2006 ACTM
STATE GEOMETRY EXAM

In each of the following you are to choose the **best (most correct)** answer and mark the corresponding letter on the answer sheet provided. The figures are not necessarily drawn to scale.

1. The length of a rectangle is 3 more than its width. If its perimeter is 24, what is its area?

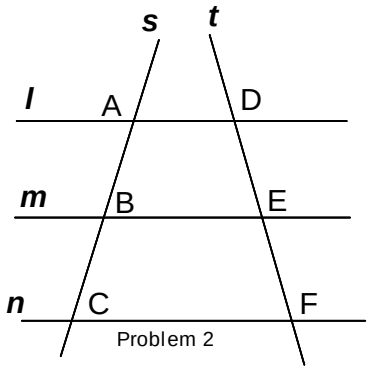
   A. 27 B. 191.75 C. 33.75

   D. Not enough information E. None of these

2. In the figure ***l, m, n*** are parallel lines with transversals ***s*** and ***t***. If AB = 3, BC = 4, DE = 2x – 3 and EF = x + 5 then DF =

   A. 21 B. 18.2 C. 10.4

   D. 7.8 E. None of these

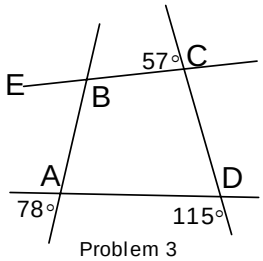


Problem 2

3. In the figure at the right, with angle measures indicated, what is the measure of ∠ABE?

   A. 86^o B. 94^o C. 96^o

   D. 104^o E. None of these



Problem 3

4. Angle A and angle B are complementary angles and angle A and angle C are supplementary angles. Which of the following is/are true?

   I. m∠C > m∠B II. m∠C – m∠B = 90^o III. m∠B + m∠C = 180^o

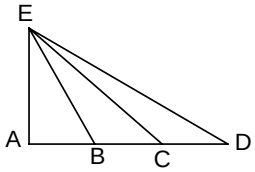
   A. I and II only B. I and III only C. II and III only

   D. I, II and III E. None of these

5. In the figure AE = 4, AB = BC = CD and the area of ΔCDE = 6. Find CE to the nearest hundredth.

   A. 9.77 B. 9.85 C. 7.14

   D. 7.21 E. None of these



Problem 5

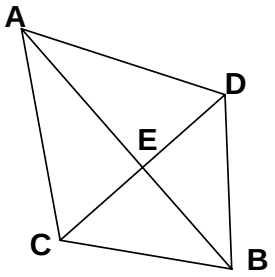
6. $\overline{AB}$ is the perpendicular bisector of $\overline{CD}$ and $\overline{CD}$ is the perpendicular bisector of $\overline{AB}$. Which of the following is/are true?

I. AC = BD II. $\overline{AC} \parallel \overline{BD}$ III. $\overrightarrow{AB}$ bisects $\angle CAD$

A. I and II only B. I and III only

C. II and III only D. I, II, and III

E. None of these

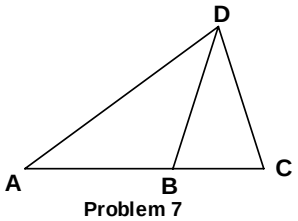


Problem 6

7. In the figure at the right, if $\overline{AB} \cong \overline{BD} \cong \overline{CD}$ and $\overline{AD} \cong \overline{AC}$ then $m\angle ADB$ =

A. 36^o B. 72^o C. 108^o

D. 62.5^o E. Not enough information



Problem 7

8. How many vertices and edges does a prism have if it has 12 faces? Answers are written as (vertices, edges).

A. (18, 28) B. (20, 30) C. (22, 32)

D. (16, 26) E. None of these

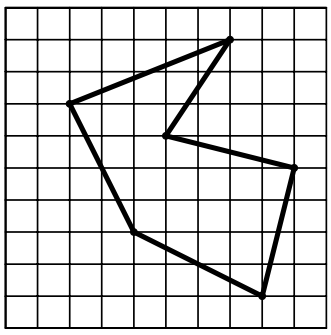
9. The contrapositive of the statement **"If $\overline{AB}$ is congruent to $\overline{CD}$ then AB = CD"** is

A. If $\overline{AB}$ is not congruent to $\overline{CD}$ then $AB \neq CD$.
B. If AB = CD then $\overline{AB}$ is congruent to $\overline{CD}$.
C. If $AB \neq CD$ then $\overline{AB}$ is congruent to $\overline{CD}$.
D. If $AB \neq CD$ then $\overline{AB}$ is not congruent to $\overline{CD}$.
E. None of these

10. The area of the polygon at the right is

A. 25½ B. 26 C. 26½

D. 25 E. None of these


Problem 10

11. The number of lines of symmetry in a regular octagon is

A. 16 B. 4 C. 24 D. 6

E. None of these

12. ΔABC is an isosceles triangle with $\overline{AB} \cong \overline{AC}$. Which of the following is/are true?

I. The centroid of the triangle lies on the angle bisector of $\angle BAC$.
II. The altitude from vertex A is a median of the triangle.
III. The center of the circle that is tangent to the three sides of the triangle lies on the median drawn from A.

A. I and II only B. I and III only C. II and III only

D. I, II, and III E. None of these

13. A regular polygon has 20 sides. The measure of an exterior angle of this polygon is

A. 36^o B. 153^o C. 18^o

D. 162^o E. None of these

14. A polygon on a geoboard has an area of 16.5. If it has eleven pegs touching the geoband, how many pegs are in its interior?

A. 12 B. 11 C. 10 D. 14

E. None of these

15. The diagonals of the quadrilateral ABCD are perpendicular. Which of the following could be true?

A. ABCD is a square B. ABCD is a rhombus C. ABCD is a kite

D. Either A, B, or C might be true E. None of these are true

16. The diagonals of the quadrilateral ABCD bisect each other. Which of the following is the most accurate?

A. ABCD is a rectangle B. ABCD is a rhombus

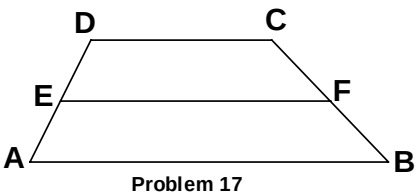
C. ABCD is a parallelogram D. ABCD is a kite

E. None of these

17. Consider the trapezoid ABCD at the right with E and F midpoints of $\overline{AD}$ and $\overline{BC}$, respectively. If AB = 36, BC = 17, CD = 15, AD = 10 then EF =

A. 25.5 B. 39 C. 19.5

D. 26 E. None of these

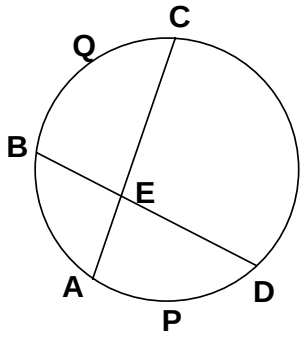


Problem 17

18. $\overline{AC}$ and $\overline{BD}$ are chords in a circle intersecting at E. If the measure of the arc APD = 32^o and the measure of arc BQC = 80^o then m$\angle$BEC is

A. 80^o B. 56^o C. 48^o

D. 24^o E. None of these

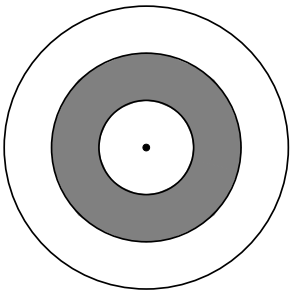


Problem 18

19. A dart board consists of three concentric circles with diameters of 6 inches, one foot, and 18 inches. If a dart is thrown at and hits the board, what is the probability it lands in the shaded region?

A. $\frac{1}{12}$ B. $\frac{1}{3}$ C. $\frac{1}{4}$

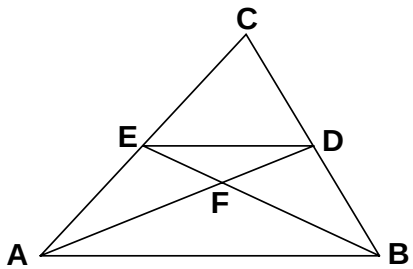
D. $\frac{4}{9}$ E. None of these


Problem 19

20. In ΔABC, $\overline{AD}$ and $\overline{BE}$ are medians intersecting at F. The ratio of the area of ΔDEF to the area of ΔABF is

A. 1 to 2 B. 2 to 3 C. 1 to 4

D. 1 to 3 E. None of these



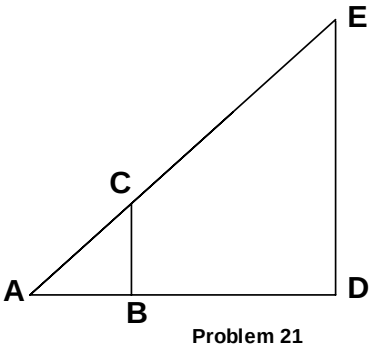
Problem 20

21. In the figure at the right $\overline{BC}$ and $\overline{DE}$ are perpendicular to $\overline{AD}$. If AC = 10, CE = 20, and DE = 18, then the area of ΔABC to the nearest hundredth is

A. 19.62 B. 24.00

C. 30.00 D. 216.00

E. None of these

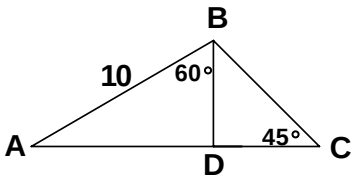


Problem 21

22. In ΔABC, $\overline{BD}$ is an altitude, AB = 10, $m\angle ABD = 60^o$ and $m\angle BCD = 45^o$. The perimeter of ΔABC, to the nearest hundredth, is

A. 35.91 B. 24.66 C. 30.73

D. 26.18 E. None of these

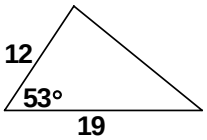


Problem 22

23. What is the area, to the nearest hundredth, of the triangle at the right?

A. 91.04 B. 90.26 C. 45.13

D. Not enough information E. None of these



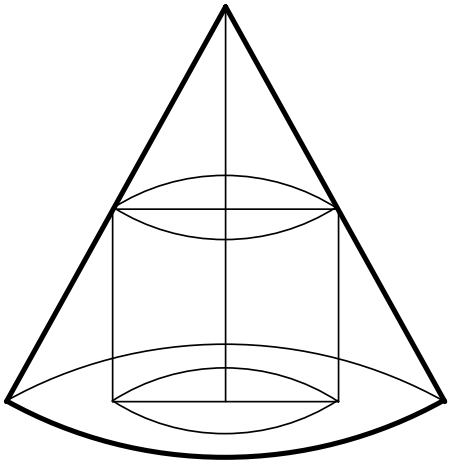
Problem 23

24. A cylinder has a radius of 3 inches and a height of 4 inches sits on a table. If a cone whose height is 12 inches is placed over the cylinder so that the top of the cylinder touches the inside of the cone and the base of the cone is on the table, what is the volume of the cone?

A. 24π in^3 B. 64π in^3

C. 81π in^3 D. 36π in^3

E. None of these


Problem 24

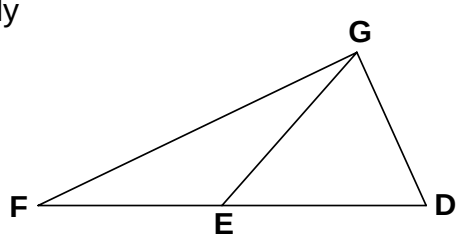
25. In the figure $m\angle FEG > m\angle GED$ and $\overline{EG} \cong \overline{ED}$. Which of the following is/are true?

I. $m\angle GED > m\angle EGF$ II. FG > FE III. FD > FG.

A. I and II only B. I and III only

C. II and III only D. I, II, and III

E. None of these



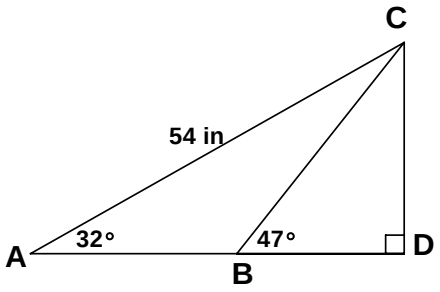
Problem 25

Geometry Tie Breaker Questions

Name_____ School _____
Please Print Please Print

The following questions will be used only in breaking ties for first, second or third place. Be sure you answer all the questions on the test before attempting these questions. They will be used in the order given to break the ties.

1. In the figure at the right, what is the length of $\overline{AB}$, to the nearest tenth of an inch?



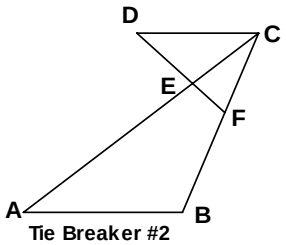
Tie Breaker #1

Geometry Tie Breaker Questions

Name_____ School _____

Please Print Please Print

2. In the figure at the right $\overline{AB} \parallel \overline{CD}$ and $\angle ACB \cong \angle CDF$. CF = 5, BF = 7, AB = 15, DC = 8, DE = 4. Compute AE.

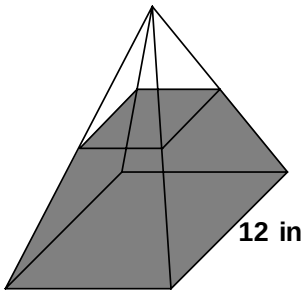


Tie Breaker #2

Geometry Tie Breaker Questions

Name_____ School _____
Please Print Please Print

3. The edges of a pyramid with a square base are all equal. A plane parallel to the base passes through the pyramid at the midpoint of the altitude of the pyramid. If an edge of the pyramid is 12 inches, what is the volume of the part of the pyramid that lies below the plane (the shaded portion)?



Tie Breaker #3

KEY

GEOMETRY 2006

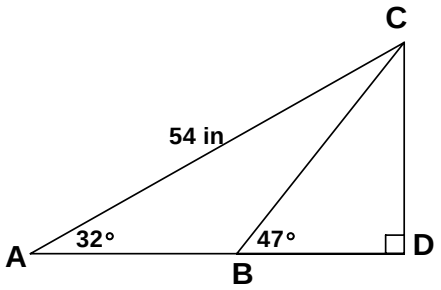
1.	C	2.	B
3.	A	4.	A
5.	D	6.	D
7.	A	8.	B
9.	D	10.	B
11.	E	12.	D
13.	C	14.	A
15.	D	16.	C
17.	A	18.	B
19.	B	20.	C
21.	B	22.	C
23.	A	24.	C
25.	D		

GeometryTie Breaker Questions

Name **KEY** School _____
Please Print Please Print

The following questions will be used only in breaking ties for first, second or third place. Be sure you answer all the questions on the test before attempting these questions. They will be used in the order given to break the ties.

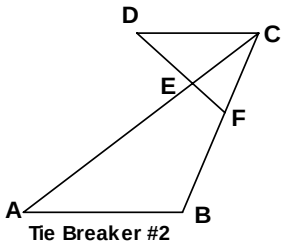
1. In the figure at the right, what is the length of $\overline{AB}$, to the nearest tenth of an inch?



Tie Breaker #1

CD = 54sin 32°
BD = 54sin 32°/tan 47°
AD = 54cos 32°
AB = AD – BD
AB = 19.1 in

2. In the figure at the right $\overline{AB} \parallel \overline{CD}$ and $\angle ACB \cong \angle CDF$. CF = 5, BF = 7, AB = 15, DC = 8, DE = 4. Compute AE.



Tie Breaker #2

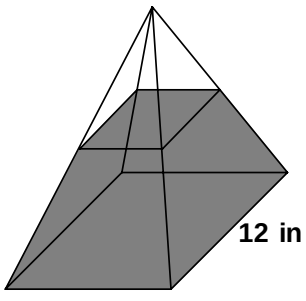
$\Delta ABC \sim \Delta CED$

$\frac{CE}{DE} = \frac{AB}{BC}$. $CE = \frac{4(15)}{12} = 5$.

$\frac{AC}{BC} = \frac{CD}{DE}$. $AC = \frac{8(12)}{4} = 24$.

AE = AC – CE = 24 – 5 = 19

3. The edges of a pyramid with a square base are all equal. A plane parallel to the base passes through the pyramid at the midpoint of the altitude of the pyramid. If an edge of the pyramid is 12 inches, what is the volume of the part of the pyramid that lies below the plane (the shaded portion)?



Tie Breaker #3

The dimensions of the top square will be 6 x 6. The altitude of the pyramid on top is $3\sqrt{2}$. The altitude of the large pyramid is $6\sqrt{2}$.
Volume (top pyramid) = $36(3\sqrt{2})/3 = 36\sqrt{2}$ in^3.
Volume(large pyramid) = $144(6\sqrt{2})/3 = 432\sqrt{2}$ in^3.
Volume (bottom) = $432\sqrt{2} - 36\sqrt{2} = 396\sqrt{2}$ in^3