

BRAIN INTERNATIONAL SCHOOL

PRACTICE PAPER - 01

SUBJECT: MATHS

Time : 3 Hours

Max. Marks : 80

General Instructions :

1. This question paper contains 38 questions.
 2. This Question Paper is divided into 5 Sections A, B, C, D and E.
 3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion - Reason based questions of 1 mark each.
 4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
 5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
 6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
 7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
 8. All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
 9. Draw neat and clean figures wherever required.
 10. Take $\pi = \frac{22}{7}$ wherever required if not stated.
 11. Use of calculators is not allowed.
-

SECTION - A

Section A consists of 20 questions of 1 mark each.

1. What is the common difference of an AP in which $a_{15} - a_{14} = 32$?
(a) 8 (b) -8
(c) -4 (d) 4
2. A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is
(a) 4 (b) 13
(c) 48 (d) 51
3. The first term of AP is p and the common difference is q , then its 10th term is
(a) $q + 9p$
(b) $p - 9q$
(c) $p + 9q$
(d) $2p + 9q$
4. Two chords AB and CD of a circle intersect at E such that $AE = 2.4$ cm, $BE = 3.2$ cm and $CE = 1.6$ cm. The length of DE is
(a) 1.6 cm
(b) 3.2 cm
(c) 4.8 cm
(d) 6.4 cm

5. If $\cos 9\alpha = \sin \alpha$ and $9\alpha < 90^\circ$, then the value of $\tan 5\alpha$ is
- (a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$
 (c) 1 (d) 0
6. The ratio of the length of a rod and its shadow is $1:\sqrt{3}$ then the angle of elevation of the sun is
- (a) 90° (b) 45°
 (c) 30° (d) 75°
7. If a circular grass lawn of 35 m in radius has a path 7 m wide running around it on the outside, then the area of the path is
- (a) 1450 m^2 (b) 1576 m^2
 (c) 1694 m^2 (d) 3368 m^2
8. Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, then distance between their tops is
- (a) 12 m (b) 14 m
 (c) 13 m (d) 11 m
9. If the perimeter of one face of a cube is 20 cm, then its surface area is
- (a) 120 cm^2
 (b) 150 cm^2
 (c) 125 cm^2
 (d) 400 cm^2
10. The co-ordinates of the point which is reflection of point $(-3, 5)$ in x -axis are
- (a) $(3, 5)$ (b) $(3, -5)$
 (c) $(-3, -5)$ (d) $(-3, 5)$
11. C is the mid-point of PQ , if P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$, then x and y respectively are
- (a) -6 and 1
 (b) -6 and 2
 (c) 6 and -1
 (d) 6 and -2
12. Consider the following frequency distribution of the heights of 60 students of a class

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
Number of students	15	13	10	8	9	5

The upper limit of the median class in the given data is

- (a) 165 (b) 155
 (c) 160 (d) 170

13. If one zero of a quadratic polynomial $(kx^2 + 3x + k)$ is 2, then the value of k is
 (a) $\frac{5}{6}$ (b) $-\frac{5}{6}$
 (c) $\frac{6}{5}$ (d) $-\frac{6}{5}$
14. The centroid of the triangle whose vertices are $(3, -7), (-8, 6)$ and $(5, 10)$ is
 (a) $(0, 9)$ (b) $(0, 3)$
 (c) $(1, 3)$ (d) $(3, 5)$
15. The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are
 (a) $m, m + 3$
 (b) $-m, m + 3$
 (c) $m, -(m + 3)$
 (d) $-m, -(m + 3)$
16. The value of k for which the system of equations $x + y - 4 = 0$ and $2x + ky = 3$, has no solution, is
 (a) -2 (b) $\neq 2$
 (c) 3 (d) 2
17. If one root of the quadratic equation $ax^2 + bx + c = 0$ is the reciprocal of the other, then
 (a) $b = c$ (b) $a = b$
 (c) $ac = 1$ (d) $a = c$
18. The pair of equations $3^{x+y} = 81, 81^{x-y} = 3$ has
 (a) no solution
 (b) unique solution
 (c) infinitely many solutions
 (d) $x = 2\frac{1}{8}, y = 1\frac{7}{8}$
19. **Assertion :** $4x^2 - 12x + 9 = 0$ has repeated roots.
Reason : The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if discriminant $D > 0$.
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.
20. **Assertion :** The HCF of two numbers is 5 and their product is 150, then their LCM is 30
Reason : For any two positive integers a and b , $\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$.
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

SECTION - B

Section B consists of 5 questions of 2 marks each.

21. Find the ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$. Also find the value of k .
22. From an external point P , tangents PA and PB are drawn to a circle with centre O . If $\angle PAB = 50^\circ$, then find $\angle AOB$.
23. Write a rational number between $\sqrt{2}$ and $\sqrt{3}$.
24. Find the 7th term from the end of AP $7, 10, 13, \dots, 184$.
25. How many two digits numbers are divisible by 3?

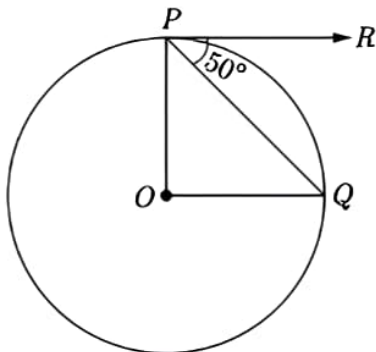
SECTION - C

Section C consists of 6 questions of 3 marks each.

26. Two dice are tossed simultaneously. Find the probability of getting
- (i) an even number on both dice.
 - (ii) the sum of two numbers more than 9.
27. An electric pole is 10 m high. A steel wire tied to top of the pole is affixed at a point on the ground to keep the pole up right. If the wire makes an angle of 45° with the horizontal through the foot of the pole, find the length of the wire. [Use $\sqrt{2} = 1.414$]
28. Solve for x : $\frac{1}{x+4} - \frac{1}{x+7} = \frac{11}{30}$ $x \neq -4, -7$.
29. Prove that the rectangle circumscribing a circle is a square.

OR

If O is centre of a circle, PQ is a chord and the tangent PR at P makes an angle of 50° with PQ , find $\angle POQ$.



30. From a solid right circular cylinder of height 14 cm and base radius 6 cm, a right circular cone of same height and same base removed. Find the volume of the remaining solid.

OR

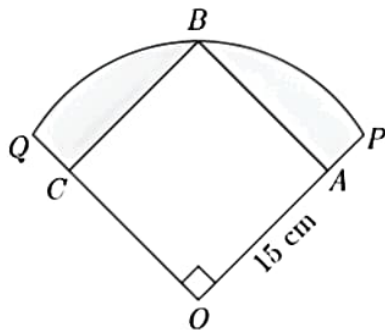
A metallic cylinder has radius 3 cm and height 5 cm. To reduce its weights, a conical hole is drilled in the cylinder. The conical hole has a radius of $\frac{3}{2}$ cm and its depth $\frac{5}{9}$ cm. Calculate the ratio of the volume of metal left in the cylinder to the volume of metal taken out in conical shape.

31. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction.

SECTION - D

Section D consists of 4 questions of 5 marks each.

32. In Figure, a square $OABC$ is inscribed in a quadrant $OPBQ$. If $OA = 15$ cm, find the area of the shaded region. (Use $\pi = 3.14$).

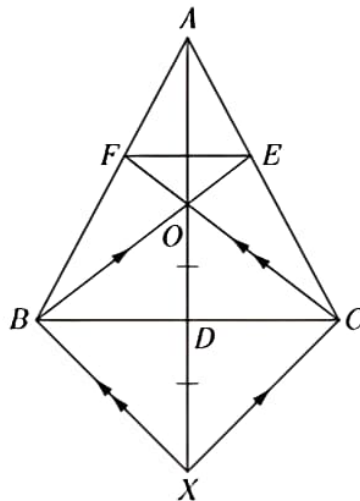


33. Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients.

OR

If α and β are the zeroes of the polynomial $2x^2 - 4x + 5$, find the values of

- $\alpha^2 + \beta^2$
 - $\frac{1}{\alpha} + \frac{1}{\beta}$
 - $(\alpha - \beta)^2$
 - $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$
 - $\alpha^2 + \beta^2$
34. In $\triangle ABC$, AD is a median and O is any point on AD . BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that $OD = DX$ as shown in figure. Prove that :
- $EF \parallel BC$
 - $AO : AX = AF : AB$



35. If $\sin A = \frac{3}{4}$ calculate $\sec A$.

OR

Tan A = 12/5 find all trigonometry values

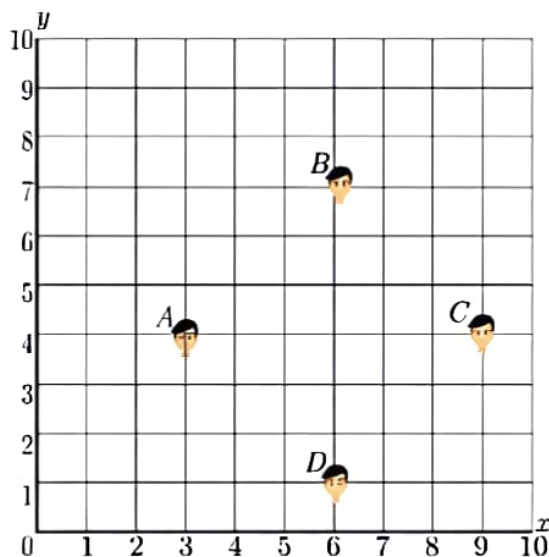
SECTION - E

Section E consists of 3 case study based questions of 4 marks each.

36. Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. A good school is always particular about their morning assembly schedule. Morning assembly is important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life.



Have you noticed that in school assembly you always stand in row and column and this make a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given below.



Here A, B, C and D are four friend Amar, Bharat, Colin and Dravid.

- What is the distance between A and B ?
- What is the distance between C and D ?
- What is the distance between A and C ?

OR

What is the distance between D and B ?

- 37.** Heart Rate : The heart rate is one of the 'vital signs,' or the important indicators of health in the human body. It measures the number of times per minute that the heart contracts or beats. The speed of the heartbeat varies as a result of physical activity, threats to safety, and emotional responses. The resting heart rate refers to the heart rate when a person is relaxed. While a normal heart rate does not guarantee that a person is free of health problems, it is a useful benchmark for identifying a range of health issues. After the age of 10 years, the heart rate of a person should be between 60 and 100 beats per minute while they are resting.



Thirty women were examined by doctors of AIIMS and the number of heart beats per minute were recorded and summarised as follows.

Number of heart beats per minute	Number of women (f_i)
65-68	2
68-71	4
71-74	3
74-77	8
77-80	7
80-83	4
83-86	2

Based on the above information, answer the following questions.

- (i) What is the mean heart beats per minute for these women ?
- (ii) What is the upper limit of median value of heart beats per minute for these women ?
- (iii) What is the lower limit of mode value of heart beats per minute for these women ?

OR

How many women are having heart beat in range 68-77?

- 38.** Volume of a Bird Cage. A company makes rectangular shaped bird cages with height b inches and square bottoms. The volume of these cages is given by the function $V = b^3 - 6b^2 + 9b$.
- (i) Find an expression for the length of each side of the square bottom.
 - (ii) Use the function to find the volume of a cage with a height of 18 inches.
 - (iii) Use the remainder theorem to find the volume of a cage with a height of 15 inches.

OR

What is the perimeter of rectangular shaped bird cage



□□□□□□



Time : 3 Hours

Max. Marks : 80

General Instructions :

1. This question paper contains 38 questions.
 2. This Question Paper is divided into 5 Sections A, B, C, D and E.
 3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion - Reason based questions of 1 mark each.
 4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
 5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
 6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
 7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
 8. All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
 9. Draw neat and clean figures wherever required.
 10. Take $\pi = \frac{22}{7}$ wherever required if not stated.
 11. Use of calculators is not allowed.
-

SECTION - A

Section A consists of 20 questions of 1 mark each.

1. In $\triangle ABC$, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm, then $\angle B = \dots\dots\dots$.
(a) 30° (b) 60°
(c) 45° (d) 90°
2. The decimal representation of $\frac{21}{16 \times 15}$ will
(a) terminate after 2 decimal place (b) terminate after 3 decimal place
(c) terminate after 4 decimal places (d) terminate after 5 decimal places
3. $1 + \frac{\cot^2 \alpha}{1 + \operatorname{cosec} \alpha} = ?$
(a) $\cos \alpha$ (b) $\tan \alpha$
(c) $\operatorname{cosec} \alpha$ (d) $\sin \alpha$
4. If the first term of an AP is -5 and the common difference is 2, then the sum of the first 6 terms is
(a) 0 (b) 5
(c) 6 (d) 15

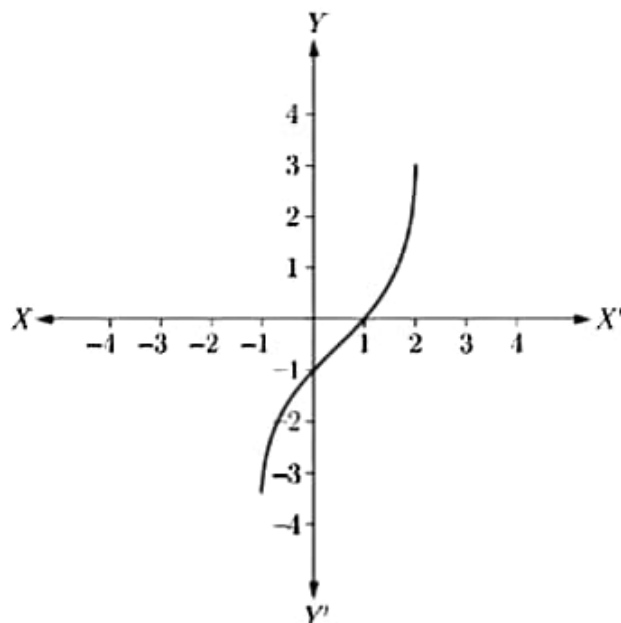
5. If $\sin \theta + \sin^2 \theta = 1$ then $\cos^2 \theta + \cos^4 \theta = ?$
 (a) 1 (b) 2
 (c) $2\sqrt{2}$ (d) $2\sqrt{3}$
6. A bag contains cards with numbers written on it from 1-80. A card is pulled out at random. What is the probability that the card shows a perfect square?
 (a) $\frac{1}{2}$ (b) $\frac{1}{5}$
 (c) $\frac{1}{10}$ (d) $\frac{3}{10}$
7. The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$ then the angle of elevation of the sun is
 (a) 90° (b) 45°
 (c) 30° (d) 75°
8. If the circumference of a circle and the perimeter of a square are equal, then
 (a) Area of the circle = Area of the square
 (b) Area of the circle > Area of the square
 (c) Area of the circle < Area of the square
 (d) Nothing definite can be said about the relation between the areas of the circle and square
9. The first term of AP is p and the common difference is q , then its 10th term is
 (a) $q + 9p$ (b) $p - 9q$
 (c) $p + 9q$ (d) $2p + 9q$
10. The co-ordinate of the point dividing the line segment joining the points $A(1, 3)$ and $B(4, 6)$ in the ratio $2 : 1$ is
 (a) (5, 3) (b) (3, 5)
 (c) (4, 6) (d) (6, 4)
11. The quadratic equation $5x^2 - 3x + 1 = 0$ has
 (a) two distinct real roots
 (b) two equal real roots
 (c) no real roots
 (d) more than 2 real roots
12. What are the values of x and y for the following system of linear equations ?

$$2x - y = 2$$

$$x + 3y = 15$$

 (a) 4 and 5 (b) 3 and 4
 (c) 5 and 4 (d) 4 and 4
13. Ratio of lateral surface areas of two cylinders with equal height is
 (a) $1 : 2$ (b) $H : h$
 (c) $R : r$ (d) None of these

14. In given figure, the graph of a polynomial $p(x)$ is shown. The number of zeroes of $p(x)$ will be



- (a) 1
(b) 2
(c) 3
(d) 4
15. If α and β are the zeroes the polynomial $2x^2 - 4x + 5$, the value of $(\alpha - \beta)^2$ is
(a) 2
(b) 1
(c) -1
(d) -6
16. If α and β are the zeroes of a polynomial $x^2 - 4\sqrt{3}x + 3$, then the value of $\alpha + \beta - \alpha\beta$ will be
(a) $\sqrt{3}(2 - \sqrt{3})$
(b) $\sqrt{3}(2 + \sqrt{3})$
(c) $\sqrt{3}(4 + \sqrt{3})$
(d) $\sqrt{3}(4 - \sqrt{3})$
17. If $2x + y = 23$ and $4x - y = 19$, the value of $(5y - 2x)$ and $(\frac{y}{x} - 2)$ will be
(a) $-\frac{5}{7}$ and 31
(b) 31 and $-\frac{5}{7}$
(c) 37 and $\frac{2}{7}$
(d) $\frac{2}{7}$ and 37
18. In the formula $\bar{x} = a + h\left(\frac{\sum f_i u_i}{\sum f_i}\right)$, for finding the mean of grouped frequency distribution, u_i is equal to
(a) $\frac{x_i + a}{h}$
(b) $h(x_i - a)$
(c) $\frac{x_i - a}{h}$
(d) $\frac{a - x_i}{h}$

19. **Assertion :** PA and PB are two tangents to a circle with centre O . Such that $\angle AOB = 110^\circ$, then $\angle APB = 90^\circ$.
Reason : The length of two tangents drawn from an external point are equal.
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.
20. **Assertion :** The equation $8x^2 + 3kx + 2 = 0$ has equal roots then the value of k is $\pm \frac{8}{3}$.
Reason : The equation $ax^2 + bx + c = 0$ has equal roots if $D = b^2 - 4ac = 0$
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

SECTION - B

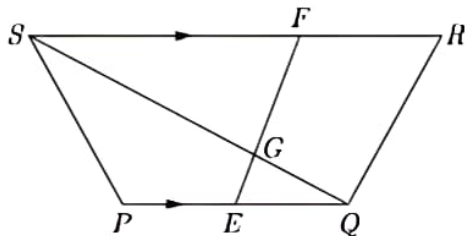
Section B consists of 5 questions of 2 marks each.

21. If the distance between the points $A(4, p)$ and $B(1, 0)$ is 5 units then what are the values of p ?
22. Check whether 4^n can end with the digit 0 for any natural number n .
23. If α and β are zeroes of $x^2 - (k - 6)x + 2(2k - 1)$, find the value of k if $\alpha + \beta = \frac{1}{2}\alpha\beta$.

OR

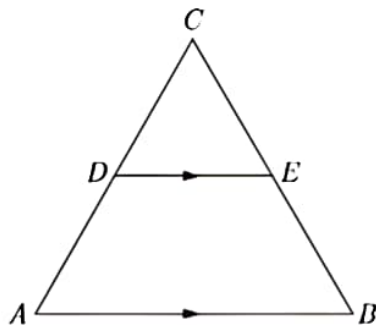
Find the quadratic polynomial, the sum and product of whose zeroes are -3 and 2 respectively. Hence find the zeroes.

24. In the figure, $PQRS$ is a trapezium in which $PQ \parallel RS$. On PQ and RS , there are points E and F respectively such that EF intersects SQ at G . Prove that $EQ \times GS = GQ \times FS$.



OR

In the given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$.

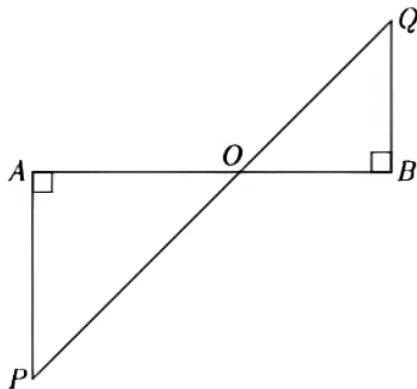


25. Harpreet tosses two different coins simultaneously. What is the probability that she gets :
- at least one head ?
 - one head and one tail ?

SECTION - C

Section C consists of 6 questions of 3 marks each.

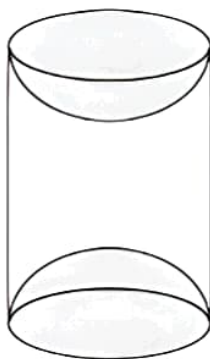
26. If $\sin A = \frac{\sqrt{3}}{2}$, find the value of $2\cot^2 A - 1$.
27. In the given figure, if $\angle A = 90^\circ$, $\angle B = 90^\circ$, $OB = 4.5\text{ cm}$, $OA = 6\text{ cm}$ and $AP = 4\text{ cm}$ then find QB .



28. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R , respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$
29. If the total surface area of a solid hemisphere is 462 cm^2 , find its volume. Use $\pi = \frac{22}{7}$

OR

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in Figure. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm , find the total surface area of the article.



30. Find the median of the following data :

Height (in cm)	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
Number of students	12	26	34	40	50

OR

Find the mean of the following distribution :

Height (in cm)	Less than 75	Less than 100	Less than 125	Less than 150	Less than 175	Less than 200
No. of students	5	11	14	18	21	28
Height (in cm)	Less than 225	Less than 250	Less than 275	Less than 300		
No. of students	33	37	45	50		

31. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together?

SECTION - D

Section D consists of 4 questions of 5 marks each.

32. Water is flowing at the rate of 15 km/hr through a cylindrical pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time the level of water in pond rise by 21 cm ?
33. If the roots of the quadratic equation $(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are equal. Then show that $a = b = c$.

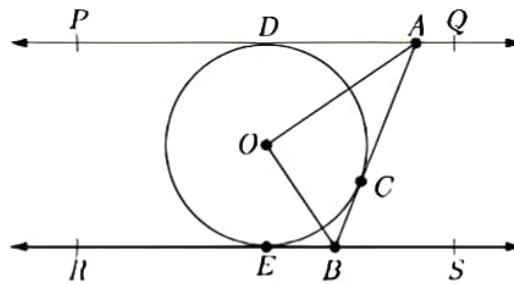
OR

A fast train takes 3 hours less than a slow train for a journey of 60 km. If the speed of the slow train is 10 km/h less than that of the fast train, find the speed of each train.

34. From a point T outside a circle of centre O , tangents TP and TQ are drawn to the circle. Prove that OT is the right bisector of line segment PQ .

OR

In Figure, PQ and RS are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting PQ at A and RS at B . Prove that $\angle AOB = 90^\circ$.



35. Find the ratio in which the point $P(\frac{3}{4}, \frac{5}{12})$ divides the line segment joining the point $A(\frac{1}{2}, \frac{3}{2})$ and $(2, -5)$.

SECTION - E

Section E consists of 3 case study based questions of 4 marks each.

36. **TOWER OF PISA :** To prove that objects of different weights fall at the same rate, Galileo dropped two objects with different weights from the Leaning Tower of Pisa in Italy. The objects hit the ground at the same time. When an object is dropped from a tall building, it falls about 16 feet in the first second, 48 feet in the second, and 80 feet in the third second, regardless of its weight.
- How many feet would an object fall in the sixth second?
 - How many feet would an object fall in the six second?
 - How many feet would an object fall in the eight second?
- OR How many feet would an object fall in the ten second?



37. Abhinav Bindra is retired sport shooter and currently India's only individual Olympic gold medalist. His gold in the 10-meter air rifle event at the 2008 Summer Olympics was also India's first Olympic gold medal since 1980. He is the first Indian to have held concurrently the world and Olympic titles for the men's 10-meter air rifle event, having earned those honors at the 2008 Summer Olympics and the 2006 ISSF World Shooting Championships. Bindra has also won nine medals at the Commonwealth Games and three gold medals at the Asian Games.

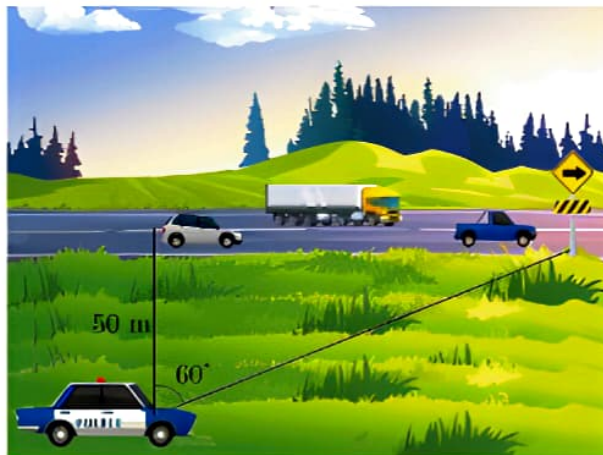


A circular dartboard has a total radius of 8 inch, with circular bands that are 2 inch wide, as shown in figure. Abhinav is still skilled enough to hit this board 100% of the time so he always score at least two points each time he throw a dart. Assume the probabilities are related to area, on the next dart that he throw,

- (i) What is the probability that he score at least 4?
 - (ii) What is the probability that he score at least 6?
 - (iii) What is the probability that he hit bull's eye ?
- OR What is the probability that he score exactly 4 points ?



38. Speed Limit Enforcement : Rajendra works in traffic police and manage traffic on highway. His van is having radar detection equipment. He takes up a hidden position 50 meter from the highway. Using a sighting device he finds the angle between his position and a road sign in the distance is 60° .



He then uses a stop watch to determine how long it takes a vehicle to pass her location and reach the road sign. In quick succession —an 18-wheeler, a truck, and a car pass her position, with the time each takes to travel this distance noted. Find the speed of each vehicle in miles per hour if

- (i) the 18-wheeler takes 8 sec,
- (ii) the truck takes 6 sec,
- (iii) the car takes 4 sec.

OR

The car takes 8 sec

□□□□□□□□□□□□□□□□