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TOPIC 12

Convert Measurements

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OVERVIEW

Topic 12 focuses on using multiplication and division to convert measurements of length, capacity, and weight or mass within either the customary or metric measurement system, on converting units of time, and on solving problems involving measurement conversions.

EQUIVALENT MEASUREMENTS

Convert Customary Units Your child will use relationships between units to convert from one customary unit to another. Your child will work with units of length (inches, feet, yards, and miles), units of capacity (fluid ounces, cups, pints, quarts, and gallons), and units of weight (ounces, pounds, and tons).

Your child can use charts of equivalent measures to help.
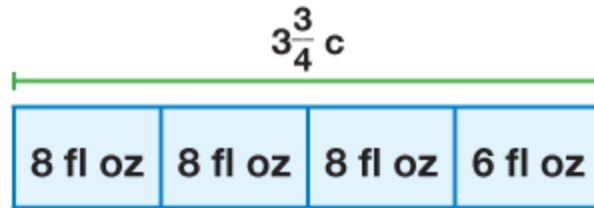
1 gallon (gal) = 4 quarts (qt)
1 quart = 2 pints (pt)
1 pint = 2 cups (c)
1 cup = 8 fluid ounces (fl oz)

Your child will learn to multiply when changing larger units to smaller units.

This example shows how to convert $3\frac{3}{4}$ cups to fluid ounces.

$$3\frac{3}{4} \, c = \boxed{} \, \text{fl oz}$$

First, make a model to show that 1 cup is equivalent to 8 fluid ounces.

$$3\frac{3}{4} \, c$$

8 fl oz	8 fl oz	8 fl oz	6 fl oz

Then multiply $3\frac{3}{4}$ by 8.

$$3\frac{3}{4} \times 8 = (3 \times 8) + \left(\frac{3}{4} \times 8\right)$$
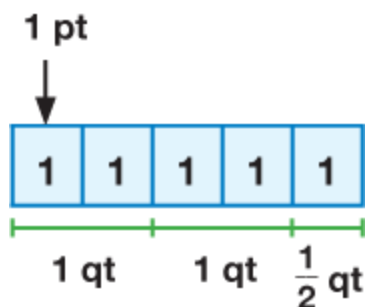$$3\frac{3}{4} \times 8 = 24 + 6$$
$$3\frac{3}{4} \times 8 = 30$$

So, $3\frac{3}{4}$ cups $= 30$ fluid ounces.

Your child will learn to divide when changing smaller units to larger ones. This example shows how to convert 5 pints to quarts.

$$5 \, \text{pt} = \boxed{} \, \text{qt}$$

First, make a model to show that 2 pints is equivalent to 1 quart.

1 pt

1	1	1	1	1

1 qt   1 qt $\frac{1}{2}$ qt

Then divide 5 by 2.

$5 \div 2 = \frac{5}{2} = 2\frac{1}{2}$

So, 5 pints $= 2\frac{1}{2}$ quarts.

Convert Metric Units Your child will use the relationships between units to convert from one metric unit to another. Your child will work with units of length (millimeter, centimeter, meter, and kilometer), units of capacity (milliliter and liter), and units of mass (milligrams, grams, and kilograms).

Your child can use charts of equivalent measures to help.

$$1 \text{ km} = 1{,}000 \text{ m}$$
$$1 \text{ m} = 100 \text{ cm}$$
$$1 \text{ m} = 1{,}000 \text{ mm}$$
$$1 \text{ cm} = 10 \text{ mm}$$

Every metric unit is 10 times as great as the next smaller unit.

DATA	1 kilometer	1 hectometer	1 decameter	1 meter	1 decimeter	1 centimeter	1 millimeter
	1000 m	100 m	10 m	1 m	0.1 m	0.01 m	0.001 m

Your child will learn to multiply when changing larger units to smaller units. This example shows how to convert 3 kilometers to meters.

$$3 \text{ km} = \boxed{} \text{ m}$$

Find 3×1000.

$$3 \text{ km} = 3{,}000 \text{ m}$$

Your child will learn to divide when changing smaller units to larger ones. This example shows how to convert 1,200 centimeters to meters.

$$1{,}200 \text{ cm} = \boxed{} \text{ m}$$

$$\text{Find } 1{,}200 \div 100.$$
$$1{,}200 \text{ cm} = 12 \text{ m}$$

So, 1,200 centimeters $=$ 12 meters.

Convert Units of Time Your child will convert units of time, applying the same process used with units of length, capacity, and weight or mass: multiply when changing larger units to smaller units, and divide when changing smaller units to larger units.

Here is how your child might solve the problem, "Kendall's family is driving to a theater to see a 2-hour movie. They find a parking lot that limits parking to 90 minutes. Should they park there?"

Your child can use a chart of equivalent measures to help.

1 week = 7 days
1 day = 24 hours
1 hour = 60 minutes
1 minute = 60 seconds

Here is one way your child might solve the problem. Convert 2 hours to minutes.

2×60 minutes $=$ 120 minutes
120 minutes $>$ 90 minutes
So, 2 hours $>$ 90 minutes.

Here is another way to solve the problem. Convert 90 minutes to hours.

90 minutes $\div 60 = 1\frac{1}{2}$ hours

2 hours $> 1\frac{1}{2}$ hours

So, 2 hours

<mark>Error parsing MathML: error on line 1 at column 127: StartTag: invalid element name</mark> 90 minutes.

Kendall's family should not park in the parking lot because they need more time than the limit of 90 minutes.

SOLVE REAL-WORLD PROBLEMS

Solve Problems Your child will solve multi-step real-world problems involving measurement conversions.

Here is how your child might solve the problem, "What is the perimeter of the pool?"
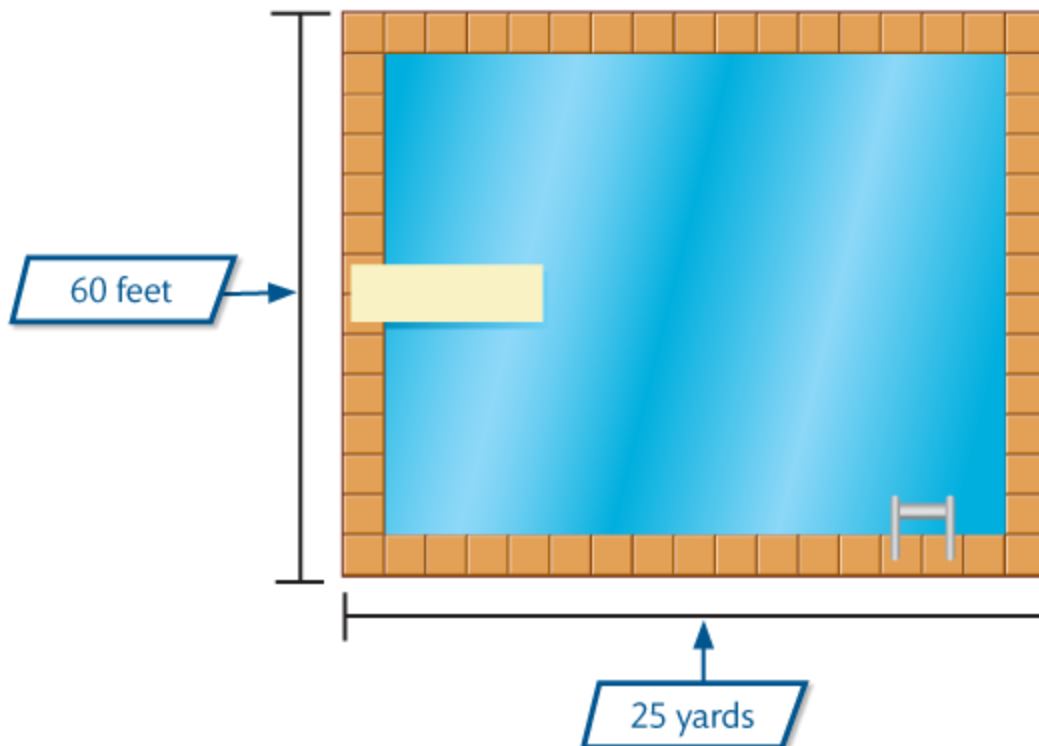
60 feet

25 yards

Convert 25 yards to feet so you can add like units.

1 yard $= 3$ feet

25×3 feet $= 75$ feet

Then use the perimeter formula with the converted measurements.

$$P = (2 \times l) + (2 \times w)$$
$$P = (2 \times 75) + (2 \times 60)$$
$$P = 150 + 120$$
$$P = 270 \text{ feet}$$

The perimeter of the pool is 270 feet.

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CONNECT THE MATH

You can connect the math in this topic to everyday experiences. Involve your child in situations in which you find yourself converting units of length, capacity, and time. For example, at the store, you might ask your child to help determine which of two same-priced bottles of juice to buy: one that contains 12 fluid ounces or one that contains 2 pints. Engage your child in converting units of time when you are planning family schedules.

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TOPIC 12 LESSONS

Lesson 12-1   Convert Customary Units of Length

Lesson 12-2   Convert Customary Units of Capacity

Lesson 12-3   Convert Customary Units of Weight

Lesson 12-4   Convert Metric Units of Length

Lesson 12-5   Convert Metric Units of Capacity

Lesson 12-6   Convert Metric Units of Mass

Lesson 12-7   Convert Units of Time

Lesson 12-8   Solve Word Problems Using Measurement Conversions

Lesson 12-9   PROBLEM SOLVING

                         Precision