

Geometry · Similar Triangles and Proportions · Worksheet

Common Core G-SRT.B.4, G-SRT.B.5 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

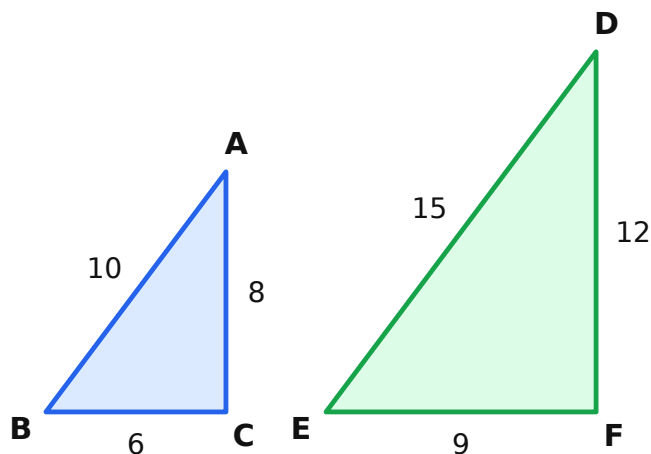
These 24 problems practice similar triangles and proportions (G-SRT.B.4 and G-SRT.B.5). You will prove similarity with AA, SAS and SSS, use the triangle proportionality theorem and its converse, and apply geometric means in right triangles.

The last problems use similar triangles to measure trees, poles and rivers. Show every proportion before solving it.

GeometryCommon Core: G-SRT.B.4 · G-SRT.B.5

Problem 1: Similar by SSS

The side lengths of triangles ABC and DEF are shown. Show that the triangles are similar, name the criterion, give the scale factor from ABC to DEF, and write a similarity statement.



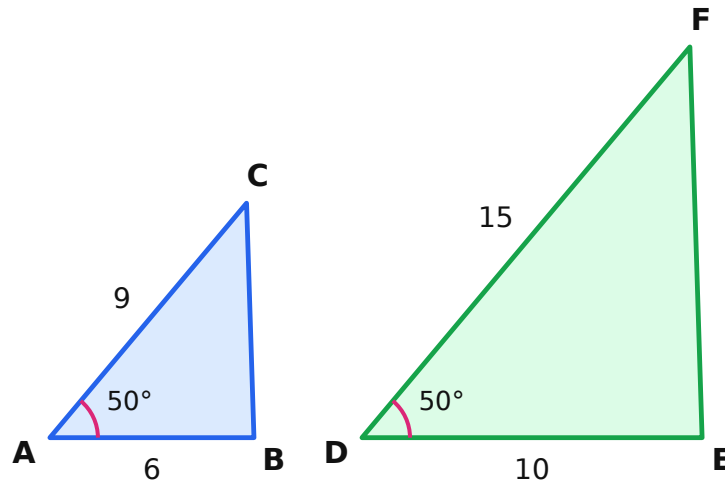
Side lengths of triangles ABC and DEF.

Problem 2: Missing sides

Triangle ABC is similar to triangle DEF with $AB=6$, $BC=8$, $AC=10$ and $DE=9$. Find EF and DF .

Problem 3: Similar by SAS

In the figure, $AB=6$, $AC=9$, $DE=10$, $DF=15$ and $m\angle A = m\angle D = 50^\circ$. Are the triangles similar? Justify your answer and give the scale factor from ABC to DEF.



Two sides and the included angle are marked in each triangle.

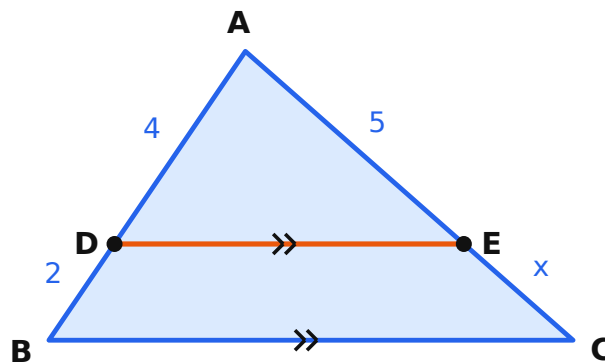
Problem 4: SSS or not

Decide whether each pair of triangles, given by side lengths, is similar. Show the ratios.

- a. 4, 6, 8 and 6, 9, 12
- b. 4, 6, 8 and 6, 9, 13
- c. 5, 12, 13 and 15, 36, 39

Problem 5: Parallel line and AA

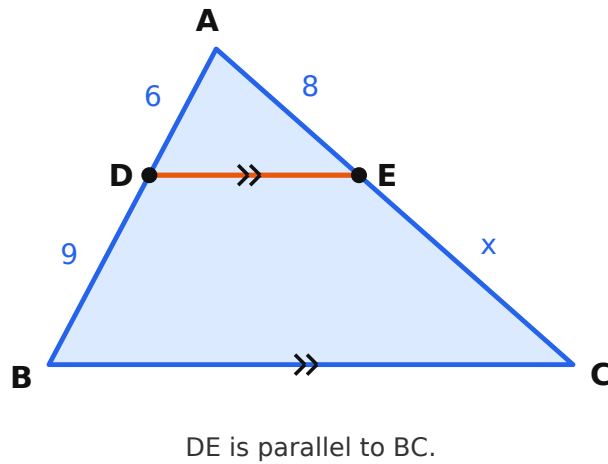
In triangle ABC, $DE \parallel BC$, $AD=4$, $DB=2$ and $AE=5$. Explain why triangle ADE is similar to triangle ABC, then find AC and EC .



DE is parallel to BC.

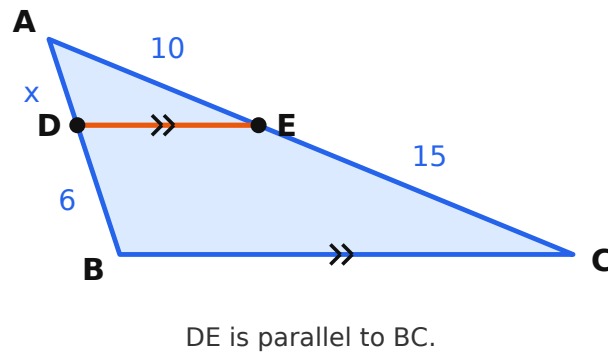
Problem 6: Side-splitter: find EC

In the figure $DE \parallel BC$. Find EC .



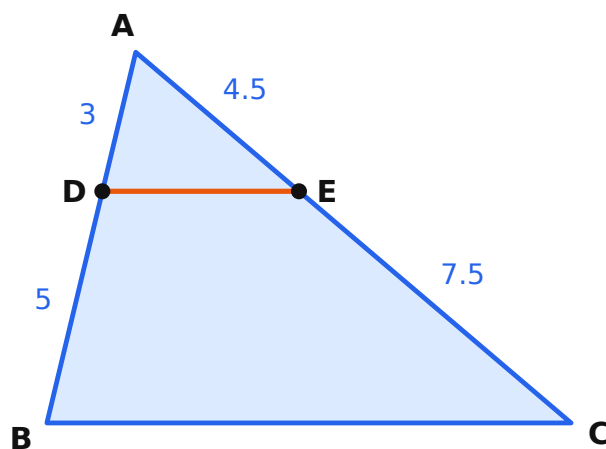
Problem 7: Side-splitter: find AD

In the figure $DE \parallel BC$. Find AD .



Problem 8: Converse: parallel

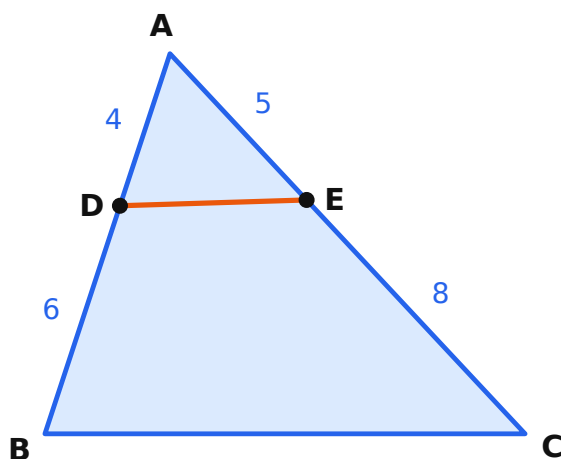
Points D and E lie on sides AB and AC with $AD = 3$, $DB = 5$, $AE = 4.5$, $EC = 7.5$. Is DE parallel to BC? Justify.



Is DE parallel to BC?

Problem 9: Converse: not parallel

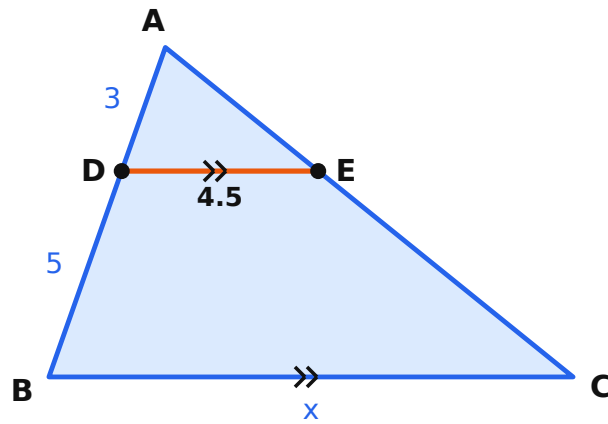
Points D and E lie on sides AB and AC with $AD = 4$, $DB = 6$, $AE = 5$, $EC = 8$. Is DE parallel to BC? Justify.



Is DE parallel to BC?

Problem 10: Using the whole side

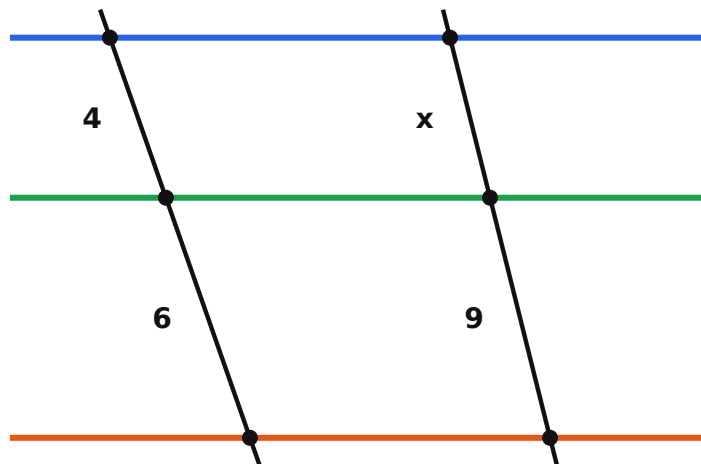
In the figure $DE \parallel BC$, $AD = 3$, $DB = 5$ and $DE = 4.5$. Find BC .



DE is parallel to BC.

Problem 11: Three parallel lines

Three parallel lines are cut by two transversals as shown. Find x .



Parallel lines cut transversals into proportional segments.

Problem 12: Geometric means

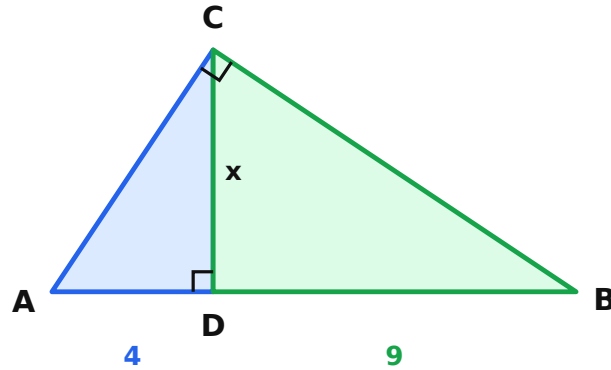
Find the geometric mean of each pair of numbers. Simplify radicals.

- 4 and 9
- 5 and 20
- 6 and 10
- 3 and 12

Problem 13: Altitude to the hypotenuse

Triangle ABC has a right angle at C, and CD is the altitude to the hypotenuse. If $AD = 4$ and

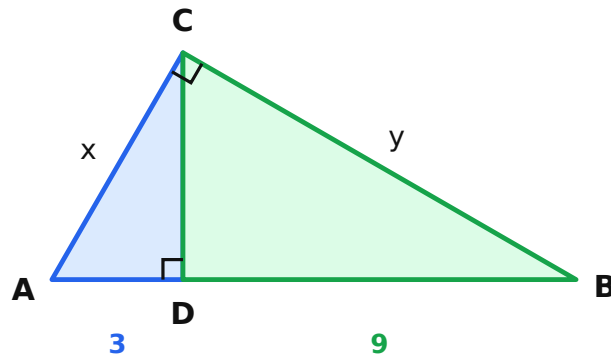
$DB = 9$, find CD .



CD is the altitude to the hypotenuse.

Problem 14: Leg lengths

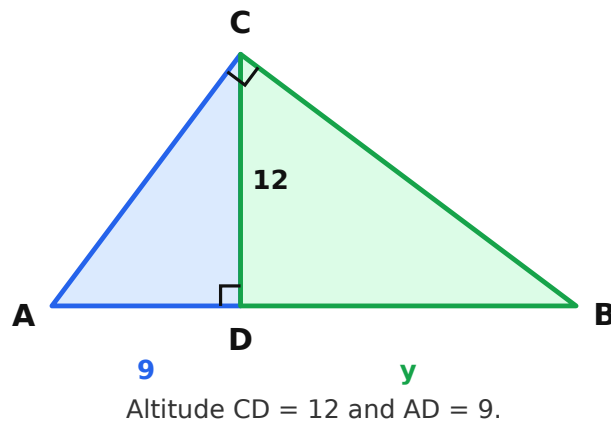
In right triangle ABC (right angle at C), the altitude CD splits the hypotenuse into $AD = 3$ and $DB = 9$. Find the legs AC and BC .



Find the legs of the right triangle.

Problem 15: Altitude, hypotenuse and legs

In right triangle ABC (right angle at C), altitude $CD = 12$ and $AD = 9$. Find DB , AB , AC and BC .



Problem 16: Pythagorean theorem proof

Complete the reason for each step in this proof of the Pythagorean theorem.

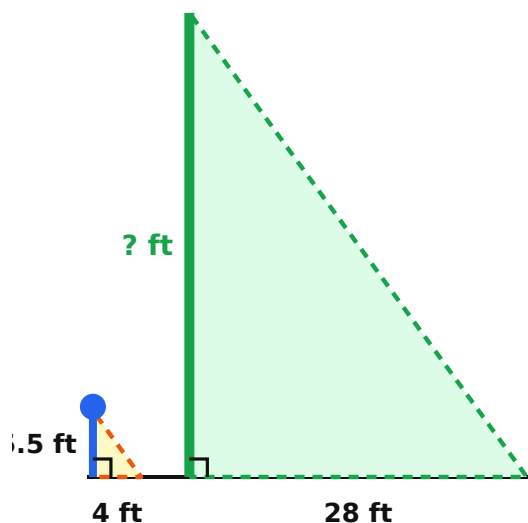
Statements	Reasons
Right triangle ABC with right angle at C; CD is the altitude to AB	Given
Triangle ACD is similar to triangle ABC, and triangle CBD is similar to triangle ABC	?
$\frac{AB}{AC} = \frac{AC}{AD}$ and $\frac{AB}{BC} = \frac{BC}{DB}$	?
$AC^2 = AB \cdot AD$ and $BC^2 = AB \cdot DB$	?
$AC^2 + BC^2 = AB \cdot AD + AB \cdot DB = AB(AD + DB)$	?
$AC^2 + BC^2 = AB^2$	?

Problem 17: Check the leg formula

A right triangle has legs $AC = 5$ and $BC = 12$ and hypotenuse $AB = 13$. The altitude from C meets AB at D. Use the leg formulas to find AD and DB , then show that they add to AB .

Problem 18: Shadow of a tree

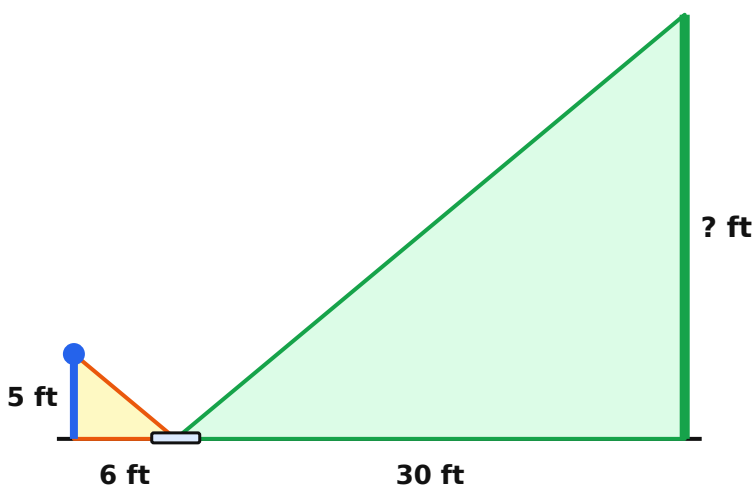
Jamal is 5.5 feet tall and casts a 4 foot shadow. At the same time a tree casts a 28 foot shadow. How tall is the tree?



Jamal and the tree at the same time of day.

Problem 19: Mirror method

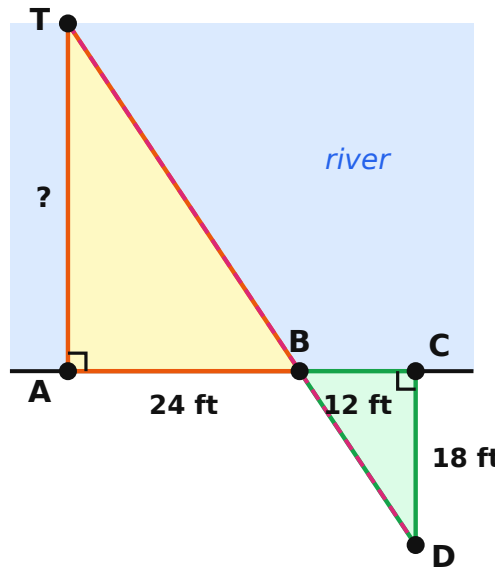
Maya's eyes are 5 feet above the ground. She stands 6 feet from a mirror lying flat on the ground and sees the top of a flagpole in it. The mirror is 30 feet from the base of the pole. How tall is the pole?



Light reflects off the mirror at equal angles.

Problem 20: Width of a river

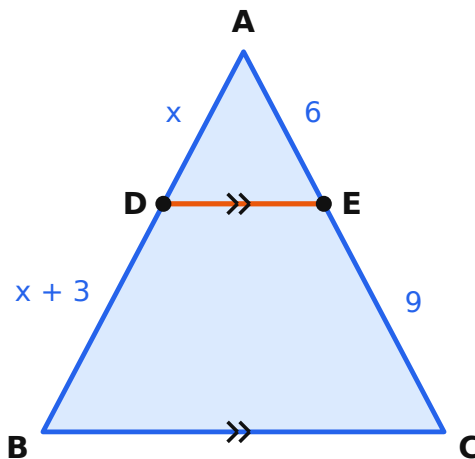
Diego wants the distance TA across a river, where T is a tree on the far bank and A is the point directly across on his bank. He walks 24 feet along the bank to B, then 12 feet farther to C. He turns away from the river and walks until D is in line with B and T. Then $CD = 18$ feet. Find TA.



Right angles at A and C; D, B and T are in line.

Problem 21: Solve with algebra

In triangle ABC, $DE \parallel BC$, $AD = x$, $DB = x + 3$, $AE = 6$ and $EC = 9$. Find x and the length of AB .



DE is parallel to BC.

Problem 22: Flower beds

Two triangular flower beds are similar with a ratio of 3 to 5. The smaller bed has a perimeter of 21 feet and a shortest side of 6 feet. Find the perimeter and the shortest side of the larger bed.

Problem 23: Sails

A small triangular sail has sides 6 ft, 8 ft and 10 ft. A larger sail is similar, and its longest side is 25 ft. Find the other two sides and the perimeter of the larger sail.

Problem 24: Lamppost shadow

Noah is 6 feet tall and stands 18 feet from the base of a lamppost. His shadow is 9 feet long. How tall is the lamppost?