

Lesson 3 pp. 10-13**Lesson Preparation****Drill**

- Do Speed Drill 3 and write the number correct on the blank.



Speed Drill 3

Checking Equations

You can check the answer to your equation to see if it is correct. Replace n with your answer. Do the math to see if the equation balances. Here's how:

Solve the equation

$$\begin{array}{rcl} n - 14 & = & 2 \\ +14 & & +14 \\ \hline & & \end{array}$$

$n = 16$

Check the equation

$$\begin{array}{rcl} n - 14 & = & 2 \\ 16 - 14 & = & 2 \\ \hline & & \end{array}$$

← Copy the equation.

← Replace n with your answer, 16.

Do the math.

← Does 2 balance 2?

Yes, our equation is solved correctly.

Here is another example.

Solve the equation

$$\begin{array}{rcl} n + 3 & = & 27 \\ -3 & & -3 \\ \hline & & \end{array}$$

$n = 24$

Check the equation

$$\begin{array}{rcl} n + 3 & = & 27 \\ 24 + 3 & = & 27 \\ \hline & & \end{array}$$

← Copy the equation.

← Replace n with your answer, 24.

Do the math.

← Does 27 balance 27?

Yes, our equation is solved correctly.

If the numbers on both sides of the $=$ sign are not equal, go back and find your mistake. The numbers *must* balance or your answer is not correct.

Solve and check these equations. The first one is done for you.

1. a. $n + 7 = 15$

$$\begin{array}{rcl} -7 & -7 \\ \hline n & = & 8 \end{array}$$

b. $n + 7 = 15$

$$\begin{array}{rcl} 8 + 7 & = & 15 \\ 15 & = & 15 \end{array}$$

c. $n - 8 = 3$

$$\begin{array}{rcl} +8 & +8 \\ \hline n & = & 11 \end{array}$$

d. $11 - 8 = 3$

$$\begin{array}{rcl} 3 & = & 3 \end{array}$$

2. a. $n - 2 = 9$

$$\begin{array}{rcl} +2 & +2 \\ \hline n & = & 11 \end{array}$$

b. $11 - 2 = 9$

$$\begin{array}{rcl} 9 & = & 9 \end{array}$$

c. $n + 7 = 9$

$$\begin{array}{rcl} -7 & -7 \\ \hline n & = & 2 \end{array}$$

d. $2 + 7 = 9$

$$\begin{array}{rcl} 9 & = & 9 \end{array}$$

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Teaching the Lesson**Checking Equations**

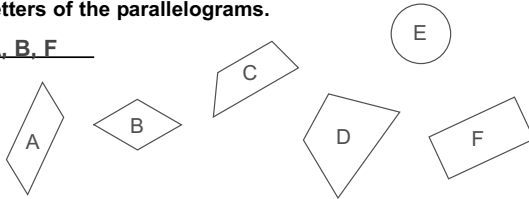
In this lesson, students learn to check their solutions to equations. They do this by copying the original equation, substituting the solution for the variable, and simplifying the expression to the left of the equal sign. If the solution is correct, and if the simplifying is correct, the numbers on either side of the equal sign should be the same.

Lesson 3



List the letters of the parallelograms.

3. A, B, F



Put a check mark (✓) in the blank after each number that is divisible . . .

4. by 6. a. 96 ✓ b. 68 c. 142 d. 210 ✓ e. 84 ✓
 5. by 5. a. 90 ✓ b. 80 ✓ c. 70 ✓ d. 56 e. 15 ✓

Write the digits that hold each place.

83,125,007,456,014

6. a. trillions 3 b. billions 5 c. millions 7
 7. a. thousands 6 b. ten thousands 5 c. tens 1
 8. a. hundred thousands 4 b. hundred millions 0 c. ten millions 0

Write the decimal.

9. Three hundred twelve thousandths 0.312

Round to the nearest . . .

10. hundred. a. 789 800 b. 25,328 25,300
 11. thousand. a. 36,067 36,000 b. 49,881 50,000
 12. ten thousand. a. 17,070 20,000 b. 758,230 760,000
 13. hundred thousand. a. 965,178 1,000,000 b. 6,324,987 6,300,000

Combine integers.

14. a. $9 + 5 = \underline{14}$ b. $-6 + 7 = \underline{1}$ c. $-3 + (-6) = \underline{-9}$ d. $-9 + 9 = \underline{0}$

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Helpful Hints

➔ Encourage students to solve and check with the algebraic method even though they may be able to get the correct answer mentally without writing down all the steps. They are learning the steps to solving very simple equations so that the method is mastered before they solve more complicated equations later on.

Board Work

Solve and check these equations.

$$\begin{array}{r} n + 3 = 8 \\ -3 \quad -3 \\ \hline n = 5 \end{array}$$

$$\begin{array}{r} n + 3 = 8 \\ 5 + 3 = 8 \\ \hline 8 = 8 \end{array}$$

$$\begin{array}{r} n - 3 = 10 \\ +3 \quad +3 \\ \hline n = 13 \end{array}$$

$$\begin{array}{r} n - 3 = 10 \\ 13 - 3 = 10 \\ \hline 10 = 10 \end{array}$$

$$\begin{array}{r} n + 7 = 14 \\ -7 \quad -7 \\ \hline n = 7 \end{array}$$

$$\begin{array}{r} n + 7 = 14 \\ 7 + 7 = 14 \\ \hline 14 = 14 \end{array}$$

$$\begin{array}{r} n - 8 = 9 \\ +8 \quad +8 \\ \hline n = 17 \end{array}$$

$$\begin{array}{r} n - 8 = 9 \\ 17 - 8 = 9 \\ \hline 9 = 9 \end{array}$$

Lesson 3

— $\begin{matrix} + \\ - \\ \times \\ \div \end{matrix}$ Skill Builders —

15. a.
$$\begin{array}{r} 71 \\ 40 \overline{)2,840} \\ \underline{280} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

b.
$$\begin{array}{r} 0.27 \\ 32 \overline{)8.64} \\ \underline{64} \\ 224 \\ \underline{224} \\ 0 \end{array}$$

c.
$$\begin{array}{r} 804 \\ 52 \overline{)41,808} \\ \underline{416} \\ 208 \\ \underline{208} \\ 0 \end{array}$$

Complete the sentences.

16. In 632.002, 2 is in the thousandths place.

17. In 26.501, 5 is in the tenths place.

Copy and solve. Write the answer in simplest form on the blank.

18. $4.003 + 18.1 + 0.397 = \underline{22.5}$

$$\begin{array}{r} 11 \\ 14.003 \\ 18.100 \\ + 0.397 \\ \hline 22.500 \end{array}$$

The Indian currency (money) is called the rupee. In 2003, one Canadian dollar was worth 31.5 rupees.

19. Pastor Pradeep rides 63 kilometers by bicycle to a small church in Teelapara to preach. If it takes him 7 hours to ride there, how far does he ride in 1 hour?

Answer: 9 km

$$\begin{array}{r} 9 \\ 7 \overline{)63} \\ \underline{63} \\ 0 \end{array}$$



20. Jordan's dad can get to Teelapara by Jeep in only 2 hours. How much longer does it take Pastor Pradeep to make a round trip to Teelapara than it takes Jordan's dad? (A round trip means there and back again.)

Answer: 10 hours longer

$$\begin{array}{r} 7 \quad 2 \\ \times 2 \quad \times 2 \\ \hline 14 \quad 4 \end{array}$$

$$\begin{array}{r} 14 \\ - 4 \\ \hline 10 \end{array}$$

Teacher Notes:

Lessons 3, 4

Write the formulas and find the answers.

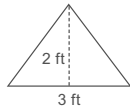
21. a. area of triangle

$$A = \frac{1}{2} (b \times h)$$

$$A = \frac{1}{2} (3 \times 2)$$

$$A = \frac{1}{2} \times 6$$

$$A = 3 \text{ ft}^2$$

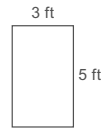


- b. area of rectangle

$$A = l \times w$$

$$A = 5 \times 3$$

$$A = 15 \text{ ft}^2$$



Follow the directions.

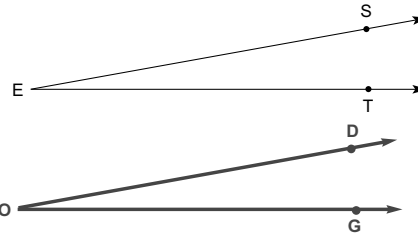
22. Measure
- $\angle SET$
- .
- 10°

- 23.
- $\angle SET$
- is an
- acute
- obtuse angle.

24. Draw an angle that is congruent to
- $\angle SET$
- .

25. Name it
- $\angle DOG$
- .

26. Name the vertex in
- $\angle SET$
- .
- E



Solve and check these equations.

27. a. $n + 6 = 13$

$$\begin{array}{r} -6 \quad -6 \\ n + 6 = 13 \\ \hline n = 7 \end{array}$$

☒ b. $7 + 6 = 13$
 $13 = 13$

c. $n + 11 = 20$

$$\begin{array}{r} -11 \quad -11 \\ n + 11 = 20 \\ \hline n = 9 \end{array}$$

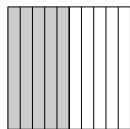
☒ d. $9 + 11 = 20$
 $20 = 20$



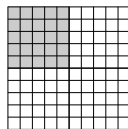
Decimals for Common Fractions

$$\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$$

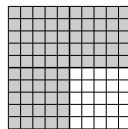
It is useful to know the equivalent decimal fractions for these common fractions.



$$\frac{1}{2} = \frac{5}{10} = 0.5$$



$$\frac{1}{4} = \frac{25}{100} = 0.25$$



$$\frac{3}{4} = \frac{75}{100} = 0.75$$

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Lesson 4 pp. 13-17

Lesson Preparation

Drill

- Do Mastery Drill 4.
Write the time and the number correct on the blanks.

Teaching the Lesson

Decimals for Common Fractions $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$

Students who memorize the decimal equivalents of these familiar common fractions will readily apply these equivalents to percents later in this LightUnit.

★ Optional Activity on page 18.

Lesson 4

We can use these same decimal values to change the fraction parts of the mixed numbers shown below.

$$3\frac{1}{2} = 3.5$$

$$6\frac{1}{4} = 6.25$$

$$9\frac{3}{4} = 9.75$$

Rewrite each fraction or mixed number as a decimal.

1. a. $\frac{1}{2} = \underline{0.5}$

b. $8\frac{3}{4} = \underline{8.75}$

c. $\frac{1}{4} = \underline{0.25}$

d. $\frac{3}{4} = \underline{0.75}$

Rewrite each decimal as a common fraction or mixed number.

2. a. $0.25 = \underline{\frac{1}{4}}$

b. $2.25 = \underline{2\frac{1}{4}}$

c. $0.5 = \underline{\frac{1}{2}}$

d. $0.75 = \underline{\frac{3}{4}}$

Using Digit Sums to Check Division

Note to teacher: This lesson on checking with digit sums will be reviewed through Math 506 but will not be tested. When students are asked to check their division after Math 506, they may use the method of their choice.

Division can be checked using digit sums. Instead of multiplying and adding the larger numbers of the division problem, you can multiply and add the smaller digit sums.

$$\begin{array}{r}
 \text{divisor} \quad \text{quotient} \quad \text{remainder} \\
 \textcircled{2} \times \textcircled{8} + \textcircled{6} \quad \boxed{4} \\
 38 \overline{) 24,610} \quad \text{647 R24} \quad \boxed{4} \\
 \underline{228} \\
 181 \\
 \underline{152} \\
 290 \\
 \underline{266} \\
 24
 \end{array}$$

- Find the digit sums of the divisor (38: $3 + 8 = 11$; $1 + 1 = \textcircled{2}$), the quotient (647: $6 + 4 + 7 = 17$; $1 + 7 = \textcircled{8}$), and the remainder (24: $2 + 4 = \textcircled{6}$).
- Multiply** the digit sums of the divisor and quotient, **and add** the digit sum of the remainder. Then find the digit sum of that answer.
 $(2 \times 8 + 6 = 22; 2 + 2 = \boxed{4})$
- Find the digit sum of the dividend (24,610: $2 + 4 + 6 + 1 + 0 = 13$; $1 + 3 = \boxed{4}$).
- Compare the results from Steps 2 and 3 ($4 = 4$).
 If they are the same, your answer should be right.
 If they are different, either your answer is wrong, or you made a mistake in your checking.

Using Digit Sums to Check Division

Using digit sums to check division is a quick and simple way to check the accuracy of a long division problem without multiplying the actual divisor by the actual quotient. However, after finding the digit sum of each part of the division problem (dividend, divisor, quotient, and remainder) we use the same method for checking. Using the digit sums instead of the larger numbers, multiply the divisor by the quotient and add the remainder. Find the digit sum of the result. It should match the digit sum of the dividend. This lesson will not be tested, but it is reviewed long enough for the student to become familiar with the process and master it. He will then be able to choose which method of checking he prefers when he is asked to check division problems in later LightUnits.

Lesson 4

Check using digit sums. One answer is wrong. Correct it in the space at the right.

3. a. $\begin{array}{r} \textcircled{1} \times \textcircled{4} + \textcircled{1} \textcircled{5} \\ 46 \overline{) 35,402} \textcircled{5} \\ \underline{322} \\ 320 \\ \underline{276} \\ 442 \\ \underline{414} \\ 28 \end{array}$ b. $\begin{array}{r} \textcircled{8} \times \textcircled{8} + \textcircled{6} \textcircled{7} \\ 35 \overline{) 28,340} \textcircled{8} \\ \underline{280} \\ 340 \\ \underline{325} \\ 15 \end{array}$ c. $\begin{array}{r} \textcircled{8} \times \textcircled{8} + \textcircled{7} \textcircled{8} \\ 35 \overline{) 28,340} \textcircled{8} \\ \underline{280} \\ 340 \\ \underline{315} \\ 25 \end{array}$

Note: For Lesson 5, *Fascinating Discoveries*, you will need an empty 2-liter (or half-gallon) milk or juice carton and a sensitive scale or balance that weighs grams and kilograms.



Solve and check these equations.

4. a. $\begin{array}{r} \textcircled{1} \\ n - 30 = 40 \\ \underline{+30 +30} \\ n = 70 \end{array}$ b. $\begin{array}{r} \textcircled{1} \\ 70 - 30 = 40 \\ 40 = 40 \end{array}$ c. $\begin{array}{r} \textcircled{1} \\ n - 11 = 22 \\ \underline{+11 +11} \\ n = 33 \end{array}$ d. $\begin{array}{r} \textcircled{1} \\ 33 - 11 = 22 \\ 22 = 22 \end{array}$

Put a check mark (✓) in the blank after each number that is divisible . . .

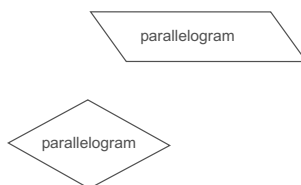
5. by 6. a. 84 ✓ b. 98 _____ c. 85 _____ d. 90 ✓ e. 78 ✓

Change to improper fractions.

6. a. $4 \frac{7}{10} = \frac{47}{10}$ b. $15 = \frac{15}{1}$ c. $2 \frac{7}{16} = \frac{39}{16}$ d. $18 = \frac{18}{1}$

Underline the statements that are true about parallelograms.

7. They are quadrilaterals.
8. Their opposite sides are parallel.
9. They can be squares.
10. They always have four equal-length sides.
11. They are round.



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Tips for Struggling Students

➔ Most students will appreciate this shortcut approach to checking long division problems because it eliminates most of the tedious calculation necessary for checking division the way they learned previously. However, if you have a student who simply cannot master the mental work required by the digit sums method of checking, don't require him to learn it. Have him check in the usual way, by multiplying the divisor and the quotient and adding the remainder, then comparing the result with the original dividend.

Board Work

Use digit sums to check the following. Some are correct, and some are not. Correct those that are wrong.

$\begin{array}{r} \textcircled{9} \times \textcircled{9} + \textcircled{4} \textcircled{4} \\ 27 \overline{) 985} \textcircled{4} \end{array}$ (correct)

$\begin{array}{r} \textcircled{6} \times \textcircled{2} \textcircled{3} \\ 42 \overline{) 9,954} \textcircled{9} \end{array}$ (incorrect)

$\begin{array}{r} \textcircled{7} \times \textcircled{6} + \textcircled{2} \textcircled{8} \\ 16 \overline{) 1,540} \textcircled{1} \end{array}$ (incorrect)

$\begin{array}{r} \textcircled{5} \times \textcircled{4} + \textcircled{6} \textcircled{5} \\ 59 \overline{) 6,089} \textcircled{5} \end{array}$ (incorrect)

$\begin{array}{r} \textcircled{6} \times \textcircled{3} \textcircled{7} \\ 42 \overline{) 9,954} \textcircled{9} \\ \underline{84} \\ 155 \\ \underline{126} \\ 294 \\ \underline{294} \\ 0 \end{array}$

$\begin{array}{r} \textcircled{7} \times \textcircled{6} + \textcircled{4} \textcircled{1} \\ 16 \overline{) 1,540} \textcircled{1} \\ \underline{144} \\ 100 \\ \underline{96} \\ 4 \end{array}$

$\begin{array}{r} \textcircled{5} \times \textcircled{4} + \textcircled{3} \textcircled{5} \\ 59 \overline{) 6,089} \textcircled{5} \\ \underline{59} \\ 189 \\ \underline{177} \\ 12 \end{array}$

Lesson 4

— \div \times *Skill Builders* —

12. a. $72 \overline{) 4,969} \begin{array}{r} 69 \\ 432 \\ \hline 649 \\ 648 \\ \hline 1 \end{array} R1$

b.
$$\begin{array}{r} 215 \\ 48 \overline{) 10,320} \\ \underline{96} \\ 72 \\ \underline{48} \\ 240 \\ \underline{240} \\ 0 \end{array}$$

c.
$$\begin{array}{r} 55 \\ 44 \\ 34 \\ 45.6 \\ \times 987 \\ \hline 3192 \\ 3680 \\ 410400 \\ \hline 45,007.2 \end{array}$$

13. a.
$$\begin{array}{r} ^2^9^1 \\ \$3.00 \\ -1.45 \\ \hline \$1.55 \end{array}$$

$$\text{b. } \frac{1\frac{2}{3}}{1\frac{4}{9}} = \frac{\frac{5}{3}}{\frac{10}{9}} = \frac{5}{3} \cdot \frac{9}{10} = \frac{3}{2}$$

c.
$$\begin{array}{r} 0.13 \\ \times 0.3 \\ \hline 0.039 \end{array}$$

d.
$$\begin{array}{r} 6.100 \\ 10.340 \\ + 16.013 \\ \hline 22.453 \end{array}$$

14. a. $\frac{\frac{1}{3}}{\frac{1}{12}} \times \frac{\frac{1}{4}}{\frac{1}{12}} = \frac{1}{12}$

b. $\frac{2}{7} \times \frac{2}{1} = \frac{4}{7}$

c. $\frac{2}{3} \times \frac{4}{5} = \underline{\frac{8}{15}}$

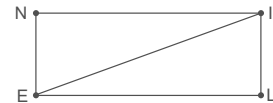
d. $\frac{3}{4} \times \frac{3}{5} = \underline{\frac{9}{20}}$

Write *horizontal* or *vertical* to complete the sentences.

15. \overline{NI} is horizontal.

16. \overline{NE} is vertical.

17. \overline{EL} is horizontal.



18. Mr. Reston's Jeep travels about 12 km for each liter of gasoline he uses. How far can he travel if his 40-L gas tank is full?

Answer: 480 km

$$\begin{array}{r} 40 \\ \times 12 \\ \hline 80 \\ 400 \\ \hline 480 \end{array}$$

★ Optional Activity.

☆ **19.** Mr. Reston has already used 8 L of gasoline, so his tank is no longer full. How much farther can he travel on the remaining gasoline?

Answer: 384 km

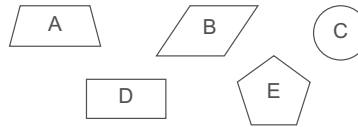
$$\begin{array}{r} 40 \\ - 8 \\ \hline 32 \end{array} \qquad \begin{array}{r} 32 \\ \times 12 \\ \hline 64 \\ 320 \\ \hline 384 \end{array}$$

Teacher Notes:

Lesson 4

Answer the question.

20. Which figures are quadrilaterals? A, B, D



Write = or \neq to tell whether the equations balance.

21. a. $60 - 4 \boxed{?} 11 \times 6$
56 \neq 66

b. $40 + 8 \boxed{?} 12 \times 4$
48 $=$ 48

c. $72 \div 6 \times 4 \boxed{?} 6 \times 8$
48 $=$ 48

Circle the sensible amount.

22. Jam for a piece of toast 3 tsp 3 c
 23. Motor oil for a car 4 mL 4 L

Write the ratio in three different ways.

Two cups of juice cost 5 rupees.

24. What is the ratio of cups to rupees?
2 to 5 2:5 $\frac{2}{5}$

In 2003 India's population was 1,050,000,000. The only country with more people at that time was China with 1,282,000,000.

Expand the number by multiplying each digit by its place value.

25. $7,284,359 = (7 \times 1,000,000) + (2 \times 100,000) + (8 \times 10,000) + (4 \times 1,000) + (3 \times 100) + (5 \times 10) + (9 \times 1)$

Write a decimal and a common fraction for each picture.



26. a. 0.75 $\frac{3}{4}$



b. 0.25 $\frac{1}{4}$



c. 0.5 $\frac{1}{2}$

Divide and check, using digit sums.

27. a. $\begin{array}{r} \textcircled{5} \overline{) 134} \text{R} \textcircled{2} \\ \underline{5} \\ 17 \\ \underline{15} \\ 22 \\ \underline{20} \\ 2 \end{array}$ $\boxed{6}$

b. $\begin{array}{r} \textcircled{7} \overline{) 1050} \text{R} \textcircled{15} \\ \underline{70} \\ 350 \\ \underline{350} \\ 0 \end{array}$ $\boxed{6}$

c. $\begin{array}{r} \textcircled{2} \overline{) 543} \text{R} \textcircled{11} \\ \underline{38} \\ 163 \\ \underline{152} \\ 11 \end{array}$ $\boxed{3}$

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Teacher Notes:
