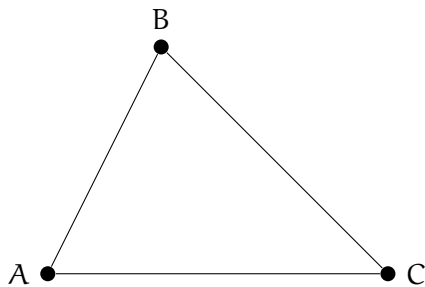




CHAPTER 1

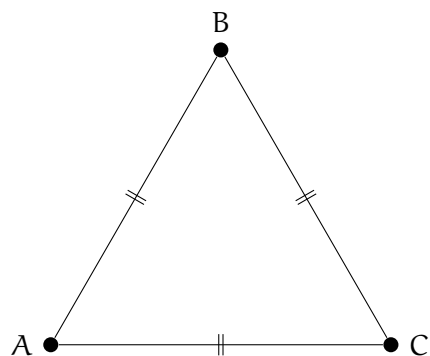
Introduction to Triangles

Connecting any three points with three line segments will get you a triangle. Here is the triangle ABC which was created by connecting three points A, B, and C:

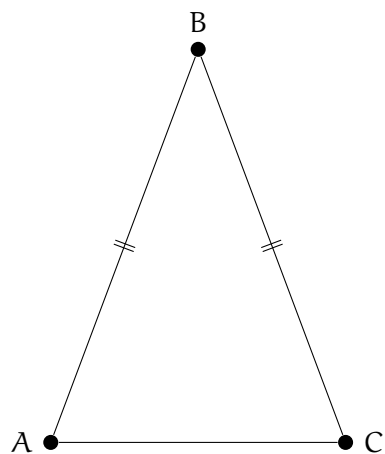


1.1 Equilateral and Isosceles Triangles

We talk a lot about the length of the sides of triangles. If all three sides of the triangle are the same length, we say it is an *equilateral triangle*:

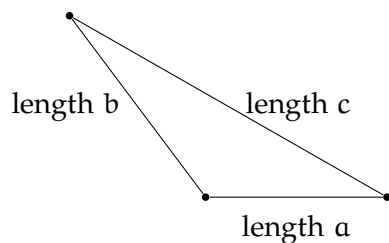


If only two sides of the triangle are the same length, we say it is an *isosceles triangle*:



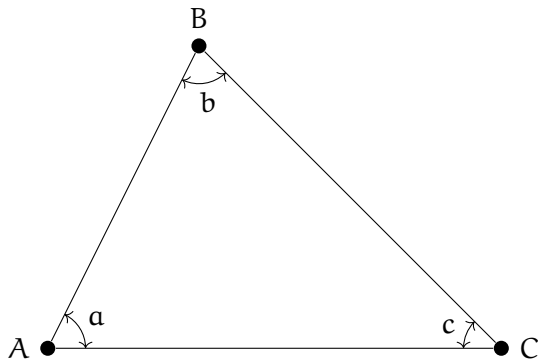
The shortest distance between two points is always the straight line between them. Thus, you can be certain that the length of one side will *always* be less than the sum of the lengths of the remaining two sides. This is known as the *triangle inequality*.

For example, in this diagram c must be less than $a + b$.

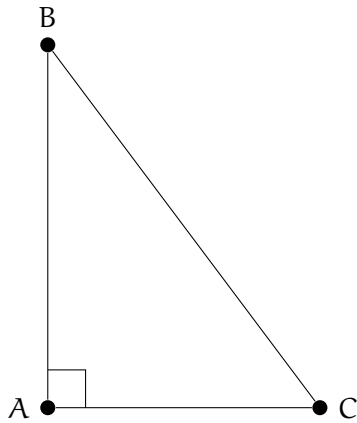


1.2 Interior Angles of a Triangle

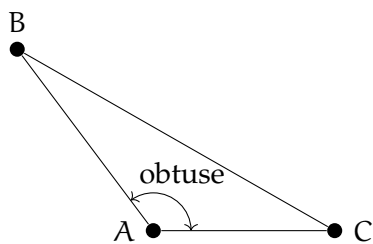
We also talk a lot about the interior angles of a triangle:



A triangle where one of the interior angles is a right angle is said to be a *right triangle*:



If a triangle has an obtuse interior angle, it is said to be an *obtuse triangle*:



If all three interior angles of a triangle are less than 90° , it is said to be an *acute triangle*.

The measures of the interior angles of a triangle always add up to 180° . For example, if we know that a triangle has interior angles of 37° and 56° , we know that the third interior angle is 87° .

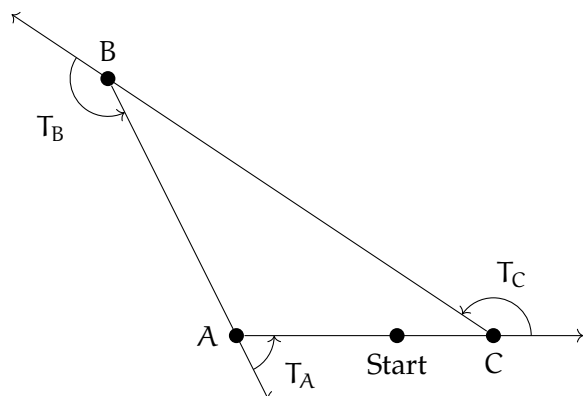
Exercise 1 **Missing Angle**

One interior angle of a triangle is 92° .
The second angle is 42° . What is the
measure of the third interior angle?

Working Space

Answer on Page ??

How can you know that the sum of the interior angles is 180° ? Imagine that you started on the edge of a triangle and walked all the way around to where you started. (going counter-clockwise.) You would turn three times to the left:



After these three turns, you would be facing the same direction that you started in. Thus $T_A + T_B + T_C = 360^\circ$. The measures of the interior angles are a , b , and c . Notice that a and T_A are supplementary. So we know that:

- $T_A = 180 - a$
- $T_B = 180 - b$
- $T_C = 180 - c$

So we can rewrite the equation above as

$$(180 - a) + (180 - b) + (180 - c) = 360^\circ$$

Which is equivalent to

$$a + b + c = 180^\circ$$

Exercise 2 **Interior Angles of a Quadrilateral**

Any four-sided polygon is a *quadrilateral*. Using the same “walk around the edge” logic, what is the sum of the interior angles of any quadrilateral?

Working Space

Answer on Page ??



APPENDIX A

Answers to Exercises

Answer to Exercise ?? (on page ??)

$$180^\circ - (92^\circ + 42^\circ) = 46^\circ$$

Answer to Exercise ?? (on page ??)

$$360^\circ$$



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