

Answer on Question #57504 – Math – Geometry

Question

1. Counting 38 cu. ft. of coal to a ton, how many tons will a coal bin 19 ft long, 6 ft wide and 9 ft deep contain when level full?

Solution

The volume of the bin is $V = 19 \cdot 6 \cdot 9 = 1026 \text{ ft}^3$. Then the bin contains $1026/38 = 27$ tons.

Answer: 27 tons.

Question

2. A tank open at the top, is made of sheet of iron 1 inch thick. The internal dimensions of the tank are 4 ft. 8 in. long, 3 ft. 6 in. wide, 4 ft. 4 in. deep. Find:
a) the weight of the tank when empty;
b) when full of salt water.
(salt water weighs = $s_w = 64 \text{ lb/ft}^3$, iron is 7.2 times as heavy as saltwater).

Solution

Because $1 \text{ ft} = 12 \text{ in}$, $length = l = 4 \text{ ft } 8 \text{ in} = (4 \cdot 12 + 8) = 56 \text{ in}$; $width = w = (3 \cdot 12 + 6) = 42 \text{ in}$; $depth = d = (4 \cdot 12 + 4) = 52 \text{ in}$;

$$iron \text{ weights} = i = 7.2 \cdot 64 \frac{lb}{ft^3} = 460.8 \frac{lb}{ft^3}.$$

The volume of tank is $V_t = 2ld + 2wd + lw + 4d + 2w + 2l + 4 = 2 * 56 * 52 + 2 * 42 * 52 + 56 * 42 + 4 * 52 + 2 * 42 + 2 * 56 + 4 = 12952 \text{ in}^3$.

The weight of the tank when it is empty is $w_T = V_t \cdot i = 12952 \cdot \frac{460.8}{1728} = 3453.8667 \text{ lb}$.

The volume of water is $V_w = l * w * d = 56 * 42 * 52 = 122304 \text{ in}^3$.

The weight of salt water is: $w_{SW} = V_w s_w = 122304 \cdot \frac{64}{1728} = 4529.7778 \text{ lb}$.

The full weight is $W_W = w_T + w_{SW} = 7983.6445 \text{ lb}$.

Answer: 3453.8667 lb; 7983.6445 lb.

Question

3. The edges of trunk are 3 ft, 4 ft and 6 ft. A second trunk is twice as long, the other edges are 4 ft by 4 ft. How do their volumes differ?

Solution

The volume of first trunk is $V_1 = l_1 \cdot w_1 \cdot h_1 = 3 \cdot 4 \cdot 6 = 72 \text{ ft}^3$.

The volume of second trunk is $V_2 = l_2 \cdot w_2 \cdot h_2 = 6 \cdot 4 \cdot 4 = 96 \text{ ft}^3$.

The difference is $V_2 - V_1 = 96 - 72 = 24 \text{ ft}^3$.

Answer: the volume of second trunk is 24 ft^3 more than second.

Question

4. A solid concrete porch consists of three steps and a landing. The steps have a tread of 11 in., a rise of 7 in., and length of 7 ft. The landing is 6 ft by 7 ft. How much material was used in its construction?

Solution

The volume of three steps is $V_p = 7 \cdot 7 \cdot 11 \cdot (1 + 2 + 3) = 3234 \text{ in}^3$.

I don't know the height of landing. Let it be h (unit of measurement – ft), $1 \text{ ft} = 12 \text{ in}$.

Then the volume of landing is $V_l = 6 \cdot 7 \cdot h = 42h \text{ ft}^3 = 42 \cdot 12^3 h \text{ in}^3 = 72576h \text{ in}^3$.

Total volume is $V = V_l + V_p = (72576h + 3234) \text{ in}^3$.

Answer: $(72576h + 3234) \text{ in}^3$.