

IBA

Name :

Batch:

MATH LECTURE - 08

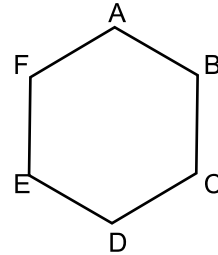
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PART I: CLASS PRACTICE

GROUP 1: POLYGONS

1. How many degrees are there in the angle formed by two adjacent sides of a regular nonagon?
a. 40° b. 70° c. 105° d. 120° e. 140°
2. In the diagram below, ABCDEF is a regular hexagon. How many degrees are there in $\angle ACD$?

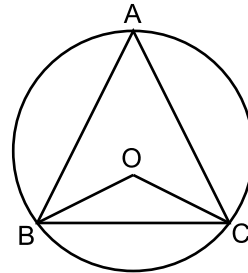
- a. 45°
b. 60°
c. 75°
d. 90°
e. None of these



GROUP 2: CIRCLE

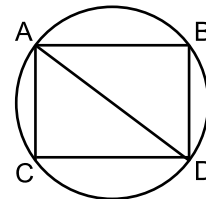
3. In the figure, O is the center of the circle and $\angle OCB = 35^\circ$. What is the value of $\angle BAC$?

- a. 65°
b. 60°
c. 55°
d. 50°
e. None of these



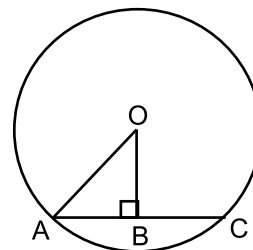
4. In the diagram below, $AB = CD$. From this we can deduce that:

- a. AB is parallel to CD
b. AB is perpendicular to BD
c. $AC = BD$
d. $\angle ADB = \angle CAD$
e. $\triangle ABD$ is congruent to $\triangle ACD$



5. In the figure, below, O is the center of the circle. If $OB = 5$, and $AC = 24$, what is the value of the circumference of the circle?

- a. 13π
b. 26π
c. 48π
d. 50π
e. Cannot be determined

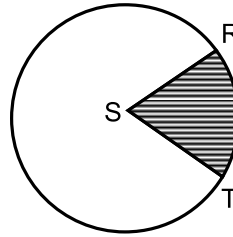


6. If the area of a semicircle is 8π square inches, what is the perimeter of the semicircle?

- a. 8π inches b. $4\sqrt{2}\pi$ inches c. $8 + 4\pi$ inches
d. $8 + 8\pi$ inches e. None of these

7. S is the center of the following circle. The diameter of the circle is 6 cm and $\angle RST = 40^\circ$. What is the area of the shaded portion in sq. cm?

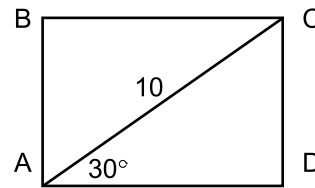
- a. π
- b. 2π
- c. 3π
- d. 4π
- e. None of these



GROUP 3: RECTANGLES & PARALLELOGRAM

8. In rectangle ABCD below, AC = 10, what is the area of the rectangle?

- a. $25\sqrt{2}$
- b. $25\sqrt{3}$
- c. 48
- d. 50
- e. 100



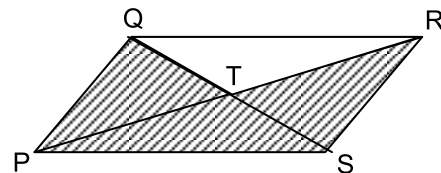
9. In rectangle ABCD, the diagonals AC and BD intersect at E. Which of the following statements is not necessarily true?

- a. $AE = BE$
- b. $\angle AEB = \angle CED$
- c. AE is perpendicular to BD.
- d. $\triangle AED$ and $\triangle AEB$ are equal in area.
- e. $\angle BAC = \angle BDC$

10. In the given diagram, if PQRS is a parallelogram, which of the following can be deduced?

1. $QT + PT = RT + ST$
2. QS is perpendicular to PR.
3. The area of the shaded portion is exactly three times the area of triangle $\triangle QRT$.

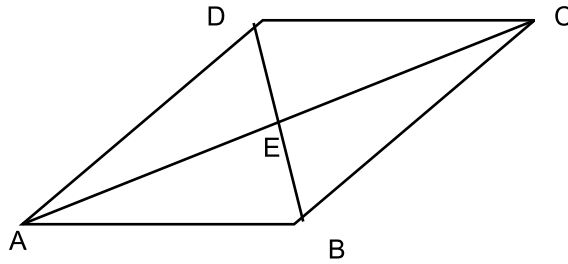
- a. 1 only
- b. 1 and 2 only
- c. 2 only
- d. 1 and 3 only
- e. 1, 2 and 3



GROUP 4: SQUARE & RHOMBUS

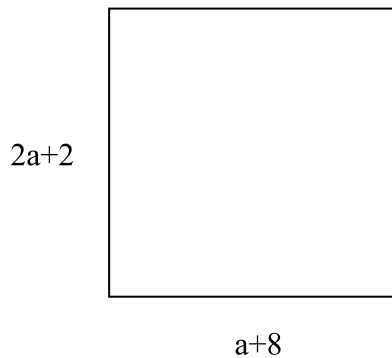
11. If the diagonal of a square is 16 inches long, what is the area of the square?

- a. 64 square inches
- b. $64\sqrt{2}$ square inches
- c. 128 square inches
- d. $128\sqrt{2}$ square inches
- e. 256 square inches



12. In the above rhombus, side $AB = 10$ cm, and $\angle BAE = 30^\circ$. What is the area of the rhombus in sq. cm?
- a. 50 b. $50\sqrt{2}$ c. $50\sqrt{3}$ d. $100\sqrt{3}$ e. Cannot be determined

13.



In this square, what is the value of a ?

- (A)12 (B)10 (C)6 (D)8 (E) None of these

GROUP 5: CLOCK RELATED PROBLEMS

14. At 7:30, how many degrees are included between the hands of a clock?
- a. 15° b. 30° c. 45° d. 60° e. 75°
15. Through how many degrees does the hour hand of a clock move in 50 minutes?
- a. 25° b. 35° c. 80° d. 120° e. 300°
16. How many degrees are included between the hands of a clock at 7:44 pm?
- a. 22° b. 29° c. 32° d. 35° e. None

GROUP 6: SOLID GEOMETRY (RECTANGULAR SOLID, CUBE, CYLINDER, SPHERE)

17. If the height of a cylinder is twice its radius and the volume of the cylinder is $\frac{44}{7}$ cubic meter, what is the radius of the cylinder in meter?
- a. 1 b. 3 c. 5 d. 9 e. Cannot be determined
18. If one cubic foot of water equals 7.5 gallons, how long will it take for a faucet which flows at the rate of 8 gal/ min to fill a cylindrical vase with radius of 2 feet and height of 7 feet?
- a. 4 minutes b. 5 minutes c. 9 minutes d. 11 minutes e. None of these
19. If the volume of a cube is 216 cubic kms, find the surface area of the cube.
- a. 36 sq. kms b. 54 sq. kms c. 216 sq. kms d. 18 sq. kms e. None of these

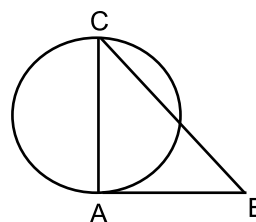
20. If the edges of a cube add up to 4 feet in length, what is the volume of the cube?
- a. 64 cubic inches b. 125 cubic inches c. 216 cubic inches
d. 512 cubic inches e. None of these
21. A rectangular solid has a length of 20 feet. Its width is one-half of its length and the height is the average of its length and width. What is the volume of the rectangular solid in cubic feet?
- a. 1000 b. 1500 c. 2000 d. 3000 e. 4500
22. The volume of a sphere is equal to the volume of a cylinder. If the radius of the sphere is 4 miles and the radius of the cylinder is 8 miles, what is the height of the cylinder?
- a. 8 miles b. $\frac{4}{3}$ miles c. 4 miles d. $\frac{16}{3}$ miles e. 1 mile

GROUP 7: ROTATION OF WHEEL

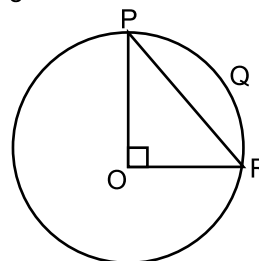
23. A wheel travels 33 yards in 15 revolutions. What is its diameter?
- a. 0.35 feet b. 0.70 feet c. 1.05 feet d. 1.40 feet e. 2.10 feet
24. Two wheels have diameters of 12 inches and 18 inches respectively. Both wheels roll along parallel straight lines at the same linear speed until the large wheel has revolved 72 times. At this point, how many times has the small wheel revolved?
- a. 32 b. 48 c. 72 d. 108 e. 162
25. A circular disc of area $0.49 \times \frac{22}{7}$ sq. meters rolls down an incline of 0.88 kilometer length, what is the number of revolutions it makes during this journey?
- a. 150 b. 200 c. 250 d. 400 e. 2,000

PART II: TAKE-HOME ASSIGNMENT

- What is the area of a regular hexagon with a side measuring 1 inch?
 - $\frac{3\sqrt{3}}{4}$
 - 3
 - $\frac{3\sqrt{3}}{2}$
 - 3
 - 6
- How many degrees are there between two adjacent sides of a regular pentagon?
 - 108°
 - 120°
 - 129°
 - 135°
 - 140°
- If the sum of the interior angles of a polygon measures up to 1260 degrees, how many sides does the polygon have?
 - 8 sides
 - 9 sides
 - 12 sides
 - 14 sides
 - Cannot be determined
- In the figure, AB is tangent to the circle at A. AC is a diameter. If BC = 12, and AB = 8, what is the area of the circle?
 - 8π
 - 9π
 - 12π
 - 20π
 - 24π

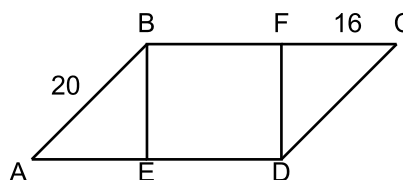


- The circle in the figure beside has center O. Which of the following measures for the figure would be sufficient by itself to determine the radius of the circle?
 - The length of minor arc PQR
 - The perimeter of triangle OPR
 - The length of chord PR

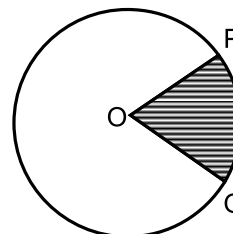


- I only
- II only
- III only
- I and III only
- I, II, and III

- In the following diagram, ABCD is a parallelogram, and BFDE is a square where AB = 20 and CF = 16, what is the perimeter of the parallelogram ABCD?
 - 72
 - 78
 - 86
 - 92
 - 96



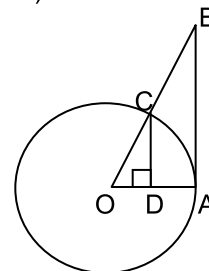
- In the figure beside, O is the center of the circle. If $\angle POQ = 36^\circ$ and the length of arc PQ = 4π cm, what is the radius of the circle in cm?
 - 12
 - 20
 - 24
 - 40
 - 42



- If the circumference and the area of a circle are numerically equal, what is the numerical value of the diameter?
 - $\frac{22}{7}$
 - 4
 - $\frac{44}{7}$
 - 2
 - 1

9. Find the area (in sq. cm) of a rhombus having a side measuring 20 cm and a diagonal measuring 32 cm.
 a. 216 b. 324 c. 384 d. 576 e. 768
10. If one gallon of water equals 231 cubic inches, approximately how much water will fill a cylindrical vase 7 inches in diameter, and 10 inches high?
 a. 1.7 gallons b. 2.1 gallons c. 3.3 gallons d. 5.3 gallons e. 6.7 gallons
11. What is the length of the line segment connecting the two most distant vertices of a 1 inch cube?
 a. 1 inch b. $\sqrt{2}$ inches c. $\sqrt{3}$ inches d. $\sqrt{5}$ inches e. $\sqrt{6}$ inches
12. If the volume of a cube is 27 cubic meters, find the surface area of the cube.
 a. 9 square meters b. 18 square meters c. 54 square meters
 d. 3 square meters e. 1 square meter
13. If water flows into a rectangular tank at the rate of 6 cubic feet per minute, how long will it take to fill the tank, which measures 18" \times 32" \times 27" ?
 a. less than one minute
 b. less than two minutes, but not less than one minute
 c. less than three minutes, but not less than two minutes
 d. less than four minutes, but not less than three minutes
 e. four minutes or more
14. The volume of a sphere is twice the volume of a cylinder. If the volume of the cylinder is 18π cubic cm, what is the radius of the sphere?
 a. 3 cm b. 6 cm c. 9 cm d. 18 cm e. 27 cm
15. How many degrees are included between the hands of a clock at 3:30?
 a. 50° b. 60° c. 75° d. 120° e. 150°
16. Through how many degrees does the minute hand of a clock move in 8 minutes?
 a. 4° b. 32° c. 48° d. 54° e. None
17. How many degrees are included between the hands of a clock at 9:52 pm?
 a. 8° b. 12° c. 16° d. 26° e. 50°
18. The area of a square will be doubled if:
 (A) The length of the diagonal is divided by 2
 (B) The length of the diagonal is divided by $\sqrt{2}$
 (C) The length of the diagonal is multiplied by 2
 (D) The length of the diagonal is multiplied by $\sqrt{2}$
 (E) None of these.

19. In the diagram pictured below, O is the center of the circle. BA is tangent to the circle at point A, and CD is Perpendicular to OA at D. Which of the following statements is (are) true?

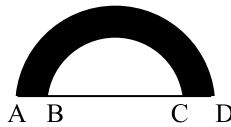


- I. $\triangle ODC$ and $\triangle OBA$ are similar.
 II. $OA: DC = OB: AB$
 III. AB is twice as long as CD .

- a. I only
 b. III only
 c. I and II only
 d. I and III only
 e. None of the above combinations

20. If the radius of a wheel is 'f' feet, how many revolutions does the wheel make per mile? [1 mile = 5,280 feet]

- a. $5,280f$ b. $\frac{5,280}{\pi f}$ c. $5,280\pi f^2$ d. $\frac{2,640}{\pi f}$ e. None of these



$AB=BC=CD$

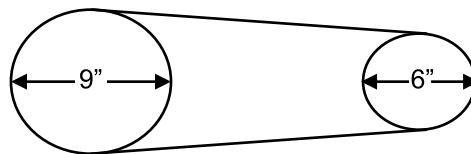
21. In the figure above, arcs \overline{AD} and \overline{BC} are semicircles. If a point is chosen at random inside the figure, what is the probability that the point lies in the shaded region?

- a. $\frac{4}{9}$ b. $\frac{5}{9}$ c. $\frac{2}{3}$ d. $\frac{7}{9}$ e. $\frac{8}{9}$

22. If the diagonals of a square divide it into four triangles, the triangles cannot be:

- a. right triangles b. isosceles triangles
c. similar triangles d. equilateral triangles
e. equal in area

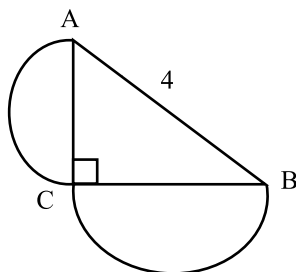
23. A pulley having a 9-inch diameter is belted to a pulley having a 6-inch diameter, as shown in the figure. If the large pulley runs at 120 rpm, what is the revolution per minute of the small pulley (rpm)?



- a. 80 b. 100 c. 160 d. 180 e. 240

24. The tip of a blade of an electric fan is $\frac{3}{2}$ feet from the axis of rotation. If the fan spins at a full rate of 1760 revolutions per minute, how many miles will a point at the tip of a blade travel in one hour?

- a. 30π b. 40π c. 48π d. 50π e. 60π



25. In the figure above, the legs of right triangle ACB are diameters of the two semicircles. If $AB = 4$ what is the sum of the areas of the semicircles?

- a. π b. 2π c. 4π d. 8π e. 16π

PART III: REVIEW LESSON FOR THE NEXT LECTURE

COORDINATE GEOMETRY:

Distance between two points:

If the coordinates of point A are (x_1, y_1) and the coordinates of point B are (x_2, y_2) , then distance between the two points, $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Example: Find the distance between the point $(2, -3)$ and the point $(5, 1)$.

Solution: In this case $x_1 = 2$, $x_2 = 5$, $y_1 = -3$ and $y_2 = 1$. Substituting into the above formula gives us: $d = \sqrt{(5-2)^2 + [1-(-3)]^2} = (\sqrt{3})^2 + 4^2 = \sqrt{25} = 5$

Finding the mid-point:

If the coordinates of point A are (x_1, y_1) and the coordinates of point B are (x_2, y_2) , then coordinates of the midpoint $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

Example: Find the midpoint of the segment connecting the points $(2, 4)$ and $(6, 2)$.

Solution: The average of 2 and 6 is 4 so the first coordinate is 4. The average of 4 and 2 is 3; thus the second coordinate is 3. The midpoint is $(4, 3)$.

Finding the area of a triangle:

If the three vertices of a triangle are A (x_1, y_1) , B (x_2, y_2) and C (x_3, y_3) ,

$$\text{Area of } \triangle ABC = \frac{1}{2} \begin{bmatrix} x_1 & y_1 \\ x_2 & y_2 \\ x_3 & y_3 \\ x_1 & y_1 \end{bmatrix}$$

$$= \frac{1}{2} [x_1 y_2 + x_2 y_3 + x_3 y_1 - y_1 x_2 - y_2 x_3 - y_3 x_1]$$

Slope of a line:

Slope of a line segment having two coordinate points (x_1, y_1) and $(x_2, y_2) = \frac{y_2 - y_1}{x_2 - x_1}$

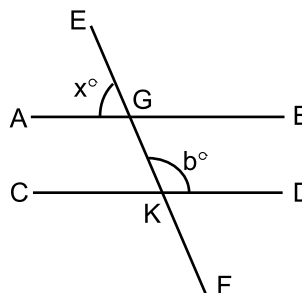
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Review Test on Lecture 7
10 Marks, 10 Minutes

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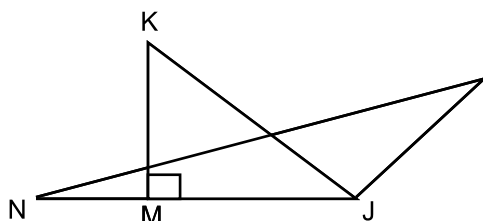
1. In the following diagram, if AB and CD are parallel, what is the value of x in terms of b?

- a. b
- b. $b - 180$
- c. $90 - b$
- d. $180 - b$
- e. $\frac{360 - b}{2}$



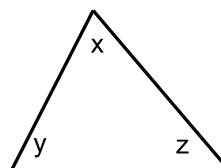
2. In the figure below, KJ bisects $\angle J$. The measure of $\angle K$ is 40° and the measure of $\angle L$ is 20° . What is the measure of $\angle N$?

- a. 57°
- b. 60°
- c. 75°
- d. 80°
- e. Cannot be determined



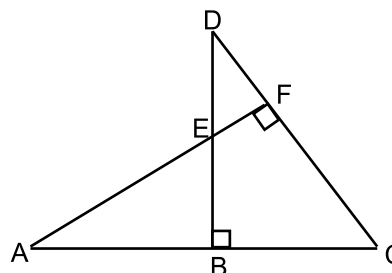
3. In the following triangle, $x = 100^\circ$ and $y = 3z$, Find the value of z.

- a. 45°
- b. 60°
- c. 35°
- d. 20°
- e. 80°



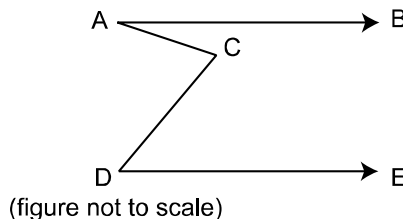
4. In the figure below, if $AC = 12$, $DC = 18$, and $DB = 15$, what is the length of AF?

- a. 8
- b. 9
- c. 10
- d. 11
- e. 12



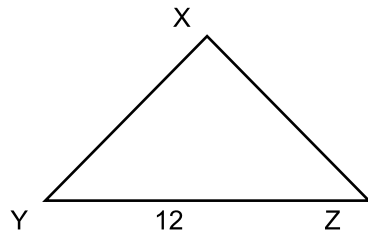
5. Which of the following could not be the lengths of the sides of a right angled triangle?

- a. 3, 4, 5
- b. 5, 12, 13
- c. 8, 15, 17
- d. 12, 15, 18
- e. 9, 12, 15



6. AB and DE are parallel. Angle BAC = 30° , angle CDE = 50° . What is the measure of angle ACD?

- a. 100
- b. 90
- c. 80
- d. 70
- e. cannot be determined from the information

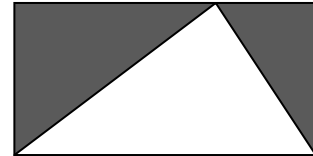


7. If $\angle XYZ = \angle XZY$ and the area of $\triangle XYZ$ is 48, what is the perimeter of the figure above?

- a. 24 b. 32 c. 40 d. 48 e. 64

8. In the rectangle below, what is the ratio of $\frac{\text{area of shaded region}}{\text{area of unshaded region}}$?

- a. $\frac{1}{4}$ b. $\frac{1}{2}$ c. 1
 d. $\frac{1}{2}$ e. It cannot be determined

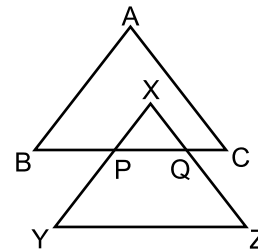


9. If the angles of a triangle are in the ratio 2:3:7, the triangle is:

- a. acute b. isosceles c. obtuse d. right e. equilateral

10. In the figure, $\triangle ABC$ and $\triangle XYZ$ are equilateral triangles. If YZ is parallel to BC , $BC=4$, $QC = 1$ & $BP = 2$, the perimeter of $\triangle XPQ$ is:

- a. 5
 b. 4
 c. 3
 d. 2
 e. None of these



Answer Sheet

1.
 2.
 3.
 4.
 5.
 6.
 7.
 8.
 9.
 10.

SCORE.....

REMARKS.....