1. $6\cdot 8 = h\cdot 10 \rightarrow h = 4.8$ B

2. Let $BD = x$. $\frac{8}{x}=\frac{10}{9-x}\rightarrow 72-8x=10x\rightarrow$
$18x = 72 \rightarrow x = 4$ A

3. Use the Pythagorean Theorem over and over.
$TV=\sqrt{8}, PW=\sqrt{12}, PX=\sqrt{16}, PY=\sqrt{20},$
and $PZ=\sqrt{24}=2\sqrt{6}$ B

4. Let $EB = x$. Then $AE = 2x$. $\frac{AE}{EB}=\frac{2x}{x}=\frac{2}{1}$ D

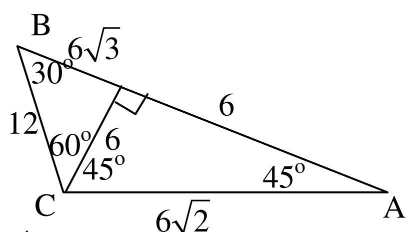
5. Using the 30-60-90 triangle relationship, $ZY = 1$ and $XZ = \sqrt{3}$. A cone is formed such that $XZ = r$ and $ZY = h$. $V=\frac{\pi r^2 h}{3}=\frac{\pi\sqrt{3}^2 1}{3}=\pi$ C

6. $x+15+x+5+2x-20=180\rightarrow$
$4x=180\rightarrow x=45$. $m\angle B = 50$. The other two angles have measures of 60 and 70. C

7. $\frac{48\sqrt{3}}{6}=8\sqrt{3}$ which is the area of one of the equilateral triangles. $8\sqrt{3}=\frac{s^2\sqrt{3}}{4}\rightarrow$
$s^2=32\rightarrow s=4\sqrt{2}\quad \therefore 3s=12\sqrt{2}$ C

8. The perimeter of triangle ABC is 8 + 9 + 13 or 30. The triangle formed has a perimeter that is half of 30 or 15. A

9. Draw an altitude to the hypotenuse. The perimeter is $12+6\sqrt{3}+6+6\sqrt{2}$ or $18+6(\sqrt{3}+\sqrt{2})$
D



10. $\frac{2}{4}=\frac{4}{BD}\rightarrow BD=8$
$AB = AD + AB = 2 + 8 = 10$ A

11. $\frac{AB}{AE}=\frac{AC}{AD}$ Let $AD = x$. Then
$\frac{11+x}{8}=\frac{10}{x}\rightarrow x^2+11x-80=0\rightarrow$
$(x+16)(x-5)=0\rightarrow x=5$
$AB = AD + DB = 5 + 11 = 16$ and $1 + 6 = 7$ D

12. Let s = the side of the square. Since the triangles are similar,
$\frac{4-s}{s}=\frac{s}{12-s}\rightarrow 48-16s+s^2=s^2\rightarrow$
$48=16s\rightarrow s=3\ \therefore\ s^2=9$ C

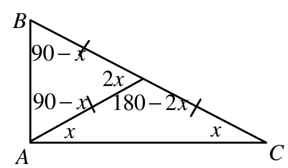
13. The radius and apothem form a 30-60-90 triangle with hypotenuse equal to the radius which is 4. The apothem is opposite the 30 degree angle so it measures 2. D

14. The angle bisectors meet at the incenter which is the center of the circle inscribed in the triangle. B

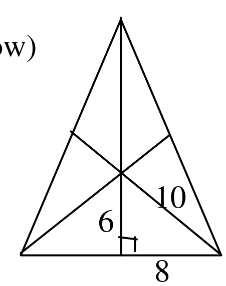
15. Major arc $\overset{\frown}{AC}$ measures $360-84$ or 276. $\angle ABC$ is an inscribed angle whose measure is half of 276 or 138. Triangle ABC is isosceles with equal base angles, so
$m\angle BAC=\frac{180-138}{2}=21$ B

16. Angle measures are shown in the diagram. The measure of angle A is $90-x+x$ or 90.

A



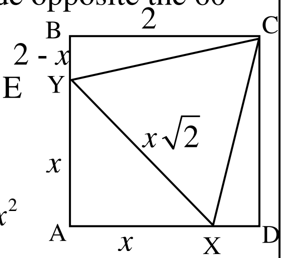
17. The medians meet at a point that is 2/3 the distance from the vertex to the midpoint of the opposite side. Also, the median that is 18 is an altitude. The base of the triangle is 16 so the area is $\frac{16\cdot 18}{2}$ or 144. (See diagram below)
D



18. The smaller triangle has a side of s and an area of $\frac{s^2\sqrt{3}}{4}$. The larger triangle has an altitude of s and a base of $\frac{2s\sqrt{3}}{3}$, so its area is $\frac{1}{2}\cdot s\cdot\frac{2s\sqrt{3}}{3}=\frac{s^2\sqrt{3}}{3}$. The ratio of the larger to the smaller is
$\frac{s^2\sqrt{3}}{3}\cdot\frac{4}{s^2\sqrt{3}}=\frac{4}{3}$ A

19. By the Converse Pythagorean Theorem, the triangle is a right triangle so its largest angle is the right angle. Therefore, the altitude, *h*, is drawn to the hypotenuse. Since 5*h* = 12, *h* = 12/5. Let *x* be the length of the shorter segment of the hypotenuse. Using similar triangles,
$\frac{x}{3}=\frac{3}{5}\to x=\frac{9}{5}\ \therefore A=\frac{1}{2}\cdot\frac{9}{5}\cdot\frac{12}{5}=\frac{54}{25}$ B

20. Since tangent segments to a circle from a point are congruent, triangle ABC is an isosceles triangle with vertex angle at *A*. Draw an altitude from vertex *A* to form two 30-60-90 triangles, each with a hypotenuse of 16. The altitude, which is opposite the 30 is 8 and the side opposite the 60 is $8\sqrt{3}$. Therefore, $BC = 16\sqrt{3}$.
$p=16\sqrt{3}+16+16=32+16\sqrt{3}$ E



21. Using the Pyth Thm,
$(CY)^2=2^2+(2-x)^2=8-4x+x^2$
$(XY)^2=2x^2$ But since the triangle is equilateral,
$$8-4x+x^2=2x^2\to x^2+4x-8=0$$
By the quadratic formula, $x=-2+2\sqrt{3}$. The side is $x\sqrt{2}$ or $\left(-2+2\sqrt{3}\right)\sqrt{2}=-2\sqrt{2}+2\sqrt{6}$ B

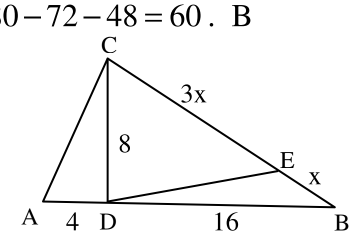
22. The slope of the given line is $-\frac{1}{2}$. Since the legs are perpendicular, their slopes are negative reciprocals of each other. Therefore, the other leg must have a slope of 2. The only line whose slope is 2 is C.

23. From the given information, $\angle A\cong\angle C$, and $\overline{AF}\cong\overline{CG}$. A

24. $9<n<15$ So *n* could be 10, 11, 12, 13, or 14. The answer is 5 or E.

25. The longest side of a triangle is opposite the largest angle. So segment AC is the longest segment in triangle ABC and segment AD is the longest segment in triangle ACD making AD the longest segment in the figure. A

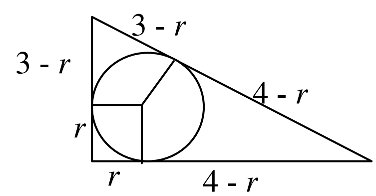
26. $2x+4x+3x+6x=360\to x=24$.
$m\angle B=\frac{1}{2}m\widehat{AD}=72$. $m\angle A=\frac{1}{2}m\widehat{BC}=48$. And the measure of $\angle BVA=180-72-48=60$. B



27. $\frac{4}{CD}=\frac{CD}{16}\to CD=8$
Using the Pythagorean Theorem, $BC=8\sqrt{5}$. In $\Delta BCD, 8\cdot 16=8\sqrt{5}\cdot h\to h=\frac{16\sqrt{5}}{5}$ Note: h is the height of both ΔBCD and ΔBDE. Since $4x=8\sqrt{5}, x=2\sqrt{5}$. $\therefore$ Area = $\frac{1}{2}2\sqrt{5}\cdot\frac{16\sqrt{5}}{5}=16$
C

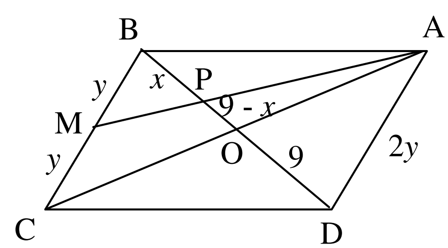
28. The diagonals of a rhombus form 4 congruent **right** triangles. Let the legs of the right triangles be 3x and 2x. Then $4\cdot\frac{1}{2}\cdot 2x\cdot 3x=300\to x=5$. So the legs are 15 and 10. Using the Pythagorean Theorem, the hypotenuses are $5\sqrt{13}$. C

29. The triangle is a right triangle.



$3-r+4-r=5\to r=1$. The area of the circle is π. The area of the right triangle is $\frac{1}{2}\cdot 3\cdot 4=6$. So the remaining area is $6-\pi$. D

30.



In the diagram, $\Delta BPM\sim\Delta DPA$. Therefore,
$\frac{BM}{DA}=\frac{BP}{DP}\to\frac{y}{2y}=\frac{x}{18-x}\to$
$\frac{1}{2}=\frac{x}{18-x}\to 18-x=2x\to 3x=18\to x=6$ A