A blueprint of an office building has a scale of 2 inches:15 feet. A completed scale model of the building is about 14.5 inches tall. Estimate the actual height of the office building.

Solution

STEP 1 Write a proportion to find the height $x$ of the office building.

$$\frac{2}{15} = \frac{14.5}{x}$$

STEP 2 Solve the proportion.

$$2 \cdot x = 14.5 \cdot 15$$

$$2x = 217.5$$

$$x = 108.75$$

The height of the office building is about 108.75 feet.

Exercises for Examples 2 and 3

4. A car travels 135 miles on 4 gallons of gasoline. How many gallons of gasoline will be used to travel 540 miles?

A blueprint has a scale of 3 cm:5 m. Use the given measurement to find the actual distance.

5. 4.5 cm

6. 8.1 cm

7. 0.6 cm
Lesson 2.6 Write Ratios and Proportions, continued

13. \( \frac{0.9}{3.6} = \frac{x}{5} \); \( x = 1.25 \)
14. \( \frac{2x}{7} = \frac{18}{21} \); \( x = 3 \)
15. \( \frac{48}{125} = \frac{3x}{25} \); \( x = 3.2 \)
16. Yes. The cross products are equal for the proportion \( \frac{9}{12} = \frac{18}{24} \).
17. 7.2 stones  
18. \( \frac{37}{40} \)  
19. \( \frac{61}{77} \)  
20. Cardinals: 9; Chickadees and pigeons: 13.5 each

Study Guide
1. \( \frac{5}{8} \)  
2. \( \frac{8}{13} \)  
3. \( x = 27 \)  
4. \( y = 45 \)  
5. \( z = 12 \)  
6. 80 words  
7. 320 words

Problem Solving Workshop:
Worked Out Example
1. S105  
2. 40 goals  
3. 375 miles  
4. 282 students

Challenge Practice
1. \( a \neq 0 \), \( b \neq 0 \), and \( a = b \)  
2. \( a \)  
3. \( b \)  
4. \( c \)  
5. \( d \neq 0 \)  
6. \( e \)  
7. \( f \)  
8. \( g \)  
9. \( h \)  
10. \( i \)  
11. \( j \)  
12. \( k \)  
13. \( l \)  
14. \( m \)  
15. \( n \)  
16. \( o \)  
17. \( p \)  
18. \( q \)  
19. \( r \)  
20. \( s \)  

Lesson 2.7 Solve Proportions Using Cross Products

Teaching Guide
1. \( \frac{3}{50} = \frac{x}{1250} \)  
2. 75 in.  
3. 87 in.

Alternative Lesson Starter: 12 cups water; 3 cups lemon juice; 3 cups sugar

Practice Level A
1. \( 4:11 = 20 : 55 \); means: 11 and 20; extremes: 4 and 55  
2. \( 18:14 = 9:7 \); means: 14 and 9; extremes: 18 and 7  
3. \( 57:104 = 50:114 \); means: 57 and 50; extremes: 25 and 114
4. \( 45x + 15(24) \)  
5. \( 7(1.5) \) and \( 3.5m \)
6. \( 7c \) and \( 70(4) \)  
7. \( 18(100) \) and \( 90x \)  
8. \( 3a \) and \( 19(33) \)  
9. \( 6(21) \) and \( 7(p + 4) \)  
10. \( x = 15 \)
11. \( m = 8 \)  
12. \( a = 24 \)  
13. \( p = 53 \)  
14. \( c = 2 \)
15. \( w = 3 \)  
16. \( d = 90 \)  
17. \( z = 64 \)  
18. \( b = 64 \)
19. \( x = 1 \)  
20. \( y = 1 \)
21. \( n = 9 \)  
22. 27 min  
23. 200 min  
24. about 8.7 h  
25. 60 km
26. 37.5 km  
27. 105 km  
28. 300 m

Practice Level B
1. \( 55n \) and \( 11(40) \)  
2. \( 4x \) and \( 9(1) \)  
3. \( 1.8(3.8) \) and \( 1.9b \)  
4. \( 7(a + 6) \) and \( 21(4) \)  
5. \( 9(5x) \) and \( 30(x + 1) \)  
6. \( 2.2(a - 1) \) and \( 3.3(a - 2) \)
7. \( m = 35 \)  
8. \( d = 35 \)  
9. \( x = 30 \)  
10. \( w = 5 \)
11. \( w = 3 \)  
12. \( z = 9 \)  
13. \( a = 10 \)  
14. \( y = -1 \)
15. \( w = 10 \)  
16. \( c = 12.375 \)  
17. \( a = 3 \)
18. \( n = 5 \)  
19. \( 209 ft \)  
20. \( 85.5 ft \)  
21. \( 66.5 ft \)
22. \( a \)  
23. \( b \)  
24. \( c \)  

Practice Level C
1. \( x = 28 \)  
2. \( a = 12 \)  
3. \( m = 1 \)  
4. \( w = 5 \)
5. \( c = 32 \)  
6. \( n = 20 \)  
7. \( d = 78 \)  
8. \( y = 20 \)
9. \( p = 15 \)  
10. \( z = 2 \)  
11. \( b = 2.5 \)
12. \( c = 3.2 \)  
13. Because the cross products property gives you \( 20 = h \cdot k \), or \( 20 \cdot k = h \), as \( k \) decreases, \( h \) must increase.  
14. About 0.47 minutes longer  
15. 1 cm : 20 km
16. Golden Gate: 4200 ft; Lewis and Clark: 1200 ft; Francis Scott Key: 1200 ft  
17. 240 freshwater fish; 400 saltwater fish; 160 more saltwater fish

Study Guide
1. \( x = 25 \)  
2. \( y = 6 \)  
3. \( z = 35 \)  
4. \( 16 \text{ gal} \)
5. 7.5 m  
6. 13.5 m  
7. 1 m

Real-Life Application
1. \( \frac{1\text{ inch}}{156 \text{ miles}} = \frac{2\text{ inches}}{x} \); 1312 miles
2. \( \frac{1\text{ inch}}{656 \text{ miles}} = \frac{1\frac{7}{16}\text{ inches}}{x} \); 943 miles
3. \( \frac{1\text{ inch}}{656 \text{ miles}} = \frac{1\frac{1}{8}\text{ inches}}{x} \); 738 miles
4. \( \frac{1\text{ inch}}{656 \text{ miles}} = \frac{x}{852.8 \text{ miles}} \)

1.3 inches = 1\( \frac{3}{10} \) inches  
b. about 1\( \frac{1}{4} \) inches