Online HW 2: Proof by Pictures

Bart Snapp and Brad Findell

January 13, 2020

Contents

Lines in a Triangle

Short-answer questions about lines in a triangle.

Adjust the figures to fit the given conditions within **eyeball accuracy**. Enter the requested measurements.

Problem 1 *Geogebra link:* `https://tube.geogebra.org/m/q32gyaud`

In $\triangle ABC$ above, move point D to make the following measurements. ***Enter -1 if it is not possible.***

(a) *When $\overline{BD}$ is a median,* $AD =$?.

(b) *When $\overline{BD}$ is a angle bisector,* $AD =$?.

(c) *When $\overline{BD}$ is a perpendicular bisector,* $AD =$?.

(d) *When $\overline{BD}$ is a altitude,* $AD =$?.

Author(s): Brad Findell

Measuring Interior Angles

Short-answer questions involving angles in triangles.

Geogebra link: `https://tube.geogebra.org/m/zrapvzpz`

Problem 2 *Measure the interior angles of quadrilateral $ABCD$ above.*

(a) $m\angle A =$? *degrees.*

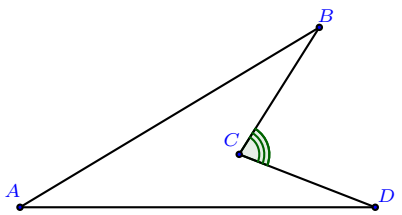
(b) $m\angle B =$? *degrees.*

(c) $m\angle C =$? *degrees.*

(d) $m\angle D =$? *degrees.*

(e) $m\angle A + m\angle B + m\angle C + m\angle D =$? *degrees.*

Problem 3 *Use the measurements from the previous problem to answer the following questions:*



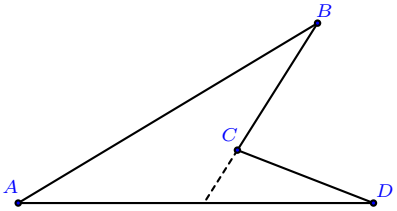
(a) *The marked angle should measure* ? *degrees.*

(b) $m\angle A + m\angle B + m\angle D =$? *degrees.*

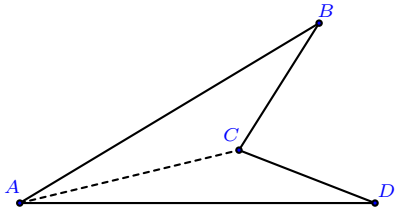
(c) *What do you notice?*

Problem 4 *In order to reason about the sum of the interior angles, Bart and Brad each* triangulated *the figure as shown below.*

Author(s): Brad Findell



Brad's triangulation



Bart's triangulation

Both Bart and Brad claim that because in a triangle the sum of the interior angles is $\boxed{?}$ *degrees, and this quadrilateral is cut into* $\boxed{?}$ *triangles, the angle sum in this quadrilateral should be* $\boxed{?}$ *degrees. What is your judgment?*

Multiple Choice:

(a) *They are both correct.*

(b) *Only Brad is correct.*

(c) *Only Bart is correct.*

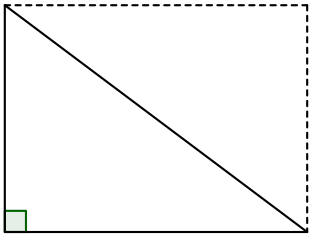
(d) *Neither of them are correct.*

Explain your reasoning.

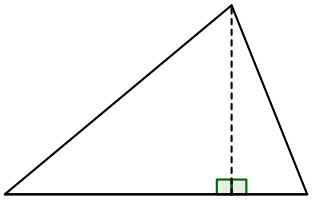
Proof by Picture 1

Short-answer proofs about triangle area.

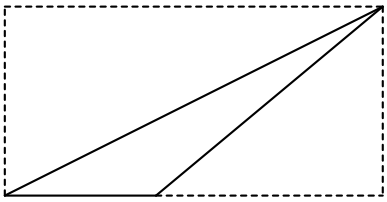
Problem 5 *Explain how the following picture "proves" that the area of a right triangle is half the base times the height.*



Problem 6 *Suppose you know that the area of a* ***right*** *triangle is half the base times the height. Explain how the following picture "proves" that the area of* ***every*** *triangle is half the base times the height.*



Problem 7 *Now suppose that a student, say Geometry Giorgio attempts to solve a similar problem. Again knowing that the area of a right triangle is half the base times the height, he draws the following picture:*



Author(s): Bart Snapp and Brad Findell

Proof by Picture 1

Geometry Giorgio states that the diagonal line cuts the rectangle in half, and thus the area of the triangle is half the base times the height. Is this correct reasoning? If so, give a complete explanation. If not, give correct reasoning based on Geometry Giorgio's picture.