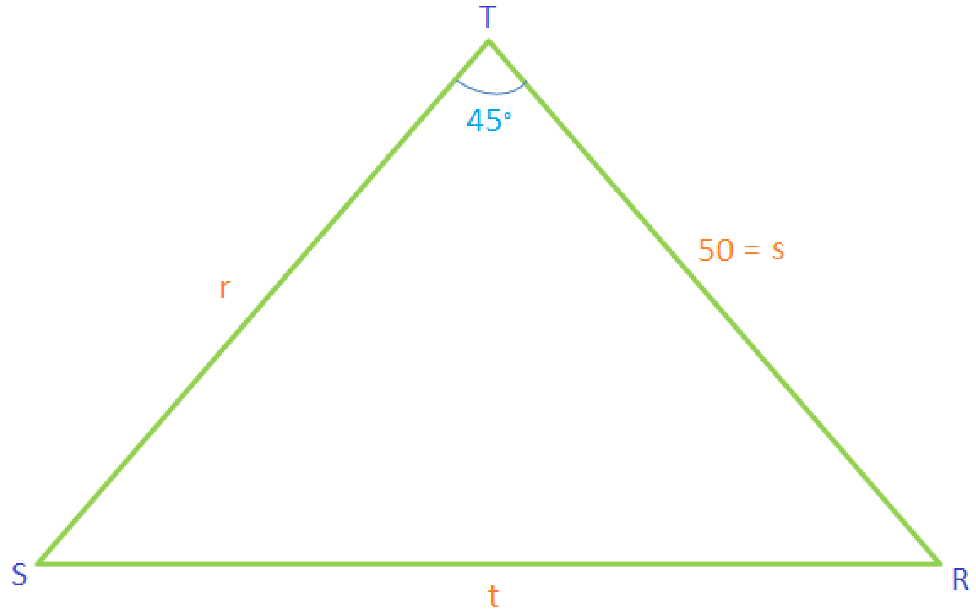
In triangle RST $s = 50$ and angle $T = 45$ degrees using simplified radicals when appropriate, find the range of values of t for which there are

a. 2 possible measures for angle S;

b. exactly 1 measure for angle S.

Solution.



a. Let S_1 *and* S_2 are two possible measures for angle S:

$$\angle S_1 < \angle S < \angle S_2$$

Let the range of values of t is (t_1, t_2)

S_1 *and* S_2 must be in the range $(0°, 135°)$.

Use law of sines to find the range of values of t.

First possible measure:

$$\frac{t_1}{\sin \angle T} = \frac{s}{\sin \angle S_1}$$

$$t_1 = \frac{s \cdot \sin 45°}{\sin \angle S_1} = \frac{25\sqrt{2}}{\sin \angle S_1}$$

Second possible measure:

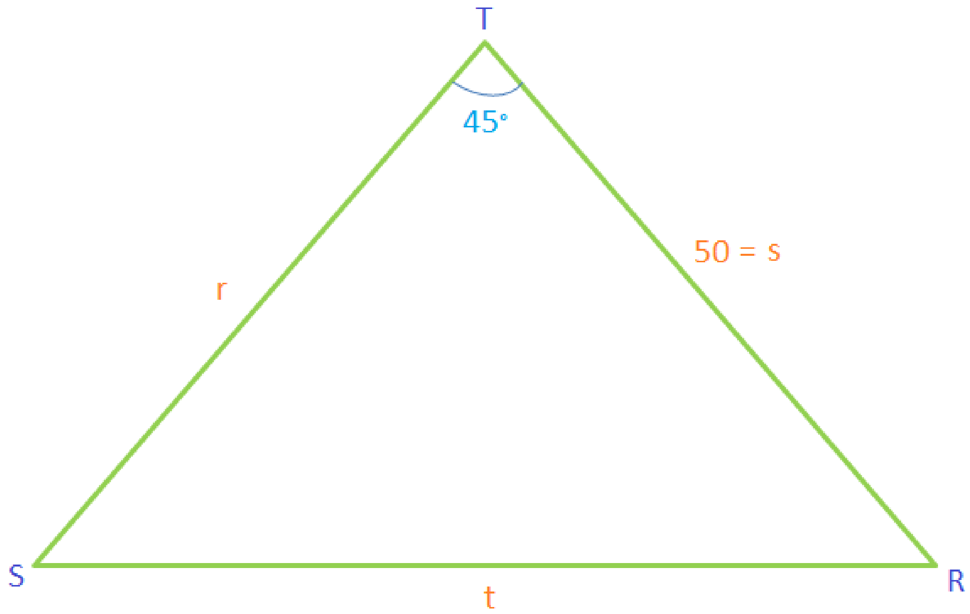
$$\frac{t_2}{\sin \angle T} = \frac{s}{\sin \angle S_2}$$

$$t_2 = \frac{25\sqrt{2}}{\sin \angle S_2}$$

Answer:

$$\frac{25\sqrt{2}}{\sin \angle S_1} < t < \frac{25\sqrt{2}}{\sin \angle S_2}$$

b.



Similarly use law of sines to find t:

$$\frac{t}{\sin \angle T} = \frac{s}{\sin \angle S}$$
$$t = \frac{s \cdot \sin \angle T}{\sin \angle S} = \frac{50 \cdot \sqrt{2}}{2 \cdot \sin \angle S}$$

Answer: $t = \frac{50 \cdot \sqrt{2}}{2 \cdot \sin \angle S}$.