MHF 4UI Unit 5 (Rational Functions):
"Creating a Model"

A **mathematical model** is a mathematical representation of the essential aspects of a system. These models can be expressed in many forms, such as equations, formulas, inequalities, etc...

Models can be very simple. For example, a model of the volume of a rectangular prism is:
$$volume = length \times width \times height$$

We will create, and solve, some slightly more complex models today.

In groups of 3 or 4…For each scenario, create a mathematical model in the form of a **rational equation**. *Define the variable(s) introduced.* Then solve the equation.

1. An aircraft maintains an average airspeed of 325 km/h (when there is no wind) between two airports on both the outbound and return trips. On one trip, on the outbound trip there is an average tailwind of 75 km/h and on the return trip a headwind of the same speed. If the airports are 1000 km apart, how long does it take to fly the round trip? **[Answer: 6.5 h]**
   Recall: average speed = distance ÷ time

2. Dieter makes a journey of 430 km, travelling 160 km by bus, and the rest by car. If the car averages 10 km/h faster than the bus, and the entire journey is 5 h, what is the speed of the car? **[Answer: 90 km/h]**

3. The sport biathlon combines cross-country skiing with rifle shooting. At the Olympics, competitors start at singly at one-minute intervals. Frank, who will start immediately after Anatole, feels that no matter how fast Anatole is, he can ski an average of 1 km/h faster. What is the average speed of each biathlete when they ski, if Frank overtakes Anatole at the first shooting range, which is 4 km from the start? **[Answer: Anatole 15 km/h and Frank 16 km/h]**

4. Students sent flowers costing $20 to a sick classmate. There were four fewer students contributing than was planned, requiring each of the others to give 25 cents more. How many students contributed to the gift? **[Answer: 16]**

5. Brendan buys a block of shares of the company *HuskyTech* for $1875. When the share price increases by $4 per share, he sells all but 15 of them for $1740. How many shares did he buy? **[Answer: 75]**