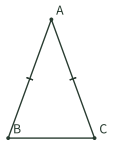
Isosceles, equilateral and special-triangle practice — Teacher answers

Year 8, upper volume • text pp. 39–50 • foundation lessons 20–25

Use the worked model and guided attempt selectively, then the eight core questions. Keep further practice and extensions optional. Ask for a reason and an original-equation or expansion check.

Worked example 1

AB=AC and ∠A=40°. Find each base angle.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

70 °.

$$(180 - 40)/2$$

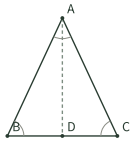
1. Equal sides give equal opposite base angles: ∠B=∠C.
2. 2∠B=180°−40°, so each base angle is 70°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Guided attempt 2

In △ABC, ∠B=∠C. Construct the internal bisector AD with D on BC. Complete a congruence proof of AB=AC.

1. ∠ABD=___; ∠BAD=___; AD=___.
2. △ABD≅△___ by ___; hence ___=___.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

△ABD≅△ACD by AAS, so AB=AC.

1. ∠ABD=∠ACD because D lies on BC and ∠B=∠C.
2. ∠BAD=∠CAD by the constructed angle bisector; AD=AD is common.
3. AAS gives △ABD≅△ACD, and corresponding sides give AB=AC.

- Give two angle pairs and common AD before AAS.
- Do not assume AB=AC at the start.

Prerequisite 3

Two equal base angles are each 65°. Find the vertex angle.

Reference answer

50 °.

$$180 - 2 * 65$$

1. The three angles total 180°.
2. 180−2×65=50°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Prerequisite 4

Find each interior angle of an equilateral triangle.

Reference answer

60 °.

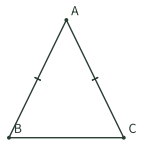
$$180/3$$

1. All three angles are equal because all three sides are equal.
2. Each angle is 180°/3=60°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Independent practice 5

AB=AC and ∠A=52°. Find each base angle.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

64 °.

$$(180 - 52)/2$$

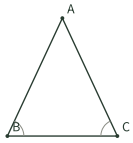
1. Equal sides give equal opposite base angles: ∠B=∠C.
2. 2∠B=180°−52°, so each base angle is 64°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Independent practice 6

If ∠ABC=∠ACB, which side equality follows?

A. All sides are zero.
B. AB=AC
C. AB=BC
D. AC=BC



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

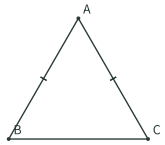
AB=AC

1. Equal angles have equal opposite sides.
2. The opposite sides to B and C are AC and AB.

- Choose the statement justified by the stated conditions and explain why.

Independent practice 7

AB=AC and ∠A=60°. Prove that △ABC is equilateral; give the angle and side reasons.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

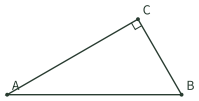
∠B=∠C=60°; equal opposite angles give AB=AC=BC.

1. AB=AC gives ∠B=∠C.
2. Each base angle is (180−60)/2=60°.
3. All three angles are equal, so their opposite sides are equal; the triangle is equilateral.

- State all hypotheses and justify each deduction.
- Do not assume the conclusion. Accept another complete justified proof.

Independent practice 8

∠C=90°, ∠A=30° and AB=10 cm. Find BC.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

5 cm.

$$10/2$$

1. BC is opposite 30° and AB is the hypotenuse.
2. BC=AB/2=10/2=5 cm.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Exit question 9

An equilateral triangle has perimeter 15 cm. Find AB.

Reference answer

5 cm.

$$15/3$$

1. All three sides have equal length.
2. AB=15/3=5 cm.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Exit question 10

In a right triangle, the leg opposite 30° is 4 cm. Find the hypotenuse AB.

Reference answer

8 cm.

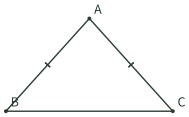
$$2 * 4$$

1. The stated leg is half the hypotenuse.
2. AB=2×4=8 cm.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 11

AB=AC and ∠A=84°. Find each base angle.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

48 °.

$$(180 - 84)/2$$

1. Equal sides give equal opposite base angles: ∠B=∠C.
2. 2∠B=180°−84°, so each base angle is 48°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 12

An equilateral triangle has side 7 cm. Find its perimeter.

Reference answer

21 cm.

$$3 * 7$$

1. The three sides are 7,7,7 cm.
2. The perimeter is 3×7=21 cm.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 13

∠C=90°, ∠A=30° and AB=9 cm. Find BC.

Reference answer

4.5 cm.

$$9/2$$

1. BC is the leg opposite 30°.
2. BC=9/2=4.5 cm.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 14

AB=AC and each base angle is 38°. Find ∠A.

Reference answer

104 °.

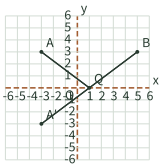
$$180 - 2 * 38$$

1. The two equal base angles total 76°.
2. ∠A=180−76=104°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Extension 15

A=(−3,3) and B=(5,3) are on the same side of the x-axis. A′=(−3,−3) is A’ s reflection and A′B=10 units. Find the minimum AQ+QB for Q on the axis and explain why.



Use the labelled axes and unit grid.

Reference answer

10 units, attained at Q=(1,0), the intersection of A′B with the axis.

1. For Q on the axis, AQ=A′Q by reflection.
2. AQ+QB=A′Q+QB≥A′B=10 by the triangle inequality.
3. Equality occurs on the straight segment A′B, at its axis crossing Q=(1,0).

- Use reflection and the triangle inequality, including the equality location.

Extension 16

AB=AC and M is the midpoint of BC. Prove that AM is both an altitude and the internal angle bisector.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

△ABM≅△ACM by SSS; the equal adjacent angles at M are 90°, and the two apex angles are equal.

1. AB=AC is given, BM=CM follows from the midpoint, and AM is common.
2. Thus △ABM≅△ACM by SSS.
3. ∠BAM=∠MAC; also ∠AMB=∠AMC and they total 180°, so each is 90°.

- State all hypotheses and justify each deduction.
- Do not assume the conclusion. Accept another complete justified proof.