OU MathDay 2001
GEOMETRY TEST

1. The supplement of an acute angle exceeds the complement of that acute angle by:

   A. 180°; **B.** 150°; **C** 120°; **D.** 90°; **E.** none of these.

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2. The area of a rectangle with a diagonal of 13 and a base of 5 is:

   A. 65; **B.** 34; **C.** $32\frac{1}{2}$; **D.** 30; **E.** none of these.

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3. In triangle MID, P is the midpoint of $\overline{MI}$ and T is the midpoint of $\overline{DI}$. If $MI = 4$, $DI = 6$, and $MD = 8$, then $PT =$:

   A. 4; **B.** 3; **C.** 2; **D.** 1; **E.** none of these.

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4. The area of a circle with a diameter of 12 is:

   A. 12π; **B.** 24π; **C.** 36π; **D.** 144π; **E.** none of these.

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5. In the figure to the right, $a \parallel b$ and the transversal c yields the angles shown. Which pair of angles need not be congruent?

   A. 1 and 7; **B.** 1 and 3; **C.** 6 and 7;

   D. 4 and 8; **E.** 2 and 6

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6. The midpoint of the segment joining (-2,5) and (8,3) is:

   A. (3,1); **B.** (3,4); **C.** (5,1); **D.** (5,4); **E.** none of these

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7. The altitude of a right circular cone in which the slant height is 20 and the radius of the base is 12 is:

   A. 15; **B.** 16; **C.** 18; **D.** $4\sqrt{34}$; **E.** none of these.

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8. Triangle PYT is a right triangle in which PY = 66 and YT =77. if PT is more than 50, and PT is expressed in the simplified form of $x\sqrt{y}$ (x and y are natural numbers and y has no repeated prime factors), then $x + y$ is:

   A. 13; **B.** 24; **C.** 85; **D.** 96; **E.** none of these.

9. In the figure to the right, $\overrightarrow{DB}$ bisects $\angle ADC$, $AD = 6$, $AB = 3$, and $DC = 8$. Then $DB =$:

   A. $3\sqrt{5}$; **B.** $4\sqrt{3}$; **C.** $\sqrt{31}$; **D.** 6;

   E. none of these

10. In triangle ABC as shown to the right, $AB = 7$, $AC = 8$, and median $\overline{AD}$ has a length of 6. Then BC is:

    A. $\sqrt{67}$; **B.** $\sqrt{82}$; **C.** $\sqrt{97}$; **D.** $\sqrt{103}$;

    E. none of these.

11. The volume of a rectangular solid with edges of 3 and 4 and with each of its four diagonals equal to $\sqrt{31}$ is:

    A. $12\sqrt{31}$; **B.** $12\sqrt{22}$; **C.** $12\sqrt{15}$; **D.** 72; **E.** none of these.

12. The measure of each angle of an equiangular polygon is 172 and the number of sides is n. Which of the following is true?

    A. no such polygon exists; **B.** $n = 45$; **C.** $n = 48$; **D.** $n = 50$; **E.**) none of these

13. The vertex angle of a certain isosceles triangle is $40°$. If an exterior angle at the base of the triangle is bisected, the measure of the angle formed by the bisector and a leg of the triangle is:

    A. 70; **B.** 35; **C.** 110; **D.** 65; **E.** none of these.

14. Cee Attle is 6 feet tall and while standing near the Pacific in the sun casts an 8 foot shadow. Nearby is 5 foot tall Waw Sheengtun. What is the length of Waw's shadow in feet?

    A. 8; **B.** 7; **C.** $6\frac{2}{3}$; **D.** $6\frac{1}{2}$; **E.** none of these.

15. In triangle ACD to the right, $\angle CAD = 50°$ and $\angle CFD = 110°$. If $\overrightarrow{CE}$ bisects $\angle ACD$, and $\overline{DB}$ is the altitude to $\overline{AC}$ then the number of degrees in $\angle CDF$ is:

    A. 20; **B.** 30; **C.** 40; **D.** 50;

    E. none of these

16. In the figure to the right , $AE = 6$, $\angle DBC = 90°$, $EC = 8$, $\angle AEC = 90°$, $\overline{AB} \cong \overline{BC}$. Then the area of the quadrilateral $ABDE$ is:

    A. $14\frac{5}{8}$; **B.** $15\frac{1}{4}$; **C.** $15\frac{3}{8}$; **D.** 16;

    E. none of these.

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1. $RHOM$ is a rhombus, as shown. If $MO = 3x + 5$ and the measure of angle MBR is $5x + 35$ degrees then the perimeter of the rhombus is:

   A. unknown because there is insufficient information; **B.** non-existent; **C.** 152; **D.** 360; **E.** none of these.

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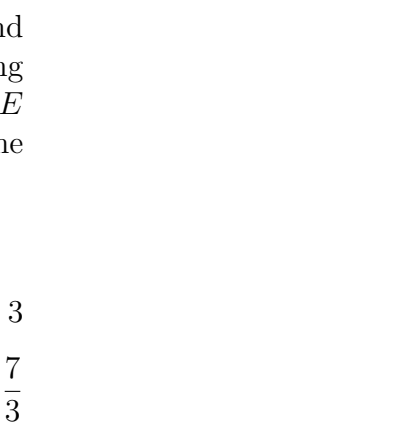
2. In the figure to the right, B lies on $\overline{AC}$, and E lies on $\overline{AD}$. In how many of the following cases are the two triangles ACD and ABE similar (with some correspondence of the vertices)?



I. $\angle ABE \cong \angle ACD$

II. $AB = 4,\ BC = 6,\ AE = 2,\ ED = 3$

III. $AB = 2,\ BC = 6,\ AE = 3,\ DE = \dfrac{7}{3}$

A. I. only; **B. II.** only; **C. III.** only;

D. I. and **II.** only; **E.** all three cases.