

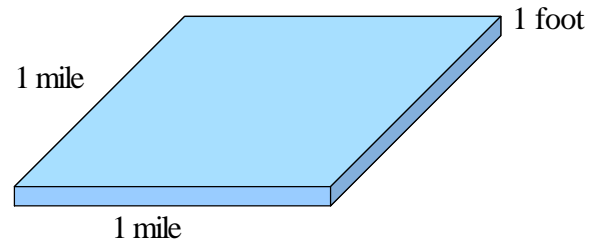
200711140844 Gallons in a 1 foot deep square mile (ANSWER)

A parcel of perfectly flat land is in the shape of a square. Each side is exactly equal to 1.000 mile.

Water covers the land exactly 1.000 foot deep. How many gallons are in this rectangle of water?

Answer accurately to 4 significant figures.

Note: 1 gallon = 231.0 cubic inches.



Solution:

This is in the shape of a rectangular solid.

Since we know gallons in cubic inches we need to determine the volume of the rectangular solid in cubic inches.

First convert 1 mile into inches:

$$1 \text{ mi} = [(1 \text{ mi})/(1)] * [(5280 \text{ ft})/(1 \text{ mi})] * [(12 \text{ in})/(1 \text{ ft})]$$
$$1 \text{ mi} = 63,360 \text{ in}$$

Determine the volume of the rectangular solid of water

$$\text{volume} = (\text{length})(\text{width})(\text{height})$$
$$\text{volume} = (63,360 \text{ in}) * (63,360 \text{ in}) * (12 \text{ in})$$
$$\text{volume} = 48,173,875,200 \text{ in}^3$$

Next convert the volume in inches cubed into gallons

$$\text{volume} = (48,173,875,200 \text{ in}^3) * [(1 \text{ gallon})/(231 \text{ in}^3)]$$
$$\text{volume} = 208,544,914.285,714,285,714,285,714,285,71 \text{ gallons}$$

Round to 4 significant digits and use scientific notation.

$$\text{Volume} = 2.085 \times 10^8 \text{ gallons}$$