



## 26.1 Measuring the Moon's Diameter

**READ**


In this skill sheet you will explore how to measure the moon's diameter using simple tools and calculations.

### Materials

Here are the materials you will need to measure the moon's diameter:

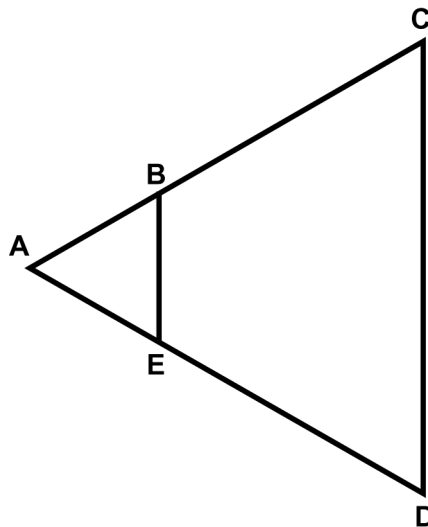
- A 3-meter piece of string
- A metric tape measure
- A small metric ruler
- Tape
- Scissors
- Marker
- One-centimeter semi-circle card (Cut out from the bottom of the last page)

**PRACTICE**


### Proportions and geometry

The method you will use to measure the moon's diameter depends on the properties of similar triangles. The following exercise demonstrates these properties.

Below is a large triangle. A line drawn from one side to the other of the large triangle results in a smaller triangle inside the larger one. The ends of each line are labeled with letters.



1. Make the following measurements of the lines on the triangle:

Distance AC: \_\_\_\_\_ cm

Distance AD: \_\_\_\_\_ cm

Distance AB: \_\_\_\_\_ cm

Distance AE: \_\_\_\_\_ cm

Distance BE: \_\_\_\_\_ cm

Distance CD: \_\_\_\_\_ cm



2. How is the distance from AB related to AC?
3. How is the distance from BE related to CD?
4. Based on your measurements and your answers to questions (2) and (3), come up with a statement that explains the properties of similar triangles.

## Finding the diameter of the moon

Now, you are ready to use your supplies to find the diameter of the moon. Follow these steps carefully and answer the questions as you go.

1. Locate a place where you can see the moon from a window. This is possible at night or early in the morning.
2. Use scissors to carefully cut out the semi-circle card found on the next page.
3. Tape this card to the window when you can see the full (or gibbous) moon through the window.
4. Tape one end of the 3-meter piece of string to the card directly underneath the semi-circle.
5. Now, slowly move backward from the window while holding on to the string. Watch your step! As you move backward, pay attention to the moon. You want to move back far enough so that the bottom half of the moon “sits” in the semi-circle cutout. You want the semi-circle to be the same size as the lower half to the moon.
6. When the lower half of the moon is the same size as the semi-circle cut out, stop moving backward and hold the string up to the side of one of your eyes. Have a friend carefully mark the string at this distance.
7. Now, measure the distance from the window to the mark on the string to the nearest millimeter. Convert this distance to meters. Write the string distance in Table 1.

**Table 1: Finding the moon’s diameter data**

Semi-circle diameter	0.01 meter
String distance	
Diameter of the moon	???
Distance from Earth to the moon	384, 400, 000 meters

## Finding the moon’s diameter

1. You have three out of four measurements in Table 1. The only measurement you need is the moon’s diameter. You can find the moon’s diameter using proportions. Which calculation will help you?

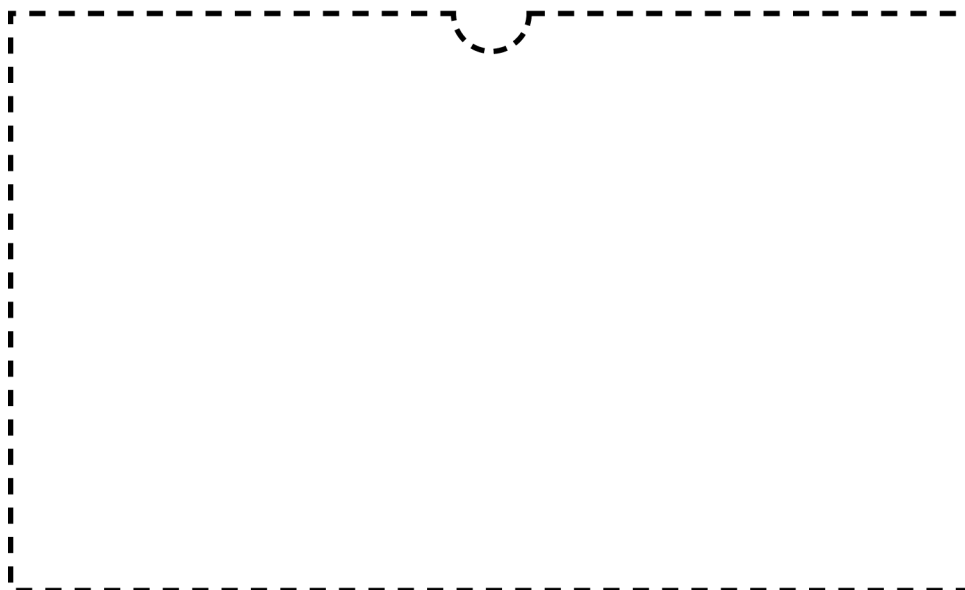
<p>a.</p> $\frac{\text{semi-circle diameter}}{\text{moon diameter}} = \frac{\text{distance to semi-circle}}{\text{distance from Earth to the moon}}$	<p>b.</p> $\frac{\text{semi-circle diameter}}{\text{distance to semi-circle}} = \frac{\text{moon diameter}}{\text{distance from Earth to the moon}}$
<p>c.</p> $\frac{\text{moon diameter}}{\text{semi-circle diameter}} = \frac{\text{distance to semi-circle}}{\text{distance from Earth to the moon}}$	<p>d.</p> $\frac{\text{moon diameter}}{\text{semi-circle diameter}} = \frac{\text{distance from Earth to the moon}}{\text{distance to semi-circle}}$

2. Use the proportion that you selected in question (1) to calculate the moon’s diameter.
3. How is performing this calculation like the exercise you did in part 2?



Semi-Circle Card:

Diameter = 1 cm



Semi-circle card  
(cut out along dotted lines)