

grade out of 90 pts

MATH 106 – EXAM 3

Name Key

Show all work necessary. **Be sure to include correct units if needed.** Use complete sentences for any explanations. Good luck!

1. (2 points each) Complete the following conversions:

- a. $125 \text{ m} = \underline{12500} \text{ cm}$ $100 \text{ cm} = 1 \text{ m}$
- b. $357.6 \text{ ml} = \underline{0.3576} \text{ liters}$ $1000 \text{ mL} = 1 \text{ L}$
- c. $\underline{126} \text{ inches} = 3.5 \text{ yard}$ $36'' = 1 \text{ yd}$
- d. $\underline{2,400,000} \text{ m}^2 = 2.4 \text{ km}^2$ $(1000 \text{ m})^2 = (1 \text{ km})^2$
 $1000000 \text{ m}^2 = 1 \text{ km}^2$
- e. $9 \text{ yd}^2 = \underline{81} \text{ ft}^2$ $(1 \text{ yd})^2 = (3 \text{ ft})^2$ $1 \text{ yd}^2 = 9 \text{ ft}^2$
- f. $8.9 \text{ mm}^2 = \underline{.089} \text{ cm}^2$ $(10 \text{ mm})^2 = (1 \text{ cm})^2$ $100 \text{ mm}^2 = 1 \text{ cm}^2$
- g. $2.4 \text{ liters} = \underline{2400} \text{ cm}^3$ $1 \text{ cm}^3 = 1 \text{ mL}$, $1000 \text{ mL} = 1 \text{ L}$
- h. $7 \text{ m}^3 = \underline{7000} \text{ dm}^3$ $(10 \text{ dm})^3 = (1 \text{ m})^3$
 $1000 \text{ dm}^3 = 1 \text{ m}^3$

2. (3 points) Suppose I reported the length of a bookshelf to be 2.12 meters. What range would you expect the actual length of the bookshelf to lie in? Explain your answer.

2.12 to nearest hundredth implied
 $2.12 \pm .005 = 2.115 \text{ to } 2.125$

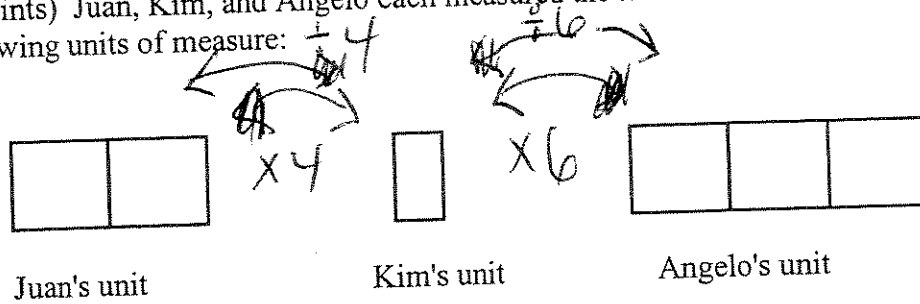
3. (4 points) If you weigh 3 items separately on a scale, which measures weights to the nearest *tenth of a pound*, and then add up these weights, how far from the actual total might the sum be?

Each measure could have possible error = $\pm \frac{1}{2} \cdot \frac{1}{10} = \frac{1}{20} = .05$ pounds.

So the total possible error = $\pm \frac{3}{20}$ pounds.

$= .15$

4. (4 points) Juan, Kim, and Angelo each measured the area of a surface using the following units of measure:



Which of the following could be a set of measurements they came up with?

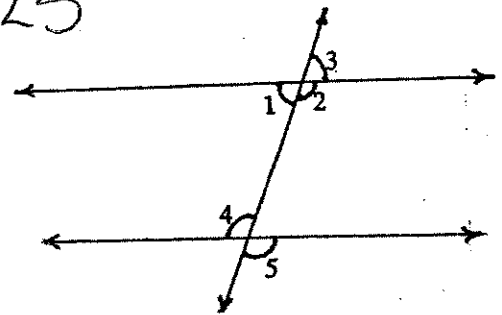
- | | | | |
|-------------------------------------|-----------------|----------------|-------------------|
| a. | Juan: 60 units | Kim: 15 units | Angelo: 90 units |
| <input checked="" type="radio"/> b. | Juan: 60 units | Kim: 240 units | Angelo: 40 units |
| c. | Juan: 120 units | Kim: 30 units | Angelo: 80 units |
| d. | Juan: 120 units | Kim: 480 units | Angelo: 180 units |

5. (6 points) Use the numbered angles in the figure shown to answer each question.

a. name a pair of corresponding angles: $\angle 2$ & $\angle 5$

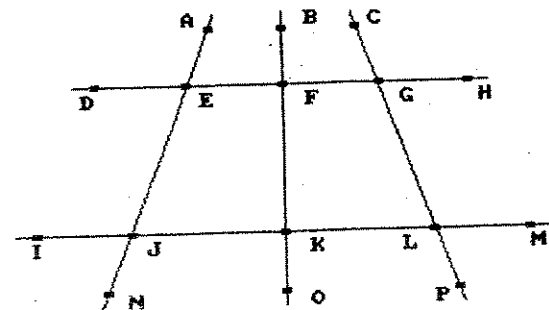
b. name an angle that is vertical to angle 4: $\angle 5$

c. name a pair of alternate interior angles: $\angle 2$ & $\angle 4$

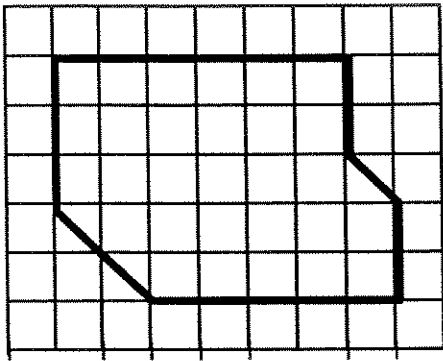


6. (2 points) Choose the true statement:

- | | |
|-------------------------------------|---|
| a. | $m\angle IJN + m\angle EJK = 180^\circ$ |
| <input checked="" type="radio"/> b. | $m\angle IJN = m\angle AEF$ |
| c. | $m\angle FEJ < m\angle DEJ$ |
| d. | $\angle BFG$ and $\angle CGH$ are complementary |



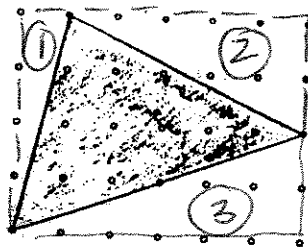
7. (3 points) What is the area of the figure below (use the natural unit)?



- A. 35 square units
- B. 30 square units
- C. $30\frac{1}{2}$ square units
- D. 32 square units
- E. None of A-D

8. (3 points) What is the area of the triangle below? Use the natural unit.

Area = 11 square units

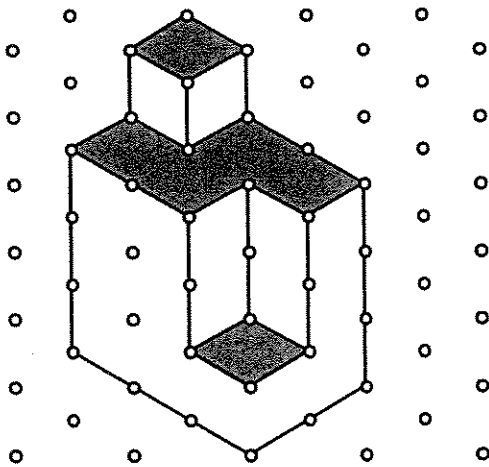


$$4 \times 6 = 24$$

$$\left. \begin{aligned} \Delta 1 &= \frac{1}{2}(1)(4) = 2 \\ \Delta 2 &= \frac{1}{2}(2)(5) = 5 \\ \Delta 3 &= \frac{1}{2}(2)(6) = 6 \end{aligned} \right\} = 13$$

$$24 - 13 = 11$$

9. (6 points) Give the surface area and the volume of the 3D shape shown. Use the natural units.



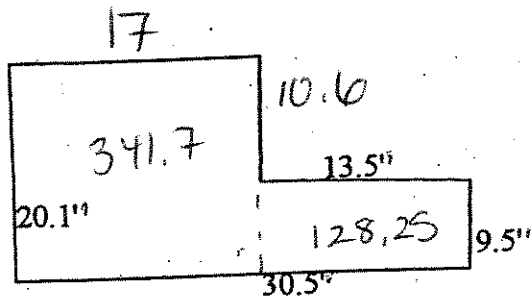
Surface area = 46

Volume = 17

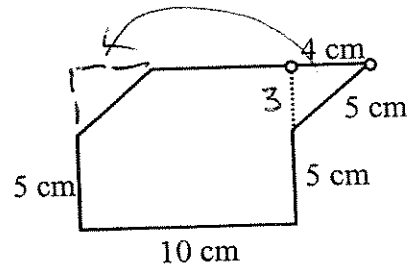
10. (6 points) Find the perimeter and area of the figure shown below: Assume all angles are right angles

Perimeter = 101.2 inches

Area = 469.95 square inches



10. (3 points) What is the area of the hexagonal region to the right, in square centimeters? Assume that lines that look parallel are parallel, and that angles that look like right angles are right angles.

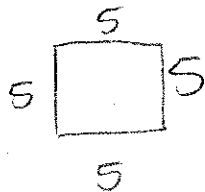


- A. 100 (B. 80) C. 65 D. 40 E. 29

Extra credit

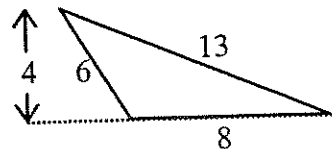
11. (3 points) The perimeter of a square is 20 cm. What is its area, in cm^2 ?

- A. 400 B. 80 (C. 25) D. 20 E. None of A-D



12. (3 points) What is the area of the triangle to the right, in cm^2 ? Given measurements are in cm.

- A. 32 B. 31 C. 24 (D. 16) E. None of A-D

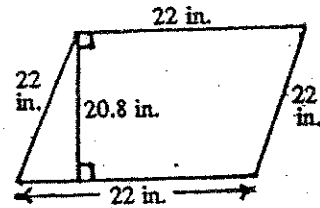
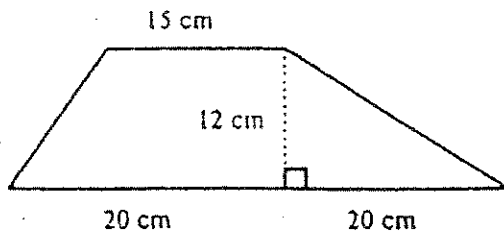


$\frac{1}{2}(4)(8) = 16$

13. (6 points) Find the area of the trapezoid and parallelogram shown below. Round answers to the nearest tenth if necessary.

Area = 330 cm²

Area = 457.6 m²



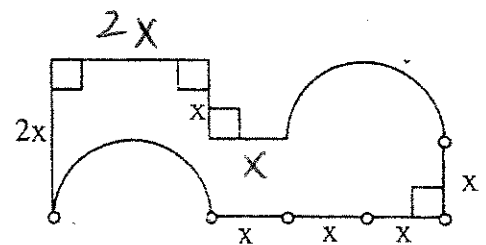
$$A = \frac{1}{2} (40 + 15) (12)$$

$$A = 22 (20.8)$$

14. (4 points) Find the perimeter of the given figure, in terms of x (and π).

Perimeter = $10x + 2\pi x$

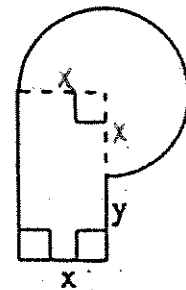
straight parts = $10x$
 + 2 curved parts = $2\pi x$
 (semi circles)
 = 1 circle
 circumference



15. (4 points) Find the area of the shape shown below. Use only the measurements "x" and "y" in your solution.

Area = $x^2 + xy + \frac{3}{4}\pi x^2$

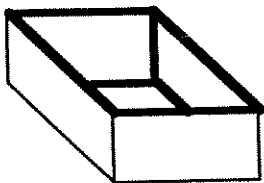
rectangle = $x(x+y)$
 $\frac{3}{4}$ circle = $\frac{3}{4}(\pi \cdot x^2)$



16. (3 points) Cube A has edges that are 3 times as long as the edges of Cube B. The volume of Cube A is 108 cubic cm. What is the volume of Cube B?
 A. 36 cm³ B. 324 cm³ C. 12 cm³ D. 4 cm³ E. None of A-D

$$\begin{aligned} \text{New volume} &= SF^3 (\text{old volume}) \\ 108 &= (3)^3 (B) \\ 108 &= 27 (B) \qquad B = 4 \end{aligned}$$

17. (3 points) What is the volume of the box below?

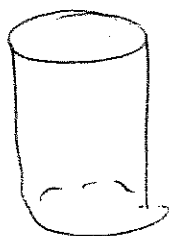


Height of box = 2.5 inches
 Area of bottom of box = 35 sq. inches
 Length of diagonal of bottom = 8.5 inches

- A. 87.5 cubic inches
 B. 743.75 cubic inches
 C. 297.5 cubic inches
 D. 46 cubic inches
 E. 37.5 cubic inches

18. (6 points) A cylinder has a volume of 320π cubic centimeters of water and the diameter of the container is 8 cm. Find the height of the container and the surface area of the container.

Height = $\frac{20 \text{ cm}}{}$
 Surface area = $\frac{192\pi \text{ cm}^2}{}$ ($\approx 603.2 \text{ cm}^2$)



diameter = 8
 radius = 4

$$\begin{aligned} V &= B \cdot h \\ 320\pi &= \pi(4^2) \cdot h \\ 320\pi &= 16\pi \cdot h \\ h &= 20 \end{aligned}$$

$$\begin{aligned} SA &= 2B + \text{rect} \\ &= 2(16\pi) + 8\pi(2) \\ &= 32\pi + 160\pi \\ &= 192\pi \end{aligned}$$

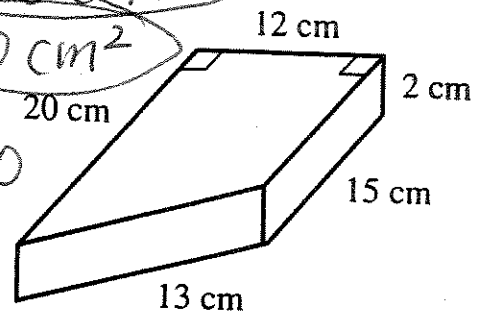
19. (3 points each blank) Find the volume and ^{or} surface area of the figures shown:

a. Volume = $B \cdot h = (210)(2) = 420 \text{ cm}^3$

Surface area = $210 + 210 + 120 = 540 \text{ cm}^2$

B (area of trapezoid top/bottom) = $\frac{1}{2}(20 + 15)(12) = 210$

Area of other faces = $(13)(2) + (15)(2) + (12)(2) + 20(2) = 26 + 30 + 24 + 40 = 120$



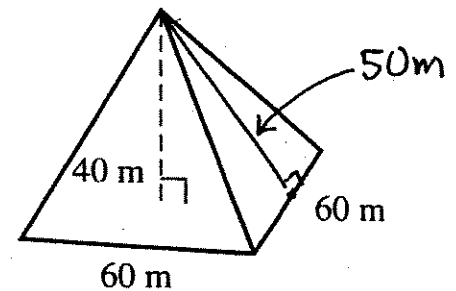
Right trapezoidal prism

b. Volume = 8000 m^3

Surface area = 9600 m^2

$V = \frac{1}{3} B h = \frac{1}{3}(3600)(40)$

$SA = B + 4 \Delta = 3600 + 4 \left[\frac{1}{2} \cdot 60 \cdot 50 \right] = 3600 + 4 [1500]$

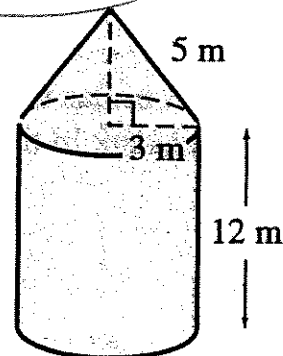


Right square pyramid

c. Volume = $123\pi \approx 386 \text{ m}^3$

$V_{\text{cone}} = \frac{1}{3}(\pi \cdot 3^2)(5) = 15\pi$

$V_{\text{cylinder}} = (\pi \cdot 3^2)12 = 108\pi$



Cylindrical grain silo with conical top