

Using Units to Solve Multi-Step Problems

Grade 9 – Algebra 1 math · Worksheet · Standards: N-Q.A.1, N-Q.A.2, N-Q.A.3

Name: _____ Date: _____ Class: _____

These problems train unit analysis, rate conversions, fair comparisons, graph scales and sensible rounding, as described in standards N-Q.A.1, N-Q.A.2 and N-Q.A.3. The first problems convert simple units, then the middle ones convert rates and areas. The last six problems are multi-step situations such as a road trip, a pool, a bakery stand and a garden. Write the unit beside every number and check that the units cancel to what you want.

Standards: N-Q.A.1, N-Q.A.2, N-Q.A.3 · **Level:** Grade 9 Algebra 1

Problem 1 Hours to minutes (easy)

Convert 4.5 hours to minutes.

Problem 2 Feet to miles (easy)

Convert 7,920 feet to miles.

Problem 3 Gallons to quarts (easy)

Convert 3.2 gallons to quarts (1 gallon = 4 quarts).

Problem 4 Units of a product (easy)

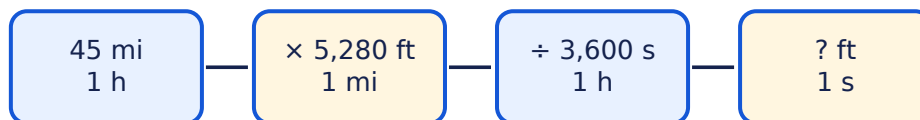
A bulk store sells walnuts for \$2.75 per pound. Find the cost of 6.4 pounds and state the unit of the result.

Problem 5 Cyclist speed (easy)

A cyclist rides 22.5 miles in 90 minutes. Find the average speed in miles per hour.

Problem 6 Miles per hour to feet per second (medium)

Convert 45 miles per hour to feet per second. Fill in the last box of the diagram.



Fill in the last box.

Problem 7 Leaking faucet (medium)

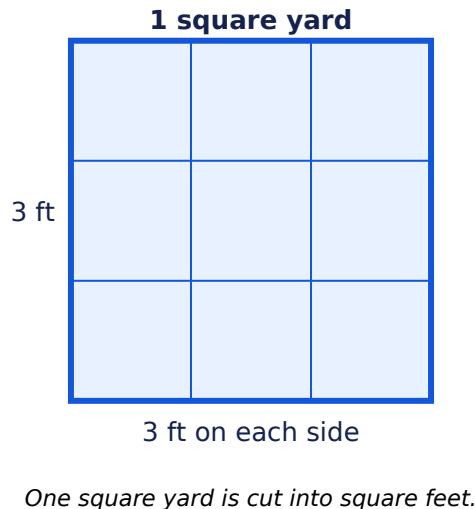
A faucet leaks 5 fluid ounces each hour. How many gallons does it leak in one day? Use 1 gallon = 128 fluid ounces and round to the nearest hundredth.

Problem 8 Hose flow rate (medium)

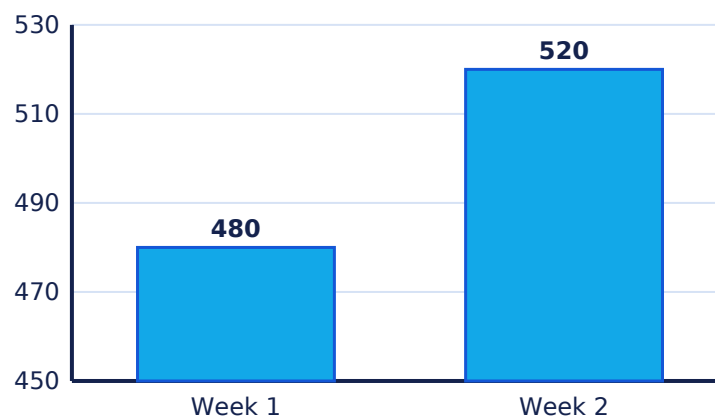
A hose fills 14 gallons in 8 minutes. Find its flow rate in gallons per hour.

Problem 9 Square yards to square feet (medium)

A rug covers 2 square yards. Use the diagram to find its area in square feet.

**Problem 10 Truncated axis** (medium)

The bar graph shows weekly sales for a lemonade stand. (a) Compare the heights of the bars, measured from the bottom of the axis, as a ratio. (b) Find the true ratio of Week 2 sales to Week 1 sales.



Weekly lemonade-stand sales in dollars (axis starts at 450).

Problem 11 Accuracy of an area (medium)

A school banner measures 8.3 feet by 5.6 feet, each to two significant figures. Compute the

area and report it with suitable accuracy.

Problem 12 Crowded parks (medium)

Decide which park is more crowded by defining a suitable quantity, then compute it for each park.

Park A: 1,260 visitors on 18 acres

Park B: 930 visitors on 15 acres

Saturday attendance at two parks.

Problem 13 Days to seconds (medium)

Convert 3 days to seconds.

Problem 14 Conveyor speed (medium)

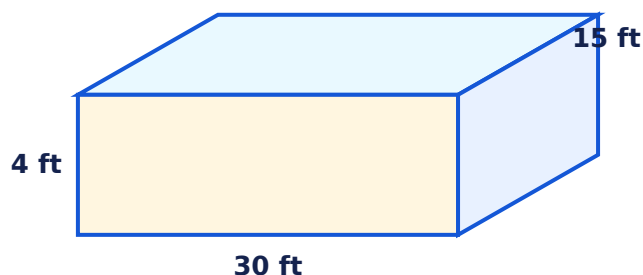
A conveyor belt moves 3.5 feet per second. Find its speed in miles per hour, rounded to the nearest hundredth.

Problem 15 Road trip fuel cost (hard)

A family drives 364 miles. Their car travels 28 miles on each gallon, and gas costs \$3.85 per gallon. Find the fuel cost for the trip.

Problem 16 Filling the pool (hard)

The pool shown is 30 ft long, 15 ft wide and 4 ft deep. One cubic foot holds about 7.5 gallons. A pump adds 450 gallons per hour. How many hours does it take to fill the pool completely?



The pool is a rectangular prism.

Problem 17 Hiking average speed (hard)

A hiker covers 2.4 miles in 50 minutes, rests, and then covers 1.8 miles in 45 minutes. Find the average speed for the walking time in miles per hour, to the nearest hundredth.

Problem 18 Better juice buy (hard)

Which juice costs less per fluid ounce? Give each unit price in cents per fluid ounce.

Juice A: 64 fl oz bottle, \$3.84
Juice B: 1.5 gallon jug, \$10.56
(1 gallon = 128 fl oz)

Shelf labels at the grocery store.

Problem 19 Muffin sugar (hard)

A bakery stand bakes 40 batches of muffins. Each batch needs 1.5 cups of sugar. A 5-pound bag holds about 11.25 cups. How many bags must the stand buy?

Problem 20 Garden soil bags (hard)

A rectangular garden measures 12.5 ft by 8.25 ft. Each bag of soil covers 6 square feet. How many bags are needed to cover the whole garden?