Lesson 10.2.2 Day 1

- **10-73.** See below.
  
a. See diagram below.

\[
\begin{array}{c}
\text{red} \\
\frac{1}{2} \\
\text{blue} \\
\frac{1}{2}
\end{array}
\begin{array}{c}
\text{chicken} \frac{1}{6} \\
\text{pig} \frac{1}{6} \\
\text{cow} \frac{1}{6}
\end{array}
\begin{array}{c}
\text{chicken} \frac{1}{4} \\
\text{pig} \frac{1}{5} \\
\text{cow} \frac{1}{20}
\end{array}
\]

b. \(P(\text{Cow}) = \frac{1}{20} + \frac{1}{6} = \frac{13}{60}\)

c. See diagram below.

\[
\begin{array}{c}
\text{red} \left( \frac{1}{2} \right) \\
\text{blue} \left( \frac{1}{2} \right)
\end{array}
\begin{array}{c|c}
\frac{1}{3} & \frac{1}{3} \\
\frac{1}{2} & \frac{1}{5}
\end{array}
\begin{array}{c|c}
\frac{1}{6} & \frac{1}{6} \\
\frac{1}{4} & \frac{1}{5}
\end{array}
\]

\[P(\text{red given cow}) = \frac{\frac{1}{6}}{\frac{1}{20} + \frac{1}{6}} = \frac{10}{13} \approx 76.9\%\]

\[P(\text{blue if pig}) = \frac{\frac{2}{10}}{\frac{2}{10} + \frac{1}{10}} = \frac{6}{11} \approx 54.5\%\]

- **10-74.** See below.
a. 

\[
\begin{array}{ccc}
\text{R} & \frac{3}{10} & \text{B} \quad \frac{3}{10} & \text{Y} \quad \frac{2}{5} \\
\text{H} & \frac{3}{20} & \frac{3}{20} & \frac{1}{5} \\
\text{T} & \frac{1}{4} & \frac{1}{12} & \frac{1}{6} \\
\text{R} & \frac{1}{2} & \text{B} \quad \frac{1}{6} & \text{Y} \quad \frac{1}{3}
\end{array}
\]

b. The two blue rectangles can be shaded to represent the probability of the sample space. 

\[
P(H \text{ given B}) = \frac{\frac{3}{20}}{\frac{3}{20} + \frac{1}{12}} = \frac{9}{14} \approx 64.3\%
\]

10-78. a: \(x = y\)  
b: \(y = 2x\) or \(x = \frac{1}{2}y\)  
c: \(3y = 5x\)  
d: \(x + y = 180^\circ\)

10-79. a: Yes, because of the Triangle Sum Theorem, \(180^\circ - 64^\circ - 26^\circ = 90^\circ\). 
b: Yes, because \(8^2 + 15^2 = 17^2\).

10-80. a: See diagram at right.  
b: 1.4 ft\(^3\)

10-81. a: See diagram at right. 
b: \(\frac{5}{6} \times \frac{5}{6} = \frac{25}{36}\) 69.4%  
c: \(\frac{5}{6} \times \frac{5}{6} = \frac{25}{36}\) 69.4%  
d: \(\frac{5}{6} (49)\) 128.28 square cm  
e: \(\frac{1}{4} \times \frac{2}{3} = \frac{1}{12}\) \(\frac{1}{12} (360^\circ) = 30^\circ\)

10-82. 540°

10-83. a: Both are \(\frac{\pi}{4}\). Note that a radian measure is a ratio and does not have units. 
b: If \(x\) is the unknown central angle of the circle, then the equation, \(\frac{\frac{x}{360}(2r)}{r} = \frac{2}{3}\), can be solved for \(x\). \(x = 60^\circ\)

10-84. B

10-85. a: \(P(\text{on-campus given Engr}) = \frac{120}{800 + 120} = 13.0\%\)
b: \( P(\text{on-campus}) = 0.6 \)

c: No. The probability of living on campus given that the student is an engineer is much smaller than the probability of living on campus.

10-86. Region A is \( \frac{1}{4} \) of the circle, so it should result \( \frac{1}{4} \times (80) = 20 \) times. Regions B and C have equal weight (which can be confirmed with arc measures), so they should each result \( (80 - 20) \div 2 = 30 \) times.

10-87. a: \( \frac{360^\circ}{9} = 40^\circ \)

b: \( m\overline{AD} = 2(97^\circ) = 194^\circ; \ m \ C = 0.5(1.94) = 97^\circ \)

c: \( m\overline{AB} = 125^\circ \) and the length of \( \overline{AB} = \frac{125^\circ}{360^\circ} (16 \text{ in.}) = 17.5^\prime; \) area = \( \frac{125^\circ}{360^\circ} (64 \text{ in.}) = 69.8 \text{ in.}^2 \)

10-88. Methods vary, a variety of relationships such as Parallel Line Angle Conjectures, the Exterior Angle Theorem, or the Triangle Sum Theorem can be used. \( x = 109^\circ, \ y = 71^\circ, \ z = 99^\circ. \)

10-89. a: \( x = 34 \) \quad b: \( x = \frac{4}{3} \) \quad c: \( x = 5 \) \quad d: \( x = \frac{32}{5} \)

10-90. She is incorrect, which can be tested by substituting both answers into the equation; \( w = 6 \) or 4.

10-91. A