<table>
<tr><td>Title: 100,000 Computers</td><td>Grade: 6th

Author(s): Hope Phillips</td><td>BIG Idea: Proportional Reasoning</td></tr>
<tr><td colspan="3">Real-World Connection:

According to the Futures' Channel Video, 100,000 Computers, workers at the Dell Corporation Worldwide Headquarters in Round Rock, TX ship 100,000 computers per day. Collectively, workers can assemble up to 10,000 computer systems per day, while individual workers assemble from 20 to 50 computers per day. The most efficient employee assembles 15 computers per hour.

After discussion of the above statistics, the question is posed, "If an employee can assemble 15 computers per hour, how many computers could he/she produce in a week? In a month? In a year?" Students will use the traditional dimensional analysis/factor-label method to approach the problem after drawing a representation of this process using graph paper.

How Students will Experience the Connection:

Video Clip — Photo — Podcast
Print Media (article, ad, etc.) — Vodcast — Other</td></tr>
<tr><td colspan="3">GPS Standards:

M6A2b: Use manipulatives or draw pictures to solve problems involving proportional relationships.

M6M1: Students will convert from one unit to another within one system of measurement (customary or metric) by using proportional relationships.

M6P4: Students will make connections among mathematical ideas and to other disciplines.

M6P5: Students will represent mathematics in multiple ways.</td></tr>
<tr><td colspan="3">Objectives:

1. Using drawings students will represent proportional relationships given a variety of unit rates.

2. Students will use dimensional analysis/factor-label to convert among ratios with different units.</td></tr>
<tr><td colspan="3">Materials:

• Futures' Channel Video – 100,000 Computers a Day (or statistics above; video not required)
• Calculators – one per student</td></tr>
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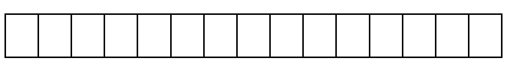
- *Graph paper – one per student (size will be determined by the problem specifications; see asterisk below in “Related Task”)
- Rulers or straight edges; one per student

Related Task:

Ask students what factors they must consider to address the questions about computer assembly. These may include the following: the number of hours in a typical work day, factoring in of meal time and breaks; the number of work days in a week and month – might Dell have weekend shifts; does the plant close for any holidays; and how many work days per year. *Because a class may determine unique specifications to the factors above, answers to this problem may vary. These details will determine the size graph paper students will need. As written the graph paper dimensions would need to be, at least, 75 boxes horizontally by 30 boxes vertically.

Once specifications have been determined, pass out graph paper and ask students how they might draw a picture representing the number of computers produced in a day. Have students use their rulers to draw a 15 x 1 rectangle in the leftmost corner of the graph paper, representing $\frac{15\ computers}{1\ hour}$.

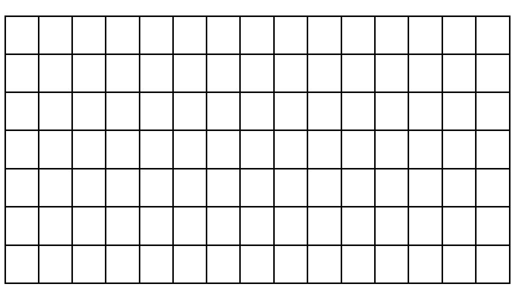
# of Computers



1 hour

Ask students how they might extend their drawing to show the number of computers assembled in a seven-hour work day. The rectangle (see below) represents 15 computers/hour multiplied times 7 hours/work day.

# of Computers



Hours in a Work Day

On the board write the following:

$$\frac{15\ computers}{hour} \times \frac{7\ hours}{day} = \frac{105\ computers}{day}$$

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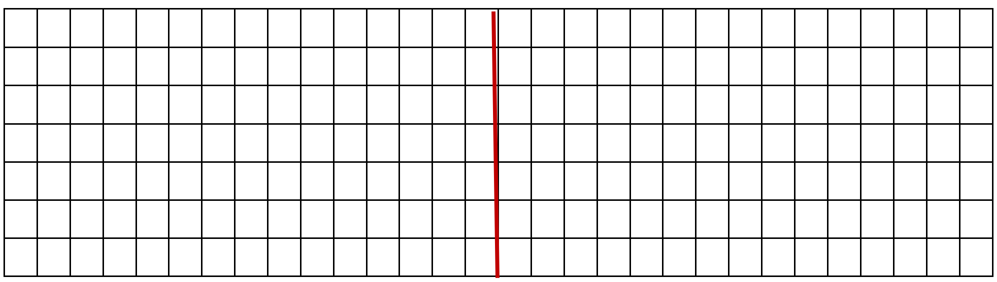
Discuss with students that these are unit rates and, after multiplying, the product is 105 computers/day. Have students count the number of “boxes” on their graph paper to confirm the value *105*.

Ask students how they might extend their drawing to represent the number of computer assembled in one week. The dimensions of the new rectangular representation will depend on the number of work days per week the students determine. Students are to add on to the original rectangle producing a total of five, 7 x 15 rectangles in a single row. Make sure the rectangles are connected. See graphic below.

On the board write the following:

$$\frac{15\ computers}{hour} \times \frac{7\ hours}{day} \times \frac{5\ days}{work\ week} = \frac{525\ computers}{week}$$



***NOTE:** The drawing above represents **2 days, not 5,** due to limited space.

Ask students how they might represent the number of computers assembled in a month. Continue the drawing by adding three more rows (assuming a work month of *approximately* 4 weeks). Each student should now have a drawing of the number of computers assembled in one month.

On the board write the following:

$$\frac{525\ computers}{week} \times \frac{4\ weeks}{month} = \frac{2100\ computers}{month}$$

Students may group their work with a total of 12 students to represent the number of computers assembled in one year. Put together, the drawings resemble a calendar. These may be displayed in the classroom to help students see the enormity of the number of assembled computers by the most efficient worker.

On the board write the following to summarize the yearlong assembly:

$$\frac{2100\ computers}{month} \times \frac{12\ months}{year} = \frac{25{,}200\ computers}{year}$$

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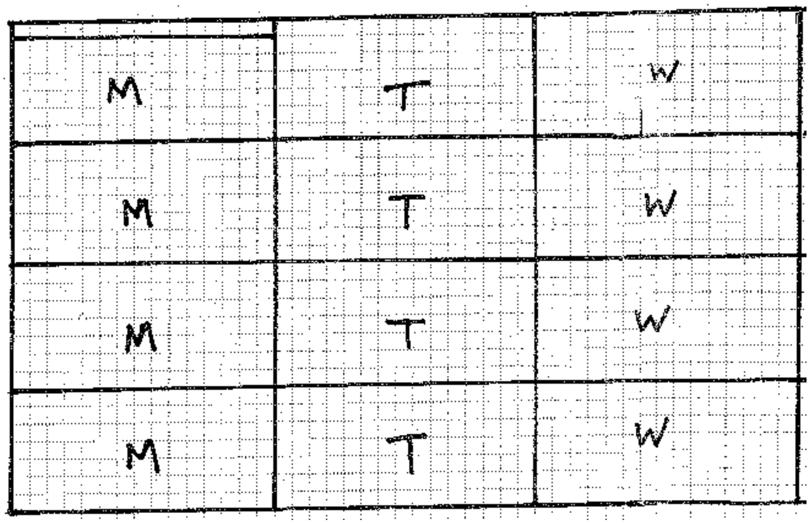
As all calculations are displayed on the board, discuss that this method allows students to see how the units change. Specifically, how *computers/hour* becomes *computers/year* through the multiplication of unit rates.

Below is a scanned copy of a **partial** graph paper drawing of the problem, labeled “Monday, Tuesday, and Wednesday.”



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