1. **A** $x = 3d, y = d, x = 3y$

2. **B** The ratio of the circumference to the diameter of any circle is $\pi : 1$.

3. **D** The altitude is 3 times the median or $6\sqrt{3}$. Using the 30-60-90 triangle relationship, the side is 12. $A = \frac{1}{2} \cdot 12 \cdot 6\sqrt{3} = 36\sqrt{3}$.

4. **C** An exterior angle measures 180 - 156 or 24 degrees. $\frac{360}{24} = 15$ sides. Perimeter is 150.

5. **D**

6. **A** Possibilities are 8, 9, 12; 8, 9, 20; 8, 12; 20, and 9, 12, 20. But the sum of two sides must be greater than the 3rd. 8, 9, 12 and 9, 12, 20 are the only ones that work.

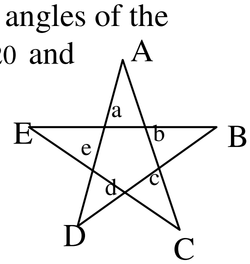
7. **A** The side opposite the 30 degree angle is $\frac{300}{\sqrt{3}}$ or $100\sqrt{3}$. Add her eye level and the result is $103\sqrt{3}$.

8. **B** $\left(\frac{2}{3}\right)^2 = \frac{32}{A}; 4A = 32 \cdot 9; A = 72$

9. **C**

10. **A** $\frac{360}{60} = 6$ sides. It is a hexagon.

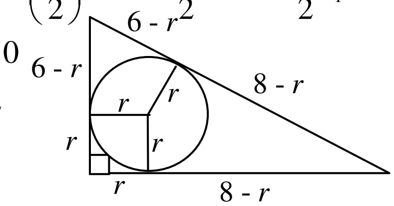
11. **D** The sum of the angles of the 5 triangles is $\angle A + \angle B + \angle C + \angle D + \angle E + 2a + 2b + 2c + 2d + 2e$. The sum is also 5(180) or 900. $a + b + c + d + e = 360$ because they are the 5 exterior angles of the pentagon. $2(a + b + c + d + e) = 720$ and $900 - 720 = 180$ which is the required sum.



12. **C** $V_1 = \pi r^2 h; V_2 = \pi\left(\frac{r}{2}\right)^2 \cdot 2h = \frac{1}{2}\pi r^2 h = \frac{1}{2}V_1$

13. **A** $6 - r + 8 - r = 10$

$2r = 4 \rightarrow r = 2$



14. **B** ΔPRQ is a right triangle with hypotenuse 2 and a leg of 1. The other leg is PR which has a length of $\sqrt{2^2 - 1^2}$ or $\sqrt{3}$ by the Pythagorean Theorem.

15. **A** Let x represent the side of the original square. Then the diagonal is $x\sqrt{2}$. So, $2x + x\sqrt{2} = 8$.

$$x(2 + \sqrt{2}) = 8 \rightarrow x = \frac{8}{2 + \sqrt{2}} \cdot \frac{2 - \sqrt{2}}{2 - \sqrt{2}}$$

$$x = \frac{16 - 8\sqrt{2}}{2} = 8 - 4\sqrt{2}.$$

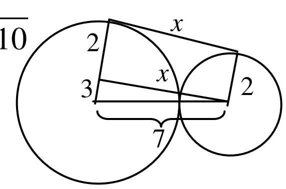
16. **D** $V = \frac{5}{27} \cdot 12 \cdot 12 \cdot 12 = 5(64) = 320 \text{ in}^3$.

$320 = 64 \cdot h \rightarrow h = 5$ inches.

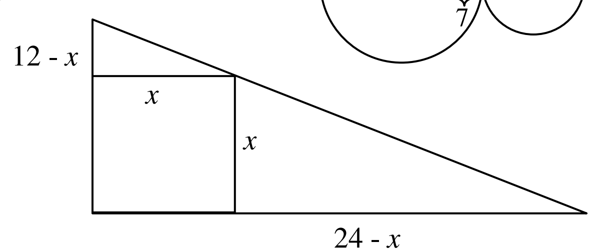
17. **C**

$m\angle CDX = m\angle CBD + m\angle C = m\angle A + m\angle C = 110$

18. **B** $x^2 + 3^2 = 7^2 \rightarrow x = 2\sqrt{10}$



19. **D**



The two triangles in the figure are similar.

$$\frac{12 - x}{x} = \frac{x}{24 - x} \rightarrow 12 \cdot 24 - 36x + x^2 = x^2 \rightarrow$$

$$12 \cdot 24 = 36x \rightarrow x = 8 \rightarrow x^2 = 64$$

20. **B** Each side of the regular hexagon is also 12 because it can be divided into 6 equilateral triangle. Therefore, the perimeter is 72.

21. **C** $\Delta ABE \sim \Delta ADC \rightarrow \frac{AB}{AD} = \frac{AE}{AC}$

$\frac{8}{12} = \frac{x}{10} \rightarrow 12x = 80 \rightarrow x = \frac{20}{3}$

22. **E** The region is a circle with area $\pi \cdot 5^2$ or 25π.

23. **A** Let *x* represent the measure of the angle.

$2(90 - x) = 180 - x - 25$

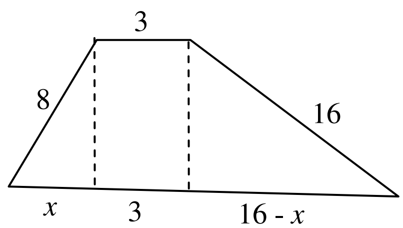
$180 - 2x - 155 - x$

$25 = x$

$90 - 25 = 65$ and $180 - 25 = 155$

$65 + 155 = 220$

24. **D**



$x^2 + h^2 = 64 \rightarrow h^2 = 64 - x^2$

$(16 - x)^2 + h^2 = 256 \rightarrow h^2 = 256 - (16 - x)^2$

$64 - x^2 = 256 - (16 - x)^2$

$64 - x^2 = 32x - x^2$

$x = 2$

$4 + h^2 = 64 \rightarrow h = \sqrt{60} = 2\sqrt{15}$

25. **C** Let the length and width be 2*x* and 5*x*. Then the perimeter is 14*x*. Then 14*x* = 280 and *x* = 20. So the length and width are 40 and 100 making the area 4000.

26. **A** $\angle ACY \cong \angle PQZ$ because right angles are congruent. $\angle Y \cong \angle Z$ because base angles of an isosceles triangle are congruent. $\overline{YA} \cong \overline{ZP}$. So, the triangles can be proved congruent by AAS.

27. **B** The solid figure formed will be a cone. Since CD = 6, the radius of the cone is $\frac{6}{\sqrt{2}}$ or $3\sqrt{2}$. The height is also $3\sqrt{2}$.

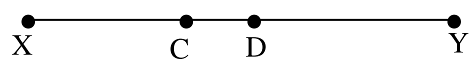
$V = \frac{\pi r^2 h}{3} = \frac{\pi\left(3\sqrt{2}\right)^3}{3} = 18\pi\sqrt{2}$.

28. **A** DR = 8 + 2 = 10 which is the radius of the circle. Since diagonals of a rectangle are congruent, DB = AC and DB is also a radius of the circle. Therefore, AC = 10.

29. **D** $\frac{4}{6} = \frac{6}{DQ} \rightarrow DQ = 9$. PQ = PD + DQ

Therefore, PQ = 4 + 9 = 13

30. **B**



Let *m* be the length of *XY*. Then $XC = \frac{3}{5}m$ and $XD = \frac{3}{4}m$. Therefore, $CD = \frac{3}{4}m - \frac{3}{5}m = \frac{3}{20}m$ and $CD{:}XY = \frac{3}{20}$.

Answers

1. A
2. B
3. D
4. C
5. D
6. A
7. A
8. B
9. C
10. A
11. D
12. C
13. A
14. B
15. A
16. D
17. C
18. B
19. D
20. B
21. C
22. E
23. A
24. D
25. C
26. A
27. B
28. A
29. D
30. B