1. B or E
2. C
3. C
4. C
5. D

6. D
7. B
8. D
9. E
10. B

11. A
12. C
13. C
14. D
15. A

16. B
17. E
18. D
19. A
20. D

21. A
22. D
23. C
24. D
25. B

26. D
27. A
28. B
29. E
30. B

SOLUTIONS

1. **(B)** The other leg of the triangle is 48, and the circumference of the semicircle is $\pi r = \left(\frac{22}{7}\right)(7) = 22$. The sum is $22 + 48 + 50 = 120$.
2. **(C)** The wheel's circumference is $2\pi r = 2\pi\left(\frac{4}{\pi}\right) = 8 = 2^3$. $\frac{2^5}{2^3} = 2^2 = 4$.
3. **(C)** The only way to score 10 points is to score 3+7, 7+3, or 5+5. The sum of the respective probabilities is $\left(\frac{7}{16}\right)\left(\frac{3}{16}\right) + \left(\frac{3}{16}\right)\left(\frac{7}{16}\right) + \left(\frac{5}{16}\right)\left(\frac{5}{16}\right) = \frac{67}{256}$
4. **(C)** By definition.
5. **(D)** The square's perimeter is $4\frac{2r}{\sqrt{2}} = 4r\sqrt{2} \approx 5.6r$. The hexagon's perimeter is 6*r*. The circle's circumference is $2\pi r \approx 6.3r$.
6. **(D)** An interior angle of a regular dodecagon (which *is* the supplement of an exterior angle) is $\frac{180°(12-2)}{12} = 150°$.
7. **(B)** The woman ends 2 miles east and 6 miles south of her starting point, a distance of $\sqrt{2^2 + 6^2} = \sqrt{40}$. Her total walkage was 10, and $\frac{40}{100} = \frac{2}{5}$.
8. **(D)** The semiperimeter is 5, and by Heron's formula, the area is $\sqrt{5(2)(2)(1)} = \sqrt{20} = 2\sqrt{5}$.
9. **(E)** If cylinder A's volume $V = \pi r^2 h$ then for cylinder B, having height *b*, $\frac{V}{2} = \pi\left(\frac{r}{5}\right)^2 b$. So $\pi r^2 h = 2\pi\frac{r^2}{25}b \;\rightarrow\; h = \frac{2}{25}b \;\rightarrow\; b = 12.5h$.
10. **(B)** The only constraint that does not indicate that at least one (and therefore all) of the angles are right.
11. **(A)** $\cos R = \frac{RT}{GR}$. Solving $\frac{1}{3} = \frac{x}{6}$, $x = 2$.
12. **(C)** Note that the small triangle atop the square is equilateral (due to the square's parallel sides.) Its height is $\frac{x\sqrt{3}}{2}$. Solving, $x + \frac{x\sqrt{3}}{2} = h \rightarrow x\left(\frac{2+\sqrt{3}}{2}\right) = h \rightarrow \frac{h}{x} = \frac{2+\sqrt{3}}{2}$.
13. **(C)** By Euler's formula for solids, $V + F = E + 2$.
14. **(D)** Ask the universe.
15. **(A)** According to triangle inequality, each side must be less than the sum of the other two. $x > 0$ from the given. $3x < 2y + (x+y) \rightarrow x < \frac{3}{2}y$. $2y < 3x + (x+y) \rightarrow y < 4x \rightarrow y < 4x + |y|$ (Adding any nonnegative number to the "greater" side of an inequality maintains its integrity.) $(x+y) < 3x + 2y \rightarrow x > -\frac{y}{2}$.

16. **(B)** Ignore the distracting triangle. Segments tangent to a circle from the same point are congruent.

17. (E) $H = \frac{6(6-3)}{2} = 9$, so one diagonal is 18. A side of a rhombus forms a right triangle with each half-diagonal. Solving, the other diagonal is 24. The area is $\frac{1}{2}(18)(24) = 216 = 24H$

18. **(D)** The area of the sector is $\frac{\pi}{3}$, and $\frac{\sqrt{3}}{4}$ of that area is occupied by the triangle. Subtract to get the segment's area.

19. **(A)** The legs measure $3\sqrt{5}$ and $6\sqrt{5}$. $3\sqrt{5}\cdot 6\sqrt{5} = 15h$. So, $h = 6$..

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

21. **(A)**

22. **(D)** The legs of the trapezoid measure 8, and *AD* is 8 more than *BC*. $AD = \frac{100-24}{2} = 38$.

23. **(C)** $3x + 90 + \frac{3x+90}{3} = 540$, and $x = 114$. This is larger than $\frac{3(114)}{4} = 85.5$.

24. (D) The cone-shaped water is similar to the cup. If it has $\frac{1}{2}$ the height, then it has $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$ of the volume.

25. (B) The contrapositive of a true statement is true.

26. (D) $\sqrt{2^2 + 2^2 + 2^2} = 2\sqrt{3}$

27. (A) $2(4x + 2x + 8) = 30$, so $x = \frac{7}{6}$. The surface area is $\left(\frac{7}{6}\right)(2)(4) = \frac{28}{3}$.

28. (B) The woman's shadow is 18 feet long. The shadow is 3 times as long as the object today.

29. (E)

30. **(B)** The area of the kite is half the product of its diagonals. $\frac{1}{2}(2r)(2r+8) = 24$, so the radius of the circle is 2, $KI = 2\sqrt{2}$ (isosceles right triangle) and $KE = \sqrt{2^2 + 10^2} = 2\sqrt{26}$. The product is $8\sqrt{13}$.