

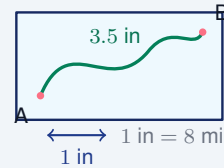
# Scale Drawings and Scale Factors

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

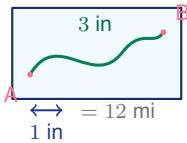
A *scale* is a promise that one measurement on a drawing stands for a different measurement in real life. If the question starts with a drawing measurement, multiply by the scale to get the real measurement. If the question starts with a real measurement, divide by the scale to get the drawing measurement. A *scale factor* works the same way for every matching side of a figure.

► **Example:** A map scale is 1 in = 8 mi. A hiking route is 3.5 in long on the map. To find the real distance, multiply the drawing length by 8:  $3.5 \times 8 = 28$ . The real route is 28 mi.

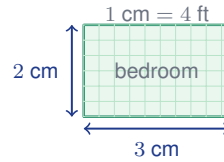


### Illustrated Practice

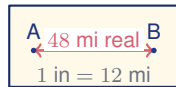
Use each picture. Decide whether to multiply or divide.



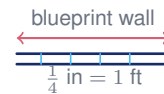
1. A map uses the scale 1 in = 12 mi. The route from A to B is 3 in on the map. What is the real distance? \_\_\_\_\_



3. A bedroom floor plan uses the scale 1 cm = 4 ft. The drawing is 3 cm long and 2 cm wide. Find the real bedroom dimensions. \_\_\_\_\_



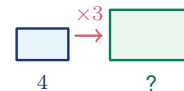
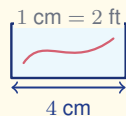
2. The real distance between two towns is 48 mi. On a map, 1 in represents 12 mi. How many inches apart should the towns be on the map? \_\_\_\_\_



4. A blueprint scale is 1/4 in = 1 ft. A wall is 5 in long on the blueprint. What is the real wall length? \_\_\_\_\_

### Bonus Scale Check

A mural sketch uses 1 cm = 2 ft. The sketch is 4 cm wide. What is the real width? \_\_\_\_\_



5. The small rectangle is enlarged by a scale factor of 3. The matching side is 4 units on the small rectangle. What is the matching side on the large rectangle? \_\_\_\_\_



◆ Illustrated Practice, continued

Each picture is part of the problem, so read the labels carefully.



6. A triangle is reduced by a scale factor of  $\frac{1}{2}$ . The original side is 18 cm. What is the matching side in the smaller triangle?

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7. The triangles are similar. The small base 6 matches the large base 15. The small height is 4. What is the large height  $h$ ?

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8. A model car uses the scale 1 in = 3 ft. The model is 1.5 in long. What is the real length of the car?

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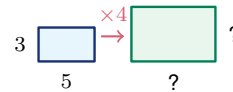
9. A bridge is 6 cm long on an engineering drawing. The scale is 1 cm = 25 m. What is the real bridge length?

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10. A park map uses 1 in = 200 yd. A trail is 1000 yd in real life. How long should the trail be on the map?

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11. Two rectangles are similar. The small rectangle is 5 by 3, and the scale factor to the large rectangle is 4. What is the perimeter of the large rectangle?

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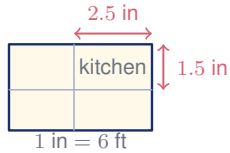
12. A square logo has area 9 square units. It is enlarged by a scale factor of 5. What is the area of the enlarged logo?

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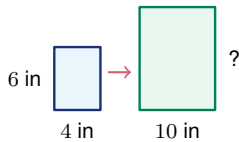
◆ **Applied Scale Problems**

These are still scale problems, but the pictures look more like real test situations.



**13.** A kitchen is 2.5 in by 1.5 in on a house plan. The scale is 1 in = 6 ft. Find the real kitchen dimensions.

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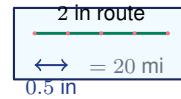
**14.** A photograph is enlarged from 4 in wide to 10 in wide. The original photo is 6 in tall. What is the height of the enlarged photo?

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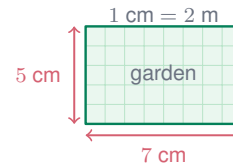
**15.** A dollhouse is built with scale factor  $\frac{1}{12}$ . A real table is 36 in long. How long is the model table?

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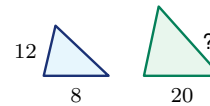
**16.** A scale bar says 0.5 in represents 20 mi. A route is 2 in long on the map. What is the real distance?

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**17.** A garden drawing is 7 cm by 5 cm. The scale is 1 cm = 2 m. What is the real area of the garden?

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**18.** The triangles are similar. A side of 8 on the small triangle matches a side of 20 on the large triangle. Another small side is 12. What is the matching large side?

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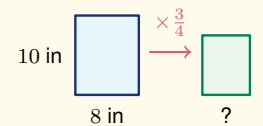
**Bonus Mixed Scale Challenge**

Extra practice, not part of the /18 score



**A.** A playground drawing is 6 cm by 3 cm. The scale is 1 cm = 40 m. Find the real perimeter.

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**B.** An 8 in by 10 in print is reduced by a scale factor of  $\frac{3}{4}$ . Find the new dimensions.

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## Answer Keys

- |                  |                      |                        |
|------------------|----------------------|------------------------|
| 1. 36 mi         | 7. 10                | 13. 15 ft by 9 ft      |
| 2. 4 in          | 8. 4.5 ft            | 14. 15 in              |
| 3. 12 ft by 8 ft | 9. 150 m             | 15. 3 in               |
| 4. 20 ft         | 10. 5 in             | 16. 80 mi              |
| 5. 12 units      | 11. 64 units         | 17. 140 m <sup>2</sup> |
| 6. 9 cm          | 12. 225 square units | 18. 30                 |

**Bonus:** 8 ft    **Challenge A:** 720 m    **Challenge B:** 6 in by 7.5 in

### Step-by-Step Explanations

1. The picture gives a drawing distance of 3 inches, and the scale says each inch stands for 12 miles. Since we are going from the drawing to the real world, multiply:  $3 \times 12 = 36$ . So the real distance is 36 miles.

2. This time the question gives the real distance first, so we go backward from real life to the map. One map inch represents 12 miles, so divide the real distance by 12:  $48 \div 12 = 4$ . The towns should be 4 inches apart on the map.

3. Use the scale on each dimension of the room. The drawing length is 3 cm, so  $3 \times 4 = 12$  ft; the drawing width is 2 cm, so  $2 \times 4 = 8$  ft. The real bedroom is 12 ft by 8 ft.

4. The blueprint scale says  $\frac{1}{4}$  inch represents 1 foot, which means 1 full inch represents 4 feet. The wall is 5 inches on the drawing, so multiply  $5 \times 4 = 20$ . The real wall is 20 feet long.

5. A scale factor of 3 means every matching length is multiplied by 3. The small side is 4 units, so the matching large side is  $4 \times 3 = 12$  units.

6. A reduction by  $\frac{1}{2}$  means the new figure is half as large in each length. Half of 18 cm is  $18 \times \frac{1}{2} = 9$  cm, so the matching side in the smaller triangle is 9 cm.

7. Start with the matching bases because both are labeled: the large base compared to the small base is  $15 \div 6 = 2.5$ . The height must grow by the same scale factor, so  $4 \times 2.5 = 10$ . The large height is 10.

8. The model length is a drawing length, and the scale says each model inch represents 3 real feet. Multiply  $1.5 \times 3 = 4.5$ . The real car is 4.5 feet long.

9. The bridge measurement on the drawing is 6 cm. Since each centimeter represents 25 meters in real life, multiply  $6 \times 25 = 150$ . The real bridge length is 150 meters.

10. The problem gives a real trail length of 1000 yards, but asks for the map length. Because 1 inch on the map represents 200 yards, divide:  $1000 \div 200 = 5$ . The trail should be 5 inches long on the map.

11. First enlarge both side lengths by the scale factor of 4. The large rectangle is  $5 \times 4 = 20$  units by  $3 \times 4 = 12$  units. Perimeter adds all four sides, so  $20 + 12 + 20 + 12 = 64$  units.

12. Area does not multiply by just 5 because both the length and the width are enlarged. When side lengths are multiplied by 5, area is multiplied by  $5^2 = 25$ . The new area is  $9 \times 25 = 225$  square units.

13. Apply the house-plan scale to both labeled dimensions. The real length is  $2.5 \times 6 = 15$  ft, and the real width is  $1.5 \times 6 = 9$  ft. The kitchen is 15 ft by 9 ft.

14. Use the widths to find the scale factor for the enlargement. The photo goes from 4 inches wide to 10 inches wide, so the factor is  $10 \div 4 = 2.5$ . Multiply the old height by the same factor:  $6 \times 2.5 = 15$  inches.

15. A scale factor of  $\frac{1}{12}$  means the model length is one-twelfth of the real length. Divide 36 by 12, or multiply by  $\frac{1}{12}$ :  $36 \times \frac{1}{12} = 3$ . The model table is 3 inches long.

16. The scale bar says 0.5 inch represents 20 miles. A 2-inch route contains four half-inch pieces because  $2 \div 0.5 = 4$ . Each piece is 20 miles, so  $4 \times 20 = 80$  miles.

17. First convert both garden dimensions to real measurements: 7 cm becomes  $7 \times 2 = 14$  m, and 5 cm becomes  $5 \times 2 = 10$  m. Area is length times width, so  $14 \times 10 = 140$  square meters.

18. Use the matching sides 8 and 20 to find the scale factor from small to large:  $20 \div 8 = 2.5$ . The other small side is 12, so the matching large side is  $12 \times 2.5 = 30$ .

**Bonus.** The sketch width is 4 cm, and each centimeter represents 2 feet in real life. Go from the drawing to the real mural by multiplying:  $4 \times 2 = 8$ . The real mural is 8 feet wide.

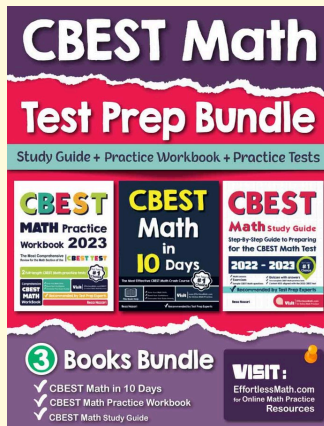
**Challenge A.** Convert both drawing dimensions first: 6 cm becomes  $6 \times 40 = 240$  m, and 3 cm becomes  $3 \times 40 = 120$  m. Perimeter adds all four sides:  $240 + 120 + 240 + 120 = 720$  m.

**Challenge B.** A scale factor of  $\frac{3}{4}$  multiplies every length. The new width is  $8 \times \frac{3}{4} = 6$  inches, and the new height is  $10 \times \frac{3}{4} = 7.5$  inches.



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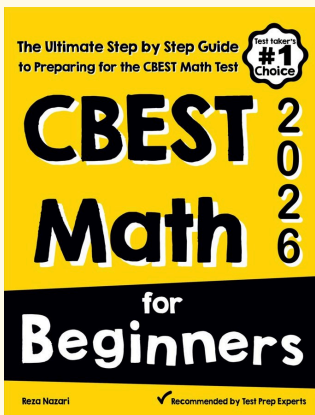
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