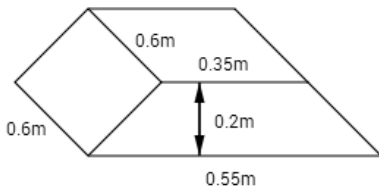


1

Dimensions of crate:  
55cm long, 60cm wide, 102cm high

In this case I am assuming that the sculpture cannot be disassembled.

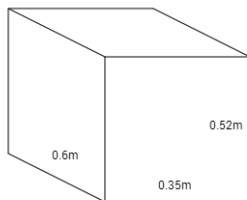


Part A: base shape- trapezoidal prism  
length 0.55m, top length 0.35m, width 0.6m, height 0.2m

Volume of stone in part A:

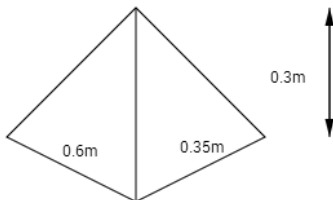
$$= \left( \frac{0.35 + 0.55}{2} \right) \times 0.2 \times 0.6$$

$$= \frac{0.9}{2} \times 0.2 \times 0.6 = 0.45 \times 0.2 \times 0.6 = 0.054m^3$$



Part B: shape – cuboid

$$\text{Volume} = 0.6 \times 0.2 \times 0.6 = 0.1092m^3$$



Part C: shape – pyramid

Height=0.3m Base area = 0.35x0.6=0.21m<sup>2</sup>

Volume of pyramid

$$= \frac{1}{3} \times 0.21 \times 0.3 = 0.021m^3$$

$$\text{Total volume of sculpture} = 0.054 + 0.1092 + 0.021 = 0.1842m^3$$

4

2

$$\text{Length of fence} = (1.15 + 1.2) \times 2 = 4.7m$$

$$\text{Area of paving} = 1.15 \times 1.2 - 0.6 \times 0.55 = 1.05m^2 \text{ because the base does not sit on the paving.}$$

3

Calculating the minimum volume of stone needed.

Smallest cuboid to cover trapezoidal prism: Volume = 0.55x0.2x0.6 = 0.066m<sup>3</sup>

Smallest cuboid to cover cuboid: Volume = 0.6x0.35x0.52 = 0.1092m<sup>3</sup>

Smallest cuboid to cover pyramid: Volume = 0.35x0.6x0.3 = 0.063m<sup>3</sup>

Total minimum volume of stone for sculpture = 0.066 + 0.1092 + 0.063 = 0.2382m<sup>3</sup> of stone

Note; 0.2382 - 0.1842 = 0.054m<sup>3</sup> is amount of space wasted.

5

However as stone blocks from the local quarry come in cuboid blocks the minimum volume of stone needs to be established by carving each geometrical shape from 3 different cuboid blocks. Because of this the total stone needed to construct this sculpture is 0.2382m<sup>3</sup> and 0.054m<sup>3</sup> of this stone is wasted.

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