MODEL QUESTION PAPER : 2020-21

Subject: **MATHEMATICS (81E)**   **SET -1**   Duration: 3Hrs. 15Minutes

Class: 10th Standard   Maximum Marks : 80

I   **Four alternatives are given for each of the following incomplete statement/ question. Choose the most appropriate alternative and write complete answer along with its alphabet option.**   **1 x 8=8**

1) Standard form of the quadratic equation in the variable 'x' is
   (A) $ax^2 + bx + c = 0$ (B) $ax + b = 0$
   (C) $a^2 + b + c = 0$ (D) $ax^3 + bx^2 + c = 0$

2) In a graph representing a pair of linear equations, if the lines intersect each other, then the equations have
   (A) exactly two solutions   (B) infinitely many solutions
   (C) unique solution   (D) no solution.

3) If 'a' is the first term and 'l' is the last term of an arithmetic progression then sum of its first 'n' terms   is given by

   (A) $S_n = \frac{n}{2}(a - l)$ (B) $S_n = n(a + l)$

   (C) $S_n = n(a - l)$ (D) $S_n = \frac{n}{2}(a + l)$

4) The co-ordinates of a point lying on Y-axis are of the form
   (A) (x, y) (B) $(x, 0)$

   (C) $(0, y)$ (D) $(y, \ 0)$

5) Maximum number of tangents that can be drawn from an external point to a circle is/are
   (A) one   (B) two

   (C) three   (D) infinite

6) Volume of a sphere with radius 'r' is
   (A) $\frac{3}{4}\pi r^3$ (B) $\frac{3}{2}\pi r^3$

   (C) $\frac{2}{3}\pi r^3$ (D) $\frac{4}{3}\pi r^3$

7) If $cosA = \frac{3}{5}$ then the value of $secA$ is

(A) $\frac{5}{3}$ (B) $\frac{5}{4}$

(C) $\frac{3}{5}$ (D) $\frac{4}{5}$

8) In the two similar triangles, if corresponding sides of are in the ratio 4 : 9, then the areas of these triangles are in the ratio
    (A) 81 : 16   (B) 16 :81

    (C) 9 : 4   (D) 2 : 3

II Answer the following questions.   1x 8=8

9) Find the common difference of the arithmetic progression $3, 7, 11, 15 \ldots ..$

10) Write the nature of the roots of a quadratic equation whose discriminant is equal to zero.

11) Find the curved surface area of a hemisphere with radius 7cm. $\left(take\ \pi = \frac{22}{7} \right)$

12) Write the general form of a pair of linear equations in two variables x and y.

13) Find the distance of a point $(3,\ 4\ )$ from the origin.

14) Find the total surface area of a Cube with edge 3cm.

15) Evaluate: $sin90^o - cos0^o$.

16) In the following frequency distribution write the 'Modal class'.

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	2	6	15	4	5

III Answer the following questions.   2x 8=16

17) Solve the pair of linear equations $2x + y = 10$ and $x - y = 2$.

18) What is an arithmetic progression? Write the general form of an arithmetic progression whose first term is 'a' and the common difference is 'd'.

19) Draw a line segment of length 9cm. Divide it geometrically in the ratio 4:5.

20) Find the roots of the quadratic equation $3x^2 - 5x + 2 = 0$ using the quadratic formula.

21) Find 'x', if point $Q(0, 1)$ is equidistant from the points $P(5, -3)$ and $R(x, 6)$,

OR

Find the co-ordinates of the point which divides the line joining the points $(-1, 7)$ and $(4, -3)$ in the ratio $2 : 3$.

22) Find the 31st term of the arithmetic progression 5, 8, 11, 14……. Using the appropriate formula.

23) If A, B and C are interior angles of the ΔABC, then show that $sin\left(\frac{B+C}{2}\right) = cos\frac{A}{2}$.

24) Solve the quadratic equation $x^2 + 3x = 10$ by factorization method.

OR

Find the nature of the roots of the quadratic equation $2x^2 - x - 6 = 0$.

IV Answer the following questions.   **3 x 9 = 27**

25) Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are $(0, -1), (2, 1)$ and $(0, 3)$.

26) If sum of three terms of an arithmetic progression is 24 and their product is 440 then find the terms.

OR

A sum of Rs.700 is to be used to give seven cash prizes to the students of a school, for their overall academic performance. If each prize is Rs.20 less than its preceding prize, find the value of each of the prize.

27) Show that, $tan^2\theta + cot^2\theta + 2 = sec^2\theta cosec^2\theta$

OR

Show that $\frac{tan\theta + sec\theta - 1}{tan\theta - sec\theta + 1} = \frac{1 + sin\theta}{cos\theta}$

28) Prove that, the tangent at any point of a circle is perpendicular to the radius through the point of contact.

29) Rohan's mother is 26 years older than him. After 3years, product of their ages will be 360. Find the present ages of Rohan and his mother.

30) Calculate the median of the following frequency distribution.

Class-interval	Frequency
0-10	2
10-20	8
20-30	12
30-40	15
40-50	10
50-60	3

OR

Calculate the mode of the following frequency distribution.

Class-interval	Frequency
15-20	3
20-25	6
25-30	12
30-35	8
35-40	6
45-50	2

31) Draw a circle of radius 4cm. Construct a pair of tangents to the circle from a point 10cm away from its center.

32) Marks scored in a class test by 70 students is recorded as follows. Represent the given data by drawing a 'more than' type Ogive with suitable scale.

Marks obtained by the Students	Number of Students
More than or equal to30	70
More than or equal to 40	60
More than or equal to 50	48
More than or equal to 60	34
More than or equal to 70	22
More than or equal to 80	13
More than or equal to 90	6

33) A cylindrical jug of height 24cm and radius of base 7cm is full of milk, to be served by the glasses in the shape of frustum of a cone. Find the number of glasses

that could be served, if each glass is of height 9cm and radii of its bases are 2cm and 1cm.

OR

A 20m deep well with diameter 7m is dug and if, the earth from digging is evenly spread out to form a platform of length 22m and width 14m, find the height of the platform so formed.

V Answer the following questions.   4 x 4 = 16

34) Draw a triangle ABC with sides BC=7cm, AB=6cm and ∠ABC= 60^0. Then construct a triangle whose sides are $\frac{5}{4}$ of corresponding sides of the ΔABC.

35) A person X standing on the ground observes a bird flying at a distance of 200m from him at an angle of elevation of 30°. At the same moment, another person Y standing on the roof of a building of height 50m, finds the angle of elevation of the same bird to be 45°. If both are standing opposite to each other on either side of the bird, find the distance of the bird from Y. Also find the distance at which X is standing from the building.
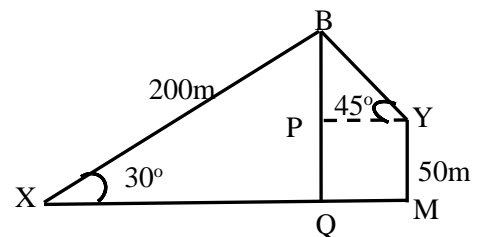

36) Solve the pair of linear equations $x + y = 4$ and $3x + y = 8$ by graphical method.

37) A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1m and 4m respectively and the slant height of the conical part is 2.8m. Find the area of the canvas used for making the tent. Also find the cost of the canvas of the tent at the rate of Rs.500 per m². $\left(take\ \pi = \frac{22}{7}\right)$

(Note that the base of the tent is not covered with canvas)
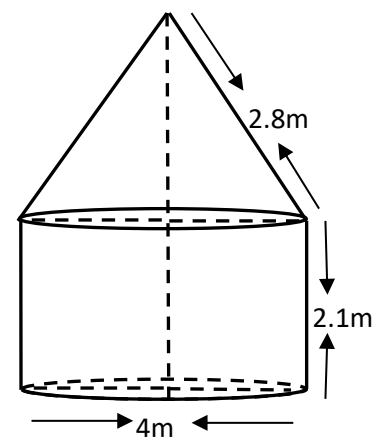
OR

A solid toy is in the form of a hemisphere surmounted by a cone of height and radius of base are 7cm. This toy is completely immersed in a cylindrical vessel containing full of water. If the radius of base of the vessel is 7cm and its height is 20cm, find the volume of water left in the vessel after immersion of the toy. $\left(take\ \pi = \frac{22}{7} \right)$
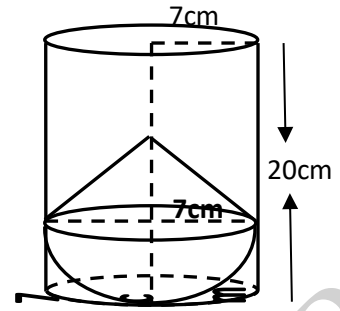
VI Answer the following question.   **5 x 1 = 5**

38) State and prove Pythagoras' theorem.

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I. In the following questions four choices are given for each question, choose the correct answer and write along with its alphabet.   1x8=8

1) The distance between origin and the point P (x , y) is

    A) $\sqrt{x^2 + y^2}$ B) $\sqrt{x^2 - y^2}$ C) $\sqrt{x^2 + y}$ D) $\sqrt{x^2 - y}$

2) In an arithmetic progression if $a_n = 5n - 2$, then the common difference of the progression is

    A) – 5   B) 8   C) 5   D) – 8

3) If $sin\,\theta = \frac{3}{5}$ then the value of cosec θ is

    A) $\frac{4}{5}$ B) $\frac{3}{5}$ C) $\frac{5}{4}$ D) $\frac{5}{3}$

4) If the discriminant $b^2 - 4ac = 0$ then the roots are

    A) Real & distinct B) Real & equal C) Rational & distinct D) Imaginary roots

5) In the two lines $a_1x+b_1y+c_1=0$ & $a_2x+b_2y+c_2=0$, $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ then the equations have

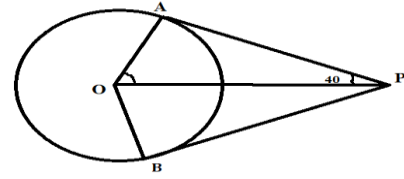   A) No solutions   B) Unique solution   C) Three solutions   D) Many solutions

6) The value of $\sin^2 60^0 + \cos^2 30^0$ is

    A) $\frac{9}{4}$ B) $\frac{4}{9}$ C) $\frac{3}{2}$ D) $\frac{\sqrt{3}}{4}$

7) A cylinder and the cone are of same radius 'r' and same height 'h' then the ratio of their volumes is.

    A) 1 : 3   B) 3 : 1   C) 2 : 3   D) 3 : 2

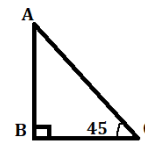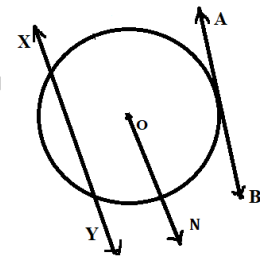8) In the figure $\angle APO = 40^0$ then $\angle POA$ is.

A) 50^0 B) 60^0 C) 70^0 D) 80^0

II. Answer the following questions.   1x8=8

9) Write the statement of " Basic proportionality theorem".

10) Find the distance between the points A(2 , 1) and B(0 , 1)

11) Write the general form of a pair of linear equations in two variables x and y

12) In the figure identify the secant.

13) In the figure if $\angle ACB = 45^0$, AB=6 cm find BC.

14) Write the relation ship between mean median & mode of the grouped data.

15) Express x(2x+3)=4 in the standard form of a quadratic equation.

16) Write the formula to find the curved surface area of the frustum of a cone whose radii is r_1 and r_2, slant height is l

III. Answer the following questions   2x8=16

17) x – y = 1 , 2x + y = 8 Solve the given pair of linear equation by elemination method.

18) Find the sum of 5 + 8 + 11 + ……………..upto 24 terms using the formula.

<div align="center">OR</div>

     Find the sum of first 15 positive multiples of 8.

19) Find how many 2- digit numbers are divisible by 3 ?

20) Divide the given line segment AB=5 cm in the ratio of 3 : 2 geometrically.

21) Find the roots of $3x^2 – 7x – 6 = 0$ by using quadratic formula.

OR

Find the value of 'k' of the quadratic equation $2x^2 + kx + 3 = 0$

22) Find ratio in which the point P(-4 , 6) divide the line segment joining the points A (-6 , 10) and B (3 , -8)

23) If $\tan2A = \cot(A-18^0)$ and 2A is an acute angle then find A.

24) The difference between two numbers is 26 and one number is three times the other find those numbers.
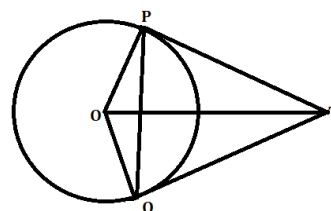
IV. Answer the following questions.   3x9=27

25) Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle 65^0.

26) Prove that the lengths of a tangents drawn from an external point to circle are equal.

OR

Two tangents TP & TQ are drawn to a circle with center 'O' from an external point T . Prove that $\angle PTQ = 2 \angle OPQ$

27) A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of a toy is 15.5 cm find the total surface area of the toy.

OR

A metalic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of the cylinder.

28) Find the mean of the following data.

Class interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
f_i	7	3	8	2	5

OR

Find the median of the following data.

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f	3	5	12	6	4

29) The following distribution gives the daily income of 50 workers of a factory. Draw a 'less than ogive' for the data.

Daily income	Number of workers
Less than 100	0
Less than 120	8
Less than 140	20
`Less than 160	34
Less than 180	44
Less than 200	50

30) Prove that $\sqrt{\dfrac{1 + sinA}{1 - sinA}} = secA + tanA$

<div align="center">OR</div>

Prove that $(sinA + cosecA)^2 + (cosA + secA)^2 = 7 + tan^2A + cot^2A$

31) The sum of the squares of two consecutive odd integers is 290 then find those integers.

32) The angle of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyd building are 30^0 and 45^0 . Find the height of the multi storeyd building and the distance between the two buildings.
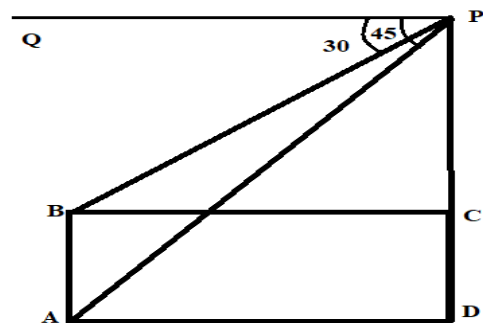
33) Find the area of the triangle formed by joining the mid points of the sides of the triangle whose vertices are (0 , -1) , (2 , 1) and (0 , 3).

34) In an airthmetic progression whose first term is 2, the sum of first five terms is one fourth of the sum of the next five terms, show that $a_{20} = -112$

<center>OR</center>

The seventh term of an airthmetic progression is four times its second term twelveth term is two more than three times of its fourth term find the progression.

35) Prove that 'the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.'

36) Solve graphically. $x + 2y = 8$, $x + y = 5$

37) Draw a triangle ABC with side BC = 6 cm, AB = 5 cm and $\angle ABC = 60^0$ then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides Δ ABC.

V. Solve   5x1=5

38) An open metal bucket is in the shape of a frustum of a cone, mounted on a hollow cylindrical base made of the same metallic sheet. The diameters of the two circular ends of the bucket are 45 cm and 25 cm, the total vertical height of the bucket is 40 cm and that of the cylindrical base is 6 cm . Find the area of the metallic sheet used to make the bucket, where we do not take into account the handle of the bucket. Also, find the volume of water the bucket can hold. (Take $\Pi = \frac{22}{7}$).
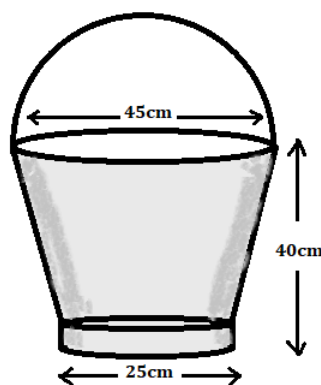
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MODEL QUESTION PAPER : 2020-21

Subject: **MATHEMATICS (81E)**   **SET-3**   Duration: 3Hrs. 15Minutes
Class: 10th Standard   Maximum Marks : 80

I. Four choices are given below for each of the incomplete statement/question choose the correct answer and write the complete answer along with its letter of the alphabet.   **8x1=8**

1. If the nth term of an arithmetic progression $a_n = 24 - 3n$ then its second term is

   (A) 18   (B) 15   (C) 0   (D) 2

2. The lines represented by $2x+3y - 9 = 0$ and $4x+6y - 18 = 0$ are

   (A) Intersecting lines   (B) Perpendicular lines

   (C) Parallel lines   (D) Coincident lines

3. The nature of the roots of the Quadratic Equation $ax^2+bx+c=0$ depends upon the value of.

   (A) $b^2 + 4ac$ (B) $b^2 - 4ac$ (C) $4ac - b^2$ (D) $4a + bc$

4. If the area of the circular base of a cylinder is $22cm^2$ and the height is 10 cm, then the volume of the cylinder is …….

   (A) $2200cm^2$ (B) $2200cm^3$ (C) $220cm^3$ (D) $300cm^3$

5. The surface area of a sphere of radius 7cm is.

   (A) $154cm^2$ (B) $616cm^2$ (C) $4312cm^2$ (D) $380cm^2$

6. The value of $\sin30^0 + \cos60^0$ is equal to

   (A) 0   (B) 1   (C) 2   (D) $\frac{1}{2}$

7. If $\sin\theta = \frac{5}{13}$, the value of $\csc\theta$ =………………

   (A) $\frac{13}{5}$ (B) $\frac{12}{13}$ (C) $\frac{5}{12}$ (D) $\frac{12}{5}$

8. The distance between the origin and the point P (6, 8) is.

(A) 9 units   (B) 10 units   (C) 14 units   (D) 2 units

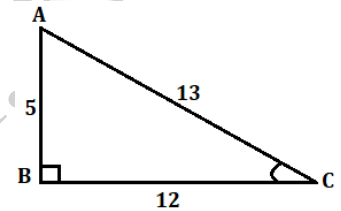## II. Answer the following questions.   8x1=8

9. Write the standard form of a Quadratic Equation.

10. State Pythagoras theorem

11. Write the formula to find the curved surface area of a frustum of a cone.

12. Find the median of the scores 5,8,14,16,19 &20

13. In the figure $\angle B=90^0$, AB=5 cm, AC=13cm. Find the value of sin C

14. If the coordinates of the triangle ABC are (x_1,y_1), (x_2,y_2) and (x_3,y_3) then write the formula to find the area of triangle.

15. How many solutions does the pair of the linear equations x+y+3=0 and 2x+2y+7=0 have.

16. Find the value of the discriminant of the Quadratic Equation $2x^2 - 4x+3=0$

III. Answer the following questions.   8X2=16

17. Solve by using elimination method. 2x + y = 11   & x + y = 8

18. Find the sum of the first 20 terms of the A.P 1, 4, 7 …

19. Find the 20th term of the A.P 1, 3, 5, 7……………….

20. Find the value of the discriminant of the quadratic equation $2x^2 - 5x - 1=0$ and hence write the nature of the roots.

21. Solve by using Quadratic formula: $- x^2 - 3x - 10 =0$

22. Find the distance between the points (-5, 7) and (-1, 3)

OR

Find the co-ordinate of the point which divides the line segment joining the points (1, 6) and (4, 3) in the ratio 1:2

23. Construct the tangents at the ends of a diameter of a circle of radius 4 cm.

24. $\triangle ABC \sim \triangle DEF$ and their areas are 64 cm^2 and 100 cm^2 respectively. If EF=12 cm then find the measure of BC.

IV. Answer the following questions.   9X3=27

25. Prove that $\frac{1+cos\theta}{sin\theta} - \frac{sin\theta}{1+cos\theta} = 2cot\theta$

<div align="center">OR</div>

Prove that $\frac{1+cos\theta}{1-cos\theta} = (cosec\theta + cot\theta)^2$

26. The diagonal of a rectangular play ground is 60m more than the smaller side of the rectangle. If the longer side is 30 m more than the smaller side, find the sides of play ground

<div align="center">OR</div>

The altitude of a triangle is 6cm more than its base .If its area is 108 cm^2, find the base and altitude of the triangle.

27. From the top of a vertical building of $50\sqrt{3}$ m height on a level ground the angle of depression of an object on the same ground is observed to be 60^0. Find the distance of the object from the foot of the building.
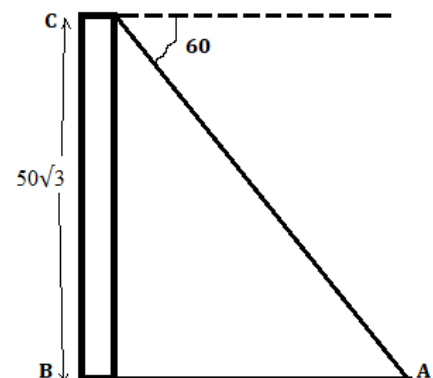
28. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 60°.

29. Prove that the tangents drawn from an external point to a circle are equal.

30. The radius of two circular ends of a frustum of a cone shaped dust bin is 15 cm and 8 cm .If its depth is 63 cm .Find the volume of the dust bin.

31. Calculate the mean for the following frequency distribution table.

C.I	5-15	15-25	25-35	35-45	45-55
F	2	5	6	5	2

OR

Calculate the median of the following frequency distribution table

Weight in Kgs (C.I)	15-20	20-25	25-30	30-35	35-40	
No of students (F)	2	3	6	4	5	N=20

32. The following table gives information of daily income of 50 workers of a factory .Draw a less than type "OGIVE" for the given data.

Daily Income	Less than 100	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
No of Workers	0	8	20	34	44	50

33. Show that the triangle whose vertices A(8,-4),B(9,5) and C(0,4) is an isosceles triangle.

V. Answer the following questions.   **4X4=16**

34. Solve graphically:-   2x + y =8   &

x + y =5

35. There are five terms in an arithmetic Progression. The sum of these terms is 55 and the 4th term is 5 more than the sum of the first two terms. Find the terms of the A.P.

36. Construct a triangle with sides 5cm, 6cm and 7cm and then construct another triangle whose sides are $\frac{3}{5}$ of the corresponding sides of the given triangle.

37. A Milk tank is in the shape of a cylinder with hemispheres of same radius attached to both ends of it as shown in the figure. If the total length of the tank is 6m and the radius is 1m. Calculate the maximum quantity of milk filled in the tank in liters.   (take $\pi = \frac{22}{7}$).
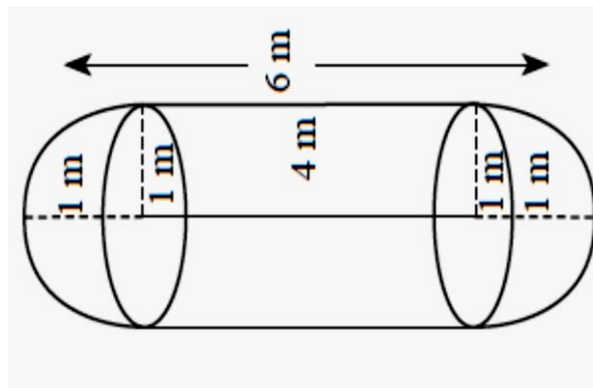
38. State and Prove "Basic Proportionality theorem".

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MODEL QUESTION PAPER : 2020-21

Subject: **MATHEMATICS (81E)**   **SET-4**   Duration: 3Hrs. 15Minutes
Class: 10th Standard   Maximum Marks : 80

I. Four alternatives are given for each incomplete questions/statements. Choose the correct answer & write the complete answer along with its letter of alphabet. 1x8=8

1) If two equations have exactly one solution and are in the form of $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ then they are.

A) Coincident lines   B) Intersecting lines   C) Transversal lines   D) Parallel lines

2) The sum of first n natural numbers of an A.P is

    A) $\frac{n(n+1)}{2}$ B) $\frac{n(n-1)}{2}$ C) n^2 D) $n(n+1)$

3) If the roots of $ax^2+bx+c=0$ are equal then

    A) $\frac{b}{2a} = \frac{2c}{b}$ B) $b^2 - 4ac = 0$ C) $\frac{b}{2a} = \frac{b}{2c}$ D) $a = b$

4) The value of $(1 + \cos\theta)(1 - \cos\theta)$ is same as

    A) $\sin^2\theta$ B) $\tan^2\theta$ C) 1   D) 0

5) The value of $\frac{tan65^0}{cot25^0}$ is

    A) $\sqrt{2}$ B) 0   C) 1   D) $\frac{1}{\sqrt{2}}$
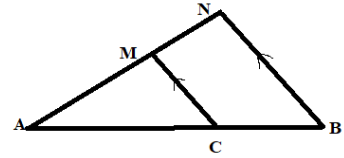
6) The coordinates of the origin is

    A) (1,1)   B) (0,0)   C) (0,1)   D) (1,0)

7) The median of 3,5,7,3,8,0,1,4 and 6 is

    A) 6   B) 8   C) 4   D) 3

8) In the adjoining figure $\triangle ANB \sim \triangle AMC$ the ratio of sides AM and AN is 2:5 then CM:BN is.

A) 2:5   B) 2:3   C) 5:2   D) 1:2

II. Answer the following questions.   1x8=8

9) The coach of a cricket team buys 3 bats and 6 balls for ₹3900. Later he buys another bat and 2 balls of same kind for ₹1300. Represent this situation algebraically.

10) Find the common difference of the A.P 1 , -1 , -3 , -5 . . .

11) Write the formula to find the roots of the $ax^2+bx+c=0$

12) What is the value of $(sin\,\theta$ x $cosec\,\theta)$?

13) Find the coordinate of the midpoint of the line joining the points (3,8) and (-7,4)

14) In a right angled triangle ABC , $\angle B = 90^0$, if AC=17 cm and AB=8 cm then find the length of BC.

15) How many tangents can be drawn to a given circle from an external point ?

16) Find the total surface area of a hemispherical solid, whose radius is 7 cm.

III. Answer the following questions.   2x8=16

17) Find which term of the A.P 3, 8, 13, 18, ... is 78

18) The sum of 20 terms of an A.P is 820. If the first term is 3,then find the common difference.

19) Determine the nature of roots of the equation $2x^2+5x+5=0$

20) Find the angle of depression when a person standing on the ground is observed from the tip of the tower $50\sqrt{3}$ m high, and he is standing $50\sqrt{3}$ m away from the foot of the tower.

21) Check whether the points (1,5) (2,3) and (-2,-11) are collinear.

           OR

     Find the value of y, if the distance between the points (2,-3) and (10,y) is 10 units.

22) Draw a circle of radius 3 cm and construct tangent at a point 'P' on the circle.

23) The surface area of a sphere is 2464 cm². Find its volume.

OR

Eight metallic spheres each of radius 2 mm are melted and recast into a single sphere. Calculate the radius of the new sphere.

24) A Fez, the cap used by the Turks is shaped like the frustum of a cone. If its radius on the open side is 10 cm, radius at the upper base is 4 cm and its slant height is 15 cm find the area of material used for making it.
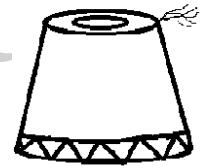
IV. Answer the following questions.   3x9=27

25) Solve by elimination method   8x + 5y = 9 3x + 2y = 4

OR

The sum of two digit number and the number obtained by reversing the digit is 66.If the digits of the number differ by 2, find the number. How many such numbers are there?

26) The perimeter of a right triangle is 60 cm. If its hypotenuse is 25 cm, then find the area of the triangle.

OR

Sum of the areas of two squares is 468 m². If the difference of their perimeter is 24 m, find the sides of two squares.

27) Prove that $\dfrac{\sin(90-\theta)}{1+\sin\theta} + \dfrac{\cos\theta}{1-\cos(90-\theta)} = 2\sec\theta$

28) The angle of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6 m.
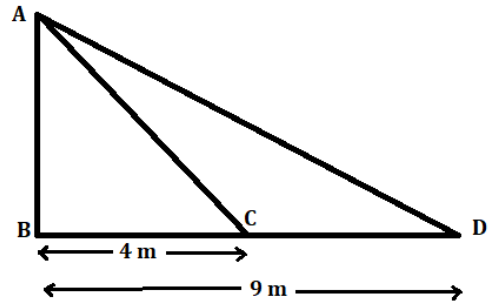
OR

A 1.5 m tall boy is standing at some distance from a 30 m tall building the angle of elevation from his eyes to the top of the building increases from 30^0 to 60^0 as he walks towards the building. Find the distance he walked towards the building.
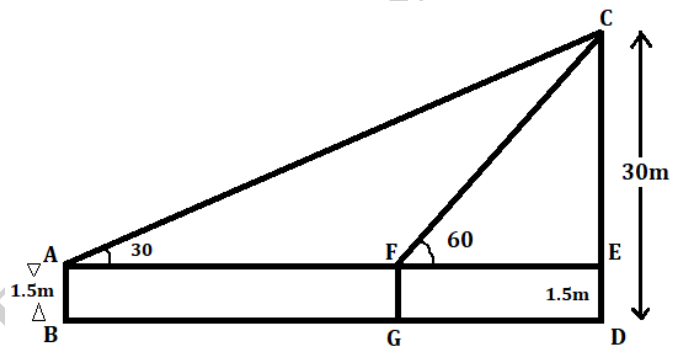
29) Find the area of triangle formed by the points (2,3) (-1,0) and (2,-4)

30) Find the mode of the following frequency distribution.

Class Interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	4	7	9	11	6	2

OR

Find the median for the following frequency distribution.

Class Interval	10-20	20-30	30-40	40-50	50-60
Frequency	8	4	6	2	6

31) Draw a less than type ogive curve for the following table.

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	4	9	15	14	8

32) Prove that at any point of a circle is perpendicular to the radius through the point of contact.

33) Draw a circle of radius 3.5 cm, and draw two tangents from an external point which is 5.5 cm away from the circle.

V. Answer the following questions. 4x4=16

34) Find the value of x and y using the graphical method, $x - y = 1$ and $2x + y = 8$

35) Prove that in a right angled triangle square of the hypotenuse is equal to sum of the squares of the other two sides.

36) Construct a triangle of sides 4 cm ,6 cm and 7cm and then construct a triangle similar to it whose sides are $\frac{2}{3}$ of the corresponding sides, of the first triangle.

37) In an A.P whose first term is 2 the sum of first 5 terms is one fourth of the sum of the next five terms, show that $a_{20} = -112$

OR

In an A.P the sum of the first term , third term and fifth term is 39 and the sum of second fourth and sixth terms is 51 .Find the 10th term of an A.P

VI. Answer the following question. 5x1=5

38) A vessel in the form of a hemispherical bowl is surmounted by a hollow cylinder of same diameter. If the diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the inner total surface area of the vessel.($Take\ \Pi = \frac{22}{7}$)
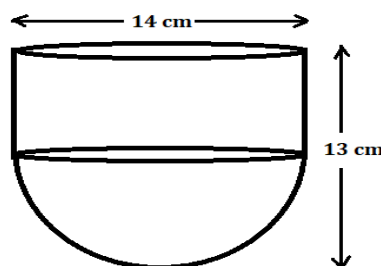
I. Four choices are given below for each of the incomplete statement/question choose the correct answer and write the complete answer along with its letter of the alphabet.   **8x1=8**

1. If the nth term of an A.P is $a_n = 8 - 3n$, then its common difference is

   A) -5 B) -3 C) 3   D) 5

2. The solution of the equations $x - y = 2$ and $x + y = 4$ are

   A) 3,1   B) 4,3   C) 5,1   D) -1, -3

3. If $2\cos\Theta = 1$ and Θ is an acute angle, then the value of Θ is

   A) 0^0 B) 30^0 C) 45^0 D) 60^0

4. The distance of the P (4, 3) from the X –axis is

   A) 2 units   B) 3 units   C) 4units   D) 5 units

5. The surface area of a sphere is 616 cm². Its radius is

   A) 7cm   B) 14cm   C) 21cm   D) 28cm

6. If one root of $px^2 + qx + r = 0$ is reciprocal of the other root then,

   A) p = q   B) q = r   C) p = r   D) p = q = r

7. If the area of a circle is 49π sq units, then its circumference is

   A) 7π B) 14π C) 21π D) 22π

8. The value of $\dfrac{\tan 65^0}{\cot 25^0}$ is

   A) 0   B) 1   C) $\frac{1}{2}$ D) -1

II. Answer the following questions.   8x1=8

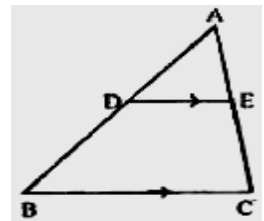9. Write the formula to calculate the 'Total surface area' of a cylinder.

10. Write $\frac{x+1}{2} = \frac{1}{x}$ in the standard form of a Quadratic Equation.

11. Write the general form of a pair of linear equation in two variables x and y

12. Find the mid-point of the class interval 5-15

13. State the Basic proportionality theorem.

14. In the adjoining figure DE ∥ BC, if AD = 1.2cm, BD = 2.4 cm and AE=1.1cm .Find CE.

15. Find the value of $\frac{1-\tan 45^0}{1+\tan 45^0}$

16. In an A.P if $S_{10} = 35$ and $S_9 = 28$ find a_{10}.

III. Answer the following questions.   8X2=16

17. Which term of the A.P 3, 8, 13, 18, ------- is 78.

18. Solve the following pair of linear equations by elimination method x+y=5 and

2x – 3y=5

19. Solve by using formula: $2x^2 – 5x – 3 = 0$

20. Find the discriminant of the equation $2x^2 +3x +1 = 0$ and write the nature of the

roots.

21. Find the co-ordinates of the mid-point of the line segment joining the points A(2,3)

and B(6,7).

22. Prove that 'If the areas of two similar triangles are equal, then they are congruent'.

23. Show that (tan A x sin A) + cos A = sec A .

24. Find the sum of first 20 terms of the A.P 3, 7, 11, 15,. . . . .

IV. Answer the following questions.   9X3=27

25. 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the
resulting cuboid.

26. Two concentric circles of radii 5cm and 3cm are drawn. Find the length of the chord of the larger circle which touches the smaller circle.

27. Prove that the length of the tangents drawn from an external point to a circle is equal.

28. Find the mode of the following distribution table.

C.I	1-3	3-5	5-7	7-9	9-11
F	7	8	2	2	1

OR

Find the mean of the following distribution table.

C.I	0-10	10-20	20-30	30-40	40-50
F	6	9	15	9	1

29. Draw a circle of radius 3.5 cm construct a pair of tangents to a circle which inclines an angle of 70^0 with each other.

30. The perimeter of rectangular field is 28 cm and its area is 48 cm^2. Find its length and breadth.

31. From a point on the ground, the angle of elevation of the top and bottom of a tower fixed on the top of a 20m high Building is 60^0 and 45^0 respectively. Find the height of the tower.
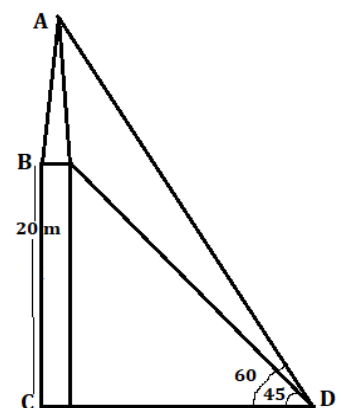
32. Prove that $\dfrac{cosA}{1-tanA} + \dfrac{sinA}{1-cotA} = cosA + sinA$

33. During the medical checkup of 35 students of a class, & their weights were recorded as follows. Draw a less than type 'Ogive' for the given data.

Wt. in kg	<38	<40	<42	<44	<46	<48	<50	<52
No of students	0	3	5	9	14	28	32	35

V. Answer the following questions. 4X4=16

34. Solve graphically:- 2x + y =8 & x – y =1

35. A cone is having its base radius 12 cm and height 20cm.If the top of this cone is cut to form a smaller cone of base radius 3 cm and is removed, and then the remaining part of the solid cone becomes the frustum of a cone. Calculate the volume of the frustum.
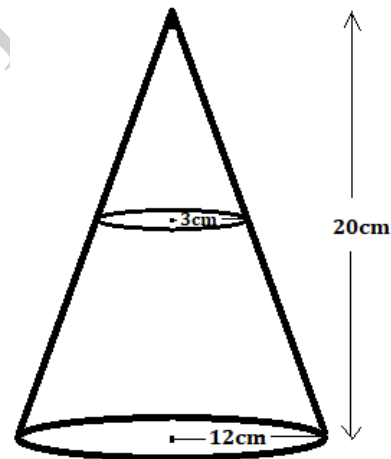
36. Construct a triangle of sides 4 cm, 6 cm and 8 cm and then construct a triangle similar to it whose sides are $\frac{3}{4}$ of the corresponding sides of the first triangle.

37. A line segment is divided into 4 parts forming an A.P.The sum of the length of the 3rd and 4th parts is 3 times the sum of the length of the first two parts. If the length of the 4th part is 14cm .Find the total length of the line segment.

VI. Answer the following questions. 5X1=5

38. Prove that "In two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio and hence the two triangles are similar".

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MODEL QUESTION PAPER : 2020-21

Subject: **MATHEMATICS (81E)**   **SET-6**   Duration: 3Hrs. 15Minutes

Class: 10th Standard   Maximum Marks : 80

I. Four alternatives are given for each incomplete questions/statements. Choose the correct answer & write the complete answer along with its letter of alphabet. 1x8=8

1) The nth term of an Arithmetic progression is $a_n = 8 - 3n$, its common difference is.

     A) -5   B) -3   C) 3   D) 5

2) The criterion used for the similarity of the given triangles shown in the figure is.
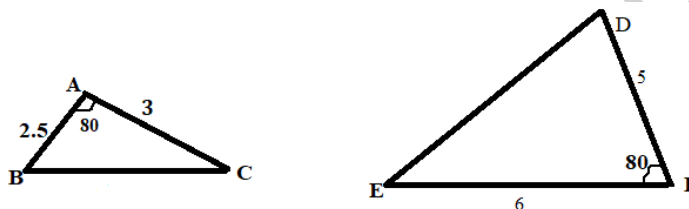
     A) SSS similarity criterion.   B) AAA similarity criterion.

     C) ASA similarity criterion.   D) SAS similarity criterion.

3) In ΔPQR, if ST||QR, PS=1.5 cm , SQ=3 cm and PT=1 cm , then measure of TR is in

     A) 2 cm   B) 2.5 cm   C) 3 cm   D) 3.5 cm

4) Equations $2x + 3y = 9$ and $4x + 6y = 18$ have

     A) Exactly one solution   B) Two solutions

     C) Infinitely many solutions   D) No solutions.

5) The distance of the point P(x ,y) from origin is.

     A) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ B) $\sqrt{(x_2 + x_1)^2 + (y_2 - y_1)^2}$

     C) $\sqrt{x^2 + y^2}$ D) $\sqrt{x^2 - y^2}$

6) On expressing $6x + 2 = -8x^2$ in standard form quadratic equation we get

     A) $8x^2+6x+2=0$ B) $-8x^2+6x+2=0$ C) $6x+8x^2+2=0$ D) $6x - 8x^2+2=0$

7) If $\cos\theta = \frac{4}{5}$ then value of $\sec\theta$ is.

A) $\frac{3}{5}$ B) $\frac{5}{4}$ C) $\frac{4}{3}$ D) $\frac{3}{4}$

8) The formula to find the volume of cylinder is.

A) $\Pi r^2 l$ sq.units   B) $\Pi r l$ sq.units   C) $\frac{1}{3}\Pi r^2 h$ sq.units   D) $\Pi r^2 h$ sq.units

II. Answer the following questions.   8x1=8

9) Find the common difference of an arithmetic progression 2, -1, -4, - - - - - -

10) What is the perpendicular distance of the point (7, -3) from x-axis?

11) What is the maximum number of tangents which can be drawn to a circle through a point on circle.

12) Find the x- coordinate if y- coordinate of $2x + y = 6$ is 2

13) Find discriminant of quadratic equation $x^2 - x + 6 = 0$

14) Find the value of $\cos48^0 - \sin42^0$

15) If in $\triangle ABC$, $\angle B=90^0$,AB=1 cm , and AC=2 cm then find the measure of $\angle C$.
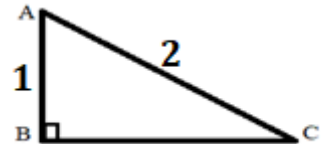
16) Find the mean of 7, 11, 3, 13 and 6

III. Answer the following.   8x2=16

17) Find the sum of the first 15 positive integers divisible by 4.

OR

Find the sum of the first 20 natural numbers.

18) Solve $x + y = 3$, $2x + y = 4$

19) Determine the value of 'k' so that the following equations have no solutions.

$2x + 3y = 7$, $6x - ky = 24$.

20) Draw a tangent at any point on a circle of radius 3.5 cm.

21) Solve quadratic equation $3x^2 - 5x + 2 = 0$ using formula.

22) Find the value of 'm' if the quadratic equation $2x^2 + mx + 8 = 0$ has equal roots.

<div align="center">OR</div>

Determine the nature of roots of the quadratic equation $x^2 + 7x - 6 = 0$

23) Define the 'angle of elevation' and the 'angle of depression'

24) Find the maximum number of cubes each of edge 5 m can be placed in a cuboidal box of length 25 m, breadth 19 m and height 10 m.

VI. Answer the following. 9x3=27

25) In an Arithmetic Progression the difference between 18th term and 8th term is 20 and the first term is 3. Find the sum of first 10 terms.

26) If the difference between the square of a positive integer and itself is 20 then find the positive integer.

<div align="center">OR</div>

The height of a triangle is 1 unit less than its base, if area of the triangle is 15 square units then find its base and height.

27) Prove that 'The tangent at any point of a circle is perpendicular to the radius through the point of contact.

28) Draw a circle of radius 4.5 cm. From a point 10 cm away from the centre, construct the two tangents to the circle.

29) If $\sin(A+B)=1$, $\sin(A - B)=\frac{1}{2}$ and $0^0 < (A+B) \le 90^0$, then find the values of A and B

<div align="center">OR</div>

Prove that $\tan48^0 \cdot \tan27^0 \cdot \tan42^0 \cdot \tan63^0 \cdot \cot45^0 = \sec^2 30^0 - \tan^2 30^0$

30) From the top of a building 16 m high. The angle of elevation to the top of a hill is 60^0 and the angle of depression of the foot of hill is 30^0. Find the height of the hill.
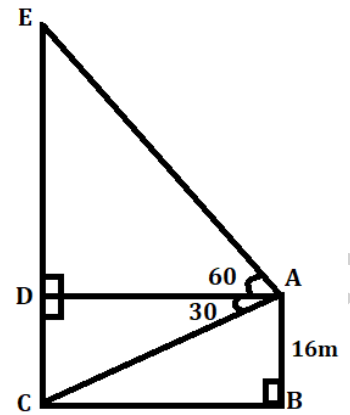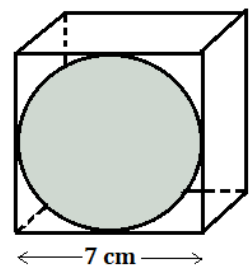
31) Find the median for the following data

Class Interval	10-20	20-30	30-40	40-50	50-60
Frequency	8	4	6	2	6

OR

Find the mode for the following distribution table.

Class Interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	4	7	9	11	6	2

32) The largest possible sphere is carved out of a wooden solid cube of each side 7 cm, find the value of the wood left after the carving.

OR

A solid metallic sphere of diameter 8 cm is melted and drawn into a cylindrical wire of uniform width. If the length of the wire is 12 m find its width.

33) The following data shows consumption of rice by 50 families in a village per month draw a 'less than type' Ogive.

Rice (in kgs)	Number of families
Less than 30	0
Less than 35	7
Less than 40	13
Less than 45	25
Less than 50	39
Less than 55	50

## V. Answer the following questions.   4x4=16

34) Solve the following pair of linear equations in two variables by graphical method.

$$x - y = 1, \qquad 2x + y = 8$$

35) Prove that " the ratio of the areas of two similar triangles is equal to the square of their corresponding sides"

36) Draw a triangle PQR with QR=7 cm, $\angle Q=60^0$ and PQ=6.5 cm then construct a triangle whose sides are $\frac{3}{7}$ of the corresponding sides of the triangle PQR.

37) A milk tank is in the form of a frustum of a cone of height 3 m with diameter of its upper and lower ends as 20 m , 12 m respectively, find the cost of milk which can fill the tank completely at the rate of ₹25 per litre.
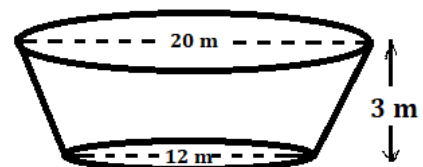
OR

A solid is composed of a cylinder with a hemisphere at one end and a cone at the other end as shown in the figure. If the radius of these solids is 7 cm and height of the cylinder is equal to slant height of the cone which is 14 cm. Find the total surface area of the solid.
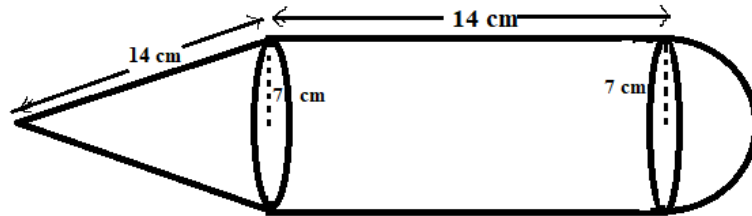
V. Answer the following question.   1x5=5

38) Show that the points A(0,-1), B(-2,3), C(6,7) and D(8,3) are the vertices of a rectangle ABCD.