1) **A,** The angles in similar triangles are always equal! So the answer is 0.

2) **C,** $P=4\sqrt{\left(\frac{d_1}{2}\right)^2+\left(\frac{d_2}{2}\right)^2}=4\sqrt{(5)^2+(12)^2}=4(13)=52$

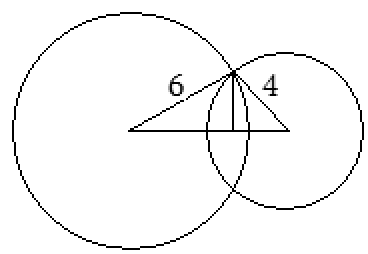
3) **C,** $A=\sqrt{14(14-12)(14-10)(14-6)}=\sqrt{14(2)(4)(8)}=8\sqrt{14}$.

4) **B,** q = regular quadrilateral (square) side length, s = hexagon side length

$\frac{q^2}{\frac{3s^2\sqrt{3}}{2}}=\sqrt{3}\rightarrow q=\frac{3s\sqrt{2}}{2}$. $\frac{X}{1}=\frac{6s}{4q}=\frac{6s}{6s\sqrt{2}}=\frac{\sqrt{2}}{2}$.

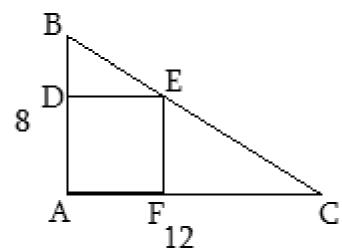
5) **B,** A cross section is provided. The altitude of the triangle will be the radius of the intersecting circle.

$Alt_c=\frac{2Area}{c}=\frac{2\sqrt{9(9-8)(9-6)(9-4)}}{8}=\frac{6\sqrt{15}}{8}=\frac{3\sqrt{15}}{4}$

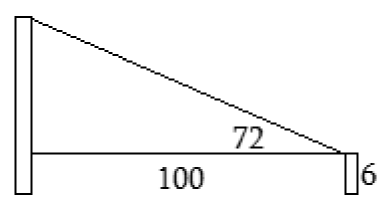


6) **C,** $AD=DE=EF=FA=x$ $\frac{8-x}{8}=\frac{x}{12}$ $8x=96-12x$

$20x=96\rightarrow x=4.8$



7) **D,** $\tan(A)=\frac{opposite}{adjacent}\rightarrow\tan(72^\circ)=\frac{h-6}{100}\rightarrow h=100\tan(72^\circ)+6$

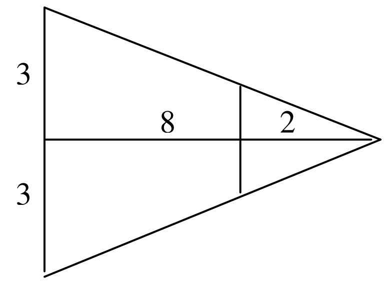


8) **C,** Three points are used.

9) **D,** The contrapositive is always logically equivalent. "If elephants do not fly, then $2+2\neq 5$"

10) **A** $(AD)^2=(DC)(DB)\rightarrow(2\sqrt{2})^2=x(x+7)\rightarrow x^2+7x-8=0\rightarrow DC=1$. Because ACB is a right triangle, ACD is a right triangle. $(AC)^2+(DC)^2=(AD)^2\rightarrow 1+(AC)^2=8\rightarrow(AC)^2=7$
$(AC)^2+(BC)^2=(AB)^2\rightarrow 7+49=56=(AB)^2\rightarrow AB=2\sqrt{14}\rightarrow r=\sqrt{14}\rightarrow A=14\pi$

11) **D,** The solid formed is a cylinder with radius 3 and height of 10, capped by 2 hemispheres.
$V = \pi r^2 h + \frac{4}{3}\pi r^3 \rightarrow \pi(3)^2(10) + \frac{4}{3}\pi(3)^3 = 90\pi + 36\pi = 126\pi$

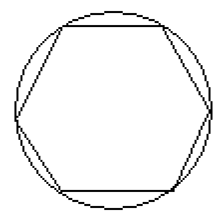


12) **B,** A cross section is provided
$\frac{UpperBase}{2} = \frac{6}{10} \rightarrow UpperBase = \frac{6}{5} \rightarrow Area = \left(\frac{6}{5}\right)^2 = \frac{36}{25} = 1.44$

13) **D,**

The great circle has an area of $8\pi \Rightarrow r = \sqrt{8}$. The volume of the sphere is $\frac{4}{3}\pi(\sqrt{8})^3 = \frac{64\sqrt{2}\pi}{3}$

14) **C,** Only right triangles follow the Pythagorean theorem.
An equilateral parallelogram can be a rhombus. The sum of exterior angles is 360: $n\left(180 - \frac{180(n-2)}{n}\right) = 180n - 180(n-2) = 360$



15) **B,** The base is as seen below: Radius = Side
$SA = 2(Base) + Side = 2\left(\frac{3(3)^2\sqrt{3}}{2}\right) + 6(3)(10) = 27\sqrt{3} + 180$

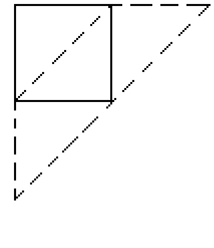
16) **E,** On the Euler line with the Circumcenter and Orthocenter as the endpoints, the distance from the circumcenter to the centroid is twice the distance from the orthocenter to the centroid.
$Circum \rightarrow Centr = 2(Ortho \rightarrow Centr) \quad x = 2(12 - x) \rightarrow x = 24 - 2x \rightarrow x = 8$
The rest of the information is extraneous.

17) **C**, In an indirect proof, the first line is the negation of the prove.

18) **D,** Congruence cannot be proven by angle-side-side.

19) **A**, The shaded region is equal to the area of semicircle PRS plus the area of triangle PQR minus the area of quarter-circle PQRT.
$A = \frac{1}{2}(8)^2\pi + \frac{1}{2}(16)(8) - \frac{1}{4}(8\sqrt{2})^2 = 32\pi + 64 - 32\pi = 64$

20) **B**
The drawing is shown below
The trapezoid has $\frac{3}{2}$ of the area of the original square.
So, the area of the trapezoid is 117.



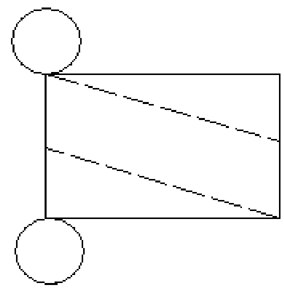
21) **A,** The maximum area will come from a semi circle with a circumference of 100.

$$C = 100 \rightarrow r = \frac{100}{\pi} \quad A = \frac{\pi\left(\frac{100}{\pi}\right)^2}{2} = \frac{5000}{\pi}$$

22) **C,** $\frac{1}{3}\left(\pi\left(2\sqrt{3}\right)^2\right) - \frac{1}{2}(6)\left(\sqrt{3}\right) = 4\pi - 3\sqrt{3}$

23) **B,** $A = Square + Eq.Triangle = s^2 + \frac{s^2\sqrt{3}}{4} = \frac{s^2(4+\sqrt{3})}{4}$. It is given that $s = 4-\sqrt{3}$

$$A = \frac{(16-8\sqrt{3}+3)(4+\sqrt{3})}{4} = 13 - \frac{13\sqrt{3}}{4}$$



24) **E,** If the cylindrical can was "unfolded", the result is shown:
The path is designated by the dotted line, and is equal to two diagonals of a rectangle with width of *h/*2 and length of $Circum_{BASE}$.

$$Path = 2\sqrt{(2\pi)^2 + (2\pi\sqrt{3})^2} = 2\sqrt{16\pi^2} = 8\pi$$

25) **A,** $h = 3r \quad Volume = V_{Cone} + V_{Hemisphere} = \frac{\pi r^2 h}{3} + \frac{2\pi r^3}{3} = \frac{\pi r^2(3r)}{3} + \frac{2\pi r^3}{3} \quad 45\pi = \frac{5\pi r^3}{3} \rightarrow r = 3$

26) **D,** $F + V - E = 2$, $F + 62 - 120 = 2 \rightarrow F = 60 \quad SA = 60(4) = 240$

27) **A,** Let *x* be the radius of circle A. $Rad_C = b - x \quad Rad_B = a - (b - x)$

$Rad_A = x = c - (a - (b - x)) \quad x = c - a + b - x \rightarrow 2x = c - a + b \rightarrow x = \frac{b + c - a}{2}$

28) **C,** $\angle VZU = \frac{UV + WX}{2} = \frac{140}{2} = 70$

29) **E,** Call the 5th largest angle *x*. $180(9-2) = (x-4) + (x-3) + \cdots + (x+3) + (x+4) = 9x$
$180(9-2) = 9x \rightarrow x = 140$ Therefore, the largest interior angle would be 144 and the largest exterior angle would be 44 (the supplement of the smallest interior angle, 136). 144 + 44 = 184

30) **C**

For a right triangle and an altitude *CD* drawn from right angle C, $(AD)(DB) = (CD)^2$.