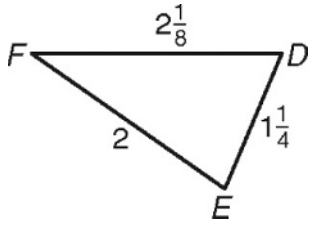
Name _____ Date _____ Class _____

LESSON 7-3

Triangle Inequalities

Practice and Problem Solving: A/B

For Problems 1–3, name the angles or sides.

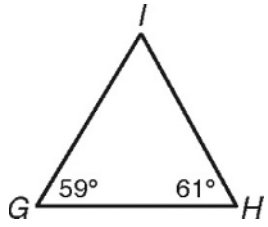


1. Write the angles of $\triangle DEF$ in order from smallest to largest.

   $\angle$ _____ $\angle$ _____ $\angle$ _____

2. Write the sides of $\triangle GHI$ in order from shortest to longest.

   _____ _____ _____



3. The sides of triangle *XYZ* are given in order below from longest to shortest. Name the angles from largest to smallest.

   $\overline{XZ}$ $\overline{ZY}$ $\overline{YX}$

   $\angle$ _____ $\angle$ _____ $\angle$ _____

Use your knowledge of triangle inequalities to solve Problems 4–7.

4. Can three segments with lengths 8, 15, and 6 make a triangle? Explain your answer. _____

   _____

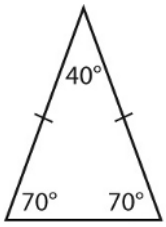
5. For an isosceles triangle with congruent sides of length *s*, what is the range of lengths for the base, *b*? What is the range of angle measures, *A*, for the angle opposite the base? Write the inequalities and explain your answers. _____

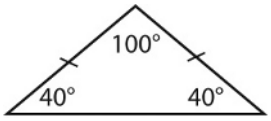
   _____

6. Aaron, Brandon, and Clara sit in class so that they are at the vertices of a triangle. It is 15 feet from Aaron to Brandon, and it is 8 feet from Brandon to Clara. Give the range of possible distances, *d*, from Aaron to Clara. _____

7. Renaldo plans to leave from Atlanta and fly into London (4281 miles). On the return, he will fly back from London to New York City (3470 miles) to visit his aunt. Then Renaldo heads back to Atlanta. Atlanta, New York City, and London do not lie on the same line. Find the range of the total distance Renaldo could travel on his trip. _____

   _____

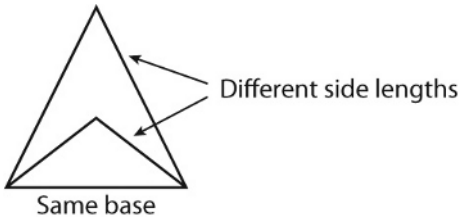
2. 



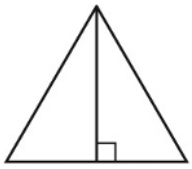
3. No. If the 60° angle is opposite one of the congruent sides, then the angle opposite the other congruent side must also be 60°, and the third angle will be 60° as well. If the 60° angle is not opposite the congruent sides, then the other two angles must be congruent and add up to 120°, so each one is 60°. Either way, all three angles are 60°, so all *three* sides are congruent.

Success for English Learners

1. No. The same base can have many different side lengths.



2. No. The height of the triangle is a leg of a right triangle, and the side is the hypotenuse. They cannot be the same.



LESSON 7-3

Practice and Problem Solving: A/B

1. $\angle F$; $\angle D$; $\angle E$
2. $\overline{HI}$; $\overline{GH}$; $\overline{GI}$
3. $\angle Y$; $\angle X$; $\angle Z$
4. The three segments cannot make a triangle because $8 + 6 < 15$; the two shorter sides together do not reach from one end of the longer side to the other.
5. $0 < b < 2s$; $0 < A < 180°$
   If the congruent sides are very close together, the base length is close to 0, and the measure of the angle opposite the base is close to 0. If the congruent sides are very spread out, the base is close to $2s$ (the combined length of the congruent sides), and the angle is close to 180°.
6. between 7 and 23 feet
7. Renaldo could travel between 8562 miles and 15,502 miles.

Practice and Problem Solving: C

1. $\overline{CD}$, $\overline{BC}$, $\overline{BD}$, $\overline{AB}$, $\overline{AD}$
2. $\overline{PT}$, $\overline{PQ}$, $\overline{QT}$, $\overline{QR}$, $\overline{RT}$, $\overline{ST}$, $\overline{RS}$
3. $\overline{YZ}$, $\overline{XY}$, $\overline{XZ}$, $\overline{WX}$, $\overline{WZ}$, $\overline{VW}$, $\overline{VZ}$
4. targets 2 and 3; targets 1 and 4
5. Possible answer: The shortest side in a triangle is opposite the shortest angle. The shortest side in $\triangle AEF$ is $\overline{AF}$. $\triangle ABF$ is equiangular, so $\overline{AF}$ has the same length as $\overline{BF}$. But $\overline{BG}$ is the shortest side in $\triangle BGF$, so $\overline{AF}$, $\overline{AB}$, and $\overline{BF}$ cannot be the shortest segments in the figure. $\overline{CG}$ is the shortest segment in $\triangle CHG$, but $\overline{BC}$ is the shortest segment in $\triangle BCG$. So $\overline{BC}$ is shorter than $\overline{CG}$. The shortest segment in $\triangle CDH$ is $\overline{DH}$. $\overline{DH}$ has length a and $\overline{CG}$ has length $(a - 2)$, so $\overline{CG}$ is shorter than $\overline{DH}$. Therefore $\overline{BC}$ is the shortest segment in the figure.
6. Proofs will vary.

Practice and Problem Solving: Modified

1. largest
2. greater than
3. opposite
4. $\angle R$; $\angle P$; $\angle Q$
5. $\angle U$; $\angle S$; $\angle T$