Triangle Inequalities
TRI1.8xv, TRI2.8xv, TRI3.8xv

Name_____

Class _____

Problem 1 – Triangle Inequality Theorem

Start the *Cabri Jr.* application and open the file *TRI1*. In *TRI1*, you are given triangle *ABC*. Segments *AB* and *AC* have fixed lengths 2 units and 3 units, respectively. Move point *B* to discover the possible lengths of *BC* and answer the following questions. (Note that when *A*, *B*, and *C* lie on the same line, there is not a triangle.)

1. What is the minimum possible length of *BC*?

2. What is the maximum possible length of *BC*?

Open the file *TRI2*. You are given another triangle *DEF*. Segments *DE* and *DF* have fixed lengths 2 units and 4 units, respectively. Move point *E* to discover the possible lengths of *EF*.

3. What interval describes all the possible lengths of segment *EF*?

4. How can you numerically determine the minimum length of segment *EF*?

5. How can you numerically determine the maximum value of segment *EF*?

6. Does a triangle with sides of length 5, 7, and 16 exist?

7. Does a triangle with sides of length 5, 7, and 10 exist?

8. Does a triangle with sides of length 7, 9, and 16 exist?

9. Given the lengths of the sides of a triangle, *a*, *b*, and *c*, what relationships must exist for the lengths to form a triangle?

Problem 2 – Pythagorean Inequalities

In the file *TRI3*, you are given triangle *ABC* and values for $a^2 + b^2$ ($AC^2 + BC^2$) and c^2 (AB^2). Move point *A* to help answer the following questions as acute, obtuse or right.

10. What kind of triangle has $a^2 + b^2 = c^2$?

11. What kind of triangle has $a^2 + b^2 > c^2$?

12. What kind of triangle has $a^2 + b^2 < c^2$?

Problem 3 – Application of the Triangle Inequalities

13. Is it possible to have a triangle with sides of length 2, 6, and 10?

14. Find the range of values for the third side for the triangle with sides of length 6 and 10.

15. What kind of triangle has sides of length 5, 7, and 10?

16. Two sides of a triangle are 5 cm and 8 cm long. Which choice(s) below could be the length of the third side?

    ❑ 8   ❑ 10   ❑ 12   ❑ 13   ❑ 17

17. Two sides of a triangle are 5 cm and 10 cm long. If the triangle is acute, which of the following could be the length of the third side?

    ❑ 5   ❑ 10   ❑ 11   ❑ 12   ❑ 13

18. Two sides of a triangle are 5 cm and 10 cm long. If the triangle is obtuse, which of the following could be the length of the third side?

    ❑ 5   ❑ 10   ❑ 11   ❑ 12   ❑ 13