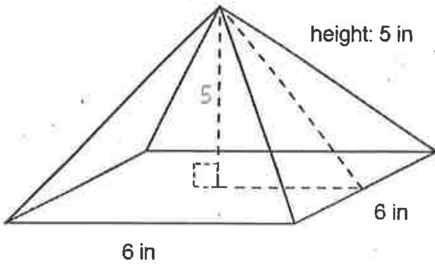
volume original | shape increased by factor of 3 → volume enlarged $= 3^3$

$2 \longrightarrow\ = 2^3$

155. Find the volume to the nearest cubic inch.



$V = \frac{1}{3}(\text{Base Area})h$

$V = \frac{1}{3}(6 \times 6)(5)$

$V = \boxed{60 \text{ in}^3}$

156. If the pyramid to the left is enlarged by a factor of 2, what will the new volume be?

$V = \frac{1}{3}(\text{Base Area})h$

$V = \frac{1}{3}(12 \times 12)(10)$

$V = \boxed{480 \text{ in}^3}$

Can you make a rule (formula) for this?

Multiply final answer by 8 if enlarged by 2. ★2^3★

157. A square-based pyramid has a volume of 250 cubic yards and a height of 30 feet. Find the side length of the square base to the nearest foot.

$\frac{250\ \cancel{yd^3}}{1} \times \frac{3\text{ ft}}{1\ \cancel{yd}} \times \frac{3\text{ ft}}{1\ \cancel{yd}} \times \frac{3\text{ ft}}{1\ \cancel{yd}} = 6750 \text{ ft}^3$

$V = \frac{1}{3} \times s^2 \times h$

$\frac{6750 \text{ ft}^3}{30\text{ ft}} = \frac{\frac{1}{3} \times s^2 \times 30\text{ ft}}{30\text{ ft}}$

$\frac{3}{1} \times (225 \text{ ft}^2) = (\frac{1}{3} \times s^2)\frac{3}{1}$

$\sqrt{675 \text{ ft}^2} = \sqrt{s^2} \rightarrow s = \boxed{26 \text{ ft}}$

158. A sphere has a volume of 3000 m^3. Find the radius of the sphere to the nearest metre.

$V = \frac{4}{3}\pi r^3$

$\frac{3}{4}(3000 \text{ m}^3) = (\frac{4}{3} \times \pi \times r^3)\frac{3}{4}$

$\frac{2250 \text{ m}^3}{\pi} = \frac{\pi \times r^3}{\pi}$

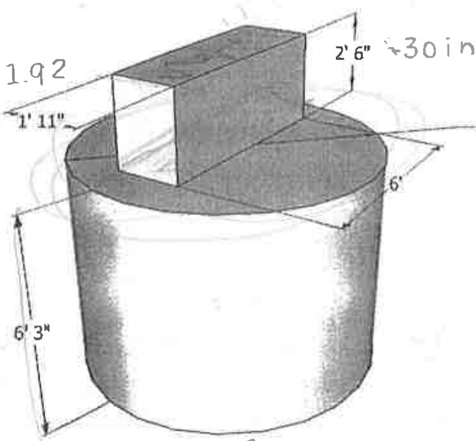
$\sqrt[3]{716.1972439 \text{ m}^3} = \sqrt[3]{r^3}$

$r = 8.947002289$

$\boxed{r = 9\text{ m}}$

159. Charlie needs to paint the composite shape below. Before he purchases paint he needs to calculate the surface area to the nearest square foot. The bottom does not need to be painted. How many square feet does he need to paint?

$SA = \cancel{2\pi r^2} + 2\pi r h$



$2'6" = 30 \text{ in}$

$d = 8\frac{8}{12} = 8.67$

$r = 4.33$

1.92

$h = 6\frac{3}{12} = 6.25$

circle $\pi r^2 = \pi(4.33)^2$

wrap $2\pi r h = 2\pi(4.33)(6.25)$

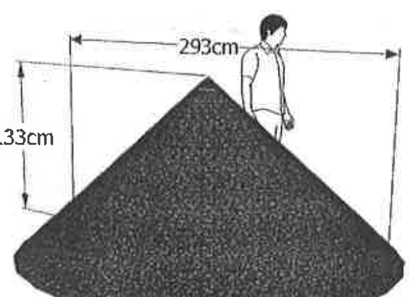
2 ends $2(2.5)(1.92)$

2 sides $2(2.5)(6)$

$= 268.54$

$= 269 \text{ ft}^2$

160. Find the volume of gravel in the pile to the nearest cubic yard.



$V = \frac{1}{3}(\pi r^2)h$

$V = \frac{1}{3}(\pi \times 146.5^2)(133)$

$V = 2989203.681 \text{ cm}^3$

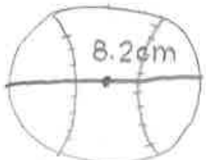
$\frac{2989203.681 \text{ cm}^3}{1} \times \frac{1\text{ ft}}{30.48\text{ cm}} \times \frac{1\text{ ft}}{30.48\text{ cm}} \times \frac{1\text{ ft}}{30.48\text{ cm}}$

$\frac{105.5627317\ \cancel{ft^3}}{1} \times \frac{1\text{ yd}}{3\ \cancel{ft}} \times \frac{1\text{ yd}}{3\ \cancel{ft}} \times \frac{1\text{ yd}}{3\ \cancel{ft}}$

$V = 3.909730805 \text{ yd}^3$ ✓

$V = \boxed{4 \text{ yd}^3}$

161. Find a spherical object and measure the diameter. Calculate the surface area of your object. Draw a neat and detailed diagram showing your object and measurement. Record all measurements to the nearest tenth of a centimetre. Round your answer to the nearest square centimetre.



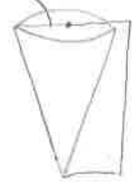
$SA = 4\pi r^2$

$SA = 4\pi(4.1)^2$

$SA = \boxed{211\,cm^2}$

162. Find a conical object. Make appropriate measurements to the nearest tenth of a centimetre. Draw a neat and detailed diagram showing your object and measurements. Calculate the volume of the cone to the nearest cubic centimetre.

r: 5.6cm



11.4cm

$V = \frac{1}{3}(\pi r^2)h$

$V = \frac{1}{3}(\pi(5.6^2))(11.4)$

$V = \boxed{374\,cm^3}$

163. One gallon of paint covers approximately 350 sq-ft. How many decorative balls can you paint with a 5-gallon bucket of paint if each ball has a radius of 12 cm.

Why 897??

$SA = 4\pi r^2 \rightarrow SA = 4\pi(12)^2$

$SA = 1809.557368\,cm^2 \times \frac{1\,ft}{30.48\,cm} \times \frac{1\,ft}{30.48\,cm}$

$SA = 1.947791347\,ft^2$

$350 \times 5 = 1750\,ft^2$

$1750\,ft^2 \div 1.947791347\,ft^2 = 898.4535269$

$\boxed{898\text{ balls}}$ X $\rightarrow$ $\boxed{897\text{ balls}}$ ☆

164. A cylindrical can holds 3 tennis balls. The diameter of a tennis ball is 2 ½ inches. Calculate the volume of air in the can surrounding the 3 balls. The can is designed to hold exactly three tennis balls in terms of height and diameter. (Nearest tenth of a cubic inch).

CAN: $V = (\text{Base Area})h \rightarrow V = \pi(1.25)^2(7.5)$

$V = 36.81553891\,in^3$

BALLS: $V = \frac{4}{3}\pi r^3 \rightarrow V = \frac{4}{3}\pi(1.25)^3$

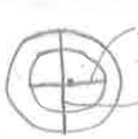
$V = (8.181230869\,in^3)3$

$V = 24.54369261\,in^3$

$36.81553891\,in^3 - 24.54369261\,in^3 =$

$\boxed{12.3\,in^3}$

165. A section of concrete pipe has an inside diameter of 2.2 m and an outside diameter of 2.5 m. Find the cross-sectional area of exposed concrete for one end of the pipe.



$A_o = \pi r^2 \rightarrow A_o = \pi(1.25)^2 \rightarrow A_o = 4.908738521\,m^2$

$A_i = \pi r^2 \rightarrow A_i = \pi(1.1)^2 \rightarrow A_i = 3.801327111\,m^2$

$A_o - A_i = \boxed{1.10741141\,m^2}$

166. A sphere has a surface area of 260π square feet. Find the exact radius of the sphere.

$SA = 4\pi r^2 \rightarrow \frac{260\pi}{4} = \frac{4\pi r^2}{4} = \frac{65\pi}{\pi} = \frac{\pi r^2}{\pi}$

$\sqrt{65} = \sqrt{r^2} \rightarrow r = \boxed{\sqrt{65}\,ft}$ X

167. A sphere has a surface area of 289π square inches. Find the radius of the sphere to the nearest tenth of an inch.

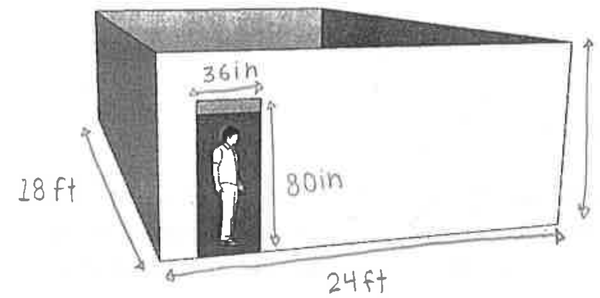
✓

$SA = 4\pi r^2 \rightarrow \frac{289\pi\,in^2}{4\pi} = \frac{4\pi r^2}{4\pi}$

$\sqrt{72.25\,in^2} = \sqrt{r^2}$

$r = \boxed{8.5\,in}$ X

168. Below is a model of a standard room at a storage facility. The interior walls are to be painted. The room measures 18' by 24' and the wall height is 8'. The door is standard height and width (36" by 80"). Find the interior surface area of the walls.



2× [24 by 8] = 384ft²

2× [18 by 8] = 288 ft²

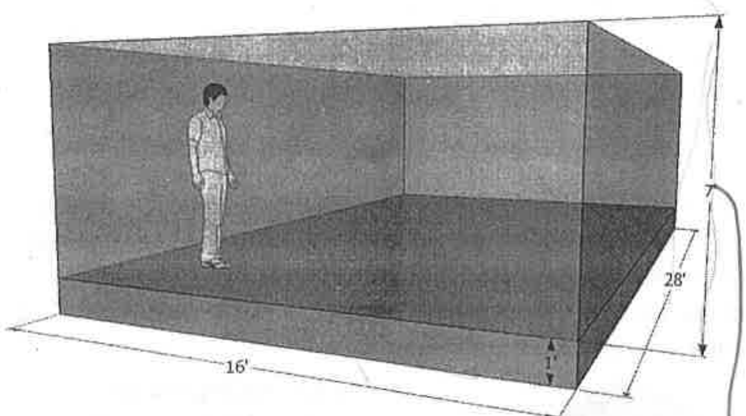
Subtractions:

1× [36in by 80in] $= \frac{2880in^2}{1} \times \frac{1ft}{12in} \times \frac{1ft}{12in}$

= 20ft²

SA: 384ft² + 288 ft² − 20 ft² = $\boxed{652\ ft^2}$

Check out the huge aquarium! Mr. J wants to swim the fishes so he is building this aquarium in his home.



7 starts at top of concrete!

169. Calculate the volume of concrete in the floor of the aquarium in cubic feet.

V = l × w × h

V = 16ft × 28ft × 1ft

V = $\boxed{448\ ft^3}$

170. Calculate the mass of the floor if concrete has a mass of 2400 kg per cubic metre.

$\frac{448ft^3}{1} \times \frac{0.3048m}{1ft} \times \frac{0.3048m}{1ft} \times \frac{0.3048m}{1ft}$

12.68594727 m³ × 2400kg

$\boxed{30446.27346kg}$

171. Calculate the area of acrylic (aquarium wall) required to build this structure.

2 × [16 by 7] = ~~192~~ 224 ft²

2 × [28 by 7] = ~~336~~ 392 ft²

A = $\boxed{616\ ft^2}$

172. Sheets of acrylic sell for \$45 /sq ft. If he could actually find sheets this size, what would be the cost (before taxes)?

616 × 45 = $\boxed{\$\ 27\ 720}$

173. How many litres of water does the tank hold? How many gallons?
Note: $1\ cm^3 = 1\ ml, 1000\ ml = 1\ litre, 1\ gallon = 3.785\ litres$

V = l × w × h = V: 16 × 28 × 7 = $\frac{3136ft^3}{1} \times \frac{30.48cm}{1ft} \times \frac{30.48cm}{1ft} \times \frac{30.48cm}{1ft}$

V = 88801630.91 cm³ = $\frac{88801630.91ml}{1} \times \frac{1L}{1000ml} \times \frac{1\ gallon}{3.785L}$

★ Why round? ★

★ 01 on L? ★

V = $\boxed{88801.663091\ L}$ ★ ?? 01? ★

V = $\boxed{23461.46127\ gallons}$

174. A sphere has a volume of $\frac{256\pi}{3}$ cm³. Find the exact radius of the sphere.

$V = \frac{4}{3}\pi r^3$

$\frac{3}{4}\left(\frac{256\pi}{3}\right) = \left(\frac{4}{3}\pi r^3\right)\frac{3}{4}$

$\frac{64\pi}{\pi} = \frac{\pi r^3}{\pi}$

$\sqrt[3]{64} = \sqrt[3]{r^3} \rightarrow \boxed{r = 4\text{cm}}$

175. A square-based pyramid with a height of 10 metres has a volume of 300m³. Find the exact side length of the base.

$V = \frac{1}{3} \times s^2 \times h$

$\frac{3}{1}(300\text{m}^3) = \left(\frac{1}{3} \times s^2 \times 10\text{ m}\right)\frac{3}{1}$

$\frac{900\text{m}^3}{10\text{m}} = \frac{s^2 \times 10\text{m}}{10\text{m}}$

$\sqrt{90\text{m}^2} = \sqrt{s^2}$

$\boxed{s = \sqrt{90}\text{m}}$

$s = \sqrt{9 \times 10} \rightarrow \boxed{3\sqrt{10}\text{m}}$

176. Find the height of a cylinder if it has a volume of 1200 cm³ and a radius of 12 cm. Answer to the nearest tenth of a centimetre.

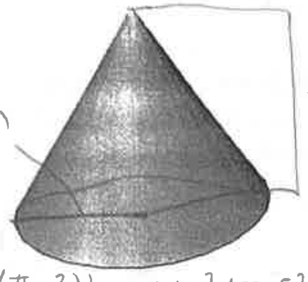
$V = \pi r^2 \times h$

$1200\text{cm}^3 = \pi \times 12^2 \times h$

$\frac{1200\text{cm}^3}{144} = \frac{\pi \times 144 \times h}{144}$

$\frac{8.\overline{333}}{\pi} = \frac{\pi \times h}{\pi} \rightarrow h = \boxed{2.7\text{cm}}$

177. Find the exact volume of the right cone below. It has a height of 10 cm and a radius of 5 cm.



10cm

5 cm

$V = \frac{1}{3}(\pi r^2)h \rightarrow V = \frac{1}{3}(\pi \times 5^2)(10) \rightarrow \frac{1}{3} \times \frac{\pi \times 25 \times 10}{1} = \boxed{\frac{250\pi}{3}}\text{cm}^3$

178. Find the exact volume of a cylinder with the same height and radius as the cone in the previous question.

$V = \pi r^2 \times h$

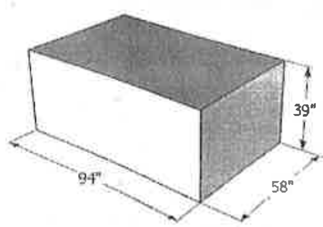
$V = \pi(5)^2 \times 10$

$V = \boxed{250\pi\text{cm}^3}$

179. What is the ratio of volumes for the two figures in the previous two questions?

$\boxed{1:3}$

180. Find the volume of the right prism below. Answer to the nearest cubic inch.

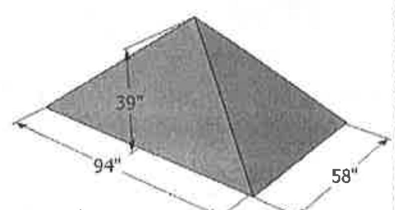


$V = l \times w \times h$

$V = 94" \times 58" \times 39"$

$V = \boxed{212628\text{ in}^3}$

181. Below is a right pyramid with the same base and height as the prism in the previous question. Find the volume to the nearest cubic inch.



$V = \frac{1}{3}(\text{Base Area})h$

$V = \frac{1}{3}(94 \times 58)(39)$

$V = \boxed{70876\text{ in}^3}$

182. What is the ratio of volumes for the two previous figures?

$\boxed{3:1}$ why 1:3??

183. In general, what is the relationship between the volumes of right pyramids and right prisms with the same dimensions?

Right pyramids will have $\frac{1}{3}$ the volume of right prisms $\overline{w}$ the same dimensions.

Answers:

1. 9 ft
2. 45 ft
3. $37\frac{1}{2}$ or 37.5 ft
4. 4 yd
5. 27 inches
6. $45\frac{1}{3}$ yd
7. 96 *in*
8. 33 in
9. 57.6in
10. 3 ft
11. $11\frac{2}{3}\,ft$
12. 168 ft
13. 3520 yd
14. 22176 ft
15. $\frac{75}{88}$ miles
16. 189000 in
17. 10lbs
18. $13\frac{3}{4}$ or 13.75 lbs
19. 64 oz
20. 36 oz
21. 3 tons
22. 96'
23. 128 oz
24. 192"
25. $162.06 for 74'
26. 46 yd , 2 ft
27. 85yd, 1 ft
28. 9 yd, 2 ft, 8 in
29. 11' 10 "
30. 5 yd, 2 ft
31. 2 tons, 1266 lbs and 4 oz
32. 74 ft
33. 24 yd, 2 ft
34. 6' x 7'
35. $199.92
36. 13 yd, 1 ft
37. 192 sq ft
38. $147.84 for 48 rolls
39. $1\frac{149}{1056}$ *miles* (about 1.141 miles)
40. $23\frac{67}{176} \cong 23.4\ miles$
41. 158400"
42. 117"
43. 564"
44. 876"
45. 1536"
46. 48 frames
47. 1267200"
48. 20 miles
49. 116.5 yd
50. $A = lw$
51. 9 sq ft
52. 36 in
53. 1296 sq in
54. Multiply by the conversion factor (12) twice. That is, multiply by 12^2
55. 5 575 680 sq ft
56. Multiply by $(5280)^2$
57. 36 sq in
58. 120"
59. 101788 sq in
60. 79168 sq in
61. 125 cm
62. 3725 cm
63. 8 mm
64. 138 000 mm
65. 15.1 m
66. 32.8 mm
67. 628 mm
68. 2400 cm
69. 125 mm
70. 3450 mm
71. 12357 m
72. 0.2 m
73. 1 365 000 mm
74. 17200 mm
75. 75 000 cm
76. 0.000 03 mm
77. 885 180 000 cm
78. 162 000 000 mm²
79. 2304 mm
80. 1475.4 m
81. 147512 cm
82. 80.5 km
83. 84.0 kg
84. 164.0 yd
85. 182.9 cm
86. 1190.7 g
87. 773.8 miles
88. 137824.7 ft
89. 2126.0 in
90. 2.8 lbs
91. 137795.3 ft
92. 167322.8 in
93. 1180.4 kg
94. 5.53 kg
95. 1.31 kg
96. 3402 g
97. 3.81 m
98. 8.23 m
99. 15.62 yd
100. 3.81 m
101. Try yards →feet→metres
102. Try m→ cm →inches→yards
103. 50.94 cm
104. 82"
105. $66\frac{1}{3} = 66.33$ linear ft.
106. Your answers here.
107. Your answers here.
108. Your answers here.
109. Your answers here.
110. Trundle wheel.
111. Vernier calipers.
112. Micrometer.
113. Inches, cm, mm.
114. Eg. Measuring tape. Cm, inches (and fractions thereof)
115. Eg. Measuring cup. Cups, ounces, ml, l
116. Eg. Volumetric cylinder. ml
117. Eg. 2-pan balance scale. g, kg
118. Eg. Electronic scale. μg, mg, g
119. Diameter, distance.
120. Volume. ml
121. Diameter, distance.
122. One set of claws is for measuring inside diameters such as inside a tube. The other is for measuring outside diameter.
123. 1.97 mm
124. 3.15 cm
125. 3.68 cm
126. 0.40 mm
127. 27 m^2
128. 12 830 sq in
129. 81 268 sq in
130. 19 684 sq in
131. 1810 mm^2
132. 86 cm^2
133. 16 965 sq ft
134. 137 sq ft
135. 333 cm^2
136. 20"
137. Find the surface area of the rectangular prism, add the area of the curved cylindrical surface, subtract the bottom of the prism and the two circles.
138. 41 734 sq in
139. Frank should buy 4 quarts.
140. 739 655 cm^2 (with bottom) 478889 cm^2 (without bottom)
141. 36m^2
142. 7560 Beacon Bits

143. 7560 cm^3
144. 237 583 cubic inches
145. The three dimensions have units such as centimetres. If we multiply $cm \times cm \times cm$ we get cm^3.
146. Bottom (base area) multiplied by the height.
147. Find the volume of the large pyramid and subtract the volume of the small (removed) pyramid.
148. 11.5 m^3
149. 11 058 432 cm^3
150. 4 193 205 cm^3
151. 85 cubic feet
152. 24.4 m^3
153. 7.1 m^3
154. 804 cubic feet
155. 60 cubic inches
156. 480 cubic inches
157. 26 ft
158. 9 m
159. 269 sq ft
160. 4 yd^3
161. Your answer here.
162. Your answer here.
163. 897 balls
164. 12.3 cubic inches
165. 1.1 m^2
166. Radius is $\sqrt{65}$ ft
167. 8.5 in
168. 652 sq ft
169. 448 cubic feet or 12.69 m^3
170. 30 446 kg
171. 616 sq ft
172. $27720
173. 88 800 l, 23 461 gal
174. 4 cm
175. $3\sqrt{10}$ m (approx 9.49 m)
176. 2.7 cm
177. $\frac{250}{3}\pi$ cm^3
178. 250π cm^3
179. $1:3$ or $\frac{1}{3}$
180. 212628 cubic inches
181. 70876 cubic inches
182. $1:3$ or $\frac{1}{3}$
183. Pyramids and cones will have volumes equal to one-third of their corresponding prism.