1. (10 pts) A water system must be installed in a field as shown below. If the pipe comes in both 8-foot and 15-foot lengths, and cannot be cut, how many pipes of each length will be required?

2. (3 pts) Use inductive reasoning to 6th, 7th, and 12th terms of the following sequence:

4, 7, 11, 16, 22, ...

6th = 29
7th = 37
12th = 92

3. (3 pts each) Determine the missing numbers in each of the following Fibonacci-type sequences:

A. 1, 4, 5, 9, ___, 28, ___, 37
B. 2, ___, 6, 10, 16, ___, 26
C. 3, ___, 10, ___, 17, 27
4. (8 pts) In the figure, \( m\angle FAB = 30^\circ \), \( m\angle CAB = 66^\circ \), \( m\angle GAD = 23^\circ \), \( \overline{BA} \perp \overline{EA} \), and \( G \) and \( F \) are collinear.

\[ \begin{align*}
\text{23°} & \quad \text{G} \\
\text{60°} & \quad \text{A} \\
\text{30°} & \quad \text{F}
\end{align*} \]

A. What type of angle is \( \angle AFB \)? \( \text{Acute} \)

B. Are \( \angle FAC \) and \( \angle BAG \) supplementary? \( \text{No} \)

C. What is \( m\angle DAE \)?

\[ 180 - (60 + 23) = 97^\circ \]

5. (6 pts) Convert 29.11° to degrees and minutes.

\[ 0.11^\circ \times \frac{60\text{ min}}{1^\circ} = 6.6' \]

\[ 29^\circ 6.6' \]

6. (10 pts) Water is flowing along a stream at the rate of 1200 gallons per minute. What is the rate in liters per second? Round to the nearest hundredth. (Remember there are 4 quarts in a gallon and 1.057 quarts in a liter).

\[ \frac{1200 \text{ gal}}{\text{min}} \times \frac{4 \text{ qts}}{\text{gal}} \times \frac{1.057 \text{ qts}}{\text{l}} = \frac{75.6859}{\text{60 sec}} \]

\[ = 75.69 \text{ l/sec} \]
7. (8 pts) A large rectangular flower planter is 4 ft by 1.5 ft by 9 ft. Potting soil comes in \( \frac{1}{2} \) cubic yard bags. How many bags of potting soil are needed to completely fill the planter? (3 ft = 1 yard)

\[
V = lwh = 4(1.5)(9) = 54 \text{ ft}^3
\]

\[
54 \text{ ft}^3 \times \left(\frac{1 \text{ yd}^3}{27 \text{ ft}^3}\right)^3 = \frac{54}{27} = 2 \text{ yd}^3
\]

\[\text{Bags} = 2 \text{ yd}^3 \times \frac{1 \text{ bag}}{\frac{1}{2} \text{ yd}^3} = 4 \text{ bags}\]

8. (8 pts) Determine the area of the figure shown:

![Diagram of a trapezoid]

\[A = \frac{1}{2} h(b_1 + b_2)\]

\[h = 10^2 - 6^2 = 64\]

\[h = 8\]

\[A = \frac{1}{2} (8)(8+20) = 4(28) = 112 \text{ cm}^2\]

9. (8 pts) What is the surface area of the rectangular prism shown below?

![Diagram of a rectangular prism]

\[
2(9.1)(7.1) + 2(9.1)(13.5) + 2(9.1)(13.5) = 2(9.1)^2 + 4(9.1)(13.5)
\]

\[= 165.62 + 491.4 = 657.62 \text{ in}^2\]

EXTRA CREDIT ON BACK
A cylindrical cooling sleeve for a beverage is filled with liquid for freezing. The sleeve is 1 cm thick; the inner radius of the sleeve is 4 cm, the outer radius of the sleeve is 5 cm, and the height of the sleeve is 10 cm. How much liquid is needed? Round to the nearest hundredth.

\[
V_{\text{sleeve}} = V_{\text{outer}} - V_{\text{inner}}
\]

\[
V = \pi r^2 h
\]

\[
V_{\text{outer}} = \pi (5)^2 (10) = 250 \pi \text{ cm}^3
\]

\[
V_{\text{inner}} = \pi (4)^2 (10) = 160 \pi \text{ cm}^3
\]

\[
V_{\text{sleeve}} = 250 \pi - 160 \pi \text{ cm}^3
\]

\[
= 90 \pi \text{ cm}^3
\]

\[
= 282.74 \text{ cm}^3 \quad (\pi = 3.14)
\]