

# SAXON

# HOMESCHOOL

## Middle Grades Sampler

*Math 5/4, Math 6/5, Math 7/6, Math 8/7, and Algebra 1/2*

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*Math 5/4, Math 6/5, Math 7/6, Math 8/7, and Algebra 1/2* form a series of courses to move students from primary grades to algebra. Each course contains a series of daily lessons covering all areas of general math. Each lesson presents a small portion of math content (called an increment) that builds on prior knowledge and understanding.

Students are not required or expected to grasp a concept fully the first time it is presented. After an increment is introduced, it becomes a part of the student's daily work for the rest of the year. Students will have many opportunities to gain understanding and to achieve mastery. This cumulative, continual practice ensures that students will retain what they have learned.

This sampler includes materials that are representative of the Saxon math program, including samples of Lessons and Investigations.

We hope these materials will assist you in your evaluation of the Saxon program.

# *Algebra 1/2*

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## Algebra 1/2, Lesson 59

Sample taken from Algebra 1/2 (Third Edition), page 189

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### LESSON 59 Proportions with Fractions

There is no change in the method of solving conditional proportions when they contain fractions or mixed numbers. The first step is to cross multiply. Then we divide or multiply as required to complete the solution.

example 59.1 Solve:  $\frac{2}{3} = \frac{5}{\frac{1}{x}}$

*solution* As the first step, we cross multiply.

$$\frac{2}{3} \cdot \frac{1}{5} = \frac{5}{8}x \quad \text{cross multiplied}$$

$$\frac{2}{15} = \frac{5}{8}x \quad \text{simplified}$$

We finish by multiplying both sides by  $\frac{8}{5}$ .

$$\frac{8}{5} \cdot \frac{2}{15} = \frac{8}{5}x \cdot \frac{8}{8} \quad \text{multiplied both sides by } \frac{8}{5}$$

$$\frac{16}{75} = x \quad \text{simplified}$$

## Algebra 1/2, Lesson 59

Sample taken from Algebra 1/2 (Third Edition), page 190

example 59.2 Solve:  $\frac{x}{3} = \frac{3}{2} \cdot \frac{1}{4}$

**solution** As the first step, we cross multiply.

$$\frac{2}{5}x = \frac{1}{2} \cdot \frac{3}{4} \quad \text{cross multiplied}$$

$$\frac{2}{5}x = \frac{1}{4} \quad \text{simplified}$$

We finish by multiplying both sides by  $\frac{5}{2}$ .

$$\frac{5}{2} \cdot \frac{2}{5}x = \frac{1}{4} \cdot \frac{5}{2} \quad \text{multiplied both sides by } \frac{5}{2}$$

$$x = \frac{5}{8} \quad \text{simplified}$$

**practice** Solve:

a.  $\frac{3}{1} = \frac{1}{x} \cdot \frac{4}{5}$

b.  $\frac{y}{2} = \frac{5}{1} \cdot \frac{1}{6}$

c.  $\frac{1}{2} = \frac{2}{x} \cdot \frac{1}{8}$

d.  $\frac{3}{x} = \frac{5}{7}$

### problem set 59

1. <sup>(17)</sup> The average of the first three numbers was 42. The average of the next seven numbers was only 12. What was the average of all ten numbers?
2. <sup>(30)</sup> Seven big ones cost \$280,000. Write the two rates (ratios) implied by this statement. How many big ones could be purchased for \$120,000?
3. <sup>(7)</sup> The first one weighed one hundred forty thousand, twenty-six pounds. The second weighed only one hundred thirty-two thousand, seven hundred eighty-one pounds. The first one weighed how many pounds more than the second one?
4. <sup>(38)</sup> Carolyn could walk 10 miles in 3 hours.
  - (a) What was her speed?
  - (b) How long would it take her to walk 25 miles at the same speed?

5. <sup>(55)</sup> Complete the table. Begin by inserting the reference numbers.

FRACTION	DECIMAL	PERCENT
(a)	(b)	16%
$\frac{2}{3}$	(c)	(d)

6. <sup>(50)</sup>
  - (a) Write 0.093 in scientific notation.
  - (b) Write  $1.2 \times 10^6$  in standard notation.

## Algebra 1/2, Lesson 59

Sample taken from Algebra 1/2 (Third Edition), page 191

7. Nine tenths of what number is 72?  
(51)

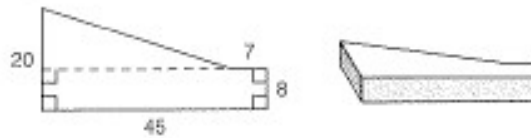
8. What fraction of  $6\frac{1}{2}$  is  $8\frac{1}{4}$ ?  
(56)

9. What decimal part of 630 is 441?  
(51)

10. Eight and one fourth of what number is  $7\frac{1}{2}$ ?  
(56)

11. One and one fourth of  $8\frac{2}{3}$  is what number?  
(56)

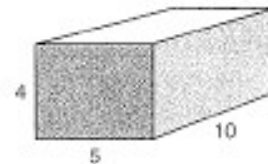
12. What is the volume of a right solid whose base is the figure shown on the left and whose height is 4 inches? Dimensions are in inches.  
(45)



13. (a) What is 1% of 192?  
(33)

(b) What is 45% of 192?

14. Find the surface area of this rectangular solid. Dimensions are in meters.  
(90)



Solve:

15.  $\frac{1}{4} = \frac{9}{x}$   
(76)

16.  $\frac{2}{5} = \frac{p}{12}$   
(89)

17.  $1\frac{3}{5}x = 6$   
(56)

18.  $3\frac{1}{4}p = 5$   
(30)

Simplify:

19.  $49 - 2[(5 - 2^2)(4 + 2) - 5]$   
(64)

20.  $\sqrt[3]{8} + 2^3[2^2(2^3 - 5) - 4]$   
(66)

21.  $2\frac{1}{3} \cdot 3\frac{1}{4} - \frac{11}{12}$   
(66)

22.  $14\frac{2}{3} - 12\frac{7}{8} + \frac{11}{48}$   
(55)

23.  $171.6 \times 0.007$   
(7)

24.  $1171.61 - 13.321$   
(81)

25.  $\frac{611.51}{0.03}$   
(7)

26.  $\frac{1}{6}\left(\frac{1}{3} + \frac{1}{2}\right) - \frac{5}{36}$   
(33)

27.  $\frac{1}{5}\left(\frac{1}{4} - \frac{1}{8}\right) + 2\frac{7}{8}$   
(52)

28.  $6\frac{2}{3} \div 2\frac{1}{4}$   
(63)

29.  $6\frac{1}{4} \div 3\frac{2}{3} \times 2\frac{1}{4} \div \frac{1}{8}$   
(47)

30. Evaluate:  $x^2 + 3xy^2 + 3x^2y + y^x$  if  $x = 1$  and  $y = 2$   
(56)

## Algebra 1/2, Lesson 75

Sample taken from Algebra 1/2 (Third Edition), page 237

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### LESSON 75 *Implied Ratios*

Remember that a ratio is a comparison of two numbers. Ratios are often written in the form of fractions. Remember also that a proportion is a statement that two ratios are equal. These are equal ratios.

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

The equation is called a proportion. Many ratio word problems do not actually use the word ratio. When we read the problem, we must recognize that the problem is a ratio problem. We must also be able to pick out the **implied ratio**.

**example 75.1** It takes  $2\frac{1}{2}$  eggs to make 140 cookies. Jenny wants to make 1680 cookies. How many eggs does she need?

**solution** This problem is a ratio problem about eggs and cookies. We decide to put eggs in the numerator.

$$\frac{E}{C} = \frac{E}{C}$$

The first sentence in the problem gives us the implied ratio. It tells us that the ratio of eggs to cookies is  $2\frac{1}{2}$  to 140. We make the substitution.

$$\frac{2\frac{1}{2}}{140} = \frac{E}{C}$$

## Algebra 1/2, Lesson 75

Sample taken from Algebra 1/2 (Third Edition), page 238

Jenny wants to make 1680 cookies, so we use 1680 for  $C$  and solve for  $E$ .

$$\frac{2\frac{1}{2}}{140} = \frac{E}{1680} \quad \text{substituted}$$

$$\frac{5}{2} \cdot 1680 = 140E \quad \text{cross multiplied}$$

$$4200 = 140E \quad \text{simplified}$$

$$30 = E \quad \text{divided both sides by 140}$$

Jenny needs **30 eggs** to make 1680 cookies.

**example 75.2** It takes 3 tons of fertilizer to fertilize 170 acres. Farmer Brown wants to fertilize 1870 acres. How many tons of fertilizer does Farmer Brown need?

**solution** This problem concerns ratios of tons and acres. We decide to put tons in the numerator.

$$\frac{T}{A} = \frac{T}{A}$$

The first sentence in the problem gives us the implied ratio. It says that the ratio of tons to acres is 3 to 170. We substitute these numbers on the left. On the right we substitute 1870 for  $A$ . Then we solve for  $T$ .

$$\frac{3}{170} = \frac{T}{1870} \quad \text{substituted}$$

$$3 \cdot 1870 = 170T \quad \text{cross multiplied}$$

$$5610 = 170T \quad \text{simplified}$$

$$33 = T \quad \text{divided both sides by 170}$$

Farmer Brown needs **33 tons** of fertilizer to fertilize 1870 acres.

**practice** a. The baker found that it took 4 huge measures of sugar to make 13 confections. The baker needed to make 143 confections. How many huge measures of sugar were needed?

**problem set 75** 1. <sup>627</sup> The receipts for the day totaled \$5200. This was only three fifths of the money needed to pay the bills. How much money was needed to pay the bills?

2. <sup>656</sup> Edsel traveled the 350 miles from the factory to the River Rouge plant in 7 hours. The next day he was in a hurry to return. If he must complete the trip back to the factory in 5 hours, what should be his speed?

3. <sup>664</sup> The ratio of believers to doubters at the meeting was 8 to 3. If 2400 of those in attendance were believers, how many doubters were present?

4. <sup>682</sup> Four fifths of the bees were not in the hive. If 1350 bees were in the hive, how many were not in the hive?

5. <sup>675</sup> Corey needs to develop 5 rolls of film. The machine takes 30 seconds to develop 2 rolls of film. How long will it take Corey to develop the 5 rolls?

6. <sup>679</sup> Jonathon uses 7 sticks of vine charcoal for every 3 drawings he creates. How many drawings can he create with 23 sticks?

7. <sup>686</sup> Twenty-five percent of the apartment complexes in Norman allow pets. If 85 apartment complexes allow pets, how many apartment complexes are there in Norman? Draw a diagram to help solve the problem.

## Algebra $\frac{1}{2}$ , Lesson 75

Sample taken from Algebra  $\frac{1}{2}$  (Third Edition), page 239

8. Sixty-five is what percent of 325?  
(68)

Graph on a number line:

9.  $x < -34$   
(72)

10.  $x \geq 21$   
(72)

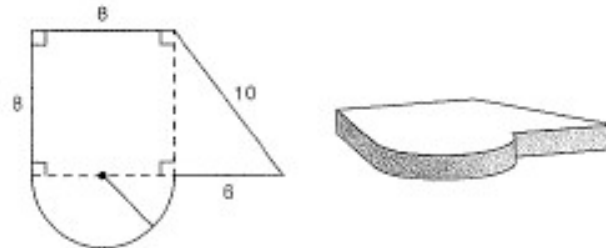
11. Complete the table. Begin by inserting the reference numbers.  
(55)

FRACTION	DECIMAL	PERCENT
(a)	0.71	(b)

12. Write 26,900,000,000 in scientific notation.  
(80)

13. What decimal part of 790 is 474?  
(57)

Use the following figures for problems 14 and 15. Dimensions are in yards.



14. Find (a) the perimeter and (b) the area of the figure on the left.  
(64)
15. What is the volume in cubic yards of a right solid whose base is the figure shown on the left and whose sides are 4 feet tall? Round to two decimal places.  
(93)
16. Find the surface area of a right circular cylinder whose radius is 4 centimeters and whose height is 9 centimeters.  
(73)
17. Use two unit multipliers to convert 1,000,000 inches to miles. Round any decimals to two places.  
(33)

Simplify:

18.  $\left(\frac{2}{3}\right)^3$   
(77)

19.  $\sqrt[3]{\frac{8}{27}}$   
(77)

20.  $\left(\frac{1}{5}\right)^3$   
(77)

21.  $\sqrt[4]{\frac{81}{256}}$   
(77)

22.  $10 + 3[3^2(1^5 + 2^3)(3^2 + 1)]$   
(40)

23.  $8 + -9 + 6 + -14$   
(76)

24.  $-30 + 14 + -1 + 17$   
(94)

25.  $11\frac{2}{8} - 5\frac{1}{2} \cdot 1\frac{2}{3} + 1\frac{1}{4}$   
(60)

26.  $\frac{1}{4}\left(3\frac{2}{3} - 1\frac{1}{4}\right) + \frac{6}{7}$   
(32)

27.  $\frac{657.12}{0.0012}$   
(7)



## Algebra $\frac{1}{2}$ , Lesson 75

Sample taken from Algebra  $\frac{1}{2}$  (Third Edition), page 240

Solve:

$$28. \frac{3\frac{1}{2}}{1\frac{2}{5}} = \frac{10}{m}$$

$$29. 5\frac{1}{4}y - 2\frac{1}{2} = 4\frac{5}{12}$$

30. Which is a better deal: 3 dingoes for \$57 or 5 dingoes for \$99.50?

## Algebra 1/2, Lesson 105

Sample taken from Algebra 1/2 (Third Edition), page 326

### LESSON 105 Evaluating Powers of Negative Bases

Let's examine the following expressions:

$$(a) x^2 \quad \text{and} \quad (b) -x^2$$

In expression (a)  $x$  is squared. If we substitute  $-2$  for  $x$ , we must square  $-2$ . In algebra this means

$$(-2)^2$$

Notice that we inserted parentheses in this expression to protect the negative sign. Thus, expression (a) tells us to multiply  $x$  by  $x$ . If  $x = -2$ ,

$$x^2 = (-2)(-2) = +4$$

Expression (b) tells us to find the opposite of the value of  $x^2$ . If we substitute  $-2$  for  $x$  in (b), we need to find the opposite of  $(-2)^2$ .

$$-(-2)^2 = -(-2)(-2) = -4$$

There is an easy way to remember if the minus sign is included in the base of the exponent. If the symbol  $-$  is not protected by parentheses, cover it with a finger. To simplify

$$-2^4$$

we cover the minus sign with a finger.



The value of  $2^4$  is 16. Now we remove our finger and uncover the minus sign and see that the final result is negative.

$$-16$$

example 105.1 Evaluate: (a)  $(-3)^2$  (b)  $-3^2$

**solution** If we try to cover the minus sign with a finger, we find that the minus sign is protected by the parentheses in (a) but not in (b).

$$(a) \quad \text{Diagram of } (-3)^2 \text{ with a finger covering the minus sign} \quad (b) \quad \text{Diagram of } -3^2 \text{ with a finger covering the minus sign}$$

So  $(-3)^2$  means  $(-3)(-3)$ , and  $-3^2$  means  $-(3)(3)$ .

$$(a) (-3)^2 = 9 \quad (b) -3^2 = -9$$

example 105.2 Evaluate: (a)  $a^2$  (b)  $-a^2$  if  $a = -4$

**solution** (a) We first write parentheses where we will insert the value for  $a$ .

$$(\quad)^2$$

Then we write  $-4$  inside the parentheses and simplify.

$$(-4)^2 = 16$$

(b) This time we begin by writing

$$-(\quad)^2$$

Then we write  $-4$  inside the parentheses and simplify.

$$-(-4)^2 = -16$$

## Algebra 1/2, Lesson 105

Sample taken from Algebra 1/2 (Third Edition), page 327

**example 105.3** Evaluate:  $a^2 - ab^2 - b^2$  if  $a = -2$  and  $b = -3$

**solution** Parentheses are not absolutely necessary, but we will use them to help us with the second term. We substitute and get

$$(-2)^2 - (-2)(-3)^2 - (-3)^2$$

We simplify this and get

$$\begin{array}{rcl} 4 - (-2)(-3)^2 - 9 & \text{simplified} \\ 4 - (-18) - 9 & \text{multiplied} \\ 4 + 18 - 9 & \text{simplified} \\ 13 & \text{added} \end{array}$$

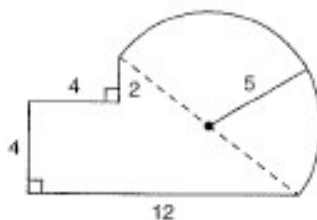
**practice** Evaluate:

a.  $a^2b - b$  if  $a = -2$  and  $b = -3$

b.  $b^2 - a^2b$  if  $a = -2$  and  $b = -3$

### problem set 105

1. <sup>(62)</sup> Six thirteenths of the audiophiles could discriminate between the two products. If 28 of the audiophiles could not discriminate, how many could discriminate?
2. <sup>(62)</sup> Six sevenths of the party delegates were proclaiming their positions. If 1100 were not involved in this behavior, how many delegates were there in all?
3. <sup>(100)</sup> The ratio of the contumacious to the affable was 2 to 17. If there were 7600, all of whom were either contumacious or affable, how many were contumacious and how many were affable?
4. <sup>(100)</sup> Lori studied fruit fly characteristics for her genetics experiment. One in 4 had white eyes; the remainder had red eyes. There were 848 flies in this generation. How many flies had red eyes?
5. <sup>(90,95)</sup> Seven times a number is 9 less than the product of the number and  $-20$ . What is the number?
6. <sup>(60)</sup> Gawain and Lancelot drove their horses through the pounding rain and covered 16 miles in 2 hours. When the rain stopped, they slowed to half that pace. How long did it take them to travel the remaining 20 miles?
7. <sup>(60)</sup> Twenty percent chose Plain Vanilla and five percent chose Bubble Gum Delight. If twenty-eight selected Plain Vanilla, how many fancied Bubble Gum Delight?
8. <sup>(60)</sup> If 90 is increased by 80 percent, what is the resulting number?
9. <sup>(77)</sup> What percent of 60 is 78?
10. <sup>(64)</sup> Find the volume of the right solid whose base is shown on the left and whose height is 2 meters. Dimensions are in meters.



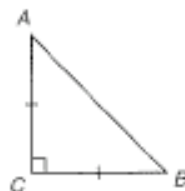
## Algebra 1/2, Lesson 105

Sample taken from Algebra 1/2 (Third Edition), page 328

11. Find the lateral surface area of the solid in problem 10.  
(185)

12. Between which two consecutive integers is  $\sqrt[4]{95}$ ?  
(182)

13. Find the measures of  $\angle A$  and  $\angle B$ , and classify  $\triangle ABC$  by its sides and by its angles.  
(190)



Use the distributive property to multiply:

14.  $3px(p + x + 2px)$   
(101)

15.  $mn^2(m + my + 3m^2)$   
(101)

Simplify by adding like terms:

16.  $m^2n^3 + 3mn^2nm - mnm^2 + 2n^3mn$   
(102)

17.  $ap^3 + pap^2 - 5p^2ap$   
(102)

18. What is the value of  $3x \div (10 - x)$  when  $2x + 5 = 85$ ?  
(107)

Solve:

19.  $5x - 4 = -3x + 20 + 2(x - 1)$   
(88, 101)

20.  $3 - 4x - 3 = -10x + 7 + 2x + 5(1 - x)$   
(88, 101)

21.  $\frac{-2}{\frac{5}{2}} = \frac{-11}{\frac{13}{x}}$   
(101, 101)

Simplify:

22.  $-[ -(-6)^2 ] + (-3)(-4)$   
(89)

23.  $a^3p^2ap^2a^4aa$   
(101)

24.  $y^8x^2yzzyx^4$   
(101)

25.  $2\frac{1}{4} - 0.315$   
(11)

Evaluate:

26.  $m^2 + \frac{n^2}{m}$  if  $m = -8$  and  $n = 4$   
(105)

27.  $p^3 + c^3$  if  $p = -3$  and  $c = -1$   
(105)

28.  $\frac{a^2}{b^3} - a$  if  $a = 4$  and  $b = -2$   
(105)

29.  $p^q + \sqrt[q]{p}$  if  $p = 4$  and  $q = 2$   
(154)

30. Sketch a rectangular coordinate system, and graph the line  $y = \frac{1}{2}x - 1$ .  
(85)

