Math 213 Exam 3A Fall 2019 Name Answers

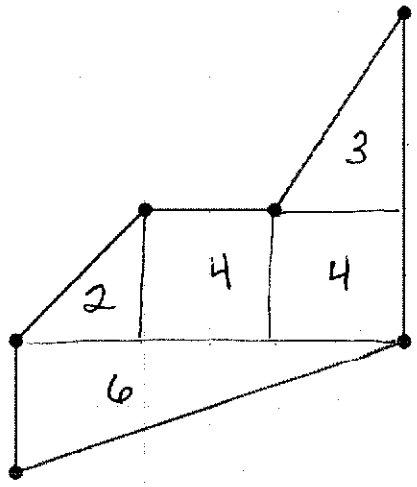
1(12). Convert 7 kilometers per minute to miles per hour using dimensional analysis (remember 2.54cm = 1in). Show set-up clearly. Round your answer to the nearest hundredth, if necessary.

$$\frac{7\text{ km}}{\text{min}} \times \frac{1000\text{ m}}{1\text{ km}} \times \frac{100\text{ cm}}{1\text{ m}} \times \frac{1\text{ in}}{2.54\text{ cm}} \times \frac{1\text{ ft}}{12\text{ in}} \times \frac{1\text{ mile}}{5280\text{ ft}}$$

$$\approx 4.3496 \frac{\text{miles}}{\text{min}} \times \frac{60\text{ min}}{1\text{ hr}} = 260.98 \frac{\text{miles}}{\text{hour}}$$

→

2(6). Find the exact area of the shape below in terms of the square units shown in the grid.
Annotate the diagram so your thinking is clear. Use 3.14 as an approximation for Pi (if needed), and round your answer to the nearest hundredth, if necessary.



19 sq. units

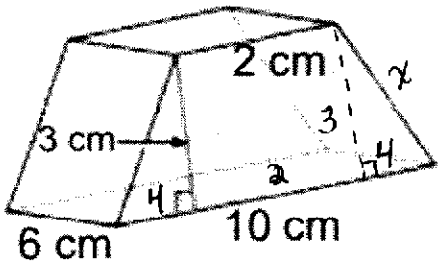
3(6). A pyramid is a polyhedron whose base is a (select the best answer):

(a) Rectangle (b) Triangle
(c) Parallelogram (d) Polygon

A prism is a polyhedron that has two _____, polygonal faces that are parallel to each other (pick the correct term to fill in the blank).

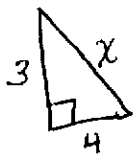
(a) Circlular (b) Congruent
(c) Parallel (d) Regular

4(20). a. Find the surface area of the following trapezoidal prism. The trapezoid is isosceles. Show all work. Round your answer to the nearest hundredth, if necessary. Include appropriate units on your answer.



Trapezoid area $= \frac{1}{2}(2+10)(3) = 18\ cm^2$

Find x:



$\rightarrow 3^2 + 4^2 = x^2 \rightarrow x = 5$

Rectangles: Top: $2 \cdot 6 = 12$

Bottom: $10 \cdot 6 = 60$

Left: $5 \cdot 6 = 30$

Right: $5 \cdot 6 = 30$

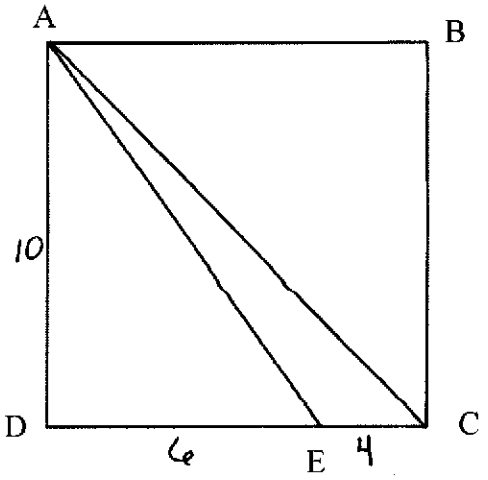
Total: $18 + 18 + 12 + 60 + 30 + 30$

$= 168\ cm^2$

b. Now convert the surface area of the above trapezoidal prism to *square inches* (remember 2.54cm = 1in).

$$168\ cm^2 \times \frac{1\ in^2}{(2.54)^2\ cm^2} \approx 26.04\ in^2$$

5(16). Triangle AEC is within square ABCD at right.
If EC = 4 and the area of triangle AEC is 20,
a. what is the area of square ABCD? Show all work.



ΔAEC has height AD

$20 = \frac{1}{2} \cdot 4 \cdot (AD) \rightarrow AD = 10$

So Square $ABCD = 10^2 = 100$

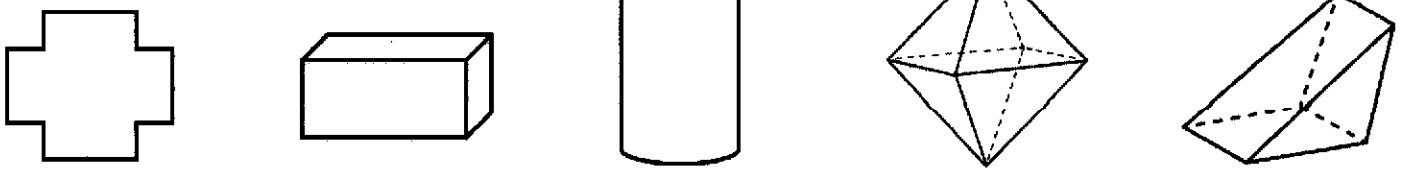
b. what is the area of triangle ADE? Show all work.

$\frac{1}{2} \cdot 6 \cdot 10 = 30$

(or ΔADC is half of the square, so has area 50.
Subtract area ΔAEC: $50 - 20 = 30$)

6(20). Consider the shapes below.

A B C D E



Indicate the shapes by letters that fit each of the following:

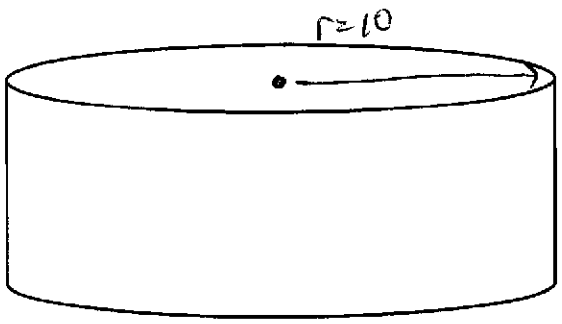
a. Which of the shapes are convex? B, C, D, E

b. Which of the shapes are polyhedra? B, D, E

c. Which of the shapes are polygons? A

d. Which of the shapes are prisms? B, E

7(20). Jared recently installed the circular swimming pool shown at right in his back yard. It is 20 feet in diameter and 4 feet deep.



Show all work for the following:

a. The pool loses heat from the uncovered top circular surface. In order to calculate how much heat will be lost, Jared needs to know the area of this top surface. How many square feet is it? (Round to the nearest whole number if necessary.)

$A = \pi \cdot 10^2 \approx 314 \text{ ft}^2$

b. He decides to install a pool heater so he can use his pool for more of the year. To decide what size pool heater to buy he needs to know the volume of water in the pool. Assuming it is full, how many cubic feet of water are in the pool? (Round to the nearest whole number if necessary.)

$V = \pi r^2 h = \pi \cdot 10^2 \cdot 4 \approx 1256 \text{ ft}^3$

c. Looking for information online he realizes he needs to know the capacity of his pool in gallons in order to select the right size heater. There are 231 cubic inches in a gallon. How many gallons are in his pool? (Round to the nearest whole number if necessary.)

$$1256 \text{ ft}^3 \times \frac{12^3 \text{ in}^3}{1 \text{ ft}^3} \times \frac{1 \text{ gal}}{231 \text{ in}^3} \approx 9396 \text{ gallons.}$$

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