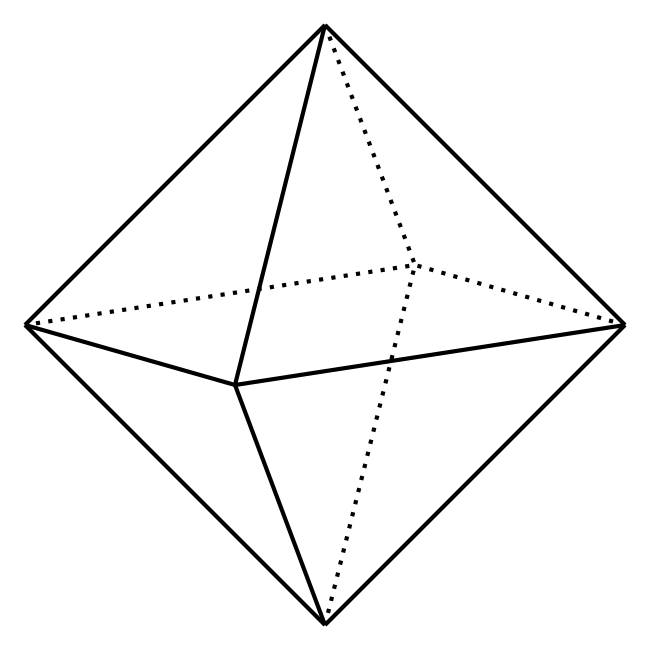
## Unit 2 Lesson 9: Which Variable to Solve for? (Part 2)

### 1 Faces, Vertices, and Edges (Warm up)

#### Student Task Statement

In an earlier lesson, you saw the equation , which relates the number of vertices, faces, and edges in a Platonic solid.

1. Write an equation that makes it easier to find the number of vertices in each of the Platonic solids described:

* 
  1. An octahedron (shown here), which has 8 faces.
  2. An icosahedron, which has 30 edges.

1. A Buckminsterfullerene (also called a “Buckyball”) is a polyhedron with 60 vertices. It is not a Platonic solid, but the numbers of faces, edges, and vertices are related the same way as those in a Platonic solid.

* Write an equation that makes it easier to find the number of faces a Buckyball has if we know how many edges it has.

### 2 Cargo Shipping

#### Student Task Statement

An automobile manufacturer is preparing a shipment of cars and trucks on a cargo ship that can carry 21,600 tons.

The cars weigh 3.6 tons each and the trucks weigh 7.5 tons each.



1. Write an equation that represents the weight constraint of a shipment. Let be the number of cars and be the number of trucks.
2. For one shipment, trucks are loaded first and cars are loaded afterwards. (Even though trucks are bulkier than cars, a shipment can consist of all trucks as long as it is within the weight limit.)

* Find the number of cars that can be shipped if the cargo already has:
  1. 480 trucks
  2. 1,500 trucks
  3. 2,736 trucks
  4. trucks

1. For a different shipment, cars are loaded first, and then trucks are loaded afterwards.
   1. Write an equation you could enter into a calculator or a spreadsheet tool to find the number of trucks that can be shipped if the number of cars is known.
   2. Use your equation and a calculator or a computer to find the number of trucks that can be shipped if the cargo already has 1,000 cars. What if the cargo already has 4,250 cars?

### 3 Streets and Staffing

#### Student Task Statement

The Department of Streets of a city has a budget of $1,962,800 for resurfacing roads and hiring additional workers this year.

The cost of resurfacing a mile of 2-lane road is estimated at $84,000. The average starting salary of a worker in the department is $36,000 a year.



1. Write an equation that represents the relationship between the miles of 2-lane roads the department could resurface, , and the number of new workers it could hire, , if it spends the entire budget.
2. Take the equation you wrote in the first question and:
   1. Solve for . Explain what the solution represents in this situation.
   2. Solve for . Explain what the solution represents in this situation.
3. The city is planning to hire 6 new workers and to use its entire budget.
   1. Which equation should be used to find out how many miles of 2-lane roads it could resurface? Explain your reasoning.
   2. Find the number of miles of 2-lane roads the city could resurface if it hires 6 new workers.



© CC BY 2019 by Illustrative Mathematics®