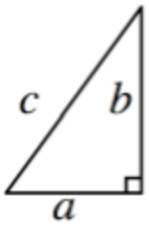
C. Pythagorean theorem:

In any triangle with a 90° (right) angle, the sum of the squares of the legs equals the square of hypotenuse.

(The legs are the two shorter sides; the hypotenuse is the longest side.)

If the legs have lengths a and b, and c is the hypotenuse length, then $a^2 + b^2 = c^2$.



In words: " In a right triangle, leg squared plus leg squared equals hypotenuse squared."

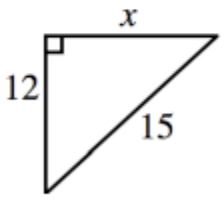
example: A right triangle has hypotenuse 5 and one leg 3. Find the other leg. Since $leg^2 + leg^2 = hyp^2$,

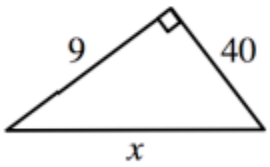
$$3^2 + x^2 = 5^2$$
$$9 + x^2 = 25$$
$$x^2 = 25 - 9 = 16$$
$$x = \sqrt{16} = 4$$

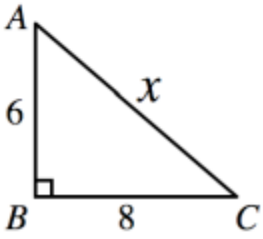
Problems 22-24: Find the length of the third side of the right triangle:

22. one leg: 15, hypotenuse: 17
23. hypotenuse: 10, one leg: 8
24. legs: 5 and 12

Problems 25-26: Find x:

25. 

26. 

27. 

Answers

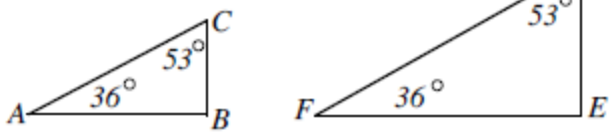
22. 8
23. 6
24. 13
25. 9
26. 41
27. 10

28. In right ΔRST with right angle R, $SR = 11$ and $TS = 61$. Find RT. (Draw and label a triangle to solve.)

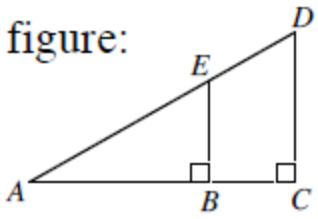
29. Would a triangle with sides 7, 11, and 13 be a right triangle? Why or why not?

Similar triangles are triangles which are the same shape. If two angles of one triangle are equal respectively to two angles of another triangle, then the triangles are similar.

example: ΔABC and ΔFED are similar:
The pairs of sides which correspond are $\overline{AB}$ and $\overline{FE}, \overline{BC}$ and $\overline{ED}$, $\overline{AC}$ and $\overline{FD}$.



Problems 30-32: Use this figure:



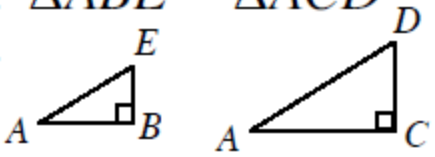
30. Find and name two similar triangles.
31. Draw the triangles separately and label them.
32. List the three pairs of corresponding sides.

Answers

28. 60

29. No, because $7^2 + 11^2 \neq 13^2$

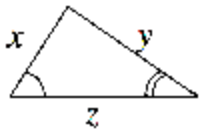
30. $\Delta ABE \sim \Delta ACD$

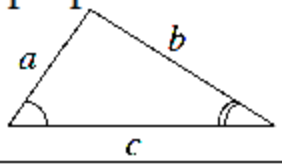
31. 

32. $\overline{AB}, \overline{AC}; \overline{AE}, \overline{AD}; \overline{BE}, \overline{CD}$

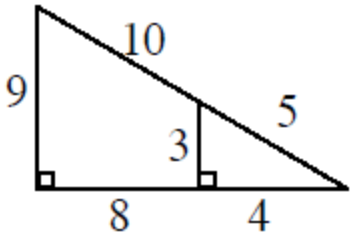
If two triangles are similar, any two corresponding sides have the same ratio (fraction value):

example: the ratio a to x, or $\frac{a}{x}$, is the same as $\frac{b}{y}$ and $\frac{c}{z}$. Thus $\frac{a}{x} = \frac{b}{y}$, $\frac{a}{x} = \frac{c}{z}$, and $\frac{b}{y} = \frac{c}{z}$. Each of these equations is called a proportion.



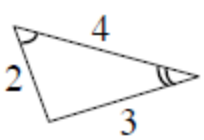


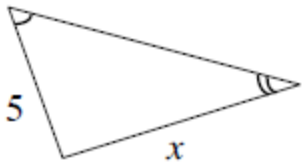
33. Draw the similar triangles separately, label them, and write proportions for the corresponding sides.



Problems 34-37: Solve for x:

example: Find x by writing and solving a proportion:



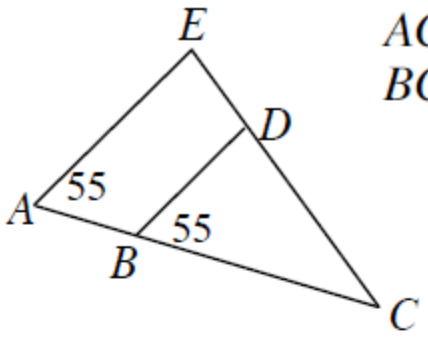


$\frac{2}{5} = \frac{3}{x}$, so cross multiply and get $2x = 15$ or

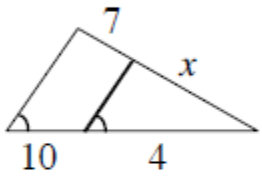
$x = 7\frac{1}{2}$

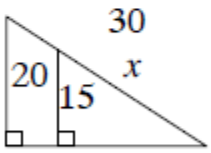
Answers

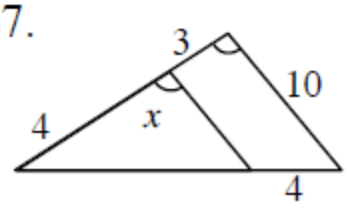
33. $\frac{3}{9} = \frac{5}{15} = \frac{4}{12}$

34. 

$AC = 10;\ EC = 7$
$BC = 4;\ DC = x$

35. 

36. 

37. 

Answers

34. $\frac{14}{5}$ or $2\frac{4}{5}$

35. $2\frac{4}{5}$ or $\frac{14}{5}$

36. $\frac{45}{2}$

37. $\frac{40}{7}$