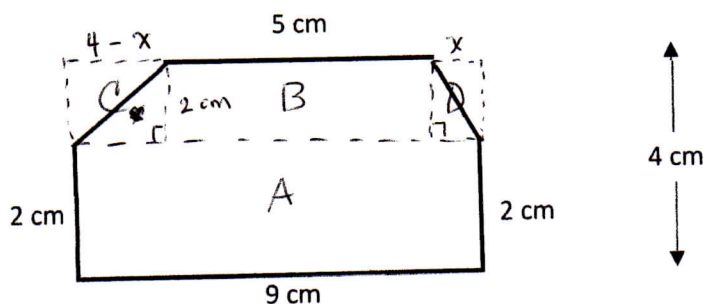


1(8). Consider the shape below right.

Using ONLY the formula for area of rectangles and the moving and additivity principles about area, determine the area of the shape.

Show work so your process is clear.

Segments are congruent, parallel, and perpendicular as they appear.



$$A: 9 \cdot 2 = 18$$

$$B: 5 \cdot 2 = 10$$

$$C + D: \frac{4 \cdot 2 + 2 \cdot 4}{2} = 4$$

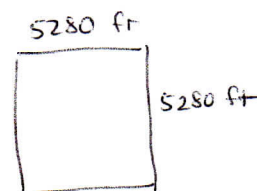
$$\text{Total area} = 32 \text{ cm}^2$$

2. One acre is 43,560 square feet. One mile is 5280 feet.

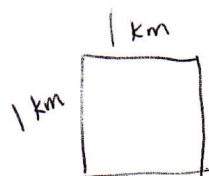
a(6). What is one square mile in acres? Show work.

$$1 \text{ square mile} = 5280^2 = 27,878,400 \text{ ft}^2$$

$$\frac{27,878,400}{43,560} = 640 \text{ acres}$$



b(10). Given 1 inch = 2.54 cm (as lengths), what is one square kilometer in acres? Show work. Round final answer to the nearest whole number.



$$1 \text{ km}^2 \times \frac{1000^2 \text{ m}^2}{1 \text{ km}^2} \times \frac{100^2 \text{ cm}^2}{1 \text{ m}^2} \times \frac{1 \text{ in}^2}{2.54^2 \text{ cm}^2} \times \frac{1 \text{ ft}^2}{12^2 \text{ in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2}$$

$$\approx 247 \text{ acres}$$

3. A garden path surrounds a circular garden as shown in the diagram. (The shaded region is the path)

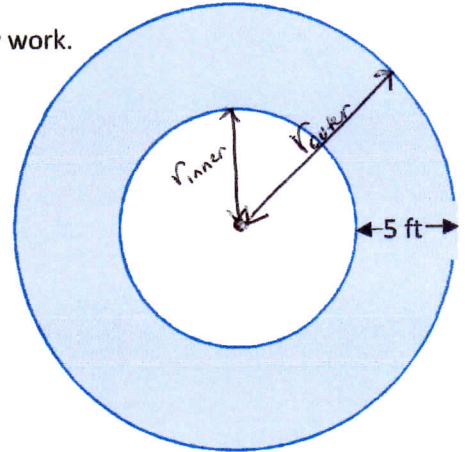
The garden path is 5 feet wide and its outer circumference is 80 feet.

a(10). What is the area of the garden (unshaded portion, inside the path)? Show work. Include appropriate units on your answer.

$$C_{\text{outer}} = 2\pi r_{\text{outer}} \rightarrow 80 = 2\pi r_{\text{outer}} \rightarrow r_{\text{outer}} \approx 12.74'$$

$$r_{\text{inner}} = r_{\text{outer}} - 5 = 7.74'$$

$$A = \pi r^2 \approx 188.1 \text{ ft}^2$$



b(8). What is the area of the garden path? Show work. Include appropriate units on your answer.

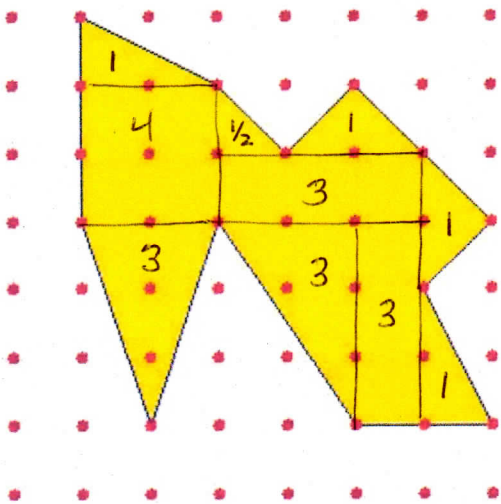
Area large circle — Area inner circle

$$\pi(12.74)^2 - 188.1$$

$$509.6 - 188.1$$

$$321.5 \text{ ft}^2$$

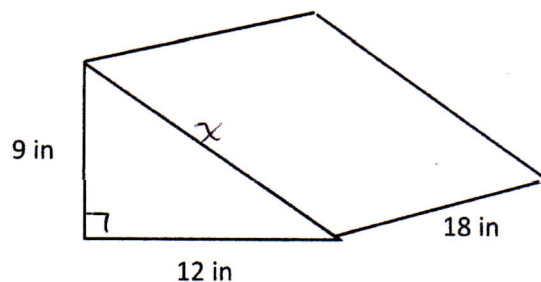
4(8). Find the exact area of the shape below. Annotate the diagram so your way of thinking is clear.



$20\frac{1}{2}$ square units

5. The wedge shown at right is a triangular prism. The triangular face is a right triangle with leg lengths 9 inches and 12 inches as shown.

a(12). Find the surface area of the wedge. Include all faces. Include appropriate units on your final answer. Show work.



$$\text{Triangular faces: } \frac{1}{2} \cdot 9 \cdot 12 = 54 \quad \times \quad 2$$

$$\text{Rectangle faces: } 9 \cdot 18 + 12 \cdot 18 + 15 \cdot 18$$

$$\text{Total SA: } 756 \text{ in}^2$$

$$\begin{aligned} 9^2 + 12^2 &= x^2 \\ \rightarrow x &= 15 \end{aligned}$$

B(8). Find the volume of the wedge. Include appropriate units on your final answer. Show work.

$$V = Ah \quad A = \frac{1}{2} \cdot 9 \cdot 12 = 54$$

$$h = 18$$

$$V = 972 \text{ in}^3$$

C(6). Convert the volume to cubic yards. Show work.

$$972 \text{ in}^3 \times \frac{1 \text{ ft}^3}{12^3 \text{ in}^3} \times \frac{1 \text{ yd}^3}{3^3 \text{ ft}^3} = .0208\bar{3} \text{ yd}^3$$

6(24). Consider the shapes below

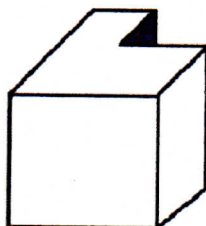
A



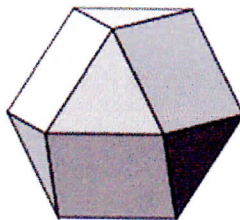
B



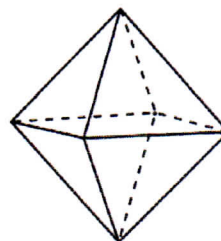
C



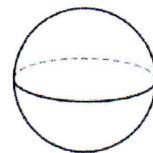
D



E



F



Identify which of the shapes are convex.

A B D E F

Identify which are prisms.

B C

Identify which are polyhedra.

A B C D E

Identify which are Platonic solids (assume segments are congruent as they appear).

E

Please copy and sign: I pledge on my honor that I have not given or received any unauthorized assistance on this exam. [signed]