

Name: \_\_\_\_\_

## Activity 1H

### Activity 1H: Rates of Change

One of the most important equations we will use in this course is the "dirt" equation:

$$\text{Distance} = \text{Rate} * \text{Time} \text{ (read as distance equals rate times time)}$$

When you know two of the variables in this equation, you can figure out the third. We can move the variables around in the equation to suit our needs (but then we couldn't call it the "dirt" equation):

$$\text{Rate} = \text{Distance} / \text{Time} \text{ (read as rate equals distance divided by time)}$$

or

$$\text{Time} = \text{Distance} / \text{Rate} \text{ (time equals distance divided by rate)}$$

#### Example: Car Speed

It's summertime: you decide to go on a road trip. You want to figure out how long it will take you to drive to the [Grand Canyon](#). You look on your map app and see that you are 380 miles away... when suddenly, your phone dies! Assuming you will drive at an average rate of 60 mph, how many hours will it take you to drive to the Grand Canyon?

First, write down your known variables:

**Distance =**

**Rate =**

Then, calculate your unknown variable using one of the equations above. Show your work:

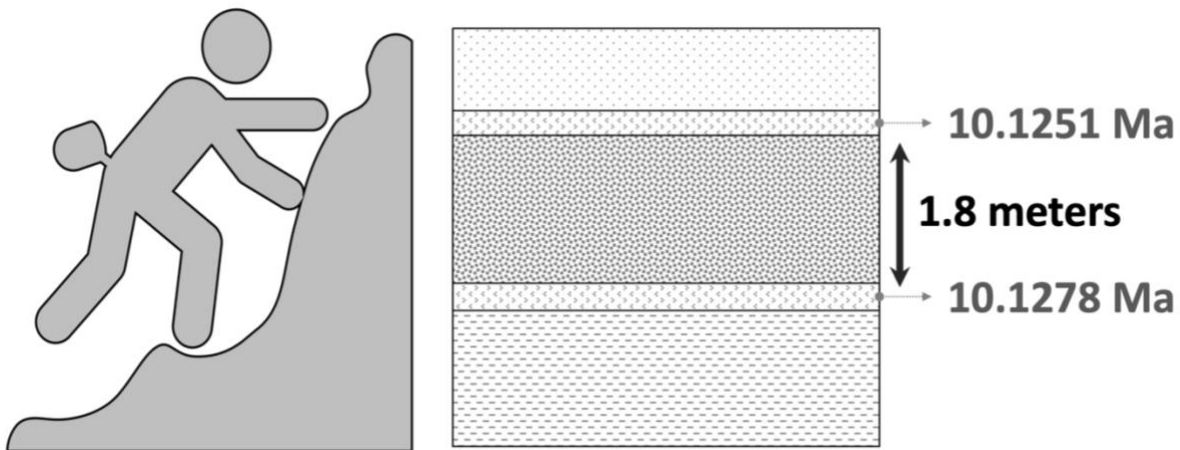
**Time =**

**Geology Example: Rate of Sedimentation**

While you're out hiking, you encounter an interesting-looking [rock bed](#). You can tell by the pebbles incorporated throughout the rock bed that it was laid down by a river over a long time. You want to find out how fast the bed was deposited by the river (this is called **rate of sedimentation**).

You measure how thick the bed is (this is its distance, a measurement of length) and discover it is 1.8 meters from the base to the top. Luckily, this bed is sandwiched by two ash beds laid down by volcanic eruptions: ash can be dated by radiometric dating!

After analyzing the samples in a lab, you learn the lower ash bed is dated at 10.1278 Ma (read as million years old) and the upper ash bed is dated at 10.1251 Ma.



**Figure 1.15:** Outcrop of layers of sedimentary rock and ash. The ash layers have been radiometrically dated.

What is the average rate of sediment deposition for your rock bed?

Write down your known variables:

**Distance =**

**Time =**

Then, calculate your unknown variable. Show your work:

**Rate =**

### Attributions

- Figure 1.15: “Outcrop of rock” (CC-BY 4.0; Chloe Branciforte, own work)