Where Would a Vampire Bite You?

Student worksheet — *Answer key*

1. **Before the experiment**

   a. Complete the sentence correctly by filling in the blanks with *capillary* or *artery*.

   In the blood flow model, the wide straw represents a/an _____*artery*_____

   and the narrow straw represents a/an _____*capillary*_____.

   b. Do you think the capillary straw will empty faster, slower, or in about the same amount of time as the artery straw? Write your prediction below.

   Student answers will vary.

2. **During the experiment**

Record your results in the table below.

Measured data will vary. Here are example results obtained by Science Buddies' staff.

Experiment	Flow time [seconds]
Artery straw	*13*
Capillary straw	*48*

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3. After the experiment

Do this step if you are familiar with long division. *Otherwise, skip this step and continue with the next step.*

a. Calculate the *flow rate* from your results.

- In the beginning, you had 400 milliliters (mL) water in your cup.
- Divide the water volume (in milliliters) by the measured time (in seconds).
- Your result will be the water flow rate in milliliters per second (mL/s).

Flow rate for the artery straw: _____*30.8*_____mL/s

Flow rate for the capillary straw: _____*8.3*_____mL/s

The flow rates below were calculated based on the example data provided in the data table in Step 2. Although students' flow rates might be lower or higher, the flow rate for the artery straw should be higher than for the capillary straw.

b. Plot your results on the graph on the next page.

- Write a title for the vertical axis (y-axis). Don't forget to add the units to your y-axis title.
- Write number labels on the y-axis.
  - Look at your data. You want your largest value to be near the top of your graph. To do this, decide if your y-axis will increase by 1's, 2's, 5's, 10's or 20's.
  - Based on your decision, fill in the number labels next to the y-axis.
- Draw a bar that shows the measured time (or calculated flow rate) for the artery straw. Label the horizontal axis (x-axis) below it *artery straw*.
- Draw a bar that shows the measured time (or calculated flow rate) for the capillary straw. Label the horizontal axis (x-axis) below it *capillary straw*.

The graphs on the next page represent the example data shown in Step 2. Although students' flow times and flow rates might be lower or higher, the general trend should be the same.

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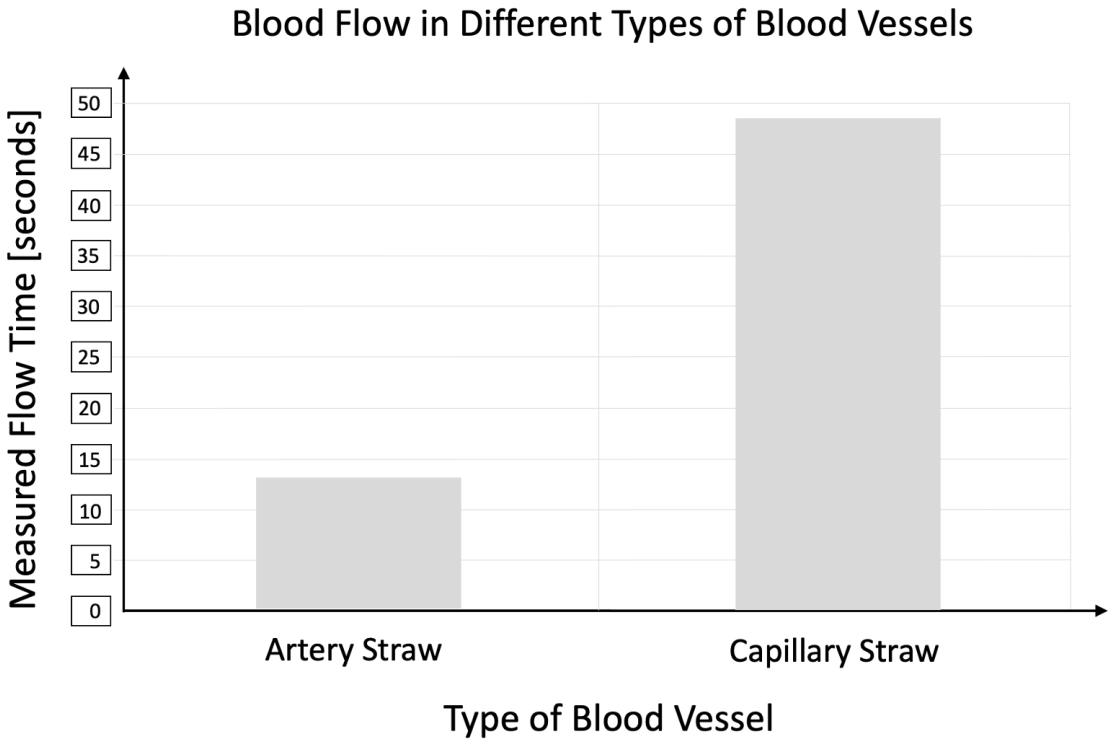
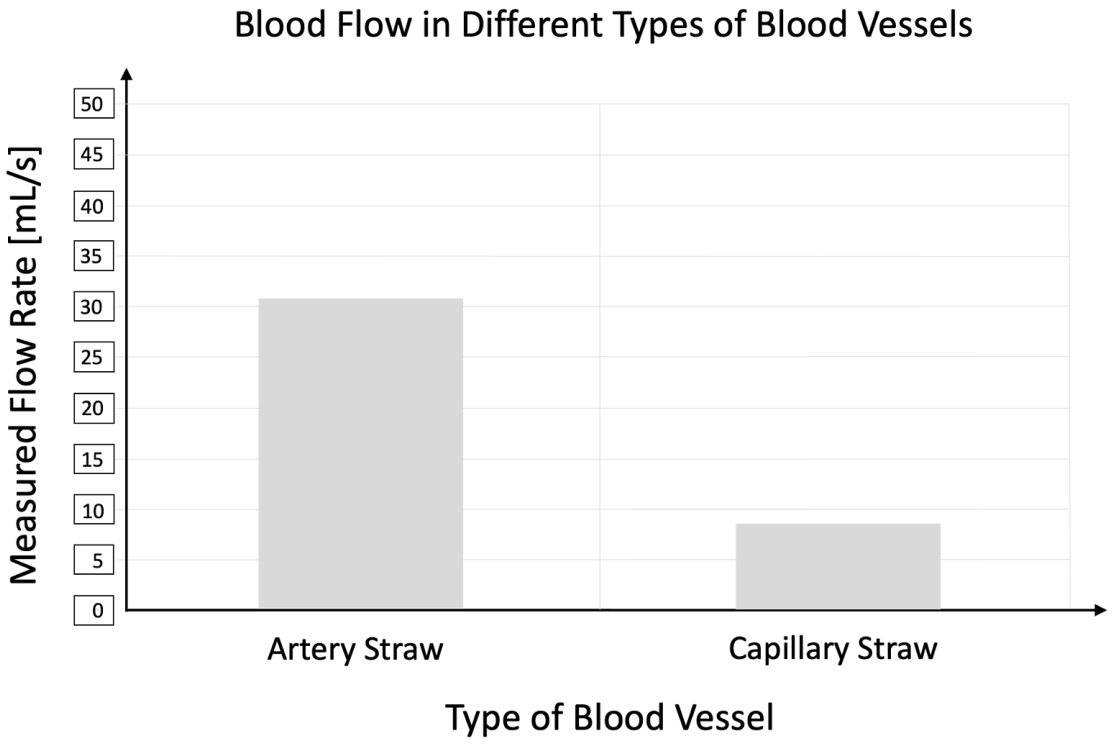
Student worksheet — *Answer key*





Where Would a Vampire Bite You—Page 4

Student worksheet — *Answer key*

Word Bank

- *Artery*
- *Blood circulation*
- *Blood flow*
- *Blood vessel*
- *Capillary*
- *Cardiovascular system*
- *Circulatory system*
- *Diameter*
- *Heart*
- *Oxygen*
- *Narrow*
- *Transport*
- *Oxygen transfer*
- *Wide*

c. Did the capillary straw empty the cup faster, slower, or in about the same amount of time as the artery straw? What is the data that supports your answer?

The capillary straw emptied the cup slower than the artery straw. The data shows that the flow time for the capillary straw was longer than for the artery straw. At the same time, the flow rate for the capillary straw was lower than for the artery straw.

d. In your own words, explain why we have different-sized blood vessels. Use some of the words from the word bank when writing your answer.

We have different types of blood vessels that serve different functions. We have wide blood vessels, such as the arteries, to carry a lot of blood from the heart to the rest of the body in a very short time. The narrower blood vessels, such as the capillaries, serve a much smaller body area and thus only need to transport a small amount of blood per second. The capillaries' main function is to deliver oxygen from our blood to the body cells they pass near. Our circulatory system's branching structure with different-sized blood vessels is nature's clever way of providing our body with the oxygen it needs to survive.