LESSON MAKER PRO

# Scale Factor Sleuths

*Prove similarity and use matching side ratios.*

**HIGH SCHOOL · HSG-SRT.B**

**CCSS.Math.Content.HSG-SRT.B** "Prove theorems involving similarity"

NAME _____ DATE _____

## SIMILARITY TOOLS

When two triangles are similar, corresponding angles are equal and corresponding side lengths have the same scale factor. You can prove triangles similar with AA, or use parallel lines to create equal angles. Match corresponding vertices in order, then write a proportion using matching sides.

## WORKED EXAMPLE

Triangle RST is similar to triangle UVW, with R corresponding to U, S to V, and T to W. RS = 14, UV = 21, and ST = 10. Find VW.

1. Corresponding sides give RS/UV = ST/VW.
2. 14/21 = 10/x.
3. 14x = 210, so x = 15.

**Answer: VW = 15**

## PRACTICE 6 problems

**1** Triangle ABC is similar to triangle DEF, with A corresponding to D, B to E, and C to F. AB = 8, DE = 12, and BC = 18. Find EF.

**ANSWER** _____

**2** In triangle PQR, m∠P = 37° and m∠Q = 68°. In triangle XYZ, m∠X = 37° and m∠Y = 68°. Which triangles are similar, and why?

**ANSWER** _____

**3** Triangle LMN is similar to triangle RST, with L corresponding to R and M to S. LM = 11, MN = 19, and RS = 22. Find ST.

**ANSWER** _____

**4** In triangle ABC, D lies on AB and E lies on AC. DE is parallel to BC. AD = 5, DB = 7, and AE = 25. Find EC.

**ANSWER** _____

**5** Triangle JKL is similar to triangle MNO, with J corresponding to M, K to N, and L to O. JK = 13, KL = 17, and MN = 26. Find NO.

**ANSWER** _____

**6** Triangle GHI has side lengths 24, 32, and 40. Triangle QRS has side lengths 33, 44, and 55. Are the triangles similar? State the criterion.

**ANSWER** _____

## APPLY IT Show your work

**1** At a skate park, a 7-foot vertical sign casts a 4-foot shadow. At the same time, a light pole casts a 20-foot shadow. Assume the sun rays make similar right triangles. How tall is the light pole?

WORK SPACE

**ANSWER** _____

**2** A student designs a rectangular thumbnail for a video channel. The original is 18 cm wide and 12 cm high. The enlarged version is 30 cm wide. If the rectangles are similar, what is its height?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

**CHALLENGE**

In triangle ABC, D lies on AB and E lies on AC. AD = 18, DB = 12, AE = 24, and EC = 16. Explain why DE is parallel to BC.

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**ANSWER KEY**

# Scale Factor Sleuths

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## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Triangle ABC is similar to triangle DEF, with A corresponding to D, B to E, and C to F. AB = 8, DE = 12, and BC = 18. Find EF. | **EF = 27** |
| 2 | In triangle PQR, m∠P = 37° and m∠Q = 68°. In triangle XYZ, m∠X = 37° and m∠Y = 68°. Which triangles are similar, and why? | **Triangle PQR is similar to triangle XYZ by AA similarity.** |
| 3 | Triangle LMN is similar to triangle RST, with L corresponding to R and M to S. LM = 11, MN = 19, and RS = 22. Find ST. | **ST = 38** |
| 4 | In triangle ABC, D lies on AB and E lies on AC. DE is parallel to BC. AD = 5, DB = 7, and AE = 25. Find EC. | **EC = 35** |
| 5 | Triangle JKL is similar to triangle MNO, with J corresponding to M, K to N, and L to O. JK = 13, KL = 17, and MN = 26. Find NO. | **NO = 34** |
| 6 | Triangle GHI has side lengths 24, 32, and 40. Triangle QRS has side lengths 33, 44, and 55. Are the triangles similar? State the criterion. | **Yes. Triangle GHI is similar to triangle QRS by SSS similarity.** |

## PART 2 · APPLY IT

1. **35 feet** Set 7/4 = x/20 because the height-to-shadow ratios are equal. Cross-multiplying gives x = 35.
2. **20 cm** The scale factor is 30/18 = 5/3. Multiply 12 by 5/3 to get 20.

## CHALLENGE

**AD/DB = 18/12 = 3/2 and AE/EC = 24/16 = 3/2. Since the two sides are divided proportionally, DE is parallel to BC by the converse of the triangle proportionality theorem.**

Accept equivalent ratios and simplified fractional forms. For similarity statements, accept a correctly ordered correspondence with AA or SSS, and for the challenge require equal side-division ratios plus the converse theorem.