \bullet 4 = 1000$
Estimate: between 800 and 1000

Rounded:
$241 \bullet 3.7412 = 901.6292 \approx 901.629$

2.
$$\begin{array}{r} 13.16\ldots \\ 48\overline{)632.00\ldots} \\ -48 \\ \hline 152 \\ -144 \\ \hline 80 \\ -48 \\ \hline 320 \\ -288 \\ \hline 32 \end{array}$$

$632 \div 48 = 13.1\overline{6}$

3.

Fraction	Decimal
$\frac{3}{5}$	0.6
$\frac{2}{3}$	$0.\overline{6}$
$4\frac{5}{8}$	4.625

Detailed work is shown below.

$0.6 = \frac{6}{10} = \frac{3}{5}$

$\frac{2}{3} \rightarrow$
$$\begin{array}{r} 0.6\ldots \\ 3\overline{)2.0\ldots} \\ -18 \\ \hline 2 \end{array}$$

$4\frac{5}{8} = \frac{37}{8}$

$$\begin{array}{r} 4.625 \\ 8\overline{)37.000} \\ -32 \\ \hline 50 \\ -48 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

4.
$$\begin{array}{r|l} 2 & 420 \\ 2 & 210 \\ 3 & 105 \\ 5 & 35 \\ & 7 \end{array} \qquad \begin{array}{r|l} 2 & 600 \\ 2 & 300 \\ 2 & 150 \\ 3 & 75 \\ 5 & 25 \\ & 5 \end{array}$$

$\frac{420}{600} = \frac{\cancel{2} \bullet \cancel{2} \bullet \cancel{3} \bullet \cancel{5} \bullet 7}{\cancel{2} \bullet \cancel{2} \bullet 2 \bullet \cancel{3} \bullet \cancel{5} \bullet 5} = \frac{7}{10}$

5.
$$\begin{array}{r|l} 2 & 248 \\ 2 & 124 \\ 2 & 62 \\ & 31 \end{array} \qquad \begin{array}{r|l} 2 & 1240 \\ 2 & 620 \\ 2 & 310 \\ 5 & 155 \\ & 31 \end{array}$$

$\frac{248}{1240} = \frac{\cancel{2} \bullet \cancel{2} \bullet \cancel{2} \bullet \cancel{31}}{\cancel{2} \bullet \cancel{2} \bullet \cancel{2} \bullet 5 \bullet \cancel{31}} = \frac{1}{5}$

6.

Expression	Value
$4-10+2+7-1$	2
$-3+5-7+4-2$	-3
$-1+4-2-(-1)$	2

Detailed work is shown below.

$$\begin{aligned}&4-10+2+7-1\\&=-6+2+7-1\\&=-4+7-1\\&=3-1\\&=2\end{aligned}$$

$$\begin{aligned}&-3+5-7+4-2\\&=2-7+4-2\\&=-5+4-2\\&=-1-2\\&=-3\end{aligned}$$

$$\begin{aligned}&-1+4-2-(-1)\\&=3-2-(-1)\\&=1-(-1)\\&=1+1\\&=2\end{aligned}$$

Expression	Value
$\frac{3}{4}-\frac{7}{8}$	$-\frac{1}{8}$
$\frac{1}{2}+\left(-\frac{5}{8}\right)$	$-\frac{1}{8}$
$3-6.5$	-3.5

Detailed work is shown below.

$$\frac{3}{4}-\frac{7}{8}=\frac{6}{8}-\frac{7}{8}=-\frac{1}{8}$$

$$\frac{1}{2}+\left(-\frac{5}{8}\right)=\frac{4}{8}+\left(-\frac{5}{8}\right)=-\frac{1}{8}$$

$$3-6.5=3+(-6.5)$$

$$6.5-3=3.5$$

$$|-6.5|>|3|$$

$$3-6.5=-3.5$$

7. a. same sign, positive answer

$$\begin{array}{r}{}^{1}17\\ \times\ 2\\ \hline 34\end{array}$$

$-17\bullet(-2)=34$

b. different signs, negative answer

$$\begin{array}{r}3.4\\ \times\ 1.2\\ \hline 68\\ +\ 340\\ \hline 4.08\end{array}$$

$1.2\bullet(-3.4)=-4.08$

8. a. different signs, negative answer

$$\begin{array}{r}12\\ 7\overline{)84}\\ \underline{-7}\\ 14\\ \underline{-14}\\ 0\end{array}$$

$84\div(-7)=-12$

b. different signs, negative answer

$$\frac{-3\frac{4}{5}}{\frac{5}{12}}$$

$$\begin{aligned}&=-3\frac{4}{5}\div\frac{5}{12}\\&=-\frac{19}{5}\bullet\frac{12}{5}\\&=-\frac{228}{25}\\&=-9\frac{3}{25}\end{aligned}$$

$$\frac{-3\frac{4}{5}}{\frac{5}{12}} = -9\frac{3}{25}$$

9.

Exponent Form	Expansion	Simplified
4^3	$4 \bullet 4 \bullet 4$	64
$(-3)^5$	$-3(-3)(-3)(-3)(-3)$	-243
$\frac{75}{5^4}$	$\frac{75}{5 \bullet 5 \bullet 5 \bullet 5}$	$\frac{3}{25}$
$\left(\frac{4}{5}\right)^4$	$\frac{4}{5} \bullet \frac{4}{5} \bullet \frac{4}{5} \bullet \frac{4}{5}$	$\frac{256}{625}$
3^{-5}	$\frac{1}{3 \bullet 3 \bullet 3 \bullet 3 \bullet 3}$	$\frac{1}{243}$
10^{-6}	$\frac{1}{10 \bullet 10 \bullet 10 \bullet 10 \bullet 10 \bullet 10}$	$\frac{1}{1000000}$

Detailed work is shown below.

$$(-3)^5$$
$$= -3 \bullet (-3) \bullet (-3) \bullet (-3) \bullet (-3)$$
$$= 9 \bullet (-3) \bullet (-3) \bullet (-3)$$
$$= -27 \bullet (-3) \bullet (-3)$$
$$= 81 \bullet (-3)$$
$$= -243$$

$$\frac{75}{5^4} = \frac{75}{5 \bullet 5 \bullet 5 \bullet 5} = \frac{3 \bullet \cancel{5} \bullet \cancel{5}}{\cancel{5} \bullet \cancel{5} \bullet 5 \bullet 5} = \frac{3}{25}$$

$$\left(\frac{4}{5}\right)^4 = \frac{4}{5} \bullet \frac{4}{5} \bullet \frac{4}{5} \bullet \frac{4}{5} = \frac{256}{625}$$

$$10^{-6} = \frac{1}{10^6} = \frac{1}{10 \bullet 10 \bullet 10 \bullet 10 \bullet 10 \bullet 10} = \frac{1}{1000000}$$

10. a. $10^{-2} \rightarrow 1.$
0.01

b. $10^{-5} \rightarrow 1.$
0.00001

11. a.
$$500002014$$
$$= 500000000 + 2000 + 10 + 4$$
$$= (5 \bullet 100000000) + (2 \bullet 1000) + (1 \bullet 10) + (4 \bullet 1)$$
$$= (5 \bullet 10^8) + (2 \bullet 10^3) + (1 \bullet 10^1) + (4 \bullet 10^0)$$

b.
$$6284.203$$
$$= 6000 + 200 + 80 + 4 + 0.2 + 0.003$$
$$= (6 \bullet 1000) + (2 \bullet 100) + (8 \bullet 10) + (4 \bullet 1) + (2 \bullet 0.1) + (3 \bullet 0.001)$$
$$= (6 \bullet 10^3) + (2 \bullet 10^2) + (8 \bullet 10^1) + (4 \bullet 10^0) + (2 \bullet 10^{-1}) + (3 \bullet 10^{-3})$$

12. a. $54{,}382{,}300{,}000 = 5.43823 \times 10^{10}$

b. $0.0000000423 = 4.23 \times 10^{-8}$

13. a. $8.15 \times 10^{-3} \rightarrow 8.15$
0.00815

b. $9.01 \times 10^6 \rightarrow 9.01$
9010000

Unit 1 Assessment

Note to parent/teacher: This assessment covers concepts taught in Unit 1. Problems are designed to assess multiple skills. If a problem is missed, show the student the answer and allow him or her time to find the error. Often, students can correct mistakes when checking their work. If the student still has difficulty, have him or her revisit the corresponding lesson for review. Corresponding lesson numbers are listed in the course book at the end of each problem.

1. a. $7 \cdot 3 = 21$

$8 \cdot 3 = 24$

Estimate: between 21 and 24

Rounded: $7.412 \cdot 3 = 22.236 \approx 22.24$

b. $6 \cdot 4 = 24$

Estimate: 24

Rounded: $5.963 \cdot 4.2 = 25.0446 \approx 25.04$

2. a. $2 \overline{)342}$

$3 \overline{)171}$

$3 \overline{)57}$

19

$342 = 2 \cdot 3^2 \cdot 19$

b. $2 \overline{)450}$

$3 \overline{)225}$

$3 \overline{)75}$

$5 \overline{)25}$

5

$450 = 2 \cdot 3^2 \cdot 5^2$

3. $\frac{342}{450} = \frac{\cancel{2} \cdot \cancel{3} \cdot \cancel{3} \cdot 19}{\cancel{2} \cdot \cancel{3} \cdot \cancel{3} \cdot 5 \cdot 5} = \frac{19}{25}$

4. $420 \overline{)70} \longrightarrow 42 \overline{)7.00...}$

-42

280

-252

28

$70 \div 420 = 0.\overline{16}$

5. a.

$$5 \overline{)4.0}$$
$$-40$$
$$0$$

$\frac{4}{5} = 0.8$

b.

$$6 \overline{)5.00...}$$
$$-48$$
$$20$$
$$-18$$
$$2$$

$\frac{5}{6} = 0.8\overline{3}$

6. a. $0.125 = \frac{125}{1000} = \frac{1}{8}$

b. $5.43 = 5\frac{43}{100}$

7. a. $25 - 38 + 15 = -13 + 15 = 2$

b. $-7 - 33 - 32 = -40 - 32 = -72$

c. $67 - 35 + 12 = 32 + 12 = 44$

8. a. same signs, positive $-14 \cdot (-3) = 42$

b. different signs, negative $-90 \div 10 = -9$

c. different signs, negative $21 \cdot (-5) = -105$

d. same signs, positive $-55 \div (-11) = 5$

9. a. $-\frac{\cancel{7}^{1}}{8} \bullet \left(-\frac{3}{\cancel{14}_{2}}\right) = \frac{3}{16}$

b. $-4\frac{5}{6} \div \frac{2}{9}$

$= -\frac{29}{6} \div \frac{2}{9}$

$= -\frac{29}{\cancel{6}_{2}} \bullet \frac{\cancel{9}^{3}}{2}$

$= -\frac{87}{4}$

$= -21\frac{3}{4}$

10. $\dfrac{\frac{4}{15}}{\frac{8}{45}}$

$= \frac{4}{15} \div \frac{8}{45}$

$= \frac{\cancel{4}^{1}}{\cancel{15}_{1}} \bullet \frac{\cancel{45}^{3}}{\cancel{8}_{2}}$

$= \frac{3}{2}$

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

11. a. $\frac{5}{7} + 3\frac{11}{14} - \frac{25}{28}$

$= \frac{5}{7} + \frac{53}{14} - \frac{25}{28}$

$= \frac{20}{28} + \frac{106}{28} - \frac{25}{28}$

$= \frac{126}{28} - \frac{25}{28}$

$= \frac{101}{28}$

$= 3\frac{17}{28}$

b. $-\frac{3}{2} - \frac{8}{11} + \frac{1}{11}$

$= -\frac{33}{22} - \frac{16}{22} + \frac{2}{22}$

$= -\frac{49}{22} + \frac{2}{22}$

$= -\frac{47}{22}$

$= -2\frac{3}{22}$

12. a.
$$\begin{array}{r} 4.3570 \\ 10.3210 \\ +\ 5.0101 \\ \hline 19.6881 \end{array}$$

b.
$$\begin{array}{r} 12.987 \\ -\ 4.012 \\ \hline 8.975 \end{array} \longrightarrow 8.975 - 9.754$$

Subtract and use the sign of the greater absolute value.

$$\begin{array}{r} \cancel{9}^{8}\,\cancel{.}^{}\,\cancel{7}^{16}\,\cancel{5}^{14}\,\cancel{4}^{1} \\ -\,8.9\,7\,5 \\ \hline 0.7\,7\,9 \end{array}$$

The answer is negative.

$12.987 - 4.012 - 9.754 = -0.779$

13. a.
$$\begin{array}{r} \cancel{1}^{1} \\ 2.3 \\ \times\ 4.5 \\ \hline 115 \\ +\ 920 \\ \hline 10.35 \end{array}$$

Enrichment: Sequences and Series

This is an enrichment lesson. Students are not expected to master content in the enrichment lessons at this level.

1.

	Rule	Next Two Terms	A, G, or N	Common Difference or Ratio
a.	+2	14, 16	A	2
b.	perfect squares	49, 64	N	none
c.	–6	70, 64	A	–6
d.	÷2	$\frac{1}{4}, \frac{1}{8}$	G	$\frac{1}{2}$
e.	+2	15, 17	A	2
f.	•1.5	60.75, 91.125	G	1.5
g.	prime numbers	19, 23	N	none
h.	•2	192, 384	G	2

2. a. The sequence is arithmetic with a common difference of 6.

$$\begin{aligned} a_{17} &= 5+(17-1)(6) \\ &= 5+(16)(6) \\ &= 5+(96) \\ &= 101 \end{aligned}$$

b. The sequence is arithmetic with a common difference of –3.

$$\begin{aligned} a_{42} &= 7+(42-1)(-3) \\ &= 7+(41)(-3) \\ &= 7+(-123) \\ &= -116 \end{aligned}$$

c. The sequence is arithmetic with a common difference of 3.5.

$$\begin{aligned} a_{101} &= -10+(101-1)(3.5) \\ &= -10+(100)(3.5) \\ &= -10+(350) \\ &= 340 \end{aligned}$$

3. a. The sequence is geometric with a common ratio of 2.

$$\begin{aligned} b_{11} &= 1 \bullet 2^{11-1} \\ &= 1 \bullet 2^{10} \\ &= 1 \bullet 1024 \\ &= 1024 \end{aligned}$$

b. The sequence is geometric with a common ratio of $\frac{1}{3}$.

$$\begin{aligned} b_9 &= 729 \bullet \left(\frac{1}{3}\right)^{9-1} \\ &= 729 \bullet \left(\frac{1}{3}\right)^{8} \\ &= 729 \bullet \frac{1}{6561} \\ &= \frac{1}{9} \end{aligned}$$

c. This sequence is geometric with a common ratio of $\frac{3}{2}$.

$$\begin{aligned} b_6 &= 18 \bullet \left(\frac{3}{2}\right)^{6-1} \\ &= 18 \bullet \left(\frac{3}{2}\right)^{5} \\ &= 18 \bullet \frac{243}{32} \\ &= 136.6875 \end{aligned}$$

Multi-Step Equations with Negative Coefficients

WARM-UP

1. a. $8^2 = 8 \bullet 8 = 64$
   b. $9^2 = 9 \bullet 9 = 81$
   c. $\sqrt{16} = 4$
   d. $\sqrt{25} = 5$

2. a. $120 \bullet 4 = 480$
   b. $800 \bullet 12 = 9600$

PRACTICE

1. **Blue**

$$-3x + 4 = 20 - x$$
$$-3x + x + 4 = 20 - x + x$$
$$-2x + 4 = 20$$
$$-2x + 4 - 4 = 20 - 4$$
$$-2x = 16$$
$$\frac{-2x}{-2} = \frac{16}{-2}$$
$$x = -8$$

2. **Green**

$$3 - 2a + 5 = -12 + 2a$$
$$3 - 2a + 5 + 2a = -12 + 2a + 2a$$
$$8 = -12 + 4a$$
$$8 + 12 = -12 + 4a + 12$$
$$20 = 4a$$
$$\frac{20}{4} = \frac{4a}{4}$$
$$5 = a$$
$$a = 5$$

3. **Yellow**

$$7 - 2b = 1 + b + 5 - 2b$$
$$7 - 2b = 1 + 5 - b$$
$$7 - 2b = 6 - b$$
$$7 - 2b + b = 6 - b + b$$
$$7 - b = 6$$
$$7 - b - 7 = 6 - 7$$
$$-b = -1$$
$$\frac{-b}{-1} = \frac{-1}{-1}$$
$$b = 1$$

4. **Orange**

$$12 + 14s = 72 - 6s$$
$$12 + 14s + 6s = 72 - 6s + 6s$$
$$12 + 20s = 72$$
$$12 + 20s - 12 = 72 - 12$$
$$20s = 60$$
$$\frac{20s}{20} = \frac{60}{20}$$
$$s = 3$$

5. **Red**

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

6. **Blue**

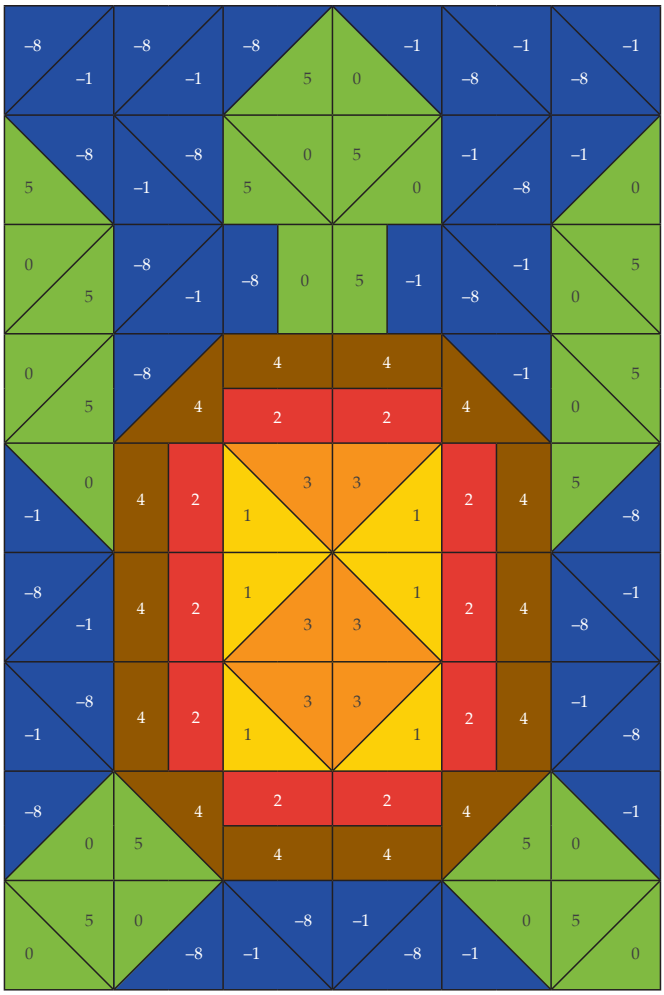
$$4y+5=7+y-5$$
$$4y+5=y+2$$
$$4y+5-y=y+2-y$$
$$3y+5=2$$
$$3y+5-5=2-5$$
$$3y=-3$$
$$\frac{3y}{3}=\frac{-3}{3}$$
$$y=-1$$

7. **Green**

$$2-3z=z+2$$
$$2-3z+3z=z+2+3z$$
$$2=4z+2$$
$$2-2=4z+2-2$$
$$0=4z$$
$$\frac{0}{4}=\frac{4z}{4}$$
$$0=z$$
$$z=0$$

8. **Brown**

$$p-3=5-p$$
$$p-3+p=5-p+p$$
$$2p-3=5$$
$$2p-3+3=5+3$$
$$2p=8$$
$$\frac{2p}{2}=\frac{8}{2}$$
$$p=4$$



Mixed Review

Tables may vary. Students must have the five required ingredients in their tables (tortillas, meat, cheese, beans, sauce). The total cost must be $35.00 or less. A sample table with three extra ingredients is shown below. Check the student's work using a calculator.

Ingredient	Variety	Unit Cost	Quantity	Ingredient Cost
Tortillas	Precooked flour	$2.75	1	$2.75 • 1 = $2.75
Meat	Pork	$4.25	2	$4.25 • 2 = $8.50
Cheese	3-Cheese blend	$5.78	1	$5.78 • 1 = $5.78
Beans	Pinto beans	$0.78	3	$0.78 • 3 = $2.34
Sauce	Green sauce	$2.19	3	$2.19 • 3 = $6.57
Extra Ingredient 1	Onion	$0.65	1	$0.65 • 1 = $0.65
Extra Ingredient 2	Sour cream	$2.48	1	$2.48 • 1 = $2.48
Extra Ingredient 3	Red sauce	$1.78	1	$1.78 • 1 = $1.78
Extra Ingredient 4				
Extra Ingredient 5				
			Subtotal	$30.85
			Tax Amount (3%)	$0.93
			TOTAL	**$31.78**

Subtotal: $2.75 + $8.50 + $5.78 + $2.34 + $6.57 + $0.65 + $2.48 + $1.78 = $30.85

Tax Amount: 0.03 • $30.85 ≈ $0.93

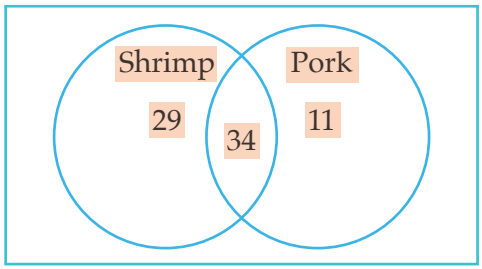
TOTAL: $30.85 + $0.93 = $31.78

Unit 2 Review

1. a. The number of people who want both shrimp and pork goes in the overlapping region.

Subtract the number of people who want both from the number of people who want shrimp.
$63 - 34 = 29$

Subtract the number of people who want both from the number of people who want pork.
$45 - 34 = 11$

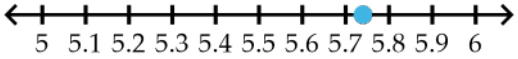


b. $29 + 34 + 11 = 74$ villagers

c. $A \cap B$

2. a. 33 is between the perfect squares 25 and 36.

b. $\sqrt{33} \approx 5.74$

c. 

3. a. $\sqrt{81} = 9$

b. $\sqrt[3]{64} = 4$

c. $\sqrt[3]{-27} = -3$

4. a.
$$\frac{2}{3}a - 1 = 1\frac{1}{3}$$
$$\frac{2}{3}a - 1 + 1 = 1\frac{1}{3} + 1$$
$$\frac{2}{3}a = \frac{4}{3} + \frac{3}{3}$$
$$\frac{2}{3}a = \frac{7}{3}$$
$$\frac{\cancel{3}}{\cancel{2}} \cdot \frac{\cancel{2}}{\cancel{3}}a = \frac{7}{\cancel{3}} \cdot \frac{\cancel{3}}{2}$$
$$a = \frac{7}{2}$$
$$a = 3\frac{1}{2}$$

b.
$$1 - 0.7b = -0.75$$
$$1 - 0.7b - 1 = -0.75 - 1$$
$$-0.7b = -1.75$$
$$\frac{-0.7b}{-0.7} = \frac{-1.75}{-0.7}$$
$$b = 2.5$$

5. a. $37 = 5m + 2$

b.
$$37 = 5m + 2$$
$$37 - 2 = 5m + 2 - 2$$
$$35 = 5m$$
$$\frac{35}{5} = \frac{5m}{5}$$
$$7 = m$$
$$m = 7$$

7 mud carp

6.
$$C = \pi d$$
$$\frac{C}{\pi} = \frac{\pi d}{\pi}$$
$$\frac{C}{\pi} = d$$
$$d = \frac{C}{\pi}$$

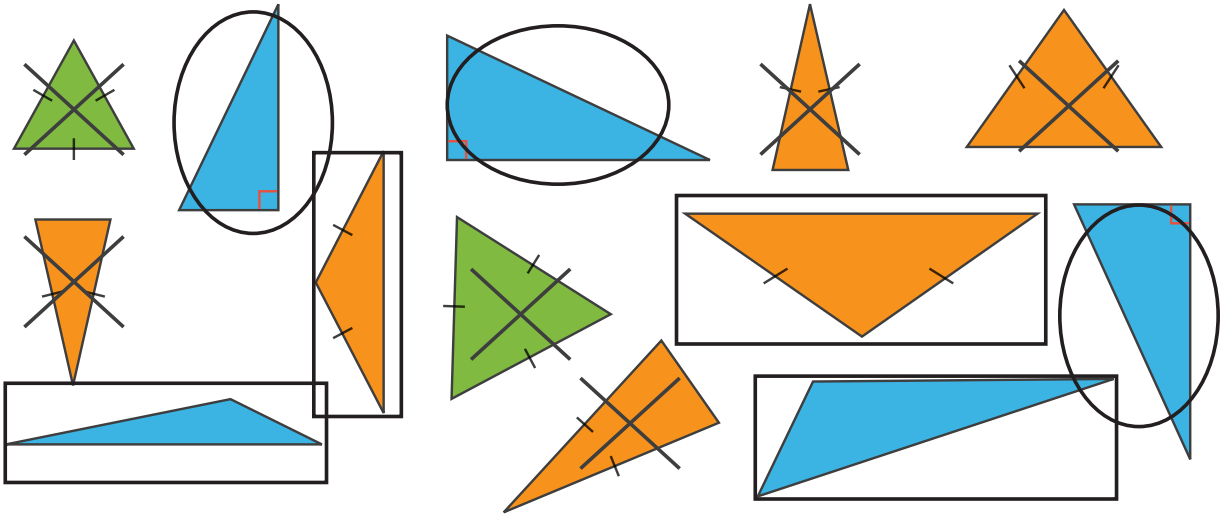
Triangles

WARM-UP

$$
\begin{aligned}
2p + 4p - 3p &= 21 \\
6p - 3p &= 21 \\
3p &= 21 \\
\frac{3p}{3} &= \frac{21}{3} \\
p &= 7
\end{aligned}
$$

PRACTICE

1.



2.

A triangle has two angles measuring 40°. What is the measure of the third angle?	74°	**A** A right triangle has an angle measuring 36°. What is the measure of the third angle?	80°
60°	**B** What are each of the angle measures in an equilateral triangle?	**C** An isosceles triangle has one angle that measures 20°. What is the measure of each of the two congruent angles?	**D** What is the measure of each of the non-right angles of an isosceles right triangle?
45°	**E** A triangle has two angles measuring 35° and 71°. What is the third angle measure?	100°	54°

Detailed work for the problems is shown below.

A
$$\begin{aligned} 90° + 36° + x &= 180° \\ 126° + x &= 180° \\ 126° + x - 126° &= 180° - 126° \\ x &= 54° \end{aligned}$$

B
$$\begin{aligned} x + x + x &= 180° \\ 3x &= 180° \\ \frac{3x}{3} &= \frac{180°}{3} \\ x &= 60° \end{aligned}$$

C
$$\begin{aligned} x + x + 20° &= 180° \\ 2x + 20° &= 180° \\ 2x + 20° - 20° &= 180° - 20° \\ 2x &= 160° \\ \frac{2x}{2} &= \frac{160°}{2} \\ x &= 80° \end{aligned}$$

D
$$\begin{aligned} x + x + 90° &= 180° \\ 2x + 90° &= 180° \\ 2x + 90° - 90° &= 180° - 90° \\ 2x &= 90° \\ \frac{2x}{2} &= \frac{90°}{2} \\ x &= 45° \end{aligned}$$

E
$$\begin{aligned} 35° + 71° + x &= 180° \\ 106° + x &= 180° \\ x + 106° - 106° &= 180° - 106° \\ x &= 74° \end{aligned}$$

3. a. $3 + 4 = 7$ 7 is greater than 5 (the third side).
$4 + 5 = 9$ 9 is greater than 3.
$3 + 5 = 8$ 8 is greater than 4.
yes

b. $3 + 3 = 6$ 6 is greater than 5.
$3 + 5 = 8$ 8 is greater than 3.
yes

c. $4 + 6 = 10$ 10 is not greater than the third side of 11.
no

REVIEW

1. a. $4 \div 2 = 2$
$6 \div 4 = 1.5$
$8 \div 6 = 1.\overline{3}$
no

b. $10 \div 2 = 5$
$35 \div 7 = 5$
$55 \div 11 = 5$
yes

2.
$$\begin{array}{r} {}^{10}\cancel{11}\text{ min }{}^{73}\cancel{13}\text{ sec} \\ -\ 9\text{ min }49\text{ sec} \\ \hline 1\text{ min }24\text{ sec} \end{array}$$

3. 4 child passes + 9 adult passes = 13 total passes
$$\begin{aligned} \frac{4 \text{ child passes}}{13 \text{ total passes}} &= \frac{144 \text{ child passes}}{x \text{ total passes}} \\ \frac{4}{13} &= \frac{144}{x} \\ 4x &= 13 \bullet 144 \\ 4x &= 1872 \\ \frac{4x}{4} &= \frac{1872}{4} \\ x &= 468 \end{aligned}$$
468 total passes

Enrichment: Circumference and Diameter

This is an enrichment lesson. Students are not expected to master content in the enrichment lessons at this level.

Part 1

Items 1, 2, and 3: Answers may vary for students' measured circles. An example is given below.

Item 1: top of a mug

Circumference: 11 in

Diameter: 3.5 in

Ratio: $\frac{C}{d} = \frac{11}{3.5} \approx 3.1429$

1. Students may notice that the ratio quotients are very close to each other. Students may also notice that the quotient is close to the value of pi.

2. $C = \pi d$

$\frac{C}{d} = \frac{\pi d}{d}$

$\frac{C}{d} = \pi$

$\pi = \frac{C}{d}$

Part 2

First Circle:

2. a. Radius: 3 in
   b. Diameter: 6 in
   c. Circumference: 6π in

12. a. The radius is approximately the same length as BC.
   b. Half of the circumference is approximately the same length as AB.

Second Circle:

8. Students may now notice that AB is approximately half of the circumference, and BC is approximately the length of the radius.

Third Circle:

8. Half of the circumference is colored in each color.

9. Side AB is approximately half of the circumference of the circle.

10. 3 inches (It is the radius of the circle.)

11. Side BC is approximately the length of the radius of the circle.

12. a. Length: $AB \approx \frac{1}{2}C$
   b. Width: $BC \approx r$
   c. $A = lw = AB \bullet BC \approx \frac{1}{2}C \bullet r$

Simplifying Rational Expressions

WARM-UP

a. $\frac{64}{16}$

$= \frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot 2 \cdot 2}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}}$

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

b. $\frac{24}{30}$

$= \frac{\cancel{2} \cdot 2 \cdot 2 \cdot \cancel{3}}{\cancel{2} \cdot \cancel{3} \cdot 5}$

$= \frac{4}{5}$

c. $\frac{9}{54}$

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

$= \frac{1}{6}$

PRACTICE

9. $\frac{2c}{3a}$

$= \frac{2 \cdot \cancel{b} \cdot \cancel{b} \cdot c \cdot \cancel{a}}{3 \cdot \cancel{a} \cdot a \cdot \cancel{b} \cdot \cancel{b}}$

$\frac{2b^2ca}{3a^2b^2}$

10. $2a$

$= \frac{\cancel{b} \cdot \cancel{b} \cdot a \cdot \cancel{b}}{\cancel{b} \cdot \cancel{b} \cdot 1 \cdot \cancel{b}}$

$\frac{6a^2b}{3ab}$

11. $3c$

$= \frac{\cancel{c} \cdot \cancel{b} \cdot \cancel{b} \cdot c}{\cancel{b} \cdot \cancel{b} \cdot 1 \cdot \cancel{c}}$

$\frac{9abc}{3ab}$

12. $\frac{a}{bc}$

$= \frac{\cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot a \cdot \cancel{b}}{\cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot c \cdot \cancel{b}}$

$\frac{a^2b^5c^6}{a^2c^6}$

13. $\frac{b}{3c^2}$

$= \frac{\cancel{2} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b}}{\cancel{2} \cdot \cancel{b} \cdot c \cdot c \cdot \cancel{b}}$

$\frac{2ac}{4ac}$

14. $\frac{3}{b}$

$= \frac{\cancel{3} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b}}{\cancel{3} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot \cancel{b} \cdot b}$

$\frac{3b^2ac^2}{b^3c^2a}$

15. $6a$

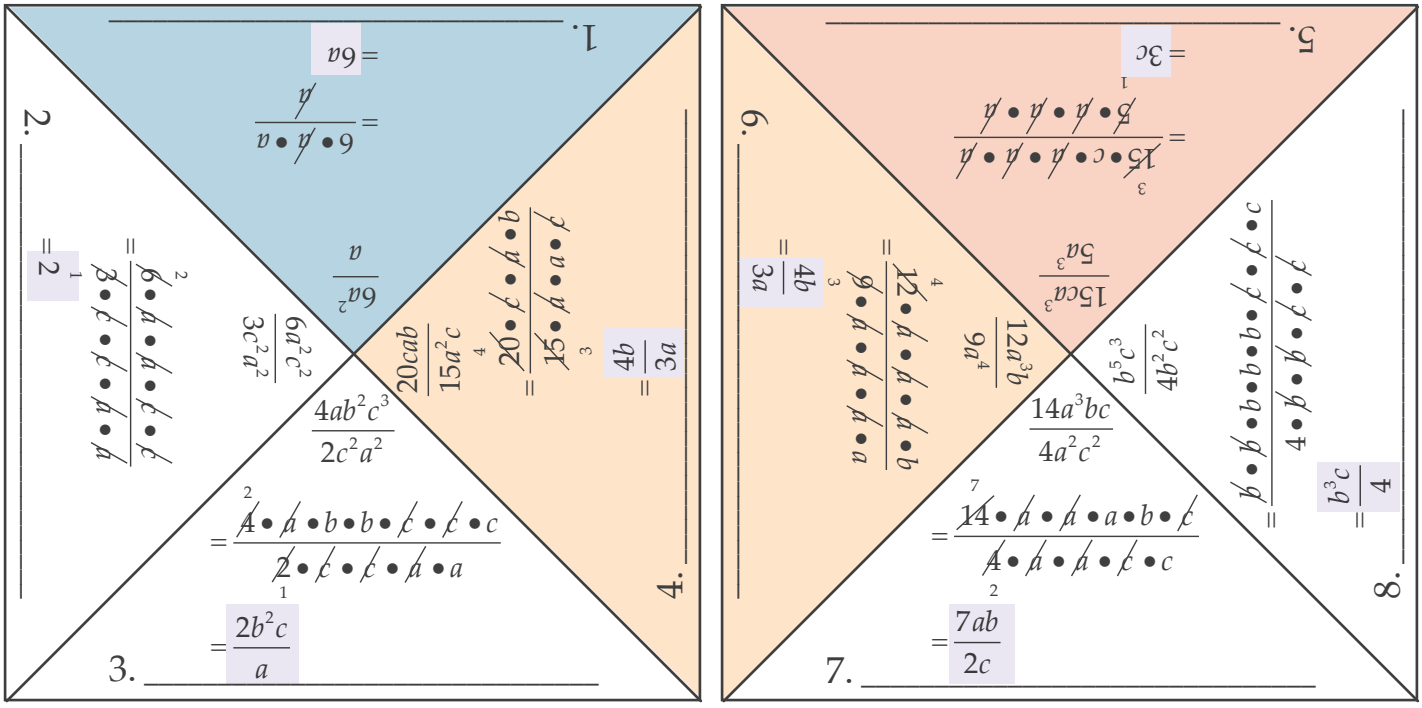
$= \frac{6 \cdot \cancel{b} \cdot \cancel{b} \cdot a}{\cancel{b} \cdot \cancel{b}}$

$\frac{6ba^2}{ab}$

16. $2a$

$= \frac{\cancel{2} \cdot \cancel{b}}{\cancel{2} \cdot \cancel{b}}$

$\frac{4ac}{2c}$



REVIEW

1. a. $6b + 8m + 10c$

   b. $b = 4$, $m = 3$, $c = 10$

   Amount of money made:

   $6(4) + 8(3) + 10(10)$

   $= 24 + 24 + 100$

   $= 148$

   $148

2. Proportion: $\frac{2}{1} = \frac{x}{4}$

   $1 \cdot x = 2 \cdot 4$

   $x = 8$

   Solution: 8 national parks

3. $\left(\frac{1}{50}\right)^2 = \frac{1}{2500}$

4. $V = \pi r^2 h$

   $V = \pi(50)^2(40)$

   $V = \pi \cdot 2500 \cdot 40$

   $V \approx 314159.27$

   314,159.27 ft^3

5. a. 33°

   b. $180° - 33° = 147°$

   c. $180° - 33° - 104° = 43°$

Course Assessment

Note to parent/teacher: This assessment covers concepts taught throughout the course. Corresponding lesson numbers are listed in the course book at the end of each problem.

1. $\frac{224}{672} = \frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{7}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot 3 \cdot \cancel{7}} = \frac{1}{3}$

2. a.
$$\begin{array}{r} 0.125 \\ 8\overline{)1.000} \\ -8 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

b.
$$\begin{array}{r} 0.015 \\ 200\overline{)3.000} \\ -200 \\ \hline 1000 \\ -1000 \\ \hline 0 \end{array}$$

3. a. $0.145 = \frac{145}{1000} = \frac{29}{200}$

b. $0.08 = \frac{8}{100} = \frac{2}{25}$

4. a. $5^3 = 5 \cdot 5 \cdot 5 = 125$

b. $\left(\frac{1}{2}\right)^3 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$

c. $3^{-4} = \frac{1}{3^4} = \frac{1}{3 \cdot 3 \cdot 3 \cdot 3} = \frac{1}{81}$

5. a. $\left(5 + 11^2\right) \div 3$
$= \left(5 + 121\right) \div 3$
$= 126 \div 3$
$= 42$

b. $6 \cdot 4 - 19 + 2^3$
$= 6 \cdot 4 - 19 + 8$
$= 24 - 19 + 8$
$= 5 + 8$
$= 13$

6. a. $17z - 4z + 16 + 13$
$= 13z + 29$

b. $4t^2 + 3s - 7t^2 + 5s$
$= 4t^2 - 7t^2 + 3s + 5s$
$= -3t^2 + 8s$

7. a. $\frac{10(3)}{3(-5)} = \frac{30}{-15} = -2$

b. $3(3) - 4(-5) = 9 + 20 = 29$

8. $30m + 30k$

9. a. $12x - 5 = 43$
$12x - 5 + 5 = 43 + 5$
$12x = 48$
$\frac{12x}{12} = \frac{48}{12}$
$x = 4$

b. $\frac{3}{5}v+4=13-3v$

$\frac{3}{5}v+4-4=13-3v-4$

$\frac{3}{5}v=9-3v$

$\frac{3}{5}v+3v=9-3v+3v$

$\frac{3}{5}v+\frac{15}{5}v=9$

$\frac{18}{5}v=9$

$\frac{5}{18}\bullet\frac{18}{5}v=9\bullet\frac{5}{18}$

$v=\frac{5}{2}=2\frac{1}{2}$

10. a. $11r-3>52$

$11r-3+3>52+3$

$11r>55$

$\frac{11r}{11}>\frac{55}{11}$

$r>5$

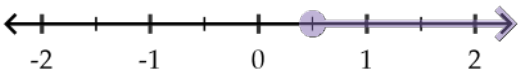
b. $18-4p\le16$

$18-4p-18\le16-18$

$-4p\le-2$

$\frac{-4p}{-4}\le\frac{-2}{-4}$

$p\ge\frac{1}{2}$



11. 3 chickens + 2 goats = 5 total

$\frac{5\text{ total}}{2\text{ goats}}=\frac{15\text{ total}}{x\text{ goats}}$

$\frac{5}{2}=\frac{15}{x}$

$5x=30$

$\frac{5x}{5}=\frac{30}{5}$

$x=6$

6 goats

12. $0.4\bullet320=128$

13. $x\bullet144=18$

$\frac{x\bullet144}{144}=\frac{18}{144}$

$x=0.125$

12.5%

14. Amount of increase:

$1350-1000=350$

$x\bullet1000=350$

$\frac{x\bullet1000}{1000}=\frac{350}{1000}$

$x=0.35$

35%

15. 1 L = 1,000 mL

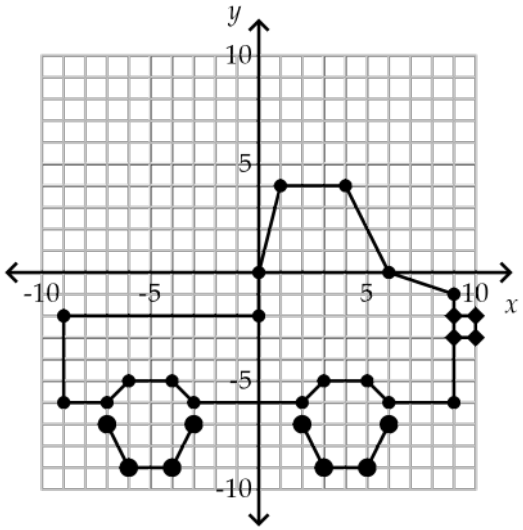
$18000\div1000=18$

18 liters

16. $8640\text{ in}\bullet\text{in}\bullet\frac{1\text{ft}}{12\text{ in}}\bullet\frac{1\text{ ft}}{12\text{ in}}=\frac{8460\text{ ft}\bullet\text{ft}}{144}=60\text{ ft}^2$

Fun with Graphing

1.



2.