

**2020A1****(2D GEOMETRY, 3D GEOMETRY)**

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**Level 1:**

*Volume \* Weight per cubic yard = Total Weight*

$$300\text{yd}^3 * 4,050 \text{ lb}/\text{yd}^3 = \text{Total Weight (lb)}$$

$$\text{yd}^3 * \text{lb}/\text{yd}^3 = \text{Total Weight (lb)}$$

$$300 * 4,050 \text{ lb} = 1,215,000 \text{ lb}$$

**Level 2:**

*Height \* Area = Volume*

$$\text{Height} = 4 \text{ ft}$$

Area of regular octagon =  $2(1 + \sqrt{2})x^2$  where x is the length of one side

$$\text{Volume} = 300 \text{ yd}^3$$

Converting height to yards:

$$\text{Height} = 4 \text{ ft} = 4/3 \text{ yd}$$

Plugging variables into volume equation:

$$\frac{4}{3} \text{ yd} * 2(1 + \sqrt{2})x^2 = 300 \text{ yd}^3$$

Solving for x:

$$2(1 + \sqrt{2})x^2 = 225 \text{ yd}^2$$

$$(1 + \sqrt{2})x^2 = 112.5 \text{ yd}^2$$

$$x^2 = 46.60 \text{ yd}^2$$

$$x = 6.83 \text{ yd} = 20.48 \text{ ft}$$

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*See below for a photo of One Energy pouring a foundation – the dimensions of the foundation in the question were simplified for calculation purposes. In reality, it is a 16-sided shape with a tapered top.*

