OU Math Day 2004

Geometry Test

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1. If a right triangle has legs of length 4 and 5 centimeters then the hypotenuse of the triangle has length

   (A) 3 cm (B) 41 cm (C) 9 cm (D) $\sqrt{41}$ cm (E) None of the above.

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2. A circle of radius R has twice the area of the circle of radius 10. What is R?

   (A) $R = 20$ (B) $R = 10\pi$ (C) $R = 10\sqrt{2}$ (D) $R = 5$ (E) None of the above.

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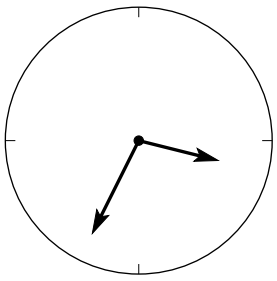
3. What is the degree measure of the angle between the two hands of a clock when the time is 3:36 PM? (Note: the picture is not drawn to scale.)

   (A) 90° (B) 108° (C) 116° (D) 126° (E) None of the above.



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4. How many cubic inches are in a cubic foot?

   (A) 12 (B) 36 (C) 144 (D) 1728 (E) None of the above.

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5. An isoceles triangle Δ has a base with length 20 and an area of 240. What are the side lengths of Δ?

   (A) 20, 26, and 26 (B) 20, 24, and $4\sqrt{61}$ (C) 20, 20 and 28
   (D) 20, $4\sqrt{61}$, and $4\sqrt{61}$ (E) None of the above.

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6. An automobile has wheels with a radius 13 inches. If it moves a distance down a street so that the wheels go through 60 complete rotations then how far has the automobile travelled?

   (A) 780π feet (B) 60 feet (C) 130π feet (D) 720 feet (E) None of the above.

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7. A circle has an area of 9 square feet. What is the length of its diameter?

   (A) $3\sqrt{\pi}/\pi$ feet (B) 3 feet (C) 6 feet (D) $6\sqrt{\pi}/\pi$ feet (E) None of the above.

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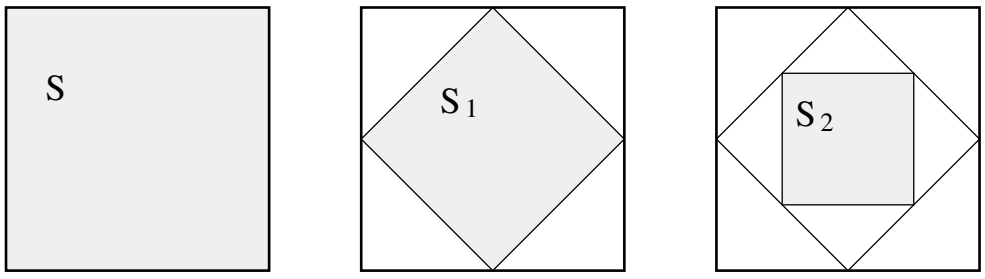
8. Inside a square $\mathcal{S}$ a second square $\mathcal{S}_1$ is constructed by joining the midpoints of the four sides of $\mathcal{S}$. The process is repeated to obtain $\mathcal{S}_2$ by joining the midpoints of $\mathcal{S}_1$, and then getting $\mathcal{S}_3$ inside of $\mathcal{S}_2$, and so on. If the original square has an area of 30 square inches then what is the least number of times that the process needs to be repeated in order to obtain a square $\mathcal{S}_n$ which has area no more than 1 square inch?

   (A) $n = 1$ (B) $n = 3$ (C) $n = 5$ (D) $n = 7$ (E) None of the above.



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9. The number of edges in a pentagon is

(A) 3 (B) 4 (C) 5 (D) 6 (E) None of the above.

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10. The side lengths of a triangle T are 6, 8 and 13. Which of the following is true?

(A) T is a right triangle.

(B) T is an acute triangle.

(C) T is an isoceles triangle.

(D) T is an equilateral triangle.

(E) None of the above.

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11. A can has the shape of a cylinder whose base is a circle of radius 4 inches. If the height of the can is 6 inches then the volume of the can equals

(A) 96π cubic inches (B) 48π cubic inches (C) 48 cubic inches
(D) 24 cubic inches (E) None of the above.

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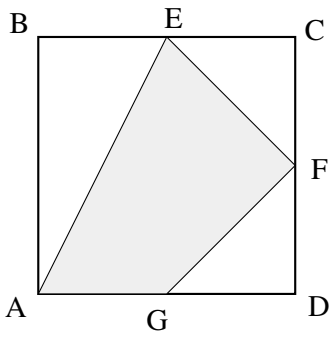
12. The square $ABCD$ has a side length of 8 centimeters. Let E, F and G be the respective midpoints of the sides BC, CD and AD. What is the area of the shaded quadrilateral $AEFG$?

(A) 16cm^2 (B) 32cm^2 (C) 48cm^2 (D) 64cm^2 (E) None of the above.



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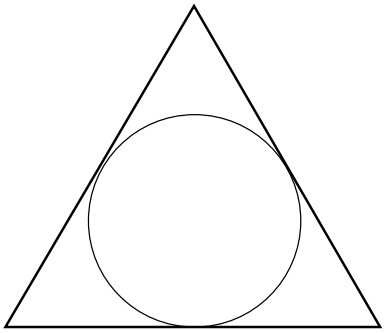
13. A circle is inscribed inside an equilateral triangle as pictured below. If each side of the triangle has length 12 then what is the radius of the circle?

(A) $7/2$ (B) 6 (C) $2\sqrt{3}$ (D) $2+\sqrt{2}$ (E) None of the above.



14. The area of a square is x square inches and its perimeter is x inches (where x is a positive number). What is x?

(A) $x = 16$ (B) $x = 1$ (C) $x = 2$ (D) $x = 4$ (E) None of the above.

15. An ant walks around the outside of a right triangle T with side lengths of 3, 4 and 5 cm. At each instant, the distance from the ant to the nearest point on T is 1 centimeter. What distance does the ant travel to complete one circuit around T?

(A) 18 cm (B) $12 + 3\pi/2$ cm (C) 12 cm (D) $12 + 2\pi$ cm (E) None of the above.