OU Math Day 2011

Geometry Test

(with answers on the last page)

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1. A square piece of paper whose diagonal has length 10 cm is folded along its diagonal. What is the perimeter of the resulting triangle in cm?

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

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2. 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.

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3. 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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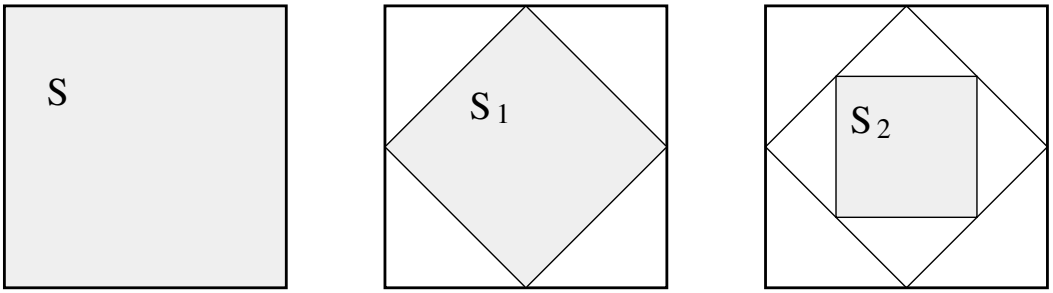
4. Inside a square $\mathcal{S}$ a second square $\mathcal{S}_1$ is constructed by joining the midpoints of the four sides of $\mathcal{S}$. The process is repeated to obtain $\mathcal{S}_2$ by joining the midpoints of $\mathcal{S}_1$, and then getting $\mathcal{S}_3$ inside of $\mathcal{S}_2$, and so on. If the original square has an area of 60 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) $n = 2$ (B) $n = 4$ (C) $n = 6$ (D) $n = 8$ (E) None of the above.


S
S 1
S 2

5. If the area of a circle is tripled then what is the ratio of the new diameter to the old diameter?

(A) $3:1$ (B) $\pi:1$ (C) $\sqrt{3}:1$ (D) $\sqrt{2}:1$ (E) None of the above.

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6. In a triangle ΔPQR the angle at P is 70° and the angle at Q is 40°. Which side of the triangle is longest?

(A) both $\overline{QR}$ and $\overline{PQ}$ (B) $\overline{PR}$ (C) both $\overline{QR}$ and $\overline{PR}$
(D) $\overline{PQ}$ (E) None of the above.

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7. The length of the hypotenuse leg of an isoceles right triangle is 10 inches. What is the area of the triangle in square inches?

(A) $10\sqrt{2}$ (B) 100 only (C) 50 (D) 25 (E) None of the above.

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8. In a plane the set of points that are equidistant from two distinct parallel lines forms which of the following?

(A) line (B) parabola (C) ray (D) ellipse (E) None of the above.

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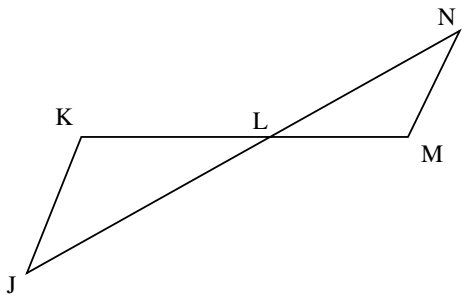
9. In the figure below the angles at J and N are equal, $LK = 3$, and the area of ΔLNM is 3. Find the area of ΔKLJ.

(A) 6 (B) 4.5 (C) 2.25 (D) 4 (E) None of the above



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10. Points A, B and C are collinear. If AB has length 17 and BC has length 5 then what is the length of AC?

(A) 11 or 6 (B) 12 (C) 6 (D) 12 or 22 (E) None of the above.

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11. What is the degree measure of the angle between the hour and minute hands of a clock when the time is 3:30 PM?

(A) 90° (B) 108° (C) 75° (D) 81° (E) None of the above.

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12. Which of the following is not true?

(A) a parallelogram is a quadrilateral
(B) at least two interior angles of a triangle are acute
(C) a trapezoid has two parallel sides
(D) an isoceles triangle has three sides with the same length
(E) the two diagonals of a rectangle have the same length

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13. If the volume of a cylinder is $20\pi \text{in}^3$ and its height is 5in what is its diameter in inches?

(A) 2 (B) 4 (C) 10 (D) 5 (E) None of the above.

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14. A triangle in the xy-plane has vertices at $(-1, 1)$, $(-1, 10)$, and $(3, 4)$. What is its area?

(A) 13.5 (B) 9 (C) 4.5 (D) 27 (E) None of the above

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15. An equilateral triangle has one side of length 7. What is the perimeter of the triangle?

(A) 21 (B) $49\sqrt{3}$ (C) $7\sqrt{3}/2$ (D) 49π (E) None of the above

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16. The area of the annular region between two concentric circles is 825π and the radius of the smaller circle is 4. Find the diameter of the larger circle.

(A) 56 (B) 58 (C) 62 (D) 72 (E) None of the above

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17. 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 traveled?

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

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18. The length of two sides of a non-degenerate triangle are 11 and 1. If the third side also has integer length c the how many different possibilities are there for the value of c?

(A) 5 (B) 7 (C) 9 (D) 11 (E) None of the above.

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19. If A and B are distinct points in a plane, which of the following describes the locus of points that would form a right triangle with A and B such that $\overline{AB}$ is the hypotenuse of the triangle.

(A) a semicircle (B) a circle (C) a line (D) two parallel lines (E) None of the above.

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20. What is the largest possible perimeter of a right triangle with hypotenuse 25?

(A) 50 (B) $25 + 5\sqrt{2}$ (C) $25 + 3\sqrt{2}$ (D) $25 + 25\sqrt{2}$ (E) None of the above.

ANSWERS:

1. C
2. E
3. B
4. C
5. C
6. A
7. D
8. A
9. E
10. D
11. C
12. D
13. B
14. E
15. A
16. B
17. C
18. E
19. E
20. D