1. \( \triangle ADE \) is equilateral: 
\[
\text{Area} = \frac{\sqrt{3}}{4} \cdot 3^2 = A
\]

2. \( A \quad \) The intersection can be a plane, or a line. II is only the definition of a plane; two intersecting lines can’t be an intersection.

3. Taking \( n = 9 \), 
\[
\frac{n(n-3)}{2} + 180(n-2) + 360 + 9 + 1 = 1657 \Rightarrow E
\]

4. \( (x - 3)^2 + (y - 7)^2 = 169 \), \( r = 13 \). Twice circumference = \( 52\pi \) \( \Rightarrow B \)

5. Area of framed picture – area of picture = area of frame
\[
36(26) - 30(20) = 336 \quad C
\]

6. \( A = \frac{1}{2} \) (product of diagonals) = 65/2 \( D \)

7. \( \pi r^2 = 2\pi r \), \( 2 \quad B \)

8. \( \frac{4}{3}\pi \left( \sqrt{e\pi} \right)^3 = \frac{\pi 5h}{3} \), \( h = 19.96 \ldots \) Slant = \( \sqrt{h^2 + 5} = 20.0892 \ldots \Rightarrow D \)

9. Circle is centered at (3, 0) with radius 3. Distance from point to center is \( \sqrt{50} \). This is the hypotenuse of a triangle, with one leg of length 3, and other \( x \). “\( x \)” is the length we want: \( \sqrt{41} \Rightarrow A \)

10. \( 2(CD + 2) = 9 \), \( CD = 5/2 \). Triangle with side lengths 3, 5, and 9/2. Heron’s formula (maybe a program on calculator) yields 6.66585 \( B \)

11. Radius of circle is 2: 
\[
\frac{16 - 4\pi}{56\pi} = 0.0195 \Rightarrow C
\]

12. Law of sines: 
\[
\frac{\sin 30^\circ}{4} = \frac{\sin 45^\circ}{x}, \quad x = 4\sqrt{2} \Rightarrow C
\]

13. \( C \)

14. \( \frac{180(n-2)}{n} = 171; \quad n = 40 \quad A \)

15. \( A = 4\pi r^2 \), \( V = \frac{4}{3}\pi r^3 \); \( 288\pi = \frac{4}{3}\pi r^3 \); \( r = 6 \); \( A = 4\pi (6)^2 = 144\pi \quad E \)
16. $3 < x < 21$  This interval contains 17 integer values

17. $\boxed{B}$

18. $(-10, -1), (-8, 2), (-6, -2)$  $\boxed{A}$

19. $r = \sqrt{7.5^2 + 3.1^2}$, Area of octagon is $\frac{1}{2}(49.6)(7.5)$, so we have $\pi r^2 - 186 = 20.90...$  $\boxed{B}$

20. $\frac{4}{3} \pi \left(\frac{1}{2} r\right)^3 = \frac{1}{8}$  $\boxed{D}$

21. We get $2 \cdot 3 \cdot \frac{1}{2} \cdot 3 \cdot \frac{2\sqrt{2}}{\sqrt{2}} \cdot \frac{\pi}{4\pi} = 2 \cdot 3 \cdot \frac{1}{2} \cdot 3 \cdot \frac{1}{2} = 486$  $\boxed{C}$

22. Triangular numbers: $\frac{n(n+1)}{2}$, count up to the thirteenth prime number. So $210 + 41$  $\boxed{E}$

23. $CP = 2PE$, $AP = 2PD$, so $4 + 7 + 6 + 10.5 = 27.5$  $\boxed{D}$

24. $lw=18, \ wh=15, \ lh=30$.  $w=18/l$,  $18/l \times h = 15$;  $l = 6h/5$;  $6h/5 \times h = 30$;  $h = 5, \ w = 3, \ l = 6$;  $V= (5)(3)(6) = 90$  $\boxed{B}$

25. Equation of the line is $x - 7y = 13$.  Midpoint is $(1/4, -13/4)$.  Distance is the square root of 40.  Slope is 19.  Answer: $\boxed{B}$

26. Area of square $= 25 \times 25 = 625$.  Area of circle $= \pi \left(\frac{25\sqrt{2}}{2}\right)^2 = \frac{625\pi}{2}$;  $\frac{625\pi}{2} = \frac{2}{\pi}$;  To change to percentage, multiply by 100.  $\frac{200}{\pi}$  $\boxed{C}$

27. It works for any angle: $\sin^2 x + \cos^2 x = 1$  $\boxed{D}$

28. The area of the triangle is 16.5.  The area of the pentagon is 72.  $\boxed{B}$

29. Using the formula for volume of icosahedron given side length “a”: $\frac{5a^3(3 + \sqrt{5})}{12}$  $\boxed{A}$
30. Cone of radius 6 and height 4: $48\pi$

Tie Breakers

14-sided polygon, interior angle of $\frac{1080}{7}$. Using Area = .5ab(sinC),

$$A = .5(4)(4)\sin(\frac{1080}{7}) = 3.4710$$