Angles $b$ and $e$ correspond to the angles that are $68^\circ$. To find the other missing angle measures, students need to use the fact that the interior angle measures of quadrilaterals have a sum of $360^\circ$. $68^\circ + 68^\circ + 112^\circ + 112^\circ = 360^\circ$. (This is the same as finding the supplement of $68^\circ$, which is $112^\circ$).

D. 1. $x = 1$ cm; Possible explanation: Find the value of $x$ that will make the following an equivalent ratio: $\frac{8}{14} = \frac{x}{1.75}$.

Note: This first ratio compares the top side of the smaller figure to the top side of the larger figure. However, students can choose any of the corresponding sides for the first ratio. Students may also use adjacent side ratios within figures. For example, comparing the adjacent side lengths, $x$ and 2, we get the ratio $\frac{x}{2}$. This is equivalent to the ratio of the adjacent sides in the corresponding positions in the other figure, $\frac{1.75}{3.5}$, or $\frac{1}{2}$. So, $x = 1$ cm.

2. $y = 7$ cm; Possible explanation: Multiply the scale factor, 1.75, by 4 to get $y$. Students may also find adjacent side length ratios within each figure, which results in the proportion $\frac{y}{14} = \frac{4}{8}$, for example.

3. The area of the small figure is 40 square centimeters, and the perimeter is 28 centimeters.

4. The area of the large figure is 122.5 square centimeters. The scale factor is 1.75. Therefore, the area of the larger figure will be $40 \times 1.75 \times 1.75 = 122.5$ square centimeters.

The perimeter is 49 cm, which you can find by multiplying the perimeter of the small figure by the scale factor $28 \text{ cm} \times 1.75 = 49 \text{ cm}$.

Corresponding ACE Answers

Applications

17. Approximately 65 feet; solve for $h$ in the proportion $\frac{16}{9} = \frac{115}{h}$; or, multiply 115 feet by the scale factor $\frac{9}{16}$, or 0.5625.

18. Taylor is right to say that the two triangles are similar. However, the scale factor is not 2. However, if you convert the measures of Triangle B to inches, the scale
factor from A to B is 24 for each side.

**Connections**

19. not equivalent  
20. not equivalent  
21. equivalent  
22. equivalent  
23. not equivalent  
24. equivalent  
25. Answers will vary.  
26. Answers will vary. Sample answer: 10 to 6 and 15 to 9. In each answer, the division of the first number by the second should give the same result as the division of the first number in the question by the second number in the question.  
27. Answers will vary. Sample answer: 8 to 2 and 20 to 5. In each answer, the division of the first number by the second should give the same result as the division of the first number in the question by the second number in the question.  
28. Answers will vary. Sample answer: 12 to 28 and 7.5 to 17.5. In each answer, the division of the first number by the second should give the same result as the division of the first number in the question by the second number in the question.  
29. Answers will vary. Sample answer: 3 to 2 and 0.75 to 0.5. In each answer, the division of the first number by the second should give the same result as the division of the first number in the question by the second number in the question.  
30. a. 40 in. Answers will vary. Possible answer: The dog in the picture is 5 inches long. Since the picture of the dog is 12.5% of the real dog’s size, then $0.125 \times$ the real length $= \text{the picture’s length}$, or 5 inches. You can rewrite this as $L = 5 \div 0.125$, or 40 in.
b. 23 in. Answers will vary. Possible answer: The dog in the picture is $2 \frac{7}{8}$ in. tall. $2 \frac{7}{8}$ is 0.125 times the real dog’s height, so you can divide $2 \frac{7}{8}$ by the scale factor, 0.125, to find the real height of the dog.

c. Duke is 8 times as large as the picture. Using 200% enlargement, you can double the size of the picture. Use the 200% enlargement three times in a row: $2 \times 2 \times 2 = 8$ times as large a picture.

31. a. $(0.5x, 0.5y)$

b. Yes, they are similar. The scale factor is 0.5 from triangle $ABC$ to the new triangle.

Extensions

44. a. Yes, since $\frac{4}{6} = \frac{8}{12}$.

b. No, since $\frac{4}{6} \neq \frac{9}{11}$.

c. Yes, since $\frac{4}{6} = \frac{6}{9}$.

d. Yes, since $\frac{4}{6} = \frac{3}{4.5}$.

45. No. None of the given paper sizes have the same base-to-height ratio as the photo.

46. Use the 50% reduction two times in a row (i.e., copy the photo once, then take the image and make its copy again.) Each time the drawing will be reduced to half its size. So, after two reductions it will be $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ of its original size.

47. (1) Applying a 50% reduction three times in a row using the image each time will reduce the size to 12.5% of its original dimensions. The area would be $\frac{1}{64}$ the area of the original.

(2) Apply a 60% reduction two times in a row to get a picture that is 36% of the original size. The area would be $\frac{81}{625}$ the area of the original.

48. You can enlarge the original 4-inch-by-6 inch picture until the side that is originally 4 inches is enlarged to 11 inches. The 6-inch side is then enlarged to 16.5 inches. This is the largest possible image to fit paper that is 11” by 17”. This requires an enlargement of 275%.

Note: To accomplish this, first enlarge the original photograph to 200%, then
enlarge the result a second time using 125% (the new copy is now 2.5 times larger than the original). Finally, take this copy and enlarge it 110%. Because the scale factors are multiplicative (and therefore commutative), the order in which these enlargements are done does not matter.

ACE Answers: Inv. 4 Stretching and Shrinking