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.

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.

3. In triangle MIDE, P is the midpoint of MI and T is the midpoint of DI. If MI = 4, DI = 6, and MD = 8, then PT = :
   A. 4;  B. 3;  C. 2;  D. 1;  E. none of these.

4. The area of a circle with a diameter of 12 is:
   A. 12\(\pi\);  B. 24\(\pi\);  C. 36\(\pi\);  D. 144\(\pi\);  E. none of these.

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

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

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.

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. $\frac{2}{3}$; D. $\frac{1}{2}$; E. none of these.

15. In triangle $ACD$ to the right, $\angle CAD = 50^\circ$ and $\angle CFD = 110^\circ$. If $\overrightarrow{CE}$ bisects $\angle ACD$, and $\overrightarrow{DB}$ 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, $AE = 6$, $\angle DBC = 90^\circ$, $EC = 8$, $\angle AEC = 90^\circ$, $\overline{AB} \cong \overline{BC}$. 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.
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.
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. $AB = 2$, $BC = 6$, $AE = 3$, $DE = \frac{7}{3}$

A. I. only;   B. II. only;    C. III. only;
D. I. and II. only;   E. all three cases.