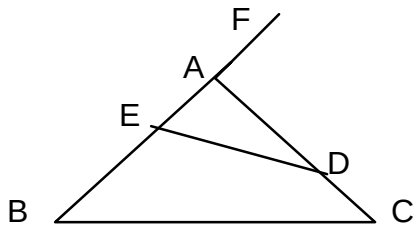
Quadrilaterals – Euclidean Division
FAMAT State Convention 2002
Diagrams are NOT drawn to scale.
NOTA means "none of the above" answers is correct.

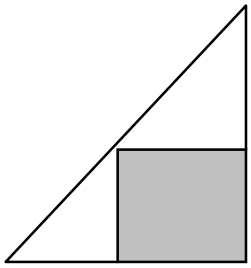
1. In the diagram, $m\angle FAD = 110, m\angle AED = 60, m\angle C = 32$.
   Find $m\angle EDC + m\angle EBC$.

   A. 78 B. 130 C. 208 D. 282 E. NOTA



2. Using the diagram, a carpenter has a scrap piece of plywood in the shape of a right triangle with legs of 10 and 15. From this, he wants to cut a square piece as shown. The top left vertex of the square is on the hypotenuse. Find the area of the square.

   A. 24 B. 25 C. 36 D. 81 E. NOTA



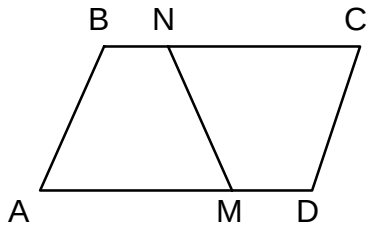
3. The perimeter of an isosceles trapezoid ABCD is 62. The length of base $\overline{AB}$ is six more than four times the length of base $\overline{CD}$. The length of $\overline{AD}$ is one more than twice the length of base $\overline{CD}$. Find the area of the trapezoid.

   A. 30 B. 36 C. 72 D. 90 E. NOTA

4. In parallelogram ABCD, $\overline{AC}$ and $\overline{DB}$ are diagonals. If BC=7, AB=8, and $m\angle C = 60$, find the value of $(AC)^2 - (BD)^2$.

   A. 8 B. 87 C. 169 D. 201 E. NOTA

5. In the diagram, parallelogram ABCD with perimeter 52. The perimeter of ABNM is 36. Find NM.



A. 10 B. 13 C. 18 D. cannot be determined E. NOTA

6. In an isosceles trapezoid, the length of each leg is 3, each diagonal has length 7, and the longer base has a length of 8. Find the length of the shorter base.

A. 3 B. 4 C. 5 D. 6 E. NOTA

7. Given parallelogram ABCD with $m\angle B = 4x + 15, m\angle D = 6x - 27$.
Find $m\angle A$.

A. 12 B. 81 C. 99 D. 101 E. NOTA

8. Find the length of the longer altitude of parallelogram ABCD if
AB= $6\sqrt{2}$, BC= $4\sqrt{3}$, and $m\angle A = 60$.

A. $3\sqrt{6}$ B. 6 C. 9 D. $6\sqrt{2}$ E. NOTA

9. In quadrilateral ABCD, $\overline{AB} \cong \overline{AD}$, $\overline{BC} \cong \overline{CD}$, AC=10, BD=6. If the midpoints of the sides of quadrilateral ABCD are joined consecutively, find the area of the resulting quadrilateral.

A. 15 B. 30 C. 60 D. 90 E. NOTA

10. In rectangle ABCD, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at point X. If $m\angle BAX = 22$ then $m\angle BXC = ?$

A. 22 B. 55 C. 68 D. 136 E. NOTA

11. A square is formed by connecting the midpoints of sides AB, CD, EF and GH of regular octagon ABCDEFGH. A side of the octagon is 10. Find the area of the square.

A. $50 + 25\sqrt{2}$ B. 100 C. 150 D. $150 + 100\sqrt{2}$ E. NOTA

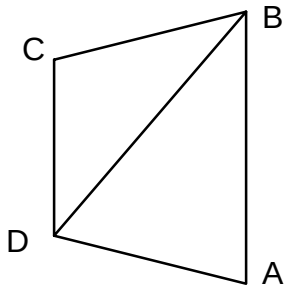
12. If quadrilateral WXYZ is inscribed in circle P, and $m\angle X$ =80, find the $m\angle Z$.

A. 40 B. 80 C. 90 D. 100 E. NOTA

13. In the diagram, given quadrilateral ABCD with $\overline{CD} \parallel \overline{AB}$ and BC=DC. Which of the following statement(s) is/are true?

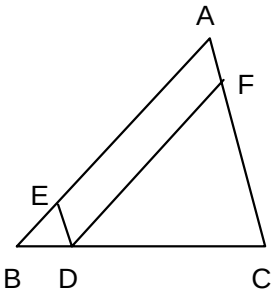
I. $m\angle CBD = m\angle ABD$ II. $m\angle ABD = m\angle CDB$ III. $m\angle CDB = m\angle CBD$

A. II only
B. II and III only
C. III only
D. I, II, III
E. NOTA



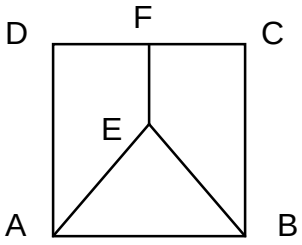
14. In the diagram, triangle ABC is isosceles with $\angle A$ the vertex angle. The legs have length 7, $\overline{DE} \parallel \overline{AC}$ and $\overline{DF} \parallel \overline{AB}$. Find the perimeter of quadrilateral DEAF.

A. $12\frac{5}{6}$
B. 14
C. $17\frac{1}{2}$
D. 21
E. NOTA



15. In the diagram, ABCD is a square with side of length 4. Triangle ABE is equilateral with $\overline{EF} \perp \overline{CD}$. Find EF.

A. $16 - 4\sqrt{3}$
B. $3\sqrt{3} - 4$
C. $2\sqrt{3}$
D. $4 - 2\sqrt{3}$
E. NOTA



16. The perimeter of a rhombus is 40. One of the angles of the rhombus has a measure of $60°$. Find the sum of the lengths of the diagonals.

A. 10 B. $10\sqrt{3}$ C. 20 D. $20\sqrt{3}$ E. NOTA

17. In rectangle ABCD, E is a point of $\overline{AB}$ such that BE=BC. AE=7 and EC=$5\sqrt{2}$. Find the ratio of the area of triangle CBE to the area of trapezoid AECD.

A. 5:38 B. 5:19 C. 10:19 D. 24:19 E. NOTA

18. Given a square with sides of length 4. What is the sum of the distances from one vertex of the square to the midpoints of each of the sides of the square?

A. 4 B. $4\sqrt{5}$ C. $4+4\sqrt{5}$ D. 16 E. NOTA

19. What is the area of a square inscribed in a circle whose radius is 6?

A. 8 B. 16 C. 32 D. 72 E. NOTA

20. Which statement is true?

A. All rhombuses are parallelograms.
B. All parallelograms are kites.
C. All kites are rhombuses.
D. All rectangles are squares.
E. NOTA

21. Given a quadrilateral ABCD inscribed in circle O with $\overline{AB}$ extended beyond B to some point E. If $m\angle BAD = 92$ and $m\angle ADC = 68$, find $m\angle EBC$.

A. 66 B. 68 C. 70 D. 92 E. NOTA

22. Let ABCD be an isosceles trapezoid with a perimeter of 28 and $\overline{AB} \parallel \overline{CD}$. Find the area of ABCD if AB=8 and CD=12.

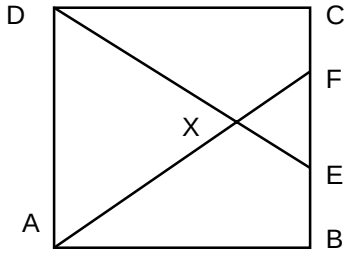
A. $12\sqrt{3}$ B. $18\sqrt{3}$ C. $20\sqrt{3}$ D. $40\sqrt{3}$ E. NOTA

23. In quadrilateral ABCD with vertices $A(-1,5), B(7,-1), C(3,-5), D(-1,-3)$, find the sum of the coordinates of the intersection of the diagonals, when the coordinates are expressed in simplified form.

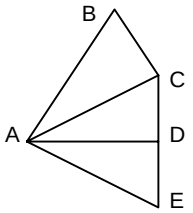
A. $-\frac{4}{11}$ B. $\frac{5}{13}$ C. $\frac{49}{11}$ D. $\frac{57}{13}$ E. NOTA

24. In the diagram, given square ABCD with sides of length 12, $\overline{BC}$ is trisected by E and F. What is AF?

A. 4 B. $4\sqrt{10}$
C. $4\sqrt{13}$ D. 20
E. NOTA



25. In the diagram,
$\overline{AC} \perp \overline{BC}, \overline{AD} \perp \overline{CE}, AB = 17,\ BC = 8, CD = 9, DE = 5.$
Find the area of quadrilateral ABCE.



A. 165 B. 330 C. 400 D. 480 E. NOTA

26. Find the area of a rhombus with sides 25 and one diagonal 14.

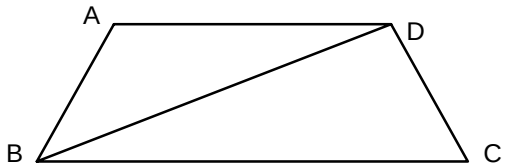
A. 98 B. 336 C. 350 D. 772 E. NOTA

27. ABCD is a parallelogram. F is a point on $\overline{AD}$ such that DF:FA=4:3. $\overline{AC}$ intersects $\overline{BF}$ at E. Find CE:EA.

A. 4:3 B. 3:4 C. 7:3 D. 7:4 E. NOTA

28. Given trapezoid ABCD with bases AD and BC. AD=15, AB=16, BD=17, BC=18. Find the ratio of the areas of triangle ABD to triangle BCD.

A. 5:6
B. 7:16
C. 7:17
D. 1:1
E. NOTA



29. The perimeter of a parallelogram is 154. The altitude to the shorter side is 12, and the altitude to the longer side is 10. Find the area of the parallelogram.

A. 210 B. 420 C. 770 D. 800 E. NOTA

30. Given ABCD is a kite with AD=AB and CD=BC. If AB= $x+3$, BC= $x+4$, CD= $2x-1$, and AD= $3x-y$. Find the perimeter of the kite.

A. 7 B. 17 C. 34 D. cannot be determined `E. NOTA