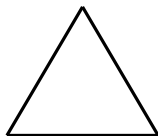


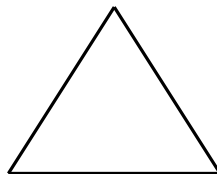
GRADE 7

TRIANGLES & PROPERTIES

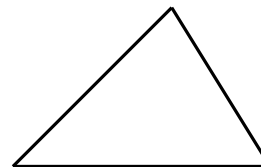
Complete Printable Worksheet Pack



Equilateral



Isosceles



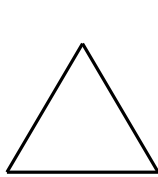
Scalene

6 Worksheets	Separate Answer Keys
Triangle Classification	Angles & Side Relationships
Inequality & Symmetry	Real-Life & Challenge Problems

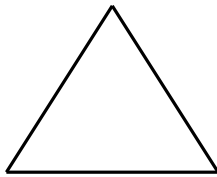
A4 printable • International Grade 7 level

Worksheet 1: Triangle Classification & Properties

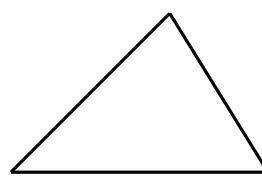
Show your working. Use correct units and explain your reasoning where asked.



Equilateral



Isosceles



Scalene

1. Classify each triangle by its sides: 5 cm, 5 cm, 5 cm; 6 cm, 6 cm, 9 cm; 4 cm, 7 cm, 8 cm.
2. Classify each triangle by its angles: 40° , 60° , 80° ; 90° , 35° , 55° ; 110° , 30° , 40° .
3. State the defining property of an equilateral triangle.
4. State the defining property of an isosceles triangle.
5. Can a triangle be both isosceles and right-angled? Give an example of its angles.
6. Can a triangle have angles 90° , 60° and 40° ? Explain.
7. A triangle has three equal sides of 8.5 cm. Find its perimeter and classify it.
8. A triangle has two equal sides of 11 cm and a third side of 14 cm. Find its perimeter and classify it by sides.
9. A triangle has angles 52° , 52° and 76° . What can you conclude about its sides?
10. Explain why the largest angle in a triangle is opposite the longest side.

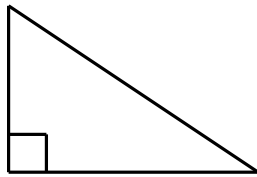
Answer Key 1: Triangle Classification & Properties

Equivalent correct methods are acceptable.

1. Equilateral; isosceles; scalene.
2. Acute; right; obtuse.
3. All three sides are equal and all three angles are 60° .
4. At least two sides are equal; the corresponding base angles are equal.
5. Yes. Example: 45° , 45° , 90° .
6. No. The angles total 190° , but a triangle must total 180° .
7. 25.5 cm; equilateral.
8. 36 cm; isosceles.
9. Equal angles are opposite equal sides, so the sides opposite 52° are equal; it is isosceles.
10. In a triangle, larger angles are opposite longer sides; this follows from the relationship between side lengths and opposite angles.

Worksheet 2: Triangle Angles & Missing Sides

Show your working. Use correct units and explain your reasoning where asked.



Right triangle

1. Find the missing angle in a triangle with angles 48° and 67° .
2. An isosceles triangle has a vertex angle of 38° . Find both base angles.
3. A triangle has angles x° , $2x^\circ$ and $3x^\circ$. Find x and all three angles.
4. A triangle has angles $(x+10)^\circ$, $(2x-5)^\circ$ and $(3x+1)^\circ$. Find x .
5. An exterior angle of a triangle is 132° . One opposite interior angle is 57° . Find the other opposite interior angle.
6. An isosceles triangle has equal sides of 13 cm and base 10 cm. Find its perimeter.
7. The sides of a triangle are 8 cm, 11 cm and x cm. State the whole-number values x can have.
8. A triangle has perimeter 42 cm. Two sides are 12 cm and 17 cm. Find the third side and determine whether the triangle is possible.
9. An equilateral triangle has perimeter 51 cm. Find each side and each angle.
10. A triangle has sides 7 cm, 10 cm and 12 cm. Which side is opposite the largest angle?

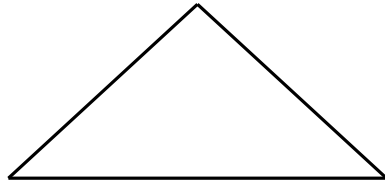
Answer Key 2: Triangle Angles & Missing Sides

Equivalent correct methods are acceptable.

1. 65°
2. 71° each
3. $x=30^\circ$; angles $30^\circ, 60^\circ, 90^\circ$
4. $x=29^\circ$; angles $39^\circ, 53^\circ, 88^\circ$
5. 75°
6. 36 cm
7. 4 through 18 inclusive
8. 13 cm; possible because $12+13>17$ and $12+17>13$.
9. Side 17 cm; each angle 60°
10. The 12 cm side.

Worksheet 3: Triangle Inequality & Reasoning

Show your working. Use correct units and explain your reasoning where asked.



Triangle angle sum = 180°

1. Can 4 cm, 7 cm and 12 cm form a triangle? Explain.
2. Can 6 cm, 8 cm and 13 cm form a triangle? Explain.
3. Find the smallest whole-number value of x so that 5 cm, 9 cm and x cm form a triangle.
4. Find the largest whole-number value of x so that 7 cm, 10 cm and x cm form a triangle.
5. A triangle has sides 9 cm, 14 cm and x cm. Write the inequality for x .
6. A triangle has sides 15 cm, 15 cm and 8 cm. Classify it by sides and find its perimeter.
7. Two sides of a triangle are 10 cm and 17 cm. What is the possible range of the third side x ?
8. A student says that 3 cm, 4 cm and 7 cm make a triangle. Is the student correct? Explain.
9. A triangle has sides 12 cm, 16 cm and 20 cm. Determine whether it is right-angled using the Pythagorean relationship.
10. Explain why the sum of any two sides of a triangle must be greater than the third side.

Answer Key 3: Triangle Inequality & Reasoning

Equivalent correct methods are acceptable.

1. No; $4+7=11$ is less than 12.
2. Yes; $6+8=14>13$.
3. $x>4$, so smallest whole number is 5.
4. $x<17$, so largest whole number is 16.
5. $5<x<23$.
6. Isosceles; perimeter 38 cm.
7. $7<x<27$.
8. No; $3+4=7$, so the points would be collinear, not a triangle.
9. $12^2+16^2=144+256=400=20^2$, so it is right-angled.
10. If two sides added to exactly or less than the third, they could not meet to enclose a region; the three segments would not form a triangle.

Worksheet 4: Triangle Properties, Symmetry & Construction

Show your working. Use correct units and explain your reasoning where asked.

1. How many lines of symmetry does an equilateral triangle have?
2. How many lines of symmetry does a non-equilateral isosceles triangle have?
3. How many lines of symmetry does a scalene triangle have?
4. A triangle has angles 60° , 60° and 60° . What symmetry and side property does it have?
5. A triangle has sides 9 cm, 9 cm and 14 cm. Which angles are equal?
6. A triangle has angles 35° , 35° and 110° . Which sides are equal?
7. Can a scalene triangle have a line of symmetry? Explain.
8. Can an equilateral triangle also be described as isosceles? Explain using the definition used in your class.
9. A triangle has two equal angles of 72° . Find the third angle and classify the triangle by angles.
10. You are given side lengths 6 cm, 8 cm and 10 cm. Describe how you could construct the triangle with a ruler and compass.

Answer Key 4: Triangle Properties, Symmetry & Construction

Equivalent correct methods are acceptable.

1. 3
2. 1
3. 0
4. Equilateral; 3 lines of symmetry.
5. The angles opposite the two 9 cm sides are equal.
6. The sides opposite the two 35° angles are equal.
7. No; a scalene triangle has three different side lengths and no reflection symmetry.
8. Yes, under the inclusive definition of isosceles (at least two equal sides), every equilateral triangle is also isosceles.
9. Third angle 36° ; acute scalene triangle by angle classification, and isosceles by sides.
10. Draw a 10 cm base. With compass radii 6 cm and 8 cm, draw arcs from the two endpoints; their intersection is the third vertex. Join it to both endpoints.

Worksheet 5: Triangles in Real Life & Applications

Show your working. Use correct units and explain your reasoning where asked.

1. A triangular road sign has sides 70 cm, 70 cm and 90 cm. Classify it by sides.
2. A roof cross-section is an isosceles triangle with equal sides 5 m and base 6 m. Find its perimeter.
3. A triangular garden has base 18 m and perpendicular height 11 m. Find its area.
4. A triangular flag has base 2.4 m and height 1.5 m. Find its area.
5. A support frame forms a right triangle with legs 6 m and 8 m. Find the third side.
6. A triangular sail has sides 7 m, 9 m and 12 m. Find its perimeter and classify it by sides.
7. A roof has an isosceles triangular cross-section with vertex angle 50° . Find each base angle.
8. A triangular field has angles 48° , 62° and 70° . Which side is longest?
9. A triangular warning sign has an exterior angle of 125° . One remote interior angle is 58° . Find the other remote interior angle.
10. A triangular banner has base 3 m and height 2.2 m. If fabric costs \$12 per m^2 , find the fabric cost.

Answer Key 5: Triangles in Real Life & Applications

Equivalent correct methods are acceptable.

1. Isosceles.
2. 16 m
3. 99 m²
4. 1.8 m²
5. 10 m
6. 28 m; scalene
7. 65° each
8. The side opposite 70°.
9. 67°
10. Area 3.3 m²; cost \$39.60

Worksheet 6: Triangles Challenge

Show your working. Use correct units and explain your reasoning where asked.

1. A triangle has angles in the ratio 2:3:4. Find all three angles and classify it by angle.
2. A triangle has angles $(2x+5)^\circ$, $(3x-10)^\circ$ and $(x+35)^\circ$. Find x and the angles.
3. An isosceles triangle has perimeter 46 cm and base 12 cm. Find the equal side lengths.
4. A triangle has sides 13 cm, 14 cm and 15 cm. Find its perimeter and state whether it is scalene.
5. A right triangle has one acute angle of 37° . Find the other acute angle.
6. A triangle has sides x cm, 9 cm and 14 cm. If x is a whole number, give all possible values of x .
7. An exterior angle of a triangle is 150° . The two opposite interior angles are in the ratio 2:3. Find both angles.
8. An isosceles triangle has a base angle of 68° . Find the vertex angle.
9. A triangle has side lengths 10 cm, 10 cm and 16 cm. Find its perimeter and classify it. Which angle is largest?
10. A triangular park has base 24 m and area 180 m^2 . Find its perpendicular height. If fencing costs \$15 per metre and the other two sides are 15 m each, find the total fencing cost.

Answer Key 6: Triangles Challenge

Equivalent correct methods are acceptable.

1. Total ratio 9; each part 20° . Angles $40^\circ, 60^\circ, 80^\circ$; acute.
2. $x=25$; angles $55^\circ, 65^\circ, 60^\circ$.
3. Equal sides = 17 cm each.
4. Perimeter 42 cm; yes, scalene.
5. 53°
6. 6 through 22 inclusive.
7. 60° and 90° .
8. 44°
9. Perimeter 36 cm; isosceles; the vertex angle opposite 16 cm is largest.
10. Height = 15 m; perimeter = 54 m; fencing cost = \$810.