

Rectangle: $L=80$ $h=40$ $W=60$ $\frac{240}{80}$

$$= 60 \times 40 \times 80 \times \frac{240}{80}$$

$$= 240 \times 80$$

$$= 192000 \text{ mm}^3$$

upper triangular prism: $L=50$ $h=46.53$ $W=60.63$

$$= \frac{50 \times 46.53 \times 60.63}{2}$$

$$= 141520.995$$

$$= 70760 \text{ mm}^3$$

Invisible triangular prism: $L=63.99$ $W=15.63$ $H=34.89$

$$= \frac{63.99 \times 15.63 \times 34.89}{2}$$

$$= 34695.711$$

$$= 17447.85 \text{ mm}^3$$

Invisible upper rectangle: $h=12.52$ $L=50.84$ $W=33.74$

$$= 12.52 \times 50.84 \times 33.74$$

$$= 21476 \text{ mm}^3$$

2 Invisible side rectangle: $W=5$ $L=41$ $H=11$

$$= 2(5 \times 11 \times 41)$$

$$= 2(2255 \text{ mm}^3)$$

$$= 4510 \text{ mm}^3$$

Main invisible rectangle: $L=69.09$ $W=52.89$ $H=22.48$

$$= 69.09 \times 52.89 \times 22.48$$

$$= 82145.74 \text{ mm}^3$$

flag poles

$$\begin{aligned}\text{pole 1} &= h=121.55 \quad D=3.81 \\ &= (2 \div (3.81)^2) \times 121.55 \\ &= (1.9)^2 \times 121.55 \\ &= 3.63 \times 121.55 \\ &= 441.23 \text{ m}^3\end{aligned}$$

pole 1 first

$$\begin{aligned}\text{triangular prism} &= h=8 \quad W=31 \quad V=30.83 \\ &= \frac{8 \times 31 \times 30.83}{2} \\ &= \frac{7645.84}{2} \\ &= 3822.92 \text{ m}^3\end{aligned}$$

$$\begin{aligned}\text{pole 2} &= h=103.94 \quad D=4.81 \\ &= 3.14 \times 2.4^2 \times 103.94 \\ &= 16 \times 103.94 \\ &= 1879.9\end{aligned}$$

pole 2 first

$$h=25 \quad h=6 \quad W=26.9$$

Triangular prism

$$\frac{25 \times 6 \times 26.9}{2}$$
$$= \frac{40.35}{2}$$
$$= 2017.5 \text{ mm}^3$$

$$\text{pole 3} = h = 40.36 \quad p = 1.58$$
$$= (2 \div (1.58)^2) \times 40.36$$
$$= (1.27)^2 \times 40.36$$
$$= 1.61 \times 40.36$$
$$= 65.097 \text{ mm}^3$$

pole 3 flag: L = 14.36 W = 18 H = 0.6

$$\frac{14.36 \times 18 \times 0.6}{2}$$
$$= \frac{155.08}{2}$$

$$= 77.54 \text{ mm}^3$$

Ledge

Little ledge: h = 9.1 D = 2.31

$$= 12 \div (2.3)^2 \times 9.1$$

$$= 12 \div (1.15)^2 \times 9.1$$

$$= 12(1.32 \times 4.1)$$

$$12(12.03 \text{ mm}^3)$$

$$= 144.36 \text{ mm}^3$$

Long edge = H = 41 D = 2.1

$$\Rightarrow 2 \div (2.1^2) \times 41$$

$$\Rightarrow 2(1.09)^2 \times 41$$

$$\Rightarrow 2(1.199 \times 41)$$

$$\Rightarrow 2(49.16 \text{ mm}^3)$$

$$= 98.32 \text{ mm}^3$$

wedge triangle front: L = 36.61 W = 18 h = 10.76

$$= \frac{36.61 \times 18 \times 10.76}{2}$$

$$= \frac{7103.8 \text{ mm}^3}{2}$$

$$= 3551.9 \text{ mm}^3$$

Surface Area

Outside Rectangle

Main rectangle =

$$\text{ant } A = 2(40 \times 65) + 2(34 \times 15.17) +$$

Outside sides (10 x 42) =

$$= (2600) - (257.89 +$$

$$420) =$$

$$2(1922.11)$$

$$= 3844.22 \text{ mm}^2$$

$$\begin{aligned} \text{part B} &= (80 \times 60) - (63 \times 15.17) \\ \text{Outside bottom} &= 4800 - 955.71 \\ &= 3844.29 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{part C} \\ \text{mini back} &= (15 \times 14.45) + (15.13 \times 60.9) \\ \text{triangle} &+ (60.9 \times 14.45) = \\ &(216.75) + (921.417) \\ &+ (860) = 2018 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{part D} \\ \text{front} &= (60 \times 40) = 240 \text{ mm}^2 \\ \text{outside} &= \end{aligned}$$

Ledge:

$$\begin{aligned} \text{part A front ledge} &= (60 \times 19) - (14 \times 53) \\ &= 1140 - 742 \\ &= 398 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{part B middle ledge} &= (60 \times 41) - (40 \times 53) \\ &= 2460 - 2120 \\ &= 360 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{part C back ledge} &= (4 \times 60) - (4 \times 53) \\ &= 240 - 212 \\ &= 28 \text{ mm}^2 \end{aligned}$$

Inside rectangle

$$\begin{aligned} \text{front: } & 60 \times 19.66 \\ & = 1179.6 \text{ mm}^2 \\ \text{Main level: } & 60 \times 59.29 = \\ & 3557.4 \text{ mm}^2 \end{aligned}$$

Upper triangle
Inside

$$\begin{aligned} \text{front: } & 60 \times 35 = 2100 \text{ mm}^2 \\ \text{side: } & (34 \times 44.96) = \\ & 2(1528.64) = \\ & 3057.28 \text{ mm}^2 \\ \text{back: } & 50 \times 11.91 = \\ & 595.5 \text{ mm}^2 \end{aligned}$$

Outside upper
triangle

$$\begin{aligned} \text{top ledge: } & (60 \times 45) - (50 \times 33) \\ & = 2700 - 1650 \\ & = 1050 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sides} &= (34 \times 44.96) + 2(16.96 \times 10) \\ &= 1528.64 + 2(169.6) \\ &= 1528.64 + 339.2 \end{aligned}$$

$$\begin{aligned} &= 1867.84 \text{ mm}^2 \\ \text{back} &= 60 \times 51.65 \\ &= 3099 \text{ mm}^2 \end{aligned}$$

flap poles

$$\text{pole 1: } h = 121.55 \quad D = 3.81$$

$$\begin{aligned} &2(3.14 \times 1.905 \times 121.55) + \\ &2(3.14 \times (1.905)^2) \\ &= 2(727.07) + 2(11.395) \\ &= 1454.14 + 22.79 \\ &= 1476.93 \text{ mm}^2 \end{aligned}$$

$$2: \quad h = 103.94 \quad D = 4.81$$

$$\begin{aligned} \text{pole 2} &= 2(3.14 \times 2.405 \times 103.94) \\ &+ 2(3.14 \times (2.405)^2) \\ &= 2(784.92) + 2(18.16) \\ &= (1569.84) + (36.32) \\ &= 1606.16 \text{ mm}^2 \end{aligned}$$

$$\text{pole 3: } h = 10.36 \quad D = 1.58$$

$$\begin{aligned}
& 2(2.14 \times 0.79 \times 20.56) \\
& + 2(3.14(0.79)^2) \\
& = 2(100.11) + 2(1.959) \\
& = 200.22 + 3.92 \\
& = 204.14 \text{ mm}^2
\end{aligned}$$

Flags

pole 1
flag:

$$\text{bottom: } 32.06 \times 30.16 =$$

$$966 \text{ mm}^2$$

$$\text{sides: } 29.28 \times 8 =$$

$$234.24 \text{ mm}^2$$

$$\text{front: } 29.78 \times 31.1 =$$

$$926.158 \text{ mm}^2$$

$$\text{back: } 31.11 \times 18.51$$

$$575.84 \text{ mm}^2$$

$$= 2546.73$$

pole 2 flag:

$$\text{bottom: } 25 \times 26.9 \text{ back: } 25 \times 9.76$$

$$= 672.5 \text{ mm}^2$$

$$= 244.75 \text{ mm}^2$$

$$\text{sides: } 26.9 \times 6 =$$

small edge = $\pi = 7.1$ N.C. > 1
Supporters)

$$\begin{aligned} & \text{Pillars } 2(3.14 \times 1.15 \times 9.1) \\ 12 \times & \left(+ 2(3.14 \times (1.15)^2) \right) \\ & = 2(32.46) + 2(4.152) \\ & = 2(65.72 + 8.3) \\ & = 848.24 \text{ mm}^2 \end{aligned}$$

upper
front
wedge
triangle

$$\begin{aligned} \text{top/bottom} &= 36.51 \times 21.08 \\ &= 767.8 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{side 1} &= 12.37 \times 24.53 \\ &= 303.43 \text{ mm}^2 \end{aligned}$$

$$\text{side 2: } 11.05 \times 36.66 = 1338.96$$

$$= 405.09 \text{ mm}^2 =$$

$$\begin{aligned} \text{side 3: } &= 10.18 \times 26.3 \\ &= 267.73 \text{ mm}^2 \end{aligned}$$

Total

Volume

Main structure

$$V = 192000 + 70760 \\ = 262760 \text{ mm}^3$$

$$262760 -$$

$$17447 =$$

$$245313 - 21476$$

$$= 223837 - 4510$$

$$= 219327 - 82145.74$$

$$= 137181.26 \text{ mm}^3$$

Volume

$$8309.1$$

$$+ 137181.26$$

$$+ 3794.58$$

$$= 149274.94$$

Flag and poles

$$441.23 +$$

$$+ 3622.92$$

$$+ 1879.9$$

$$\begin{aligned}
 &+ 2017.5 \\
 &+ 65.09 \\
 &+ 77.54 \\
 &= 8304.1 \text{ mm}^3
 \end{aligned}$$

Ledges ^{+ wedge} _{+ triangle}

$$\begin{aligned}
 &144.36 \\
 &+ 916.32 \\
 &+ 3551.9 \\
 &= 3794.58 \text{ mm}^2
 \end{aligned}$$

Total
Surface
Area

Total main Rectangles

$$\begin{aligned}
 &3844.22 \\
 &+ 3849.29 \\
 &= 7693.51
 \end{aligned}$$

Surface

Surface

Area

15469.5
 + 11793.78
 + 3287.23
 + 4637.43
 + 2806.14

= 37994.08 mm²

+ 2018
 + 240
 + 398
 + 360
 + 28
 + 1179.6
 + 3557.4
 = 15469.5 mm²

main upper triangle

2100
 + 3057.28
 + 595.5
 + 1050
 + 1892
 + 3099

= 11793.78 mm²

Poles

$$\begin{aligned} & 1476.93 \\ & + 1606.16 \\ & + 204.14 \text{ mm}^2 \\ & = 3287.23 \text{ mm}^2 \end{aligned}$$

Flag

$$\begin{aligned} & 2546.73 \\ & + 1554.15 \\ & + 536.55 \\ & = 4637.43 \text{ mm}^2 \end{aligned}$$

Ledge + wedge
+ trapez

578.94

+ 888.24

+ 1338.96

= 2806.14 mm³

Final Ratio

SA = 37994.08 mm²

V = 149279.94 mm³

$$\frac{37994.08 \text{ mm}^2}{149279.94 \text{ mm}^3} = 0.255 \text{ mm}^2 \cdot \text{mm}^{-3}$$

$$37994.08 \div 149279.94 = 0.255 \text{ mm}^2$$

$$149279.94 \div 270000 =$$

$$= 3.428 \text{ m}^3 /$$

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