OU Math Day 2006

Geometry Test

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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.

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2. The length of one side of an isoceles 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.

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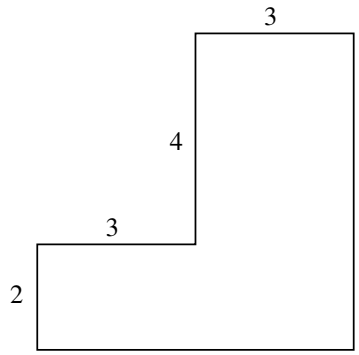
3. All of the adjacent edges in the hexagon pictured below are perpendicular and four of the edges have lengths as indicated in the picture below. What is the perimeter of the hexagon?

   (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.

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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.

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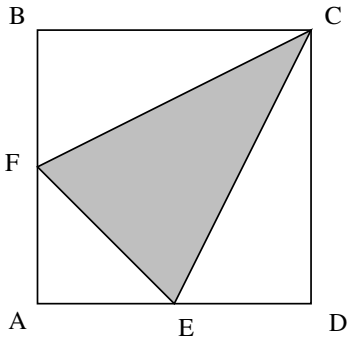
6. Let ABCD be a square as pictured below. Let E and F be the midpoints of edges AD and AB respectively. What is the area of the triangle CEF if the length of FC is $3\sqrt{5}$?

(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.

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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) 8π *in* (C) 70 *in* (D) 35 *in* (E) None of the above.

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9. The number of edges in an octagon is

(A) 7 (B) 8 (C) 6 (D) 9 (E) None of the above.

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10. Three of the interior angles of a quadrilateral have measures 110°, 120° and 130°. What is the measure of the fourth angle?

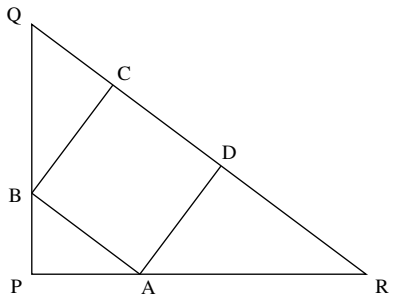
(A) 5° (B) 10° (C) 20° (D) 40° (E) None of the above.

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

(A) 5° (B) 10° (C) 20° (D) 40° (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) 37/4 (B) 37/3 (C) 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.

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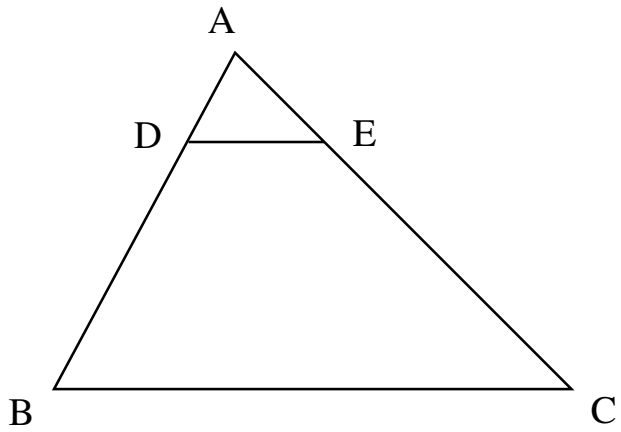
14. In the figure below, the length of EC is 12 cm and the length of AE is 2 cm. If AB has length 11 cm what is the length of AD?

(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.

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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) 100π times larger
(D) 10π times larger (E) None of the above.

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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.

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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 areincluded)?

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

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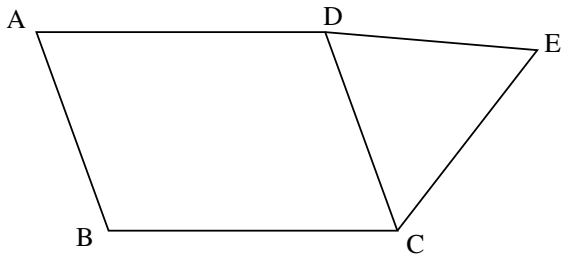
19. The figure below consists of a parallelogram ABCD and an equilateral triangle CDE. If the measure of angle BAD is 70° then what is the measure of angle ADE?

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



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20. One of the angles in an isoceles 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.
