

Triangle Truth Test

Use angle sums, side clues, and length checks.

GRADE 6 • TEKS 6.8.A

6.8.A "extend previous knowledge of triangles and their properties to include the sum of angles of a triangle, the relationship between the lengths of sides and measures of angles in a triangle, and determining when three lengths form a triangle;"

NAME _____

DATE _____

TRIANGLE RULES

The three inside angles of every triangle add to 180 degrees. The longest side is opposite the greatest angle, and the shortest side is opposite the smallest angle. Three lengths form a triangle only if the sum of any two lengths is greater than the third length.

WORKED EXAMPLE

A triangle has angles of 41 degrees, 73 degrees, and x degrees. Find x .

1. The angle total is 180 degrees.
2. $41 + 73 = 114$.
3. $180 - 114 = 66$.

Answer: $x = 66$ degrees

PRACTICE 6 problems

- 1** A triangle has angles of 52 degrees, 71 degrees, and x degrees. Find x .

ANSWER _____

- 2** The angles of a triangle measure $4x$ degrees, $2x$ degrees, and 48 degrees. Find x .

ANSWER _____

- 3** Triangle PQR has side lengths $PQ = 14$, $QR = 21$, and $PR = 16$. Which angle is greatest?

ANSWER _____

- 4** In triangle ABC, angle A = 35 degrees, angle B = 62 degrees, and angle C = 83 degrees. Which side is shortest?

ANSWER _____

- 5** Do side lengths 9, 11, and 17 form a triangle?

ANSWER _____

- 6** Do side lengths 7, 10, and 18 form a triangle?

ANSWER _____

APPLY IT Show your work

- 1** The robotics club makes a triangular display with two angles measuring 56 degrees and 69 degrees. What is the measure of the third angle?

WORK SPACE

ANSWER _____

- 2** A triangular flag at a skate park has side lengths $JK = 18$ cm, $KL = 25$ cm, and $JL = 22$ cm. Which angle is greatest?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A triangular stage prop has side lengths 15 cm, 23 cm, and x cm, where x is a whole number. List the smallest and greatest possible values of x . Explain why.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A triangle has angles of 52 degrees, 71 degrees, and x degrees. Find x .	$x = 57$ degrees
2	The angles of a triangle measure $4x$ degrees, $2x$ degrees, and 48 degrees. Find x .	$x = 22$
3	Triangle PQR has side lengths $PQ = 14$, $QR = 21$, and $PR = 16$. Which angle is greatest?	angle P
4	In triangle ABC, angle A = 35 degrees, angle B = 62 degrees, and angle C = 83 degrees. Which side is shortest?	BC
5	Do side lengths 9, 11, and 17 form a triangle?	Yes
6	Do side lengths 7, 10, and 18 form a triangle?	No

PART 2 • APPLY IT

- 55 degrees** Add the known angles: $56 + 69 = 125$. Subtract from 180, so the third angle measures 55 degrees.
- angle J** KL is the longest side because it is 25 cm. The greatest angle is opposite KL, so it is angle J.

CHALLENGE

The smallest possible value is 9 cm, and the greatest possible value is 37 cm. The third side must be greater than $23 - 15 = 8$ and less than $23 + 15 = 38$, so x can be any whole number from 9 through 37.

Accept equivalent wording for angle and side names, such as "P" for "angle P." For the challenge, accept "9 to 37 inclusive" if the student shows that x is greater than 8 and less than 38.