MATHS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 13

Part A Section I

1. In the following frequency distribution, what is the upper limit of the median class ?

Class	0-5	6-10	12-17	18-23	24-29
Frequency	13	10	15	8	11

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2. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is

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3. Explain, how the product of two consecutive positive is an even integer.

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4. Make a factor tree for the composite number 324.

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5. Find the coordinates of points which trisect the line segment joining $(1, -2) and (-3, 4)$.

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6. Find the ratio in which x-axis divides the join of (2,-3) and (5,6).

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7. In a $\Delta ABC, BD \perp CA$ and $CE \perp BA$, Prove that $\Delta ABD \sim \Delta ACE$.

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8. Draw a line segment of length 8 cm and divides it in the ratio $2:3$

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9. If cosec A $= \frac{13}{12}$ then find the value of $\frac{2\sin A - 3\cos A}{4\sin A - 9\cos A}$

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10. If the angle of elevation of the top of a tower from a point distant 100 m from its base is 45°, then find the height of the tower.

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11. If the 6^{th} terms and 11^{th} term of A.P. are 12 and 22 respectively, then find its 2^{nd} term ?

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12. Solve for x and y :

$3x - 2y = 4$

and $6x - 4y = 8$

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13. How many tangents can be drawn from a point lying inside a circle?

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14. Find the degree of the polynomial : $(x+1)\left(x^2-x+x^4-1\right)$.

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15. If r=3 is a root of quadratic equation $kr^2-kr-3=0$, then find the value of k.

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16. In a rhombus ABCD, prove that $AC^2 + BD^2 = 4AB^2$

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17. Two different dice are thrown together. Find that the probability of getting the sum of the two numbers less than 7.

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18. A bag contains 5 red, 8 green and 7 white balls. One ball is drawn at random from the bag. Find the probability of getting a red or white ball.

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19. If $x = 1$ is a root of quadratic equation $2x^2 - ax + 1$, then find the value of 'a'.

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20. Convert the following statement into a pair of linear equations in x and y $(x > y)$.

"The sum of 2 numbers is 58. The greater number exceeds twice the smaller number by 1."

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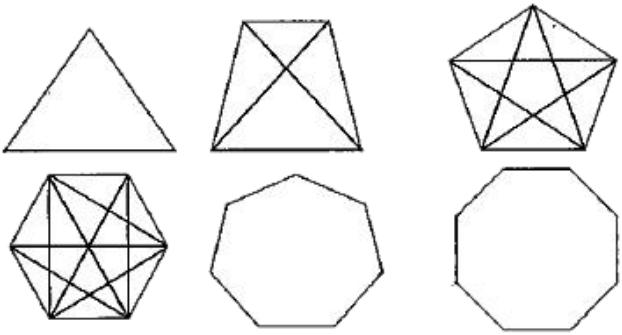
Part A Section Ii

1. A stop sign is an example of a Polygon. In the image , you can see examples of diagonals

in geometry n the stop sign, there a various number of diagonals possible in a Polygon.

the number of diagonals (d) that can be drawn in polygons with a given number of sides (n) is being investigated.



Number of sides (n)	3	4	5	6	7	8
Number of diagonals (d)	0	2	5	9	p	q

By considering the pattern, the value of 'p' is

A. 11

B. 13

C. 14

D. 15

Answer:

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2.

Number of sides (n)	3	4	5	6	7	8
Number of diagonals (d)	0	2	5	9	p	q

By considering the pattern, the value of 'q' is

A. 16

B. 18

C. 19

D. 20

Answer:

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3.

Number of sides (n)	3	4	5	6	7	8
Number of diagonals (d)	0	2	5	9	p	q

For a polygon, d and n are related as $d = An^2 + Bn$. The relations for a triangle and a quadrilateral are

A. $3A + B = 0, 8A + 2B = 1$

B. $9A + 3B = 0, 5A + B = 1$

C. $3A + B = 0, 12A + 2B = 3$

D. $3A + B = 0, 8A + B = 3$

Answer:

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4.

Number of sides (n)	3	4	5	6	7	8
Number of diagonals (d)	0	2	5	9	p	q

For a polygon, d and n are related as $d = An^2 + Bn$, the values of A and B are

A. $A = \frac{1}{2}, B = \frac{3}{2}$

B. $A = \frac{1}{2}, B = -\frac{3}{2}$

C. $A = \frac{1}{2}, B = \frac{3}{2}$

D. $A = -\frac{1}{2}, B = -\frac{3}{2}$

Answer:

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5. t1

A. 120

B. 136

C. 150

D. 170

Answer:

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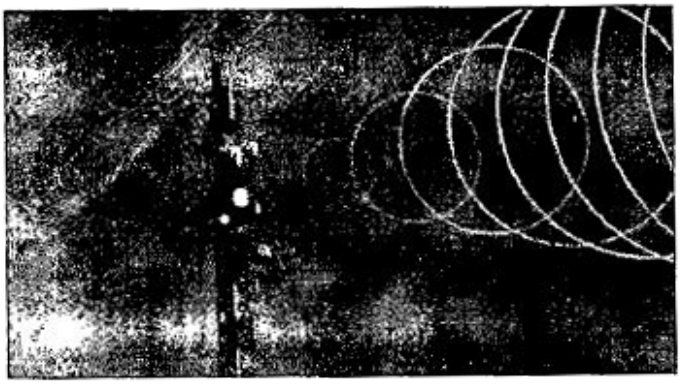

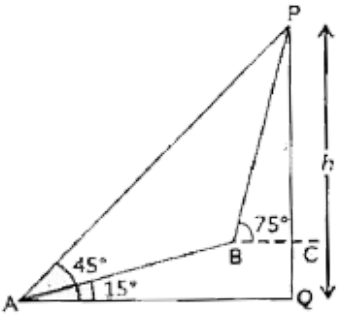

6.

In right angled triangle APQ, the measure of

$\angle APC$ is :

A. 15°

B. 30°

C. 45°

D. 60°

Answer:

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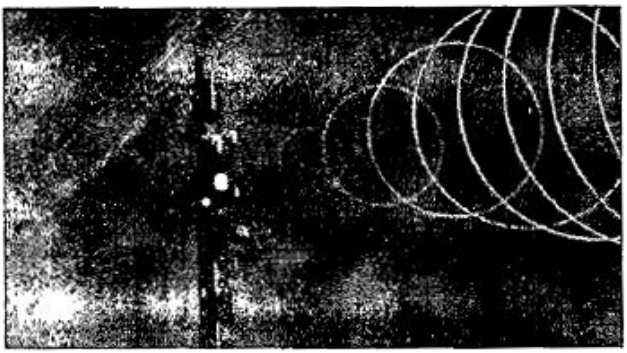

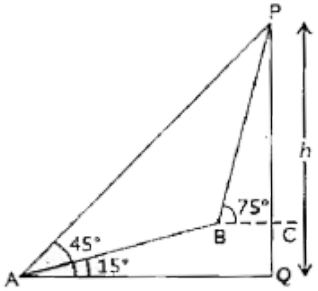

7.

In right angled triangle APQ, $BC \mid\mid AQ$, the measure if $\angle BPC$ is

A. 15°

B. 30°

C. 45°

D. 60°

Answer:

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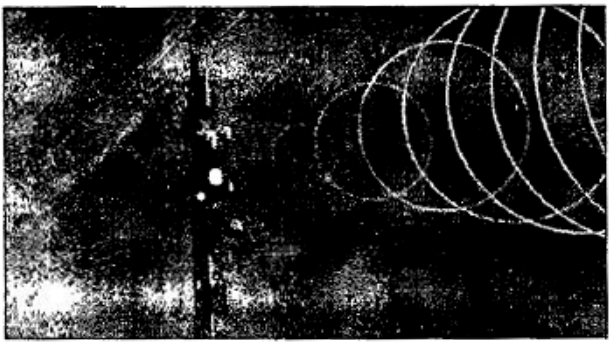

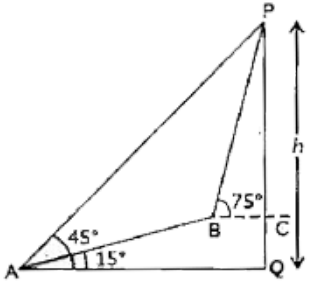

8.

In the right angled triangle APQ, the length AP is :

A. h

B. 2h

C. $\sqrt{2}$ h

D. $\sqrt{3}$ h

Answer:

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Part B Section Iii

1. Show that any number of the form 4^(n),n ne N` can never end with the digit 0.

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2. Draw a factor tree for the number 546.

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3. The angles of a triangle are in A.P. the least being half greatest. Find the angles.

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4. What should be added to the polynomial $x^2 - 5x + 4$, so that 3 is the zero of the

resulting polynomial? (a) 1 (b) 2 (c) 4 (d) 5

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5. Evaluate :

$3\cos^2 60^\circ \sec^2 30^\circ - 2\sin^2 30^\circ \tan^2 60^\circ$

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6. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

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7. A coin is tossed twice. Find the probability of getting at-most 2 heads.

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8. A heap of rice is in the form of a cone of base radius 4 m and height 3 m. How much canvas cloth is required to cover the heap

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Part B Section Iv

1. Given that $\sqrt{5}$ is irrational , prove that $2\sqrt{5} - 3$ is an irrational number.

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2. Using elimination method, solve for x and y the following pair of equations :

$7x - 4y = 49, \quad 5x - 6y = 57$

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3. The Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Sapling of Gulmohar are planted on the boundary at a distance of 1m from each other. There is a triangular gr

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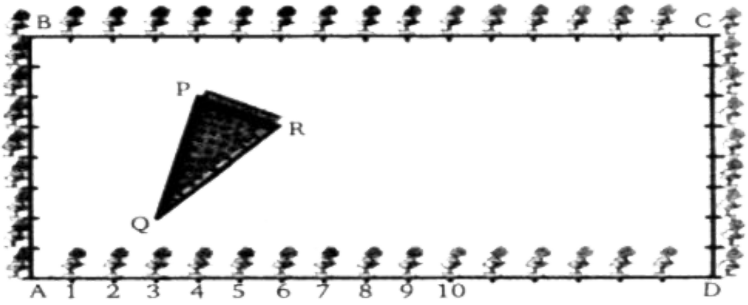
4. The class X students school in krishnagar have been allotted a rectangular plot of land

for their gardening activity. Saplings of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is triangular grassy lawn in the plot as shown in the figure. The students are to sow seeds of flowering plants on the remaining area of the plot.



What will be the coordinates of R, if C is the origin?

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5. A circular pond is on diameter 17.5m. It is surrounded by a 2m wide path. Find the cost of constructing the path at the rate of Rs. 25 per square metre.

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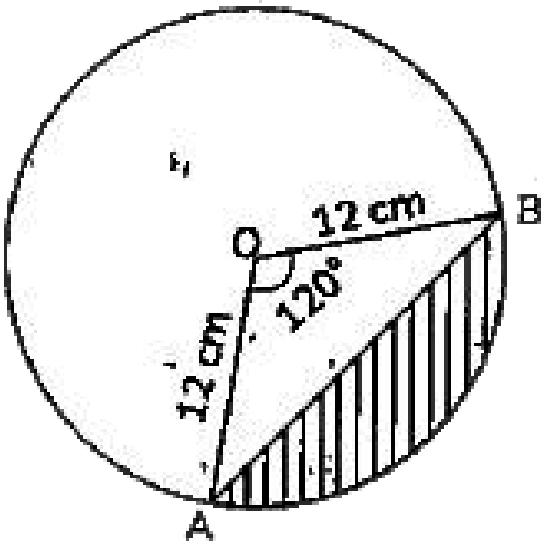
6. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre.

Find the area of the corresponding segment

of the circle (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)



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Part B Section V

1. Let s denotes the semi-perimeter of a ΔABC in which BC=a, CA=b and AB=c. If a circle touches the sides BC, CA, AB, at D, E, F, respectively. Prove that BD=s-b.

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2. All the black face cards are removed from a pack of 52 playing cards.

The remaining cards are well shuffled and then a card is drawn at random. Find the

probability of getting a (i) face card, (ii) red card, (iii) black card, (iv) king.

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3. All the black face cards are removed from a pack of 52 playing cards.

The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting a (i) face card, (ii) red card, (iii) black card, (iv) king.

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4. All the black face cards are removed from a pack of 52 playing cards.

The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting a (i) face card, (ii) red card, (iii) black card, (iv) king.

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5. All the black face cards are removed from a pack of 52 playing cards.

The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting a (i) face card, (ii) red card, (iii) black card, (iv) king.

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6. Three identical rods have been joined at a junction to make it a Y shape structure. If two free ends are maintained at $60^\circ C$ and the third end is at $0^\circ C$, then what is the junction

temperature θ ?

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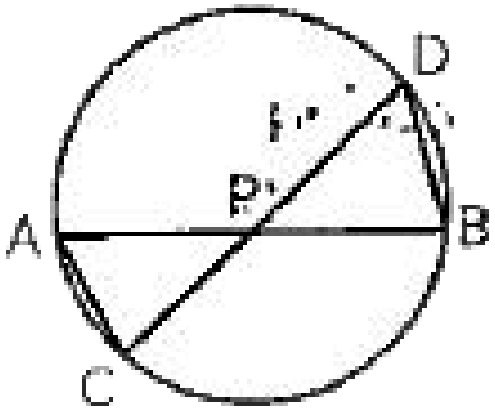
7. In the figure, two chords AB and CD intersect each other at the point P.

Prove that : $\Delta APC \sim \Delta DPB$



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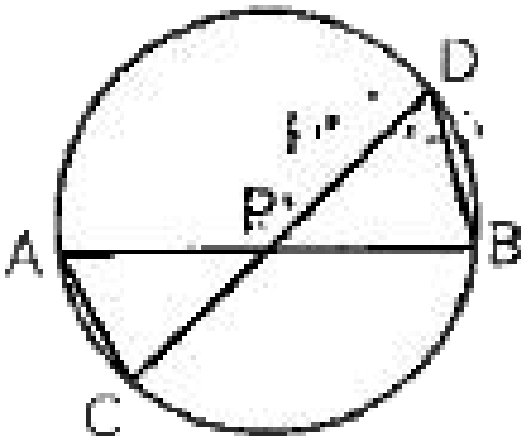
8. In the figure, two chords AB and CD intersect each other at the point P.

Prove that : AP. PB = CP. DP



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9. A man sold a chair and a table together for 760 thereby making a profit of 25% on the chair and 10% on the table. By selling them together for 767.50 he would have made a profit of 10% on the chair and 25%, on the table. Find the cost price of each.

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10. If Zeba were younger by 5 years than what she really is, then the square of her age (in

years) would have been 1 more than five times her actual age. What is her age now?

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11. A circle is inscribed in a quadrilateral ABCD where $\angle B = 90^\circ$ If AD=24 cm AB=30 cm and DS= 8cm find the radius r of the incircle

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12. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$

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Part A Section I

1. Find the median class of the following distribution:

Class	40-45	45-50	50-55	55-60	60-65	65-70	70-75
Frequency	2	3	8	6	6	3	2

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2. An integer is chosen at random between 1 and 100. Find the probability that the chosen number is divisible by 10.

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3. Two different dice are rolled together. Find the probability of getting a sum of 10 of the numbers on the two dice.

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4. Find the area of the largest triangle that can be inscribed in a semi-circle of radius a cm.

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5. Find the total surface area of a quadrant of a wooden sphere of radius 3.5 cm.

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6. If $\sin\theta - \cos\theta = 0$,then the value of $\sin^4\theta + \cos^4\theta$ is

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7. The ratio of the height of a tower and the length of its shadow on the ground is $\sqrt{3}:1$. What is the angle of elevation?

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8. Determine the zeroes of the polynomial $p(x) = x^3 - 4x$.

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9. Write the first negative term of the sequence $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}$.....

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10. Find the values of k for which the equation $x^2 - 4x + k = 0$ has distinct real roots.

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11. Write the solution of the following pair of equation:

x - 3y = 2,3x - y = 14

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12. Write a quadratic polyminal for which sum and product of the zero are 3 and - 10 respectively.

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13. If 6 times the 6^{th} term of A.P. is equal to 9 times the $9^{th}1$ then find its 15^{th} term.

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14. Check if 0.2 is a root of the equation $x^2 - 0.4 = 0$.

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15. Find the length of each side of a rhombus whose diagonals are 24 cm and 10 m long.

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16. The chord of a circle of radius $10cm$ subtends a right angle at its centre. The length of the chord (in cm) is

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17. Find the length of the altitude AL of an isoceles triangle ABC, where AB = AC = 5 cm and BC = 8 cm.

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18. State ASA criterion of congruence of triangles.

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19. Find the mid-point of the segment joining the points (-2,4) and (6,10)

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20. Find the value of 'a' if HCF (a,18) =2 and LCM (a,18) = 36.

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21. Write one rational and one irrational number lying between 0.25 and 0.32

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Part A Section Ii

1. Formula one Portugese Grand Prix technical team at the Algarve International Circuit are analysing last year data of drives's performance to provide valuable inference to commentators on how the drives can improve this year.

	Support staff	Lap errors		Support staff	Lap errors
Ferrari	36	41 (13%)	Force India	36	36 (11%)
Mercedes	36	61 (19%)	Toro Rosso	36	23 (7%)
Red Bull Racing	36	52 (16%)	Renault	36	16 (5%)
McLaren	36	31 (9%)	Sauber	36	13 (4%)
Williams	36	33 (10%)	Haas		19 (6%)

The length of time taken by 80 drives to complete a journey is given in the table below:

Times (in minutes)	70-80	80-90	90-100	100-110	110-120	120-130
Number of drivers	4	10	14	20	24	8

In which interval does the median of the distribution lie?

A. 80 - 90

B. 90 - 100

C. 100 - 110

D. 110 - 120

Answer:

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2.

Times (in minutes)	70-80	80-90	90-100	100-110	110-120	120-130
Number of drivers	4	10	14	20	24	8

In which interval does the mode of the distribution lie?

A. 80 - 90

B. 90 - 100

C. 100 - 110

D. 110 - 120

Answer:

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3.

Times (in minutes)	70-80	80-90	90-100	100-110	110-120	120-130
Number of drivers	4	10	14	20	24	8

Mean time taken to complete the journey is

A. 104

B. 106

C. 110

D. 112

Answer:

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4.

Times (in minutes)	70-80	80-90	90-100	100-110	110-120	120-130
Number of drivers	4	10	14	20	24	8

A driver is chosen at random. The probability that he took 90 minutes or less is

A. $7/40$

B. $1/20$

C. $3/20$

D. $7/25$

Answer:

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5.

Times (in minutes)	70-80	80-90	90-100	100-110	110-120	120-130
Number of drivers	4	10	14	20	24	8

A driver is chosen at random. The probability that he took 110 minutes or more is

A. $\frac{4}{395}$

B. $\frac{62}{395}$

C. $\frac{1}{100}$

D. $\frac{1}{20}$

Answer:

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Part B Section Iii

1. If n is an odd positive integer, show that $\left(n^2-1\right)$ is divisible by 8.

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2. Check whether 15^n can end with digit zero for any natural number n.

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3. Show that the roots of the quadratic equation:

$(b-c)x^2$ + (c - a) x + (a - b) = 0` are equal if c + a = 2b.

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4. If P(5,7), Q(x,-2) and R(-3,y) are collinear points such that PR = 2PQ, calculate the values of x and y.

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5. Prove that the diagonals of a rectangle with verticles (0,0),(a,0),(a,b) and (0,b) bisect each other and are equal.

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6. AB is a line segment of length 8 cm. Locate a point C on AB such that $AC = \frac{1}{3}CB$.

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7. The sum of circumferences of two circles is 132 cm. If the radius of one circles is 14 cm, find the radius of the other circle.

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8. A person goes to his office by using different means of transport on different days. It is know that the probabilities that he will come by train, bus, scooter or by car are respectively $\frac{1}{10}, \frac{3}{10}, \frac{2}{10}$ and $\frac{4}{10}$. The

probabilities that he will be late are $\frac{1}{4}, \frac{1}{5}, \frac{1}{6}$, and $\frac{1}{3}$ if he comes by train, bus, scooter and car respectively, on one day when he reaches office, he is late. What is the probability he has come by train?

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Part B Section Iv

1. Find the HCF and the LCM of 72 and 120, using prime factorisation method.

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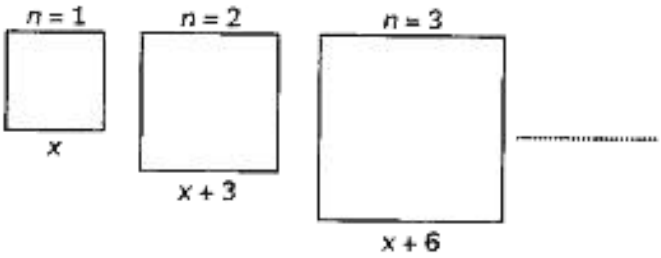

2.

Express the length of a side of the n^{th} frame in terms of x and n.

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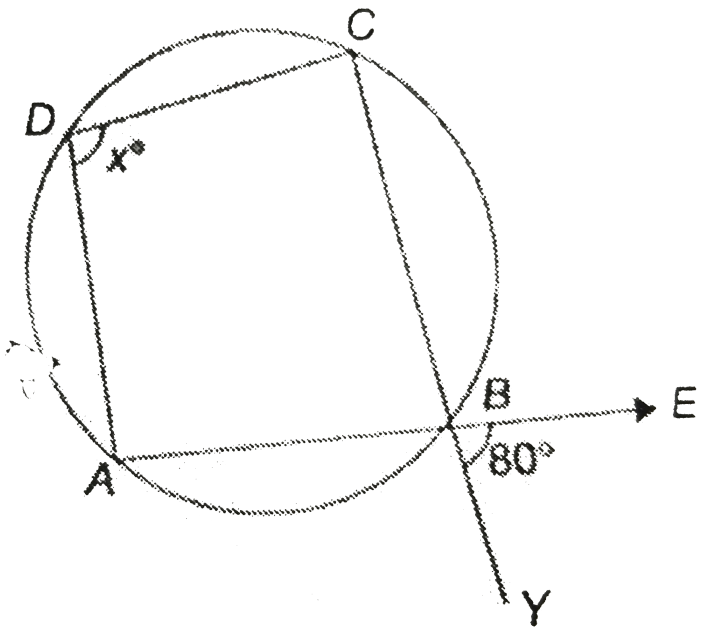
3. In Fig, find the value of x.



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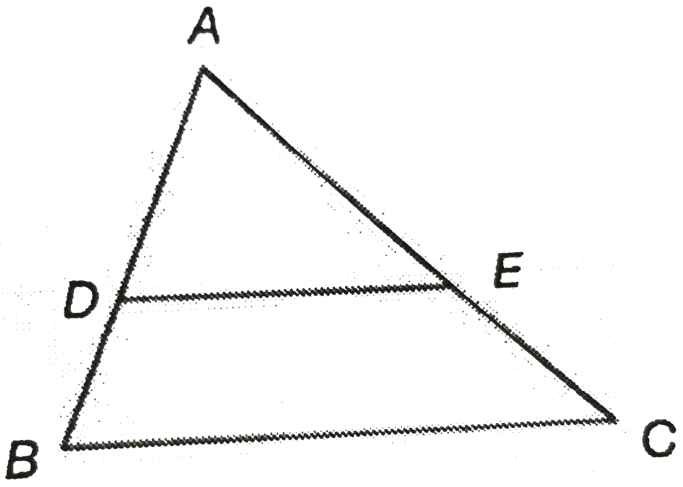
4. In the following figure, AD=5.6 cm, AE= $(x+1)cm$, $AB=8.4cm$ and $EC=(x-1)cm$, find AC. Given that $DE \| BC$.



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5. If the roots of the equation $x^2 + 2cx + ab = 0$ are real unequal, prove that the equation $x^2 - 2(a+b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots.

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6. Let A(5,6), B(-2,3) and C(6,-1) be the vertices of ΔABC. Find the coordinates of the centroid of the triangle.

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7. If $\tan\theta = \frac{12}{13}$, evaluate $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$.

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8. If $\sec\theta + \tan\theta = m$, show that $\frac{(m^2-1)}{(m^2+1)} = \sin\theta$.

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9. A sphere of diameter 6 cm is dropped in a right circular cylindrical vessel partly filled with water. The diameter of the cylindrical vessel is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylindrical vessel?

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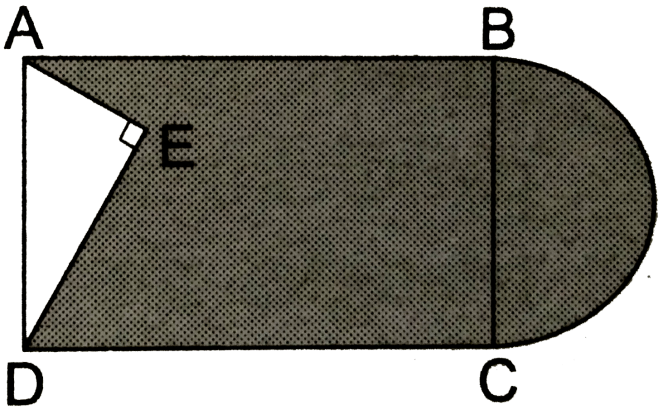
10. In the given figure, from a rectangular region ABCD with $AB = 20cm$ a right triangle

AED with $AE = 9cm$ and $DE = 12cm$, is cut off. On the other end, taking BC as diameter, a semicircle is added on outside the region. The area of the shaded region.

[Use $\pi = 3.14$]



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11. Find the mean of the following frequency distribution:

Marks	0 – 9	10 – 19	20 - 29	30 - 39	40 - 49	50 - 59
Number of students	4	6	12	6	7	5

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Part B Section V

1. From the top of a 7 m high building, the angle of elevation of the top of a tower is 60^{o}

and the angle of depression of the foot of the tower is 30^{o}. Find the height of the tower.

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2. In figure ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that $\frac{ar(ABC)}{ar(DBC)} = \frac{AO}{DO}$.

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3. Prove that the line segments joining the mid-points of the sides of a triangle from four triangles, each of which is similar to the original triangle.

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4. A piece of cloth costs Rs 35. If the piece were 4m longer and each metre costs Rs. one less, the cost would remain unchanged. How long is the piece?

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