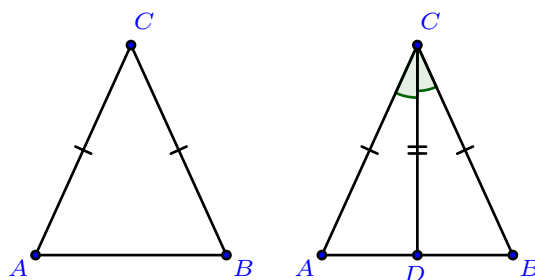


# Isosceles Triangle Theorem

*Proofs updated.*

Fix note: Below are several different proofs, along with one that is not a proof. Please consider them separately.  
Any (or all) of the proofs might be extended to conclude that, in the case of an isosceles triangle, the perpendicular bisector, angle bisector, median, and altitude all lie on the same line.

**Problem 1** Prove that the base angles of an isosceles triangle are congruent.



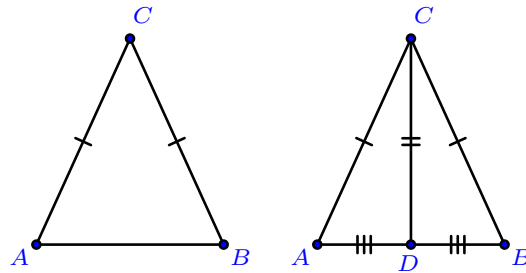
- (a) Beginning with the given figure on the left, Morgan draws  $\overline{CD}$  and marks the figure intending that this new segment is a(n) (median/ angle bisector ✓/ perpendicular bisector/ altitude).
- (b) Based on the marked figure, Morgan claims that the  $\triangle ACD \cong \triangle \boxed{BCD}$  by (SAS ✓/ SSS/ SSA/ ASA/ HL).
- (c) Finally, Morgan concludes that  $\angle A \cong \angle \boxed{B}$ , as they are corresponding parts of congruent triangles.

**Problem 2** Prove that the base angles of an isosceles triangle are congruent.

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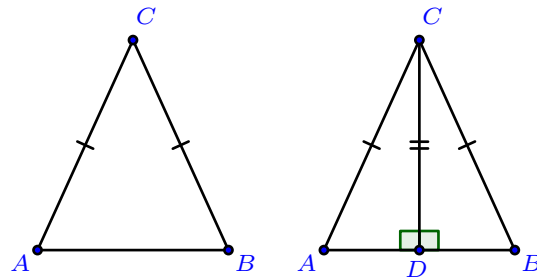
Author(s): Brad Findell

# Isosceles Triangle Theorem



- Beginning with the given figure on the left, Deja draws  $\overline{CD}$  and marks the figure intending that this new segment is a(n) (median ✓/ angle bisector / perpendicular bisector/ altitude).
  - Based on the marked figure, Deja claims that the  $\triangle ACD \cong \triangle \boxed{BCD}$  by (SAS/ SSS ✓/ SSA/ ASA/ HL).
  - Finally, Deja concludes that  $\angle A \cong \angle \boxed{B}$ , as they are corresponding parts of congruent triangles.
- 

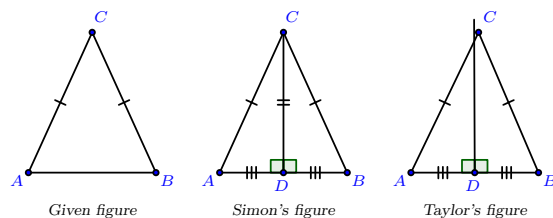
**Problem 3** Prove that the base angles of an isosceles triangle are congruent.



- Beginning with the given figure on the left, Elle draws  $\overline{CD}$  and marks the figure intending that this new segment is a(n) (median / angle bisector / perpendicular bisector/ altitude ✓).
  - Based on the marked figure, Deja claims that the  $\triangle ACD \cong \triangle \boxed{BCD}$  by (SAS/ SSS/ SSA/ ASA/ HL ✓).
  - Finally, Deja concludes that  $\angle A \cong \angle \boxed{B}$ , as they are corresponding parts of congruent triangles.
-

## Isosceles Triangle Theorem

**Problem 4** Simon and Taylor are trying to prove that the base angles of an isosceles triangle are congruent.



Beginning with the given figure on the left, Simon draws  $\overline{CD}$  and marks the second figure intending that this new segment is a perpendicular bisector of  $\overline{AB}$ .

Taylor claims that a perpendicular bisector of a side of a triangle usually misses the opposite vertex. So without using other properties of isosceles triangles or perpendicular bisectors, the figure should allow for that possibility.

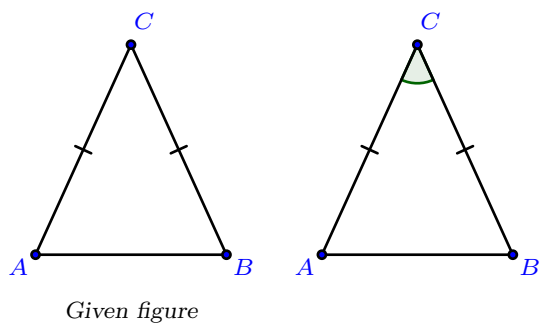
*Fix note: Taylor's claim needs some work, as is the case for the choices below.*

Choose the best response to their argument:

**Multiple Choice:**

- (a) Simon is correct, and  $\triangle ACD \cong \triangle BCD$  by SAS.
- (b) Simon is correct, and  $\triangle ACD \cong \triangle BCD$  by SSS
- (c) Taylor is correct, and the perpendicular bisector cannot be used to complete this proof. ✓
- (d) Neither of them are correct.

**Problem 5** Prove that the base angles of an isosceles triangle are congruent.



*Isosceles Triangle Theorem*

- (a) Examining the given figure on the left, Lissy notices symmetry in the triangle and claims that the triangle is congruent to itself by a (translation / reflection ✓/ rotation).
  - (b) Based on the marked figure, Lissy claims that the  $\triangle ACB \cong \triangle \boxed{BCA}$  by (SAS ✓/ SSS/ SSA/ ASA/ HL).
  - (c) Finally, Lissy concludes that  $\angle A \cong \angle \boxed{B}$ , as they are corresponding parts of congruent triangles.
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