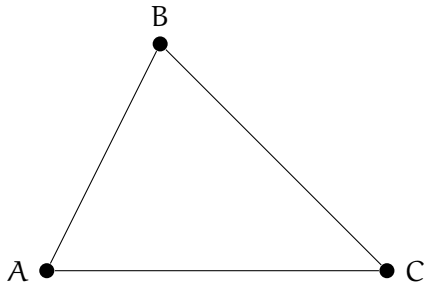


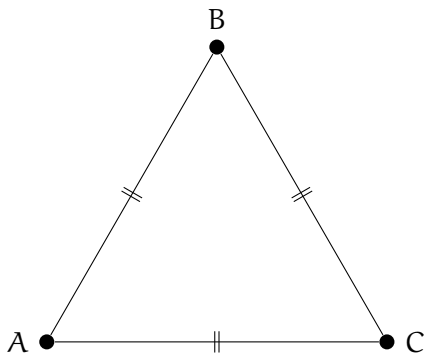
# Introduction to Triangles

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:

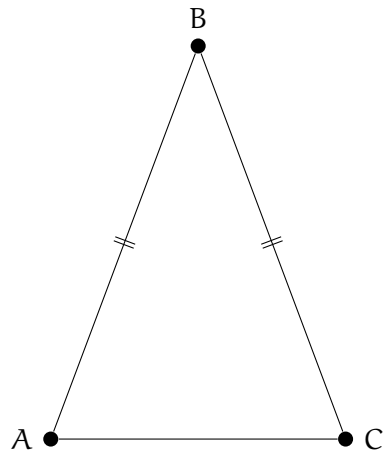


## 1.1 Equilateral and Isosceles Triangles

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*:

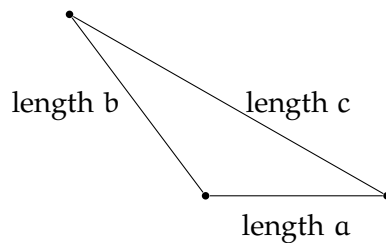


If only two sides of the triangle are the same length, we say it is an *isosceles triangle*:



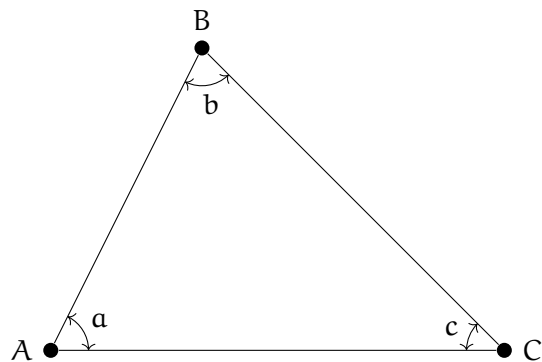
The shortest distance between two points is always the straight line between them. Thus, you can be certain that the length of one side will *always* be less than the sum of the lengths of the remaining two sides. This is known as the *triangle inequality*.

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

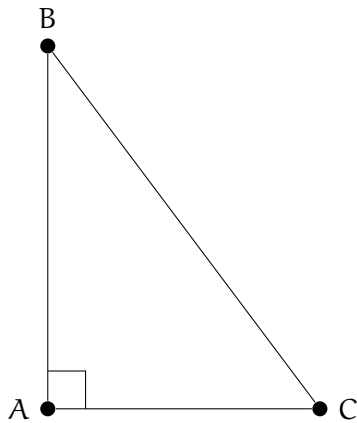


## 1.2 Interior Angles of a Triangle

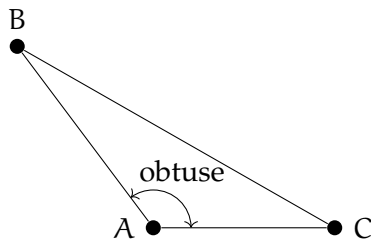
We also talk a lot about the interior angles of a triangle:



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  $90^\circ$ , it is said to be an *acute triangle*.

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

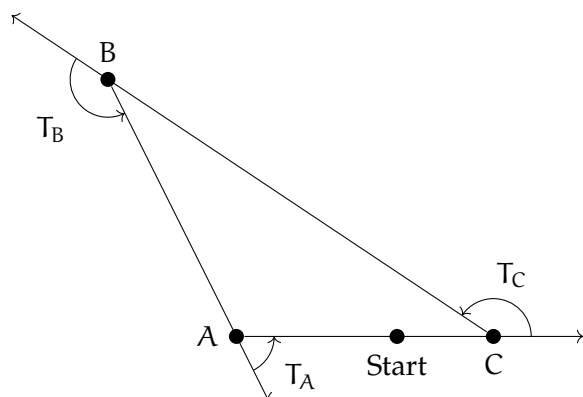
### Exercise 1 Missing Angle

One interior angle of a triangle is  $92^\circ$ . The second angle is  $42^\circ$ . What is the measure of the third interior angle?

Working Space

Answer on Page 5

How can you know that the sum of the interior angles is  $180^\circ$ ? 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

$$a + b + c = 360^\circ$$

## 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 5

# Answers to Exercises

## **Answer to Exercise 1 (on page 3)**

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

## **Answer to Exercise 2 (on page 4)**

$$360^\circ$$





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