

Using Cross Products to Solve and Check Proportions

Four cabbages cost 20 hryvnia. How much do 3 cabbages cost?

$$\frac{4 \text{ cabbages}}{20 \text{ hryvnia}} = \frac{3 \text{ cabbages}}{n}$$

3 does not go evenly into 4.

To solve this kind of proportion, use cross products.

$$\frac{4 \text{ cabbages}}{20 \text{ hryvnia}} = \frac{3 \text{ cabbages}}{n}$$

Step 1

Multiply the diagonal that has no missing number.

$$3 \times 20 = 60$$

Step 2

Divide the product from Step 1 by the number in the other diagonal.

$$60 \div 4 = 15$$

$$\frac{4 \text{ cabbages}}{20 \text{ hryvnia}} = \frac{3 \text{ cabbages}}{15 \text{ hryvnia}}$$

The answer is your solution.

Three cabbages cost 15 hryvnia.

To check proportions, use cross products.

$$\frac{4 \text{ cabbages}}{20 \text{ hryvnia}} = \frac{3 \text{ cabbages}}{15 \text{ hryvnia}}$$

$$4 \times 15 = 60$$

$$20 \times 3 = 60$$

The cross products should be the same.

Complete each of these by using cross products.

1. a. $\frac{10 \text{ pencils}}{5 \text{¢}} = \frac{\text{pencils}}{9 \text{¢}}$

b. $\frac{2 \text{ books}}{6 \text{ days}} = \frac{\text{books}}{21 \text{ days}}$

2. a. $\frac{9 \text{ hours}}{6 \text{ tons}} = \frac{3 \text{ hours}}{\text{tons}}$

b. $\frac{4 \text{ pecks}}{\$10} = \frac{\text{pecks}}{\$15}$

3. a. $\frac{6}{9} = \frac{\quad}{12}$

b. $\frac{4}{12} = \frac{5}{\quad}$

c. $\frac{6}{14} = \frac{9}{\quad}$

Check these proportions using cross products. Write = or \neq . The first one is done for you.

4. a. $\frac{4 \text{ plates}}{8 \text{ cups}} \neq \frac{8 \text{ plates}}{14 \text{ cups}}$

b. $\frac{6 \text{ pots}}{21 \text{ spoons}} \quad \frac{2 \text{ pots}}{7 \text{ spoons}}$

c. $\frac{5 \text{ trees}}{15 \text{ logs}} \quad \frac{6 \text{ trees}}{18 \text{ logs}}$

$4 \times 14 = 56$

$8 \times 8 = 64$



Round to the nearest thousand.

5. a. 7,892 _____

b. 28,065 _____

c. 167,501 _____

Write these fractions with denominators of 100. Then write them as percents.

6. a. $\frac{4}{10} = \frac{\quad}{100} = \frac{\quad}{100}\%$

b. $\frac{1}{4} = \frac{\quad}{100} = \frac{\quad}{100}\%$

c. $\frac{5}{10} = \frac{\quad}{100} = \frac{\quad}{100}\%$

Write the place value of each underlined digit.

7. 214,031,648,667,295 _____

8. 3,007,878,040,162 _____

9. 48,000,000,423,065 _____

10. 888,010,000,000,003 _____

11. 484,560,003,221 _____

Ukraine has huge flat fields. Topsoil is several feet deep in most places. In some places the topsoil reaches depths of over six feet.

Lesson 1

Skill Builders

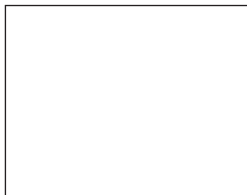
12. a.
$$\begin{array}{r} 0.052 \\ \times 0.5 \\ \hline \end{array}$$

b.
$$7 \overline{) \$59.85}$$

c.
$$\begin{array}{r} 826 \\ \times 42 \\ \hline \end{array}$$

Copy and solve.

13. $6 - 1.304 =$ _____



Write these fractions and mixed numbers as decimals.

14. a. $3\frac{1}{2}$ _____

b. $\frac{50}{100}$ _____

c. $\frac{5}{10}$ _____

d. $1\frac{1}{4}$ _____

Use $<$, $>$, or $=$ to make true statements.

15. a. 5.3 _____ 5.30

b. 6.709 _____ 6.107

c. 8.134 _____ 8.314

d. 0.6 _____ 0.600



16. Valentine and Anatoly travel by bicycle on Sunday preaching trips. One Sunday they left the village of Gorlovka and biked 4.5 kilometers to Ivanovka, 3.9 kilometers to Lesniki, and 6.1 kilometers to Radinka. They biked back home to Gorlovka the same way they had come. What was the total distance traveled?

Answer: _____



17. Pastor Yura traveled 18 kilometers to preach at a village on Sunday evening. He rode the bus for 4 kilometers, and then hitched a ride for 4 kilometers. He walked the rest of the way to the village. Find the distance Yura walked to reach this village.

Answer: _____

— ?... *Mental Math* —

18. a. $0.74 \div 100 =$ _____ b. $0.65 \div 10 =$ _____ c. $0.5 \times 10 =$ _____

19. $\sqrt{81} \times 10 \div 10 - 3 \times 4 =$ _____
 $\times 7$

Name the following.

20. Line _____

21. Line segment _____

22. Ray _____

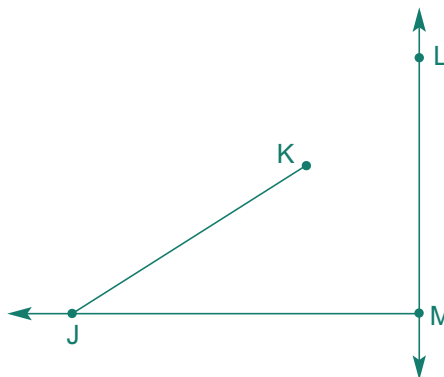
Write *true* or *false*.

23. \overline{JK} is vertical. _____

24. \overleftrightarrow{LM} is horizontal. _____

25. \overrightarrow{MJ} is horizontal. _____

26. $\angle KJM$ is an obtuse angle. _____



Simplify these expressions.

27. a. $4 + 14 \div 2 + 2 \times 3$

b. $8 + (5 - 3) + 8 \div 4$

Solve these proportions.

28. a. $\frac{28}{14} = \frac{4}{1}$

b. $\frac{9}{12} = \frac{4}{1}$

c. $\frac{7}{8} = \frac{48}{1}$

Use cross products to solve and check these proportions.

29. a. $\frac{4}{12} = \frac{9}{1}$

b. $\frac{72}{80} = \frac{90}{1}$

c. $\frac{2}{6} = \frac{5}{1}$



Understanding Prime and Composite Numbers



Every whole number is divisible by itself. $47 \div 47 = 1$ and $439 \div 439 = 1$.

Every whole number is divisible by 1. $47 \div 1 = 47$ and $439 \div 1 = 439$.

A number that is divisible by no other number besides 1 and itself is called a **prime number**.

A number that is divisible by some other number besides 1 and itself is called a **composite** (käm pä' zət) **number**.

The numbers 0 and 1 are neither prime nor composite.

47 is prime because it is divisible by only 47 and 1.

49 is composite because it is divisible not only by 49 and 1, but also by 7.

48 is divisible by 1, 2, 3, 4, 6, 8, 12, 16, 24, and 48, so it is definitely composite.

You can easily check whether numbers under 100 are composite or prime by checking if they are divisible by 2, 3, 5, or 7. Any number greater than 7 that is divisible by 2, 3, 5, or 7 is composite. If a number under 100 is not divisible by 2, 3, 5, or 7, it is prime.

42 – composite

divisible by 1, 2, 3, 6
7, 14, 21, 42

53 – prime

divisible by only 1 and 53

11 – prime

divisible by only 1 and 11

Can you guess why we use 2, 3, 5, and 7? Because these are the 4 smallest prime numbers! Remember, these were your four keys for factoring in Math 400.

2 is the only even prime number. No other even numbers are prime because they are divisible by 2.

Write *P* for **prime** or *C* for **composite**. If you write *C*, also write 2, 3, 5, or 7 to show the key factors of the number. The first row is done for you.

- | | | | |
|----------------------------|-------------------------|-------------------------------|-------------------------|
| 1. a. 13 <u> P </u> | b. 25 <u> C 5 </u> | c. 60 <u> C 2, 3, or 5 </u> | d. 7 <u> P </u> |
| 2. a. 22 <u> </u> | b. 51 <u> </u> | c. 67 <u> </u> | d. 35 <u> </u> |
| 3. a. 29 <u> </u> | b. 39 <u> </u> | c. 47 <u> </u> | d. 41 <u> </u> |

We Remember

Use cross products to solve and check these proportions.

4. a. $\frac{40}{8} = \frac{\quad}{14}$

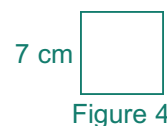
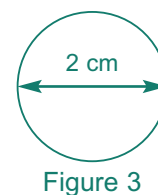
b. $\frac{7}{14} = \frac{3}{\quad}$

c. $\frac{3}{12} = \frac{2}{\quad}$

Write *true* or *false*.

5. Figures 1, 2, and 4 are parallelograms. _____

6. Figure 4 is a parallelogram and also a square. _____



Write the formulas and find the answers.

7. a. circumference of Figure 3

b. area of Figure 4

c. area of Figure 2

Solve and check.

8. a. $n - 14 = 2$

b. ☒

c. $n + 25 = 32$

d. ☒

Match.

9. _____ percent

a. 38%

10. _____ 65%

b. 63%

11. _____ 63 out of 100

c. %

12. _____ 72%

d. $\frac{65}{100}$

13. _____ $\frac{38}{100}$

e. 0.72

14. _____ 48%

f. $\frac{48}{100}$

— \div \times *Skill Builders* —

15. a.
$$\begin{array}{r} 6,239 \\ -2,977 \\ \hline \end{array}$$

c. $77 \overline{)624}$

c. $7\frac{1}{3} \times 2\frac{2}{11} = \underline{\hspace{2cm}}$

$+2$

17. 5 7 6 8 7

18. 0.7 1.57 0.57 0.75 _____ _____ _____ _____

19. by 7. **a.** 67 ____ **b.** 91 ____ **c.** 87 ____ **d.** 77 ____ **e.** 98 ____

20. by 8. **a.** 78 ____ **b.** 72 ____ **c.** 96 ____ **d.** 98 ____ **e.** 88 ____

21. by 6. **a.** 24 ____ **b.** 66 ____ **c.** 76 ____ **d.** 48 ____ **e.** 52 ____

22. Twenty-one trillion, six hundred sixty-seven billion, two hundred eighty-three million, eight hundred eighty-nine thousand, four hundred forty-seven

23. a. $24:8 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$ **b.** $40 \text{ to } 20 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$ **c.** $11:66 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$



24. Tea was served at the church fellowship meal. If 1 liter of tea served 4 people, how many people could be served with 9 liters of tea?

Answer: _____

The Ukrainian currency (unit of money) is the *hryvnia* (Hr). The Hr works just like our dollar. It has 100 smaller parts called *kopecks*, like our pennies. The Hr symbol is written in front of the amount just like the American dollar symbol. Fifty-five hryvnia is written Hr55.



25. Vasily sells some of the milk from his cow in three-liter jars at the market. If he sells each jar of milk for 5 hryvnia, how much will he receive for 24 liters of milk?

Answer: _____

Combine integers.

26. a. $-5 + (-8) = \underline{\hspace{2cm}}$ b. $-9 + 9 = \underline{\hspace{2cm}}$ c. $-5 + 6 = \underline{\hspace{2cm}}$ d. $1 + (-9) = \underline{\hspace{2cm}}$

Solve these proportions.

27. a. $\frac{30}{15} = \frac{6}{\hspace{1cm}}$ b. $\frac{2}{11} = \frac{\hspace{1cm}}{55}$ c. $\frac{5}{7} = \frac{\hspace{1cm}}{70}$

Write each ratio in fraction form. Multiply by 7 to make larger equivalent ratios.

28. a. 6 to 3 = $\frac{\hspace{1cm}}{\hspace{1cm}}$ = $\frac{\hspace{1cm}}{\hspace{1cm}}$ b. 2 to 11 = $\frac{\hspace{1cm}}{\hspace{1cm}}$ = $\frac{\hspace{1cm}}{\hspace{1cm}}$ c. 5:7 = $\frac{\hspace{1cm}}{\hspace{1cm}}$ = $\frac{\hspace{1cm}}{\hspace{1cm}}$

Round to the nearest...

29. one. a. 93.8 _____ b. 39.49 _____
 30. thousandth. a. 0.34762 _____ b. 0.0069 _____

Lessons 2, 3

Rewrite each common fraction as a decimal in simplest form.

31. a. $\frac{3}{4} =$ _____

b. $\frac{1}{2} =$ _____

c. $\frac{1}{4} =$ _____

Write the following numbers beside the correct label.

5 6 7 8 9 10 11 12

32. a. Prime _____

b. Composite _____



Understanding Rhombuses

Parallelograms are quadrilaterals whose opposite sides are parallel.

A rhombus is a special kind of parallelogram. It must have:

1. two pairs of parallel sides.
2. four congruent sides.

A rhombus may also be a square if it has four right angles.

Rhombuses

- have two pairs of parallel sides.
- have four congruent sides.



Write *true* or *false*.

1. A square is a rhombus. _____
2. All rhombuses are squares. _____
3. All rhombuses have four right angles. _____
4. A square has two pairs of parallel sides. _____
5. A rhombus has four congruent sides. _____