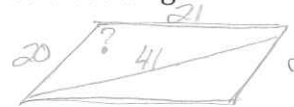


Select the best answer for each question. Show expected work. MAKE A SUPPORTING SKETCH!

1. A parallelogram has a diagonal of 41 cm and side lengths of 20 cm and 21 cm. Is the parallelogram also a rectangle? 1.2 (B) NO

A. Yes B. No *Is it a rt Δ?*

C. Not enough information *20<sup>2</sup> + 21<sup>2</sup> ≠ 41<sup>2</sup>*



*841 ≠ 1681*

2. Find the length of an arc if its arc measures 51° and has a circumference of 400 feet. 2.2 (D) 57 ft

A. 358 ft B. 2824 ft

C. 179 ft D. 57 ft

*Arc length =  $\frac{\text{Degree}}{360} \cdot \text{Circumference}$*

*$S = \frac{\theta}{360} \cdot C$*

*$S = \frac{51}{360} \cdot 400 \approx 56.66$*

3. A map has a scale of 2 cm : 17 km. You measure the distance between two locations with an inches-only ruler and get 6 3/4 inches. Find the actual distance between the two locations if 1 in = 2.54 cm. 3.2 (D) 145.7 km

A. 57.4 km B. 22.6 km

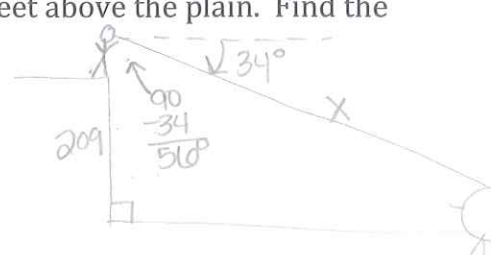
C. 2.0 km D. 145.7 km

*$6.75 \text{ in} \left( \frac{2.54 \text{ cm}}{1 \text{ in}} \right) \left( \frac{17 \text{ km}}{2 \text{ cm}} \right) = 145.7325$*

4. Tarzan is at the edge of a cliff looking over the plain with an elephant standing in a water hole. The angle of depression from Tarzan to the elephant is 34° and the cliff top is 209 feet above the plain. Find the distance from Tarzan to the elephant. 4.2 (B) 374 ft

A. 252 ft B. 374 ft

C. 310 ft D. 117 ft



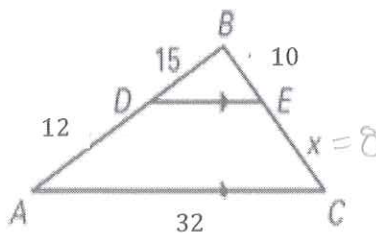
*$\cos 56^\circ = \frac{209}{X}$*

*$X = \frac{1(209)}{\cos 56^\circ} \approx 373.75$*

5. What is the perimeter of triangle ABC? 5.2 (C) 77 ft

A. 8 ft B. 45 ft

C. 77 ft D. 76 ft

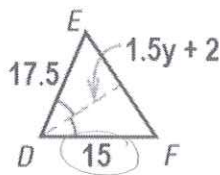
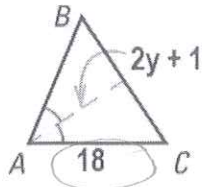


*$\frac{15}{12} = \frac{10}{x}$*

*$\frac{12(10)}{15} = 8$*

*$P = 12 + 15 + 10 + 8 + 32 = 77$*

6.3 Find the value of  $y$ ; given triangle ABC is similar to triangle DEF.



$$\frac{18}{15} = \frac{2y+1}{1.5y+2}$$

$$30y + 15 = 27y + 30$$

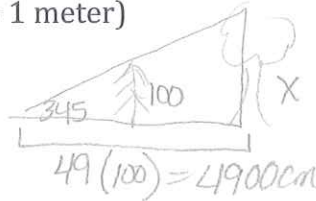
$$-27y \quad -15$$

$$3y = 15 \rightarrow y = 5$$

6.3  $y = 7$

7. A Charlie Brown Christmas tree 1 meter tall has a shadow of 345 cm while a nearby maple tree has a shadow of 49 m. Find the height of the tree. (100 cm = 1 meter)

- A. 17 m      B. 169 m  
 C. 14 m      D. 7 m



$$\frac{100}{345} = \frac{x}{4900}$$

$$x \approx 1420.29 \text{ cm}$$

$$\div 100$$

$$14.2 \text{ m}$$

7.2 (C) 14m

8. Find the perimeter of a 45-45-90 if its hypotenuse is 100 ft.

- A. 300 ft      B. 383 ft  
 C. 341 ft      D. 241 ft



$$x^2 + x^2 = 100^2$$

$$2x^2 = 10,000$$

$$x^2 = 5000$$

$$x \approx 70.71$$

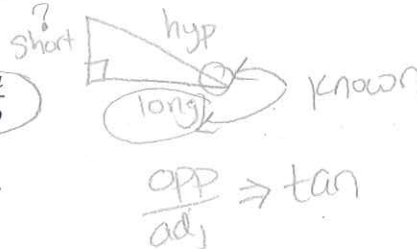
8.2 (D) 241 ft

$$P = 2(70.7) + 100$$

$$P \approx 241.4$$

9. What trigonometric function should be used to find the shortest leg length of a right triangle if the longer leg length and smaller acute angle are known?

- A.  $\cos A^\circ = \frac{a}{b}$   
 B.  $\tan A^\circ = \frac{a}{b}$   
 C.  $\tan A^\circ = \frac{b}{a}$   
 D.  $\sin A^\circ = \frac{a}{b}$



\*side 'a' is opposite of angle A.

9.2 (B) tangent

10. Find the smallest exterior angle of a convex pentagon if the interior angle expressions are  $2x^\circ$ ,  $3x^\circ$ ,  $3x^\circ$ ,  $6x^\circ$ , and  $6x^\circ$ .

- A.  $27^\circ$       B.  $153^\circ$   
 C.  $162^\circ$       D.  $18^\circ$



$$20x = (5-2)180$$

$$20x = 540$$

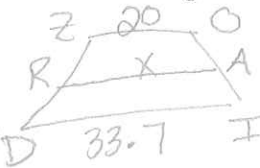
$$x = 27$$

\*Smallest ext paired w/ largest interior  
 Interior =  $6x = 6(27) = 162^\circ$   
 Ext =  $180 - 162 = 18^\circ$

10.2 (D)  $18^\circ$

11. The bases of trapezoid ZOID are  $\overline{ZO}$  and  $\overline{ID}$ , while the midsegment is  $\overline{RA}$ . If  $ZO = 20$  in and  $ID = 33.7$  in, what is the length of  $\overline{RA}$ ?

- A. 6.3 in      B. 47.4 in  
 C. 53.7 in      D. 26.85 in



$$\text{Midsegment} = \frac{1}{2}(b_1 + b_2)$$

$$x = \frac{1}{2}(20 + 33.7)$$

$$\frac{1}{2}(53.7) = 26.85$$

11.2 (D) 26.85 in

12. Name the regular polygon if each exterior angle of the polygon is  $120^\circ$ .

- A. Hexagon                      B. Heptagon  
C. Decagon                      D. Triangle

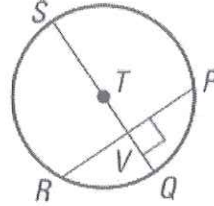
$$\frac{360}{n} = 120^\circ$$

$$n = \frac{360}{120} = 3$$

12.2 (D) Triangle

13. In  $\odot T$ ,  $PV = 3x - 1$  and  $PR = 5x + 4$ . Find  $x$ .

- A. 2.5                      B. 7  
C. 6                      D. 0.4



$$2(3x - 1) = 5x + 4$$

$$6x - 2 = 5x + 4$$

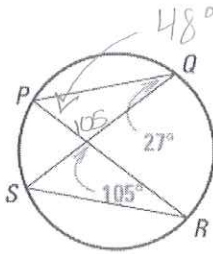
$$-5x \quad +2$$

$$x = 6$$

13.2 (C)  $x=6$

14. What is the measure of  $\angle S$ ?

- A.  $54^\circ$                       B.  $27^\circ$   
C.  $46^\circ$                       D.  $67^\circ$

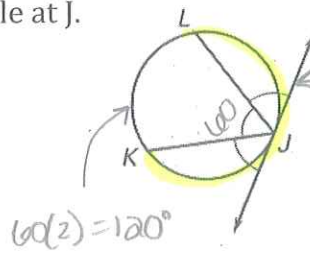


C.  ~~$46^\circ$~~   
 $48^\circ$

14.2 (C)  $48^\circ$

15. In the diagram shown, the line is tangent to the circle at J. Find the measure of  $\widehat{LJK}$ .

- A.  $60^\circ$                       B.  $120^\circ$   
C.  $180^\circ$                       D.  $240^\circ$



15.2 (D)  $240^\circ$

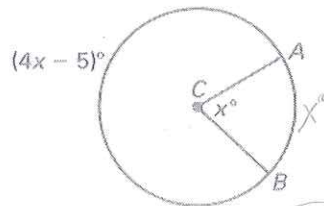
$$\frac{180}{3} = 60^\circ$$

$$\widehat{LJ} + \widehat{JK}$$

$$120 + 120 = 240^\circ$$

16. What is the measure of  $\widehat{AB}$ ?

- A.  $73^\circ$                       B.  $146^\circ$   
C.  $287^\circ$                       D.  $36.5^\circ$



16.2 (A)  $73^\circ$

$$4x - 5 + x = 360$$

$$5x - 5 = 360$$

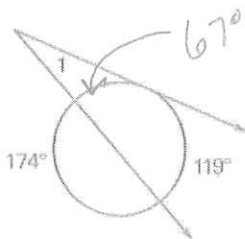
$$5x = 365$$

$$\frac{5x}{5} = \frac{365}{5}$$

$$x = 73^\circ$$

17. Find the measure of angle 1.

- A.  $26^\circ$                       B.  $59.5^\circ$   
C.  $67^\circ$                       D.  $55^\circ$



17.2 (A)  $26^\circ$

$$\frac{360}{2} = 180$$

$$180 - 174 = 6$$

$$180 - 119 = 61$$

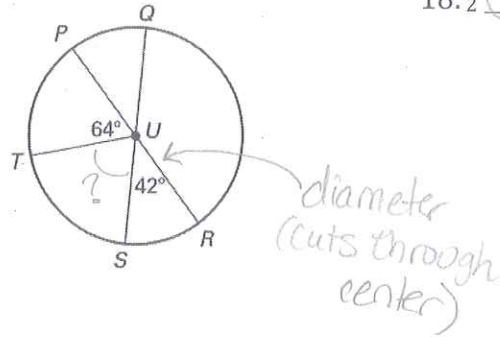
$$6 + 61 = 67$$

$$\frac{119 - 67}{2} = \frac{52}{2} = 26$$

18. In  $\odot U$ , find the measure of  $m\angle TUS$ .

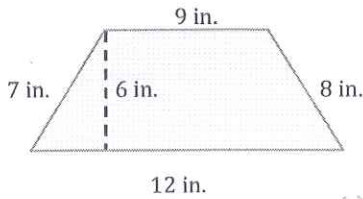
- A.  $138^\circ$       B.  $116^\circ$   
 C.  $106^\circ$       D.  $74^\circ$

$$180 - 64 - 42 = 74$$



18.2 (D)  $74^\circ$

19. Find the surface area of a trapezoidal prism with a base pictured below and a height of 9 inches.



$$\begin{array}{cccc} 7(9) & 9(9) & 8(9) & 12(9) \\ = 63 & = 81 & = 72 & = 108 \end{array}$$

$$\begin{aligned} A(\text{trap}) &= \frac{1}{2} \cdot h (b_1 + b_2) \\ &= \frac{1}{2} (6) (9 + 12) \\ &= 3(21) = 63 \quad (\text{2 bases}) \\ &= 126 \end{aligned}$$

19.2  $450 \text{ in}^2$

$$\begin{array}{l} 126 \text{ Bases} \\ + 63 \\ + 81 \\ + 72 \\ + 108 \\ \hline \end{array} \left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \text{lateral faces}$$

20. The surface area of a sphere is  $100\pi \text{ ft}^2$ . What is its volume?

- A.  $5 \text{ ft}^3$       B.  $223 \text{ ft}^3$   
 C.  $524 \text{ ft}^3$       D. Not enough information

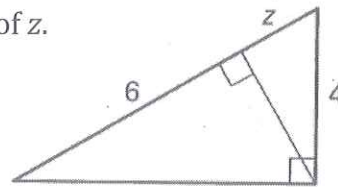
$$\begin{aligned} V &= \frac{4}{3} \cdot \pi r^3 \\ &= \frac{4}{3} \cdot \pi (5)^3 \approx 523.60 \end{aligned}$$

$$\begin{aligned} SA &= 4 \cdot \pi \cdot r^2 \\ \frac{100\pi}{4} &= \frac{4\pi \cdot r^2}{4} \\ 25 &= r^2 \\ r &= \sqrt{25} = 5 \text{ ft} \end{aligned}$$

20.2 (C)  $524 \text{ ft}^3$

21. Use similar right triangles to find the value of  $z$ .

- A. 2      B. 3  
 C. 4      D. 1.5



$$\frac{z}{4} = \frac{4}{6+z}$$

Cross mult.

No neg length

$$\begin{aligned} z(6+z) &= 4(4) \\ z^2 + 6z &= 16 \\ z^2 + 6z - 16 &= 0 \\ (z+8)(z-2) &= 0 \\ z &= -8 \quad z = 2 \end{aligned}$$

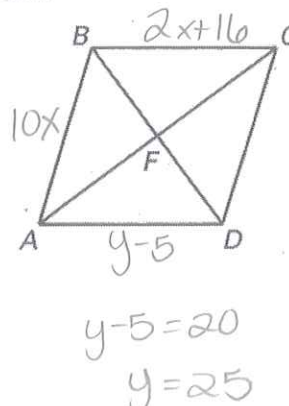
21.2 (A)  $z=2$

22. If the figure is a rhombus with  $AD = y - 5$ ,  $AB = 10x$  and  $BC = 2x + 16$ , find the value of  $y$ .

- A. 2      B. 16  
 C. 24      D. 25

$$\begin{aligned} 10x &= 2x + 16 \\ -2x & \\ 8x &= 16 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} AB &= 10x \\ &= 10(2) \\ AB &= 20 \quad \therefore AD = 20 \end{aligned}$$



$$\begin{aligned} y - 5 &= 20 \\ y &= 25 \end{aligned}$$

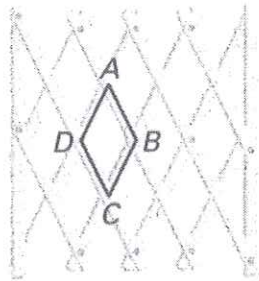
22.2 (D)  $y=25$



23. For the parallelogram shown,  $m\angle A = (x + 32)^\circ$  and  $m\angle B = (3x - 100)^\circ$ , find the measure of the smallest angle.

23.2 (C)  $86^\circ$

- A.  $66^\circ$       B.  $94^\circ$   
 C.  $86^\circ$       D.  $62^\circ$



$$m\angle A = x + 32 = 62 + 32 = 94^\circ$$

$$m\angle B = 3x - 100 = 3(62) - 100 = 186 - 100 = 86^\circ$$

$$A + B = 180$$

$$x + 32 + 3x - 100 = 180$$

$$4x - 68 = 180$$

$$4x = 248$$

$$x = 62$$

24. Find the smaller base of a trapezoid if the height is 5.5 yd, larger base is 22 yd, and its area is 110 yd<sup>2</sup>.

24.2 (B) 18 yd

- A. 16 yd      B. 18 yd  
 C. 9 yd      D. The trapezoid does not exist

$$\text{Area} = \frac{1}{2}(h)(b_1 + b_2)$$

$$110 = \frac{1}{2}(5.5)(b_1 + 22)$$

$$110 = 2.75(b_1 + 22)$$

$$110 = 2.75b_1 + 60.5$$

$$49.5 = 2.75b_1$$

$$b_1 = 18$$

25. The surface area ratio of two similar cones is 4:9. The volume of the larger cone is 60 ft<sup>3</sup>. What is the volume of the smaller cone.

25.2 (B) 17.78 ft<sup>3</sup>

- A. 135 ft<sup>3</sup>      B. 17.8 ft<sup>3</sup>  
 C. 67.5 ft<sup>3</sup>      D. 26.7 ft<sup>3</sup>

$$\text{Area ratio} = \frac{4}{9}$$

$$\text{Length ratio} = \frac{\sqrt{4}}{\sqrt{9}} = \frac{2}{3}$$

$$\text{Volume ratio} = \frac{2^3}{3^3} = \frac{8}{27}$$

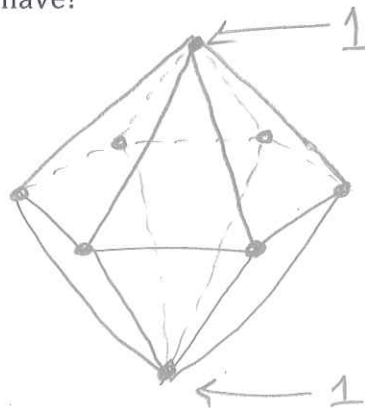
$$\frac{8}{27} = \frac{x}{60}$$

$$\frac{8(60)}{27} = x = 17.78$$

26. Two identical regular hexagonal pyramids are joined together at their bases. How many vertices does it have?

26.2 (A) 8

- A. 8      B. 14  
 C. 12      D. 13



$$1 + 6 + 1 = 8$$

$$\text{Faces} = 12$$

$$\text{Edges} = 18$$

$$F + V = E + 2$$

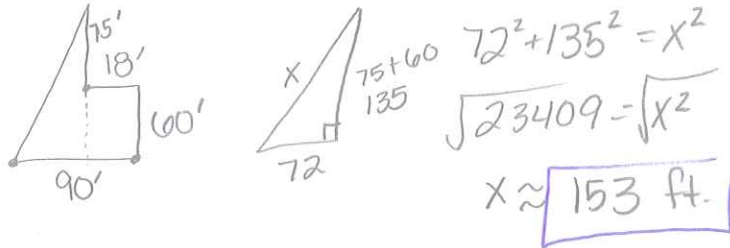
$$12 + 8 = 18 + 2$$

$$20 = 20 \checkmark$$

**This portion of the test is similar to the first part of the final exam (the written portion). Show expected work and please circle your final answers. Round to the hundredths if necessary.**

1. Use the wording to make a labeled sketch of the described situation (1 pace is 3 feet).

a.2 Find the direct distance (in feet) from the stump to the treasure.



$$72^2 + 135^2 = X^2$$

$$\sqrt{23409} = \sqrt{X^2}$$

$$X \approx \boxed{153 \text{ ft.}}$$

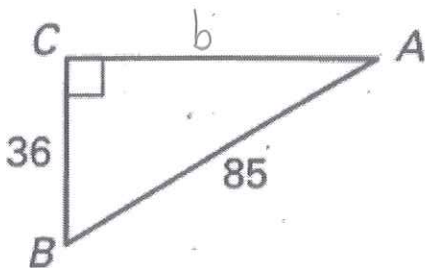
From the old stump, take 30 paces east, 90' then 20 paces north, 60' 6 paces west, and then 18' another 25 paces north 75' to find the hidden treasure.

b.2 Give the overall area enclosed by the figure.

$$A = \frac{1}{2} b \cdot h$$

$$\frac{1}{2} (72)(135) + (18)(60) = 4860 + 1080 = \boxed{5940 \text{ ft}^2}$$

2.4 Solve the triangle. Round answers to the nearest whole number.



$$36^2 + b^2 = 85^2$$

$$1296 + b^2 = 7225$$

$$-1296$$

$$\sqrt{b^2} = \sqrt{5929}$$

$$\boxed{b = 77}$$

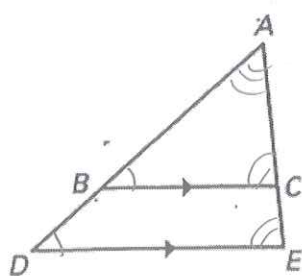
$$\sin A = \frac{36}{85}$$

$$\sin^{-1}\left(\frac{36}{85}\right) = \boxed{m\angle A = 25.06^\circ}$$

$$\cos B = \frac{36}{85}$$

$$\cos^{-1}\left(\frac{36}{85}\right) = \boxed{m\angle B = 64.94^\circ}$$

3.4 Determine if the triangles are similar. If they are, write a similarity statement and give the reason for their similarity.



// lines  $\rightarrow$  Corresponding  $\angle$ s  $\cong$

$$\boxed{\triangle ABC \sim \triangle ADE}$$

by AA Similarity

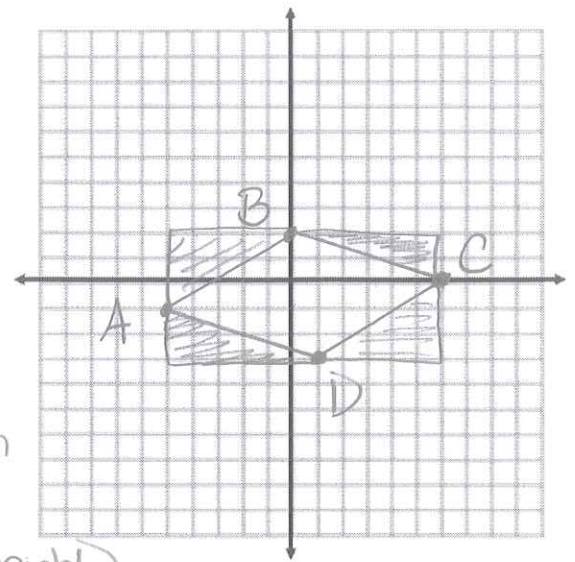
4. The vertices of quadrilateral  $ABCD$  are  $A(-5, -1)$ ,  $B(0, 2)$ ,  $C(6, 0)$ , and  $D(1, -3)$ .

a.2 What type of quadrilateral is  $ABCD$ ? Explain.

- ①  $\overline{AB} \parallel \overline{CD}$  and  $\overline{BC} \parallel \overline{AD}$   
 ②  $AB = CD$  and  $BC = AD$

} Either reasoning concludes

$ABCD$  is a parallelogram



b.2 Find the quadrilateral's area.

Area of parallelogram = (base)(height)  
 but not able to find base... so find  
 Area rectangle - Area of 4  $\Delta$ s  
 $(5)(11) - 2(\frac{1}{2} \cdot 2 \cdot 6) - 2(\frac{1}{2} \cdot 5 \cdot 3)$   
 $55 - 12 - 15 = \boxed{28 \text{ un}^2}$

5.4 Find the area of the enclosed region outside the barn.  
 Measures are in yards.

$x^2 = 6^2 + 6^2$   
 $x^2 = 72$   
 $x = \sqrt{72} = 8.49$   
 $y = 20 - 8.49 = 11.51$   
 $z = 11.51 - 5 = 6.51$

Area of Sector =  $\frac{\theta}{360} \cdot \pi (r)^2$

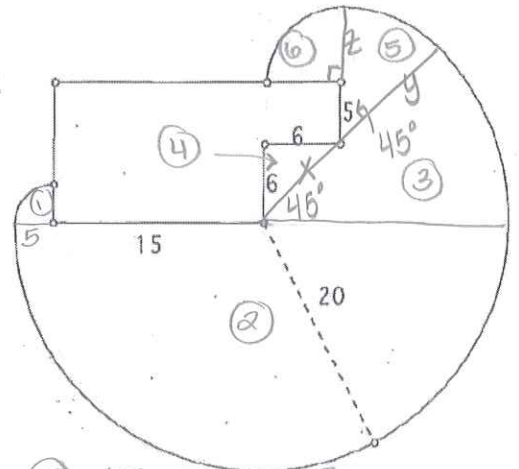
Six Areas

①  $\frac{90}{360} \cdot \pi (5)^2 = 19.63$

②  $\frac{180}{360} \cdot \pi (20)^2 = 628.32$

③  $\frac{45}{360} \cdot \pi (20)^2 = 157.08$

④ Triangle =  $\frac{1}{2}bh = \frac{1}{2}(6)(6) = 18$



⑤  $\frac{45}{360} \cdot \pi (11.51)^2 = 52.02$

⑥  $\frac{90}{360} \cdot \pi (6.51)^2 = 33.29$

Total Areas  
 $\boxed{908.34 \text{ yd}^2}$

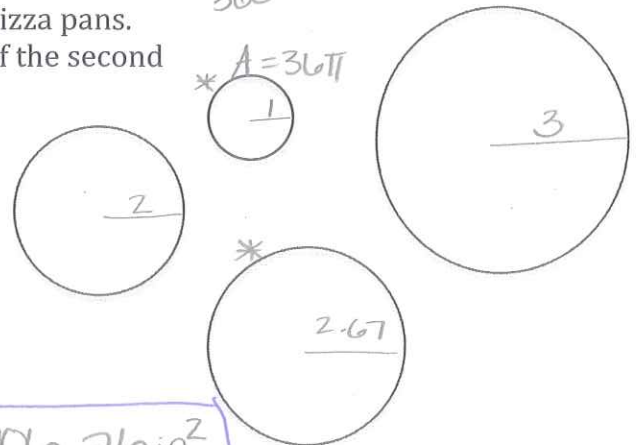
6.4 A pizza shop uses a set of four different-sized circular pizza pans. The radii are in the ratio of 1: 2: 2.67: 3. Find the area of the second largest pan if the smallest pan has an area of  $36\pi \text{ in}^2$ .

Length =  $\frac{1}{2.67}$

Area =  $\frac{1^2}{(2.67)^2} = \frac{1}{7.1289}$

$\frac{1}{7.1289} = \frac{36\pi}{A}$

$A = \frac{(7.1289)(36\pi)}{1} = \boxed{806.26 \text{ in}^2}$





7. Use the diagram with  $ABC \sim DEF$ .

a.2 Find the scale factor of  $DEF$  to  $ABC$

$$\frac{EF}{BC} = \frac{9}{19\frac{4}{5}} = \frac{9}{19.8} = \frac{90 \div 18}{198} = \frac{5}{11}$$

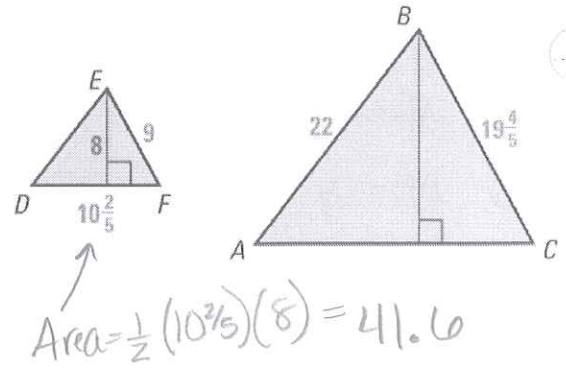
b.2 Find the area of  $ABC$ .

$$\text{Length ratio} = \frac{5}{11}$$

$$\text{Area} = \frac{5^2}{11^2} = \frac{25}{121}$$

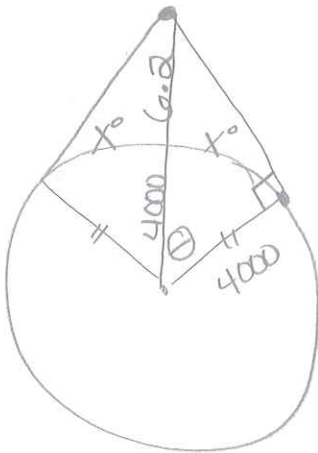
$$\frac{\Delta D}{\Delta A} = \frac{25}{121} = \frac{41.6}{X}$$

$$\frac{(121)(41.6)}{25} \approx \boxed{201.344 \text{ unit}}$$



8.4 An Air Force jet is flying from New York to Oshkosh at an altitude of 6.2 miles on its way to the FFA Fly In. Seth, the pilot, is looking out the window and he starting to think about how much of the Earth's horizon he is looking at. What is the arc measure of the Earth's horizon that Seth could possibly see from his window?

(Hint: The Earth's radius is about 4000 miles and there are 5280 feet per mile.)



$$\cos \theta = \frac{4000}{4006.2}$$

$$\theta = \cos^{-1} \left( \frac{4000}{4006.2} \right)$$

$$\theta = 3.188^\circ$$

$$\theta = X^\circ$$

$$2(X) = 2(3.188) = \boxed{6.376^\circ}$$