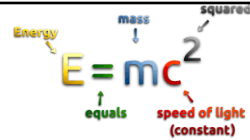


Date: \_\_\_\_\_



#### 4.4 Modelling with Formulas

You have been applying what you know about solving equations to formulas for a few years now, whether you knew it or not. Today we are going to discuss how to rearrange formulas to solve for unknowns. This means that we can use one formula to solve for all of its parts, rather than trying to remember several different formulas.

#### Try It!

Attempt the following problems. We will take them up (in real life or video form) once you make an attempt :)

- 1) The volume of a cylinder can be calculated using the formula

$$V = \pi r^2 h$$

- Find the volume of a cylinder with a radius of 4 cm and a height of 12 cm. Round your final answer to one decimal place.
  - Determine the height of a cylinder that has a radius of 3 m and a volume of  $270 \text{ m}^3$ . Round your final answer to one decimal place.
  - Determine the radius of a cylinder with a height of 12 cm and a volume of  $300 \text{ cm}^3$ . Round your final answer to one decimal place.
- 2) Rearrange the volume formula in question one to isolate h.
- 3) Rearrange the volume formula in question one to isolate r.



When we are solving for an unknown using a given formula, we can:

- Sub in the numbers, simplify, and then rearrange to isolate the remaining variable, OR
- Rearrange the formula first, and then sub in the given values and solve.

Both of these methods are correct. I will ask you to practice both, because sometimes it makes more sense to do one or the other (for example, ugly numbers would make me rearrange the formula first, while an ugly formula might make me sub in the numbers first to make it look nicer).

#### Rearrange the Formula First

The volume of a rectangular prism is calculated using the formula  $V = lwh$ . Determine the height of a prism with a volume of  $336.792 \text{ cm}^3$  if the length is  $9.0125 \text{ cm}$  and the length is  $11.1165 \text{ cm}$ .

#### Substitute First

The distance an accelerating object travels is related to its initial speed,  $v$ , its rate of acceleration,  $a$ , and time,  $t$ .

$$d = vt + \frac{1}{2}at^2$$

Find the rate of acceleration for an object that has an initial speed of  $20 \text{ m/s}$  and travels  $60 \text{ meters}$  in  $2 \text{ seconds}$ .