LESSON MAKER PRO

Similarity Detectives

Prove the match before finding the missing length.

HIGH SCHOOL · G.2D.1.10

G.2D.1.10 "Construct logical arguments to prove triangle similarity (AA, SSS, SAS)."

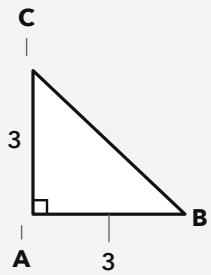
NAME _____ DATE _____

THREE WAYS TO PROVE IT

Triangles are similar by AA if two pairs of angles match, by SSS if all three pairs of sides have the same ratio, or by SAS if two pairs of sides have the same ratio and their included angles match. Match corresponding parts before you calculate an unknown side.

WORKED EXAMPLE

Triangle ABC is shown. Triangle DEF has DE = 6, DF = 6, and a right angle at D. Prove ABC ~ DEF and find DE/AB.



1. AB and AC meet at the right angle at A.
2. DE/AB = 6/3 = 2, and DF/AC = 6/3 = 2.
3. The included angles match, so ABC ~ DEF by SAS.

Answer: DE/AB = 2.

PRACTICE 4 problems

1 Angles A and D are 52°, and angles B and E are 68°. If AB = 5, DE = 10, BC = 7, and EF = x, prove ABC ~ DEF and find x.

ANSWER _____

2 ABC has AB = 8, AC = 15, BC = 17. DEF has DE = 16, DF = 30, EF = x. Angles A and D are right angles. Prove similarity and find x.

ANSWER _____

3 ABC has sides AB = 5, BC = 7, AC = 9. DEF has DE = 10, EF = 14, DF = x. Find x so the triangles are similar, and name the test.

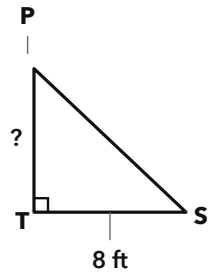
ANSWER _____

4 ABC has sides AB = 7, BC = 11, AC = 13. DEF has DE = 14, EF = 22, DF = 25. Are the triangles similar? Justify your answer.

ANSWER _____

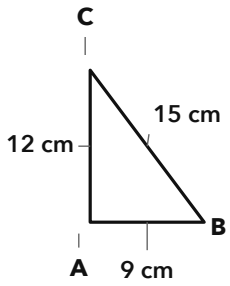
APPLY IT Show your work

1 A video crew's light stand casts the shadow shown. At the same time, a 5 ft pole casts a 2 ft shadow. The sun's rays are parallel. Prove the triangles similar and find the stand's height.



ANSWER _____

2 A merch designer enlarges the triangular patch shown. On the new patch, AB is 21 cm, AC is 28 cm, and angle A stays the same. Prove similarity and find the new BC.



ANSWER _____

CHALLENGE One step up

One triangle has sides 7, 9, 11. Another has sides 14, 18, 22. A student claims SAS proves similarity because two side ratios match. Is that proof complete? Give a valid proof.

WORK SPACE AND ANSWER

ANSWER KEY # Similarity Detectives

HIGH SCHOOL · G.2D.1.10

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Angles A and D are 52°, and angles B and E are 68°. If AB = 5, DE = 10, BC = 7, and EF = x, prove ABC ~ DEF and find x.	**AA; x = 14.**
2	ABC has AB = 8, AC = 15, BC = 17. DEF has DE = 16, DF = 30, EF = x. Angles A and D are right angles. Prove similarity and find x.	**SAS; x = 34.**
3	ABC has sides AB = 5, BC = 7, AC = 9. DEF has DE = 10, EF = 14, DF = x. Find x so the triangles are similar, and name the test.	**x = 18; SSS.**
4	ABC has sides AB = 7, BC = 11, AC = 13. DEF has DE = 14, EF = 22, DF = 25. Are the triangles similar? Justify your answer.	**No. DE/AB = EF/BC = 2, but DF/AC = 25/13.**

PART 2 · APPLY IT

1. **AA; the stand is 20 ft tall.** Both triangles have a right angle, and parallel sun rays give them a second matching angle. The height-to-shadow ratio gives 5/2 = x/8, so x = 20.
2. **SAS; the new BC is 35 cm.** The sides around angle A have equal scale factors: 21/9 = 28/12 = 7/3. By SAS, the patches are similar, so the new BC is 15 × 7/3 = 35 cm.

CHALLENGE

No. SAS also requires matching included angles, which were not given. All three side ratios equal 2, so the triangles are similar by SSS.

Accept equivalent ratios and any correct ordering of corresponding vertices. For the challenge, distinguish an incomplete SAS argument from the valid SSS proof.