1. Let $S$ be a square with side length $s$ and let $C$ be a circle with radius $r$. If $S$ and $C$ have the same area, and the perimeter of $S$ equals the circumference of $C$ then what is the relationship between $s$ and $r$?

(A) $s/r = 1$  (B) $s/r = \sqrt{\pi}$  (C) $s/r = \pi$  (D) $s/r = \pi^2$  (E) None of the above.

2. The length of one side of an isosceles right triangle is 10 inches. What is the perimeter of the triangle in inches?

(A) $10\sqrt{2} - 10$ only  (B) $20 + 10\sqrt{2}$ only  (C) either $10 + 10\sqrt{2}$ or $20 + 10\sqrt{2}$  (D) either $10 + 10\sqrt{2}$ or $10\sqrt{2} - 10$  (E) None of the above.

3. All of the adjacent edges in the hexagon pictured below are perpendicular and four of the edges have lengths as indicated in the picture below. What is the perimeter of the hexagon?

(A) 12  (B) 18  (C) 24  (D) 27  (E) None of the above.

4. What is the area of the largest triangle which can be fit inside the hexagon pictured above?

(A) 7.5  (B) 9  (C) 12  (D) 13.5  (E) None of the above.
5. A rectangular box has width 10, height 2 and length 20. What is the distance between a pair of diametrically opposite vertices of the box?
   (A) 32   (B) $10 + 2\sqrt{101}$   (C) $6\sqrt{14}$   (D) 504   (E) None of the above.

6. Let $ABCD$ be a square as pictured below. Let $E$ and $F$ be the midpoints of edges $AD$ and $AB$ respectively. What is the area of the triangle $CEF$ if the length of $FC$ is $3\sqrt{5}$?
   (A) 13.5   (B) 18   (C) 24   (D) 9   (E) None of the above.

7. Let $ABCD$ be a square as pictured above. Let $E$ and $F$ be the midpoints of edges $AD$ and $AB$ respectively. What is the side length of the square if the length of $EF$ equals 5?
   (A) $5/\sqrt{2}$   (B) 10   (C) $\sqrt{10}$   (D) $5\sqrt{2}$   (E) None of the above.

8. A rectangle has an area of 196 square inches and one side is four times longer than another. What is the perimeter of the rectangle?
   (A) 14 in   (B) $8\pi$ in   (C) 70 in   (D) 35 in   (E) None of the above.

9. The number of edges in an octagon is
   (A) 7   (B) 8   (C) 6   (D) 9   (E) None of the above.
10. Three of the interior angles of a quadrilateral have measures $110^\circ$, $120^\circ$ and $130^\circ$. What is the measure of the fourth angle?

(A) $5^\circ$   (B) $10^\circ$   (C) $20^\circ$   (D) $40^\circ$   (E) None of the above.

11. Four of the interior angles of a pentagon have measures $110^\circ$, $120^\circ$, $130^\circ$ and $140^\circ$. What is the measure of the fifth angle?

(A) $5^\circ$   (B) $10^\circ$   (C) $20^\circ$   (D) $40^\circ$   (E) None of the above.

12. A square $ABCD$ is inscribed in a right triangle $PQR$ as pictured. If the side length of the square is 5 and the length of $PB$ is 3 what is the length of the hypotenuse of triangle $PQR$?

(A) $\frac{37}{4}$   (B) $\frac{37}{3}$   (C) $\frac{185}{12}$   (D) 10   (E) None of the above.
13. What is area of the largest rectangle which fits inside a circle whose diameter is 10 cm given that the length of the rectangle is five times its width?

(A) 50 cm\(^2\)  (B) 25/3 cm\(^2\)  (C) 10 cm\(^2\)  (D) 250/13 cm\(^2\)  (E) None of the above.

14. In the figure below, the length of EC is 12 cm and the length of AE is 2 cm. If AB has length 11 cm what is the length of AD?

(A) 1.9 cm  (B) 11/6 cm  (C) 11/7 cm  (D) 12/7 cm  (E) None of the above.

15. In the figure above, if the angle measure of angle ADE is 81° and the angle measure of angle ACB is 34° what is the angle measure of DEC?

(A) 122°  (B) 146°  (C) 99°  (D) 34°  (E) None of the above.

16. Let \(C_1\) and \(C_2\) be concentric circles in which the radius of \(C_1\) is one tenth of the radius of \(C_2\). How much larger than the area of \(C_1\) is the area of \(C_2\)?

(A) 10 times larger  (B) 100 times larger  (C) \(100\pi\) times larger
(D) \(10\pi\) times larger  (E) None of the above.
17. A rectangle \( R \) has length 28 and width 7. Let \( C \) be a circle inside \( R \) which touches three sides of \( R \). What is the area of the region which is inside \( R \) and outside \( C \)?

(A) \( 49(4 - \pi/4) \)  (B) \( 49(1 - \pi/4) \)  (C) 147  (D) \( 833\pi/4 \)  (E) None of the above.

18. A cylindrical can has a radius of 3 inches and a height of 8 inches. How many square inches of metal are needed to construct the can (top and bottom are included)?

(A) \( 66\pi \)  (B) \( 57\pi \)  (C) \( 48\pi \)  (D) \( 24\pi \)  (E) None of the above.

19. The figure below consists of a parallelogram ABCD and an equilateral triangle CDE. If the measure of angle BAD is 70° then what is the measure of angle ADE?

(A) 110°  (B) 130°  (C) 150°  (D) 170°  (E) None of the above.

20. One of the angles in an isosceles triangle measures 24°. Which of the following is a possible measure for another of the triangle’s angles?

(A) 42°  (B) 52°  (C) 66°  (D) 78°  (E) None of the above.