5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

A company from Japan was doing business in the United States. In 2007 it had an annual income of $1,000,000 and annual expenses of $800,000. The formula below shows the relationship between income, expenses, and profit.

Income = Expenses + Profit

About how much was this company's profit, in Japanese yen, in 2007?

(In 2007, 1 United States dollar was approximately equal to 127 yen.)

A. 1,600 yen
B. 200,000 yen
C. 2,500,000 yen
D. 18,000,000 yen
E. 25,000,000 yen

2011-8-8-10

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessments.

The table below shows the distance of each planet from the Sun, to the nearest million kilometers.

Planet	Distance from Sun (in millions of kilometers)
Mercury	58
Venus	108
Earth	150
Mars	228
Jupiter	778
Saturn	1,427
Uranus	2,871
Neptune	4,497
Pluto	5,914

One astronomical unit (AU) is defined as the distance between Earth and the Sun (1 AU $\approx$ 150 million kilometers). To the nearest whole number, how many astronomical units is Pluto from the Sun?

A. 6,064 AU
B. 5,914 AU
C. 5,764 AU
D. 150 AU
E. 39 AU

2011-8-12-11

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessments.

How many 200-milliliter servings can be poured from a pitcher that contains 2 liters of juice?

A. 20
B. 15
C. 10
D. 5
E. 1

2007-8-7-10

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessments.

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1 mile = 5,280 feet

How many feet are in 15 miles?

A. 352
B. 35,200
C. 79,200
D. 84,480
E. 89,760

2003-8-7-1

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

A car odometer registered 41,256.9 miles when a highway sign warned of a detour 1,200 feet ahead. What will the odometer read when the car reaches the detour? (5, 280 feet = 1 mile)

A. 42,456.9
B. 41,279.9
C. 41,261.3
D. 41,259.2
E. 41,257.1

1996-8-12-7

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

How many hours are equal to 150 minutes?

A. 1 ½
B. 2 ¼
C. 2 1/3
D. 2 ½
E. 2 5/6

1990-8-7-1
1990-12-7-1

Source: National Assessment of Educational Progress, 1990, Grade 8 and Grade 12 Mathematics Assessments.

Which of the following containers has the greatest liquid capacity?
(1 gallon = 4 quarts = 8 pints = 128 ounces)

A. A 64-ounce orange juice container
B. A 16-pint water jug
C. A 5-quart punch bowl
D. A 2-quart cola bottle
E. A 1-gallon milk bottle

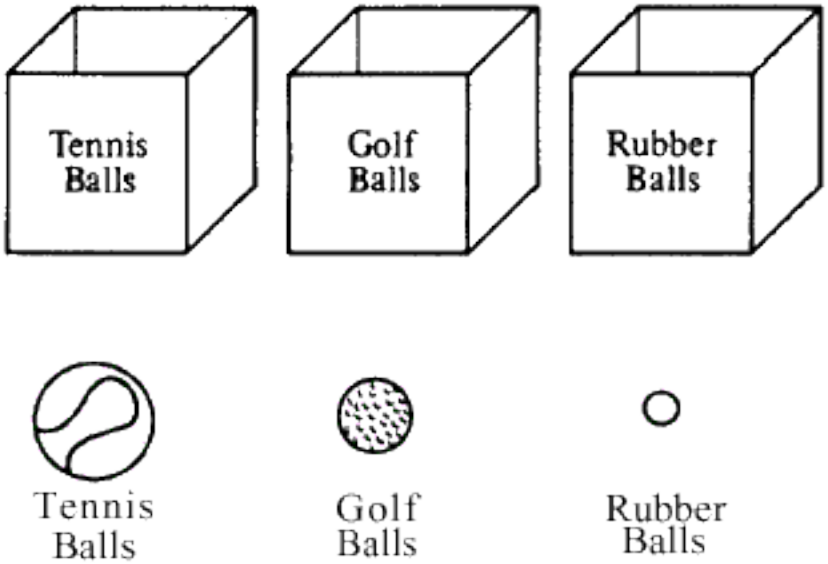
2009-12-2-6

Source: National Assessment of Educational Progress, 2009, Grade 12 Mathematics Assessment.

5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.



Linda had three large boxes all the same size and three different kinds of balls as shown above. If she fills each box with the kind of balls shown, which box will have the fewest balls in it?

A. The box with the tennis balls
B. The box with the golf balls
C. The box with the rubber balls
D. You can't tell.

1990-4-7-7

Source: National Assessment of Educational Progress, 1990, Grade 4 Mathematics Assessment.

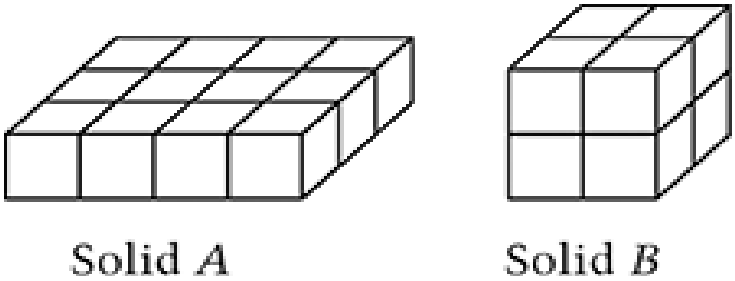
If a measurement of a rectangular box is given as 48 cubic inches, then the measurement represents the

A. distance around the top of the box
B. length of an edge of the box
C. surface area of the box
D. volume of the box

1990-8-7-9
1990-12-7-9

Source: National Assessment of Educational Progress, 1990, Grade 8 and Grade 12 Mathematics Assessments.

5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

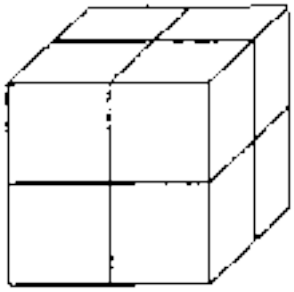


How many more small cubes were used to make Solid A than Solid B ?

A. 2
B. 4
C. 6
D. 7

2011-4-8-9

Source: National Assessment of Educational Progress, 2011, Grade 4 Mathematics Assessment.



In this figure, how many small cubes were put together to form the large cube?

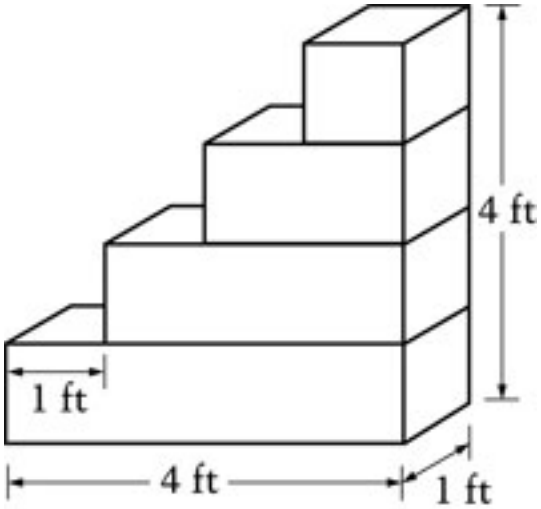
A. 7
B. 8
C. 12
D. 24

1996-4-9-6

Source: National Assessment of Educational Progress, 1996, Grade 4 Mathematics Assessment.

5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.



Sierra built the block tower with 1-foot cubes. How many cubes did she use?

A. 4
B. 6
C. 8
D. 10

2007-4-11-18

Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.

Mr. Elkins plans to buy a refrigerator. He can choose from five different refrigerators whose interior dimensions, in inches, are given below. Which refrigerator has the greatest capacity (volume)?

A. 42 x 34 x 30
B. 42 x 30 x 32
C. 42 x 28 x 32
D. 40 x 34 x 30
E. 40 x 30 x 28

2007-8-11-12

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

It takes 64 identical cubes to <u>half</u> fill a rectangular box. If each cube has a volume of 8 cubic centimeters, what is the volume of the box in cubic centimeters?

A. 1,024
B. 512
C. 128
D. 16
E. 8

1992-12-7-5

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.