## Unit 1 Lesson 16: Parallel Lines and the Angles in a Triangle

### 1 True or False: Computational Relationships (Warm up)

#### Student Task Statement

Is each equation true or false?

$62−28=60−30$

$3⋅-8=(2⋅-8)−8$

$\frac{16}{-2}+\frac{24}{-2}=\frac{40}{-2}$

### 2 Angle Plus Two

#### Images for Launch



#### Student Task Statement

Here is triangle $ABC$.



1. Rotate triangle $ABC$ $180^{∘}$ around the midpoint of side $AC$. Label the new vertex $D$.
2. Rotate triangle $ABC$ $180^{∘}$ around the midpoint of side $AB$. Label the new vertex $E$.
3. Look at angles $EAB$, $BAC$, and $CAD$. Without measuring, write what you think is the sum of the measures of these angles. Explain or show your reasoning.
4. Is the measure of angle $EAB$ equal to the measure of any angle in triangle $ABC$? If so, which one? If not, how do you know?
5. Is the measure of angle $CAD$ equal to the measure of any angle in triangle $ABC$? If so, which one? If not, how do you know?
6. What is the sum of the measures of angles $ABC$, $BAC$, and $ACB$?

### 3 Every Triangle in the World

#### Student Task Statement

Here is $△ABC$. Line $DE$ is parallel to line $AC$.



1. What is $m∠DBA+b+m∠CBE$? Explain how you know.
2. Use your answer to explain why $a+b+c=180$.
3. Explain why your argument will work for *any* triangle: that is, explain why the sum of the angle measures in *any* triangle is $180^{∘}$.

### 4 Four Triangles Revisited (Optional)

#### Student Task Statement

This diagram shows a square $BDFH$ that has been made by images of triangle $ABC$ under rigid transformations.



Given that angle $BAC$ measures 53 degrees, find as many other angle measures as you can.



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