OU Math Day 2007

Geometry Test

---

1. A circle has area 8. What is its diameter?

   (A) $4\sqrt{2}/\sqrt{\pi}$ (B) $4/\pi$ (C) $4\sqrt{2\pi}$ (D) $4/\sqrt{\pi}$ (E) None of the above.

---

2. An isosceles triangle has two sides of length 10 and one of length 12. What is the area of the triangle?

   (A) 12 (B) 24 (C) 32 (D) 48 (E) None of the above.

---

3. A circle inscribed in a square has a circumference of 6π. What is the perimeter of the square?

   (A) 12 (B) 24 (C) 36 (D) 48 (E) None of the above.

---

4. A triangle has side lengths 10, 24 and 26 inches. A rectangle with the same area as the triangle has one side with length 3 inches. What is the length of the diagonal of the rectangle in inches?

   (A) $\sqrt{298}$ (B) $\sqrt{1609}$ (C) $\sqrt{634}$ (D) $\sqrt{970}$ (E) None of the above.

---

5. If a triangle is acute, which of the following conditions are satisfied?
   I. *All internal angles are less than* $90°$.
   II. *exactly one internal angle is larger than* $90°$.
   III. *the sum of all three internal angles is* $180°$.

   (A) I only (B) II only (C) I & III only (D) III only (E) None of the above.

---

6. A circle of radius 10 is inscribed in an equilateral triangle. Find the area of the portion of the triangle which is not contained in the circle.

(A) $400\sqrt{3} - 100\pi$ (B) $200\sqrt{3} - 100\pi$ (C) $600\sqrt{3} - 100\pi$
(D) $300\sqrt{3} - 100\pi$ (E) None of the above.

---

7. Three faces of a rectangular box have areas of 40, 45 and 72 square feet. What is the volume of the box in cubic feet?

(A) 360 (B) 330 (C) 280 (D) 400 (E) None of the above.

---

8. The number of edges in an decagon is

(A) 8 (B) 9 (C) 10 (D) 12 (E) None of the above.

---

9. The sum of the interior angles in a decagon is

(A) 1440° (B) 1080° (C) 720° (D) 360° (E) None of the above.

---

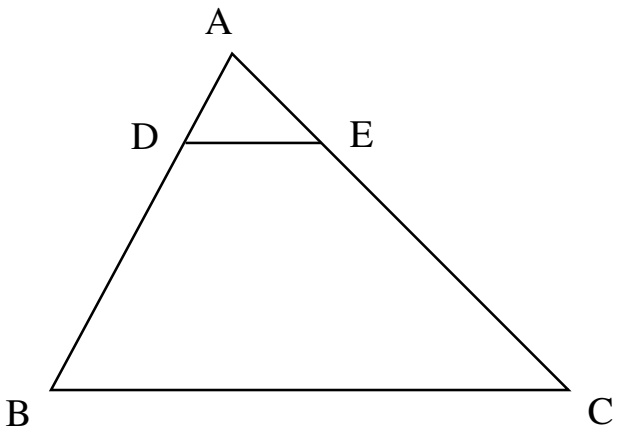
10. Each exterior angle in a regular decagon has measure

(A) 144° (B) 10° (C) 36° (D) 90° (E) None of the above.

---

11. In the triangle ABC pictured below, BC and DE are parallel. If $|BC|$ is 12 cm, $|DE|$ is 3 cm, and triangle ADE has area 5 cm^2 then what is the area of triangle ABC in square centimeters?

(A) 40 (B) 80 (C) 120 (D) 20 (E) None of the above.



12. In the triangle ABC pictured above, BC and DE are parallel. If $|BC|$ is 12 cm, $|DE|$ is 3 cm, and triangle ADE has area 5 cm^2 then what is the height of the trapezoid $DEBC$ in centimeters?

(A) 2 (B) 14/3 (C) 10 (D) 46/3 (E) None of the above.

13. A can is made out of a right circular cylinder with height h and radius 5, and circular top and bottom pieces with radius 5. If the surface area of the can is 120π then what must h equal?

(A) 12 (B) 8 (C) 7 (D) 9.5 (E) None of the above.

14. Let $\mathcal{C}$ be a circle in the plane with radius 7. Let $\mathcal{D}$ be the set of points in the plane whose distance from $\mathcal{C}$ is no more than 5. What is the area of $\mathcal{D}$?

(A) 196π (B) 189π (C) 140π (D) 95π (E) None of the above.

---

15. An altitude of an equilateral triangle has length 2. What is the perimeter of the triangle?

(A) $3\sqrt{3}$ (B) $\sqrt{3}$ (C) $3\sqrt{2}$ (D) $12/\sqrt{3}$ (E) None of the above.

---

16. The altitude to the hypotenuse of a right triangle divides the hypotenuse into pieces of length 6 and 8. What is the area of the triangle?

(A) $4\sqrt{3}$ (B) $28\sqrt{3}$ (C) 48 (D) $16\sqrt{3}$ (E) None of the above.

---

17. The triangle with vertices $(1, 1)$, $(4, 5)$ and $(0, 2)$ is:

(A) A scalene triangle (B) An isosceles triangle (C) An equilateral triangle
(D) A right triangle. (E) None of the above.

---

18. Which of the following conditions on a quadrilateral Q guarantee that Q is a parallelogram?

I. *Both pairs of opposite sides have the same length.*

II. *There is a pair of opposite sides of the same length, and also a pair of opposite sides that are parallel.*

III. *Both pairs of opposite angles are congruent.*

(A) I and III only (B) I only (C) I, II, and III (D) I and II only
(E) None of the above.

---

19. Let $\mathcal{C}$ be a circle and let P and Q be distinct points on $\mathcal{C}$. How many points on $\mathcal{C}$ are equidistant from P and Q?

(A) 0 (B) 1 (C) 2 (D) 4 (E) None of the above.
