

Geometry - Theorems About Triangles - Answer Key

Common Core G-CO.C.10 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on triangle theorems. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-CO.C.10**

Exercise 1 - Third angle

$$180^\circ - 52^\circ - 67^\circ = 61^\circ$$

61°

Exercise 2 - Right triangle

$$90^\circ - 38^\circ = 52^\circ$$

52°

Exercise 3 - Equilateral triangle

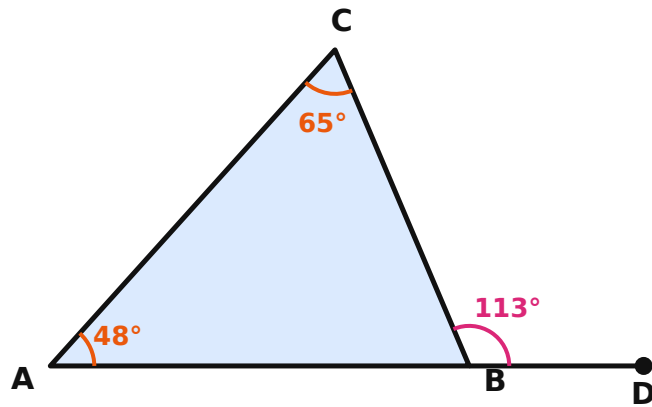
Each side is $54 \div 3 = 18$.

$$3x - 6 = 18, \text{ so } x = 8.$$

Each angle is $180^\circ \div 3 = 60^\circ$.

$x = 8$; each angle 60°

Exercise 4 - Exterior angle



Exterior angle D = 113° .

The exterior angle equals the sum of the remote interior angles.

$$48^\circ + 65^\circ = 113^\circ$$

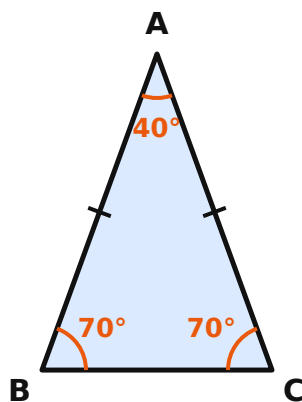
113°

Exercise 5 - Remote angle

$$140^\circ - 85^\circ = 55^\circ$$

55°

Exercise 6 - Isosceles apex



Base angles of an isosceles triangle are congruent.

The base angles are congruent and the three angles sum to 180° .

$$(180^\circ - 40^\circ) \div 2 = 70^\circ$$

70° each

Exercise 7 - Isosceles base

Both base angles are 54° .

$$180^\circ - 2 \cdot 54^\circ = 72^\circ$$

72°

Exercise 8 - Angles in a ratio of 1 : 2 : 3

$$6x = 180, \text{ so } x = 30.$$

30°, 60°, 90°

Exercise 9 - Angles with x

$$(2x+10)+(3x-5)+(x+25)=180$$

$$6x+30=180$$

$$x=25$$

Angles: 60° , 70° , 50° . Check: $60 + 70 + 50 = 180$.

x = 25; 60°, 70°, 50°

Exercise 10 - Exterior angle with x

$$(2x+11)+(3x+13)=7x-16$$

$$5x+24=7x-16$$

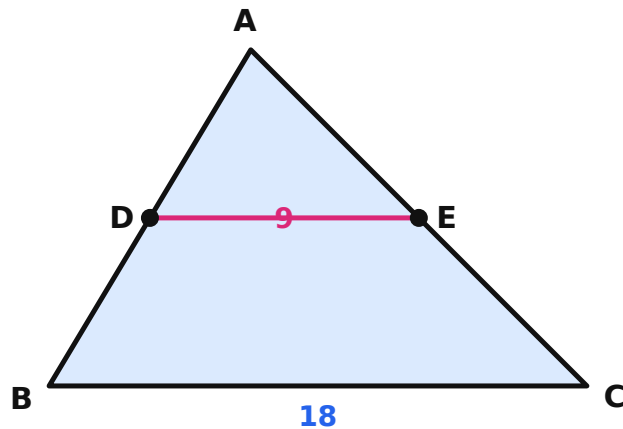
$$40=2x$$

$$x=20$$

$$7(20)-16=124^\circ$$

x = 20; 124°

Exercise 11 - Midsegment length



The midsegment DE is parallel to BC and half as long.

A midsegment is half the length of the third side.

$$DE = 18 \div 2 = 9$$

$$DE = 9$$

Exercise 12 - Midsegment with x

$$BC = 2 \cdot DE, \text{ so } 5x - 6 = 2(2x + 3).$$

$$5x - 6 = 4x + 6, \text{ so } x = 12.$$

$$DE = 27 \text{ and } BC = 54.$$

$$x = 12; DE = 27; BC = 54$$

Exercise 13 - Midsegment on the plane

$$M(4,1) \text{ and } N(1,4).$$

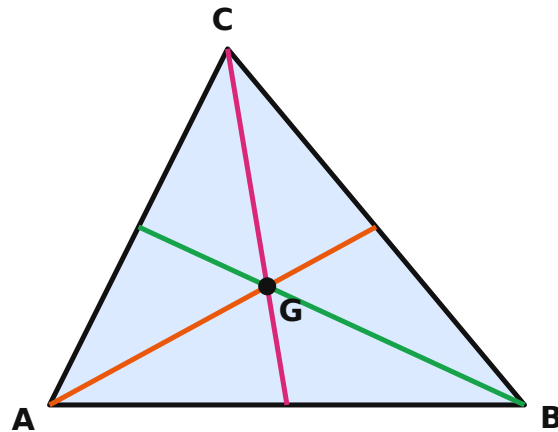
$$MN = \sqrt{3^2 + 3^2} = 3\sqrt{2}.$$

$$BC = \sqrt{6^2 + 6^2} = 6\sqrt{2}.$$

MN is half of BC.

$$M(4, 1), N(1, 4); MN = 3\sqrt{2} = \frac{1}{2} BC$$

Exercise 14 - Centroid and a median



AG = 10 and the remaining part is 5.

The centroid is two thirds of the way from the vertex.

$AG = \frac{2}{3} \cdot 15 = 10$, and the rest is $15 - 10 = 5$.

AG = 10; 5 units

Exercise 15 - Centroid coordinates

$$\left(\frac{0+6+3}{3}, \frac{0+0+9}{3} \right) = (3, 3)$$

(3, 3)

Exercise 16 - Can it be a triangle?

The two shorter sides add to $5+7=12$, which is less than 13.

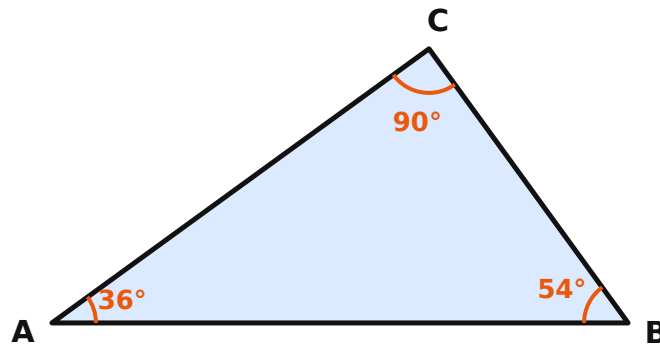
No

Exercise 17 - Third side range

$14-9=5$ and $14+9=23$.

$5 < x < 23$

Exercise 18 - Garden angles



Garden with angles 36° , 54° and 90° .

The parts total $2+3+5=10$, so one part is $180^\circ \div 10 = 18^\circ$.

Angles: 36° , 54° , 90° .

36° , 54° , 90° ; a right triangle

Exercise 19 - Roof truss

$$(180^\circ - 110^\circ) \div 2 = 35^\circ$$

35°

Exercise 20 - Walking paths

$$200 - 120 = 80 \text{ and } 200 + 120 = 320.$$

The third path must be between 80 and 320 feet, so 70 feet is too short.

No; between 80 ft and 320 ft