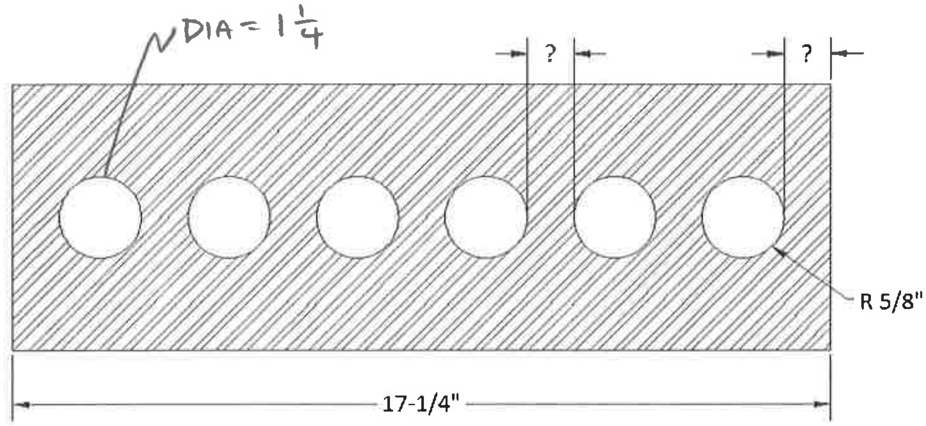
Math 63 Chapter 1 Review

Calculators are allowed but show your steps and $\boxed{\text{box}}$ your final answer.

1. A plate is to have 6 evenly spaced holes. Calculate the gap rounded to the nearest 16th of an inch.



$17\frac{1}{4} - 6(1\frac{1}{4})$

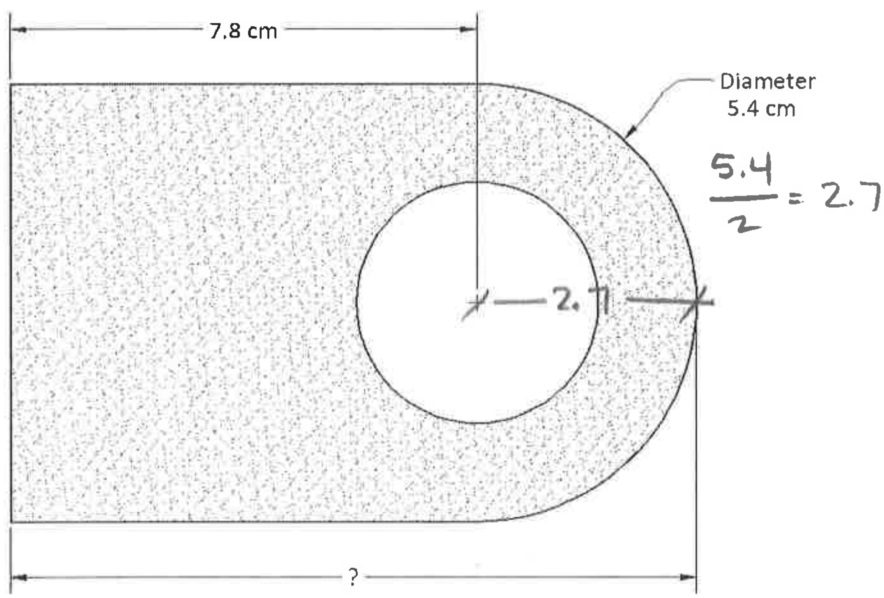
$17\frac{1}{4} - 7\frac{1}{2}$

$16\frac{5}{4} - 7\frac{2}{4} = 9\frac{3}{4}$

$9\frac{3}{4} \div 7 = \frac{39}{4} \times \frac{1}{7} = \frac{39}{28}$

$\frac{39}{28} \approx 1.39286$ $\quad \frac{.39286}{1} \cdot \frac{16}{16} = \frac{6.3}{16}$ $\quad \boxed{1\,\frac{3}{8}''}$

2. Calculate the width of the part below.



$$\begin{array}{r} 7.8 \\ +\,2.7 \\ \hline \end{array}$$

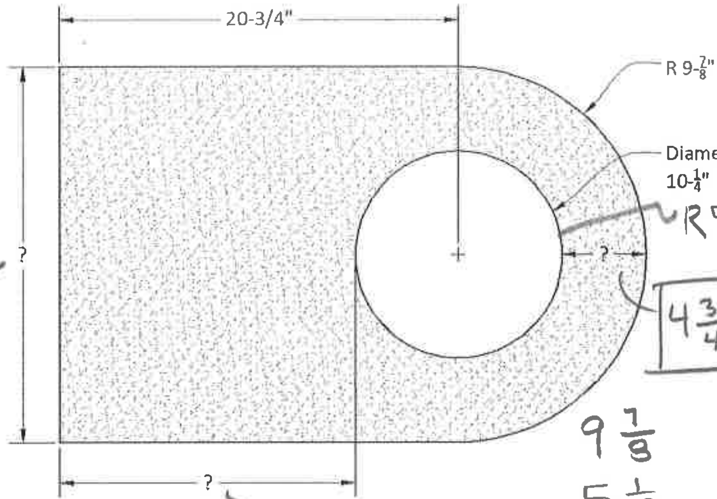
$\boxed{10.5\text{ cm}}$

3. Calculate the dimensions of the part above if it is scaled down by 28%.

$.28 \times 7.8 = 2.184 \qquad 7.8 - 2.184 = \boxed{5.616\text{ cm}}$

$.28 \times 5.4 = 1.512 \qquad 5.4 - 1.512 = \boxed{3.888\text{ cm}}$

4. Calculate the 3 missing dimensions in the part.



$2 \times 9\frac{7}{8}$

$\boxed{19\frac{3}{4}"}$

$R5\frac{1}{8}"$

$\boxed{4\frac{3}{4}"}$

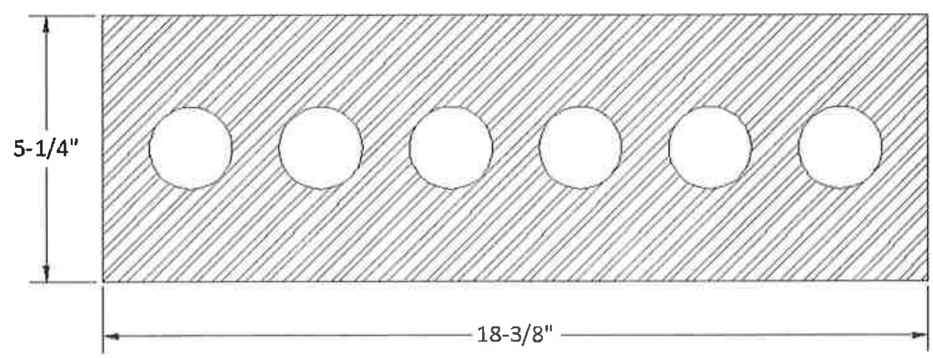
$9\frac{7}{8} - 5\frac{1}{8} = 4\frac{6}{8}$

$20\frac{3}{4} - 5\frac{1}{8} = \boxed{15\frac{5}{8}"}$

5. Calculate the new dimensions for the part if it is scaled up by a multiple of 9.

$5\frac{1}{4} \times 9 = \frac{21}{4} \cdot \frac{9}{1} = \frac{189}{4}$

$\boxed{47\frac{1}{4}"}$



$18\frac{3}{8} \times 9 = \frac{147}{8} \cdot \frac{9}{1} = \frac{1323}{8} = \boxed{165\frac{3}{8}"}$

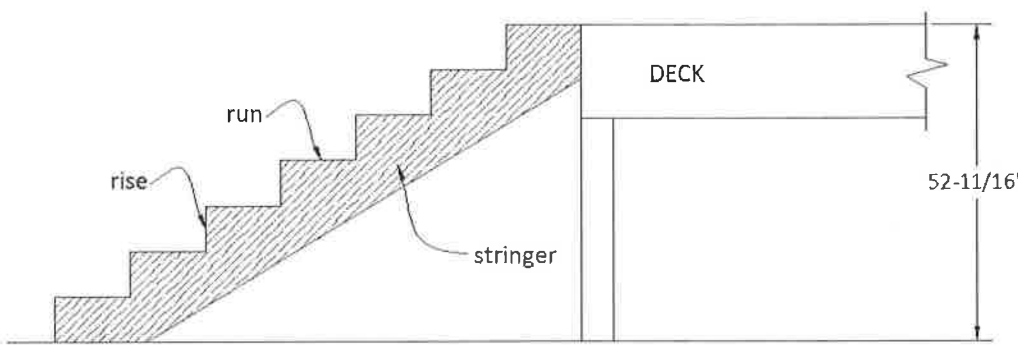
6. Calculate the height of each rise for the stair stringer rounded to the nearest 16th of an inch. Note: all the rises must be the same size to meet building code requirements.

$52\frac{11}{16} \div 7$

$\frac{843}{16} \times \frac{1}{7} = \frac{843}{112}$

≈ 7.5268

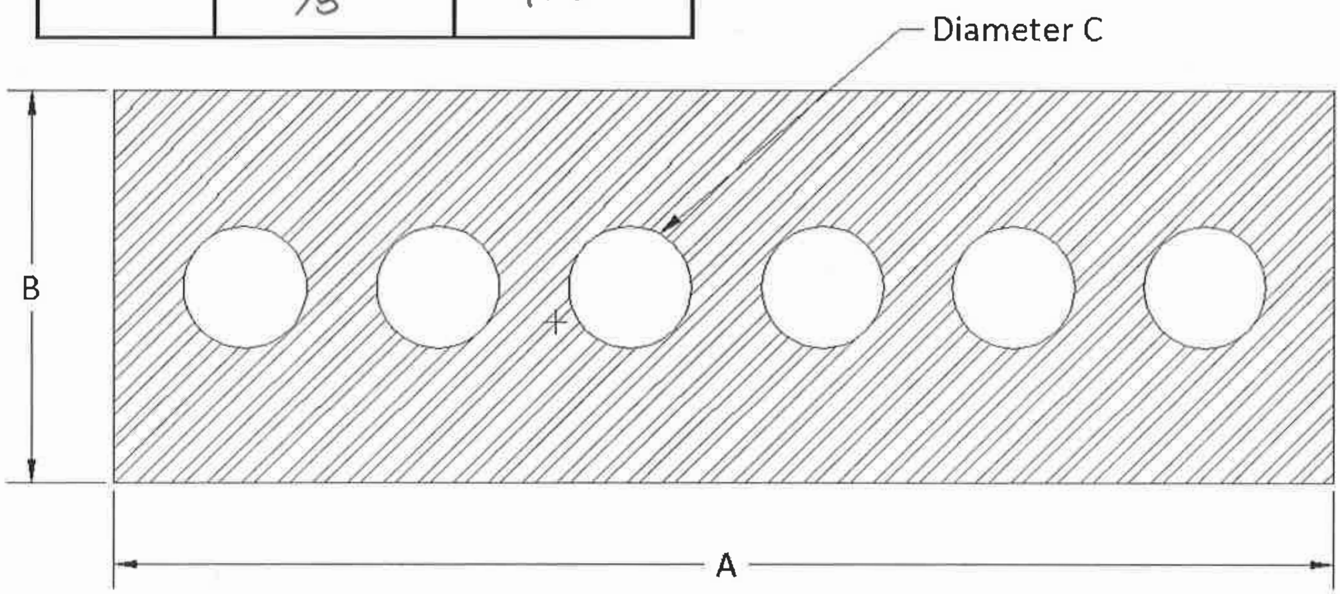
$\frac{.5268}{1} \cdot \frac{16}{16} = \frac{8.4}{16}$



$\boxed{7\frac{1}{2}"}$

7. Measure the dimensions of the part in inches rounded to the nearest 16th and in centimeters rounded to one decimal place.

Dimension	Inches	centimeters
A	$6\frac{3}{8}$"	16.2
B	$2\frac{1}{16}$"	5.2
Diameter C	5/8"	1.6



8. Use a proportion to calculate the height (rise) of the roof rounded to the nearest 16th of an inch.

$$\frac{8}{12} = \frac{?}{\cancel{66}.6875}$$

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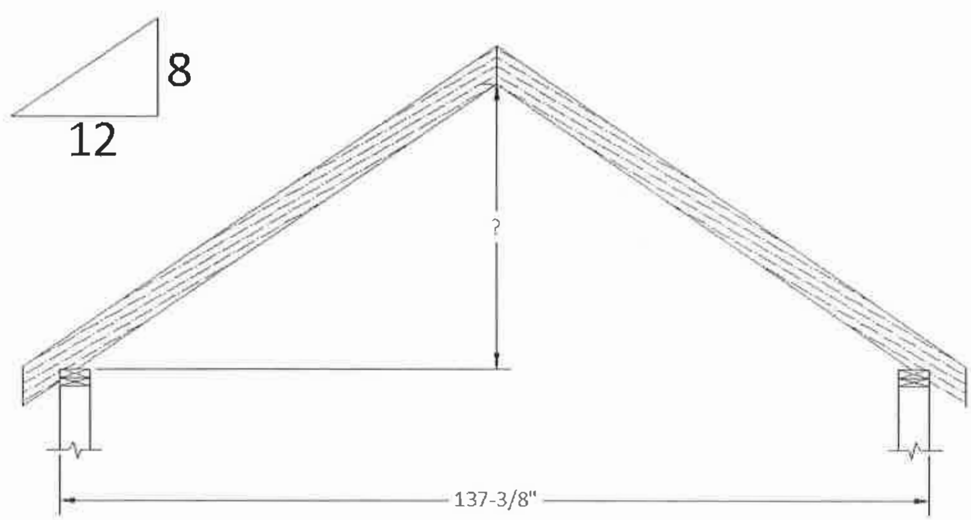
$? = 45.7917$

$$\frac{.7917}{1} \cdot \frac{16}{16} = \frac{12.7}{16}$$

$$\boxed{45\tfrac{13}{16}"}$$



$137\frac{3}{8} \div 2 = \cancel{66}.6875$

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9. Convert an area of 36 square inches (in^2) to square centimeters (cm^2) rounded to 1 decimal place.

$$\frac{36 \, IN^2}{1} \cdot \frac{6.452 \, CM^2}{1 \, IN^2} = \boxed{232.3 \, CM^2}$$

10. A (3 in x 7 in x 43 in) bar of zinc is 903 cubic inches (in^3). Calculate its weight in kilograms if zinc weighs .253 oz/cm^3. Rounded to the nearest kilogram.

$$\frac{903 \, IN^3}{1} \cdot \frac{16.387 \, CM^3}{1 \, IN^3} \cdot \frac{.253 \, OZ}{1 \, CM^3} \cdot \frac{28.35 \, g}{1 \, OZ} \cdot \frac{1 \, kg}{1000 \, g} = \boxed{106 \, kg}$$

11. Convert a volume of 214 cubic feet (ft^3) to cubic meters (m^3) rounded to 1 decimal place.

$$\frac{214 \, ft^3}{1} \cdot \frac{1728 \, IN^3}{1 \, ft^3} \cdot \frac{16.387 \, CM^3}{1 \, IN^3} \cdot \frac{1 \, M^3}{1000000 \, CM^3} = \boxed{6.1 \, M^3}$$

12. The volume of cylindrical footing (V) is $V = \pi r^2 h$.

H = height and r = radius. Find the volume rounded to one decimal place, if h = 13" and r = 7".

$$V = \pi \cdot 7^2 \cdot 13 = 637\pi \approx \boxed{2001.2 \, IN^3}$$

* USING π BUTTON ON THE CALCULATOR

13. The reactance offered by a capacitor in electronics is $X = \frac{1}{2\pi fC}$.

X = reactance measured in ohms, f = frequency measured in cycles per second (hertz), C = capacitor size measured in farads. Find the reactance for a capacitor in a circuit with a frequency of 80 hertz and a capacitor size of .00054 farads, rounded to three decimal places.

$$X = \frac{1}{2\pi \cdot 80 \cdot .00054} = \frac{1}{.2714336} = \boxed{3.684 \text{ OHMS}}$$

14. The formula for speed is $S = 234\left(\frac{H}{W}\right)^{.333}$.

H = horsepower, W = weight in pounds, and S = speed in MPH. Calculate the speed for a car that weighs 1986 pounds with 685 horse power, rounded to the nearest MPH.

$$S = 234\left(\frac{685}{1986}\right)^{.333} = 234(.3449)^{.333} = 234(.70155)$$

$$= \boxed{164 \text{ MPH}}$$

15. The voltage drop in an electrical wire is $V = \frac{2LIR}{1000}$.

AWG	R
16	4.884
14	3.072
12	1.932
10	1.215
8	.764
6	.481
4	.302

V = voltage drop measured in volts, L = length of the wire measured in feet, I = current measured in amps and R = resistance in the wire measured in ohms. Use the table at the right to determine the voltage drop in a 176 foot #14 AWG electrical cord attached to a saw drawing 12 amps of current. Round to one decimal place.

$$V = \frac{2 \cdot 176 \cdot 12 \cdot 3.072}{1000} = \boxed{13.0 \text{ VOLTS}}$$

16. The point load deflection (D) of a beam is $D = \frac{PL^3}{48EI}$.

D = deflection measured in inches, P = weight on the beam measured in pounds, L = length of the beam measured in inches, E = elasticity of the beam measured in pounds per square inch (PSI), and I = moment of inertia of the beam measured in inches^4. Find the deflection of a beam rounded to one decimal place if L = 312, P = 3650,E = 1,900,000, and I = 378.

$$D = \frac{3650 \cdot 312^3}{48 \cdot 1900000 \cdot 378} = \frac{3650 \cdot 30371328}{91200000 \cdot 378} = \frac{1.108E^{11}}{3.447E^{10}}$$

$$\boxed{3.2 \text{ IN}}$$

17. The length of a rafter (R) can be calculated using the formula: $R = \frac{W}{2}\sqrt{S^2 + 1}$.

R = length of the rafter measured in inches, W = width of the building measured in inches, and S = slope of the roof. Find the length of a rafter for a building that is 286" wide and has a slope of 9/12, rounded to the nearest 16th of an inch.

$$R = \frac{286}{2}\sqrt{\left(\frac{9}{12}\right)^2 + 1} = 143\sqrt{.5625 + 1} = 143\sqrt{1.5625}$$

$$= 143 \times 1.25$$

$$= \boxed{178\tfrac{3}{4}"}$$

18. The Exhaust Header Tubing Length (L) is $L = \frac{1900D}{d^2R}$.

L = length measured in inches, D = displacement measured in cubic inches, d = exhaust head diameter measured in inches, and R = revolutions per minute (RPM). Find L, if D = 320 in^3, d = 4 in, and R = 2600 RPM's, rounded to the nearest inch.

$$L = \frac{1900 \cdot 320}{4^2 \cdot 2600} = \frac{608000}{41600} \approx 14.6 = \boxed{15 \text{ IN}}$$