**JNV**

**PERIODIC WRITTEN TEST : 3 SESSION 2019-20**

**MATHEMATICS**

**Class : X**

|  |  |
| --- | --- |
| Roll No:X | Time: |
| Date : | MM :50 |

|  |  |  |
| --- | --- | --- |
| 1 | If cos (40° + x) = sin 30°, find the value of x. | 1 |
|  |  |  |
|  | ANS:     cos (40° + x) = sin 30° = C:\fake\image1.png  C:\fake\image2.png So, cos (40° + x) = C:\fake\image3.png  C:\fake\image4.png  40° + x = 60°  C:\fake\image5.png Thus, 40° + x = 60°  C:\fake\image6.png  x = 60° – 40° = 20° |  |
|  |  |  |
| 2 | The angle of elevation of the top of a tower from a point 20 metres away from the base is 45°. Find the height of the tower. | 1 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | Let AB is the tower and C is the point 20 m away from the base of the tower C:\fake\image7.png  BC = 20 m, C:\fake\image8.pngACB = 45° In right C:\fake\image9.pngABC, tan 45° = C:\fake\image10.png C:\fake\image11.png1 = C:\fake\image12.png    C:\fake\image13.png AB = 20 m Height of the tower = 20 m. | C:\fake\image14.png | |  |
|  |  |  |
| 3 | What is the perimeter of a sector of angle 45° of a circle with radius 7 cm? C:\fake\image15.png | 1 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | C:\fake\image16.png | C:\fake\image17.png | |  |
|  |  |  |
| 4 | Find the radius of a sphere whose surface area is 154 cm2. | 1 |
|  |  |  |
|  | ANS:     Surface area = 154 cm2 C:\fake\image18.png4C:\fake\image19.pngr2 = 154 C:\fake\image20.pngr2 = C:\fake\image21.pngC:\fake\image22.pngr = C:\fake\image23.png= C:\fake\image24.png= 3.5 cm |  |
|  |  |  |
| 5 | Two cylindrical cans have equal base areas. If one of the can is 15 cm high and other is 20 cm high, find the ratio of their volumes. | 1 |
|  |  |  |
|  | ANS:     Let the base area of first cylinder is C:\fake\image25.pngr2. C:\fake\image26.pngBase area of second cylinder is also C:\fake\image27.pngr2. h1 = 15 cm, h2 = 20 cm Ratio of volumes = C:\fake\image28.png volume of first cylinder : volume of second cylinder = 3 : 4 |  |
|  |  |  |
| 6 | Find the class marks of classes 10 – 25 and 35 – 55. | 1 |
|  |  |  |
|  | ANS:     Class marks of class 10 – 25 = C:\fake\image29.png= 17.5 Class marks of class 35 – 55 = C:\fake\image30.png= 45 |  |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| 7 | Without using the trigonometric tables, evaluate C:\fake\image31.png | 2 |
|  |  |  |
|  | ANS:     C:\fake\image32.png C:\fake\image33.pngC:\fake\image34.png |  |
|  |  |  |
| 8 | Prove the following identity : C:\fake\image35.png= sec θ . cosec θ + cot θ | 2 |
|  |  |  |
|  | ANS:     C:\fake\image36.png C:\fake\image37.pngC:\fake\image38.pngC:\fake\image39.pngC:\fake\image40.pngC:\fake\image41.png= sec θ . cosec θ + cot θ = RHS. |  |
|  |  |  |
| 9 | A paper is in the form of a rectangle ABCD in which AB = 20 cm and BC = 14 cm. A semicircular portion with BC as diameter is cut off. Find the area of the remaining part. [Use C:\fake\image42.png = 22/7]  C:\fake\image43.png | 2 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | Length of the rectangle = 20 cm Breadth of the rectangle = 14 cm d of the semicircle = 14 cm r of the semicircle = C:\fake\image44.pngcm = 7 cm Area of the remaining portion = area of the rectangle ABCD – area of the semicircle C:\fake\image45.png = (280 – 77) cm2 = 203 cm2 | C:\fake\image46.png | |  |
|  |  |  |
| 10 | Given that the mean of five numbers is 27. If one of the numbers is excluded, the mean gets reduced by 2. Determine the excluded number. | 2 |
|  |  |  |
|  | ANS:     Mean of 5 numbers = 27 Sum of 5 numbers = 27 × 5 = 135 If one number is excluded, then mean of remaining 4 numbers = 27 – 2 = 25 Sum of remaining 4 numbers = 25 × 4 = 100 ∴  Excluded number = 135 – 100 = 35. |  |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| 11 | Evaluate without using trigonometric tables :  C:\fake\image47.png | 3 |
|  |  |  |
|  | ANS:     C:\fake\image48.png C:\fake\image49.pngC:\fake\image50.pngC:\fake\image51.png |  |
|  |  |  |
| 12 | A man rowing a boat away from a lighthouse 150 m high takes 2 minutes to change the angle of elevation of the top of lighthouse from 45° to 30°. Find the speed of the boat. (Use C:\fake\image52.png= 1.732) | 3 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | Let AB is lighthouse. C:\fake\image53.pngAB = 150 m Initially boat is at C and after 2 minutes it reaches at D. In right C:\fake\image54.png ABC, C:\fake\image55.png= tan 45° C:\fake\image56.png  C:\fake\image57.png= 1  C:\fake\image58.png  BC = 150 m In right C:\fake\image59.png ABD, C:\fake\image60.png= tan 30° C:\fake\image61.png  C:\fake\image62.png Distance covered in 2 minutes = BD – BC = 150C:\fake\image63.png – 150 = 150 (C:\fake\image64.png – 1) m C:\fake\image65.pngSpeed = C:\fake\image66.png = 75 × (1.732 – 1) = 54.9 m/minutes | C:\fake\image67.png | |  |
|  |  |  |
| 13 | The angle of elevation of the top of a vertical tower from a point on the ground is 60°. From another point 10 m vertically above the first, its angle of elevation is 30°. Find the height of the tower. | 3 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | Let AB is tower and BC = x m C:\fake\image68.png  BE = CD  C:\fake\image69.png  BE = 10 m Also BC = DE = x m. Take AE = y m. In right C:\fake\image70.pngAED, C:\fake\image71.png= tan 30° C:\fake\image72.png  C:\fake\image73.png  ...(i) In right C:\fake\image74.pngABC, C:\fake\image75.png= tan 60° C:\fake\image76.png  C:\fake\image77.pngy + 10 = C:\fake\image78.png y + 10 = C:\fake\image79.png C:\fake\image80.png  y + 10 = 3y C:\fake\image81.png  y = 5m Height of tower = AE + BE = 5 + 10 = 15m | C:\fake\image82.png | |  |
|  |  |  |
| 14 | Find the area of the segment of a circle of radius 14 cm, if the length of the corresponding arc APB is 22 cm. [Use C:\fake\image83.png= C:\fake\image84.png] | 3 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | l = APB = 22 cm C:\fake\image85.pngC:\fake\image86.png= 22 cm C:\fake\image87.pngθ = 90° Area of the sector = C:\fake\image88.png= 154 cm2 Area of the triangle AOB = C:\fake\image89.png× OA × OB = C:\fake\image90.png× 14 × 14 = 98 cm2 Area of the segment = (154 – 98) cm2 = 56 cm2 | C:\fake\image91.png | |  |
|  |  |  |
| 15 | In fig., the shape of the top of a table in restaurant is that of a sector of a circle with centre O and C:\fake\image92.pngBOD = 90°, if BO = OD = 60 cm find: (i) the area of the top of the table (ii) the perimeter of the table top. [Take C:\fake\image93.png= 3.14]  C:\fake\image94.png | 3 |
|  |  |  |
|  | ANS:   |  |  | | --- | --- | | BO = OD = r = 60 cm θ = 360° – C:\fake\image95.pngBOD = 360° – 90° = 270° (i) Area of the table top (sector) = C:\fake\image96.png× 3.14 × 60 × 60 = 45 × 60 × C:\fake\image97.png= 27 × 314 = 8478 cm2 (ii) perimeter (table top) = C:\fake\image98.png = C:\fake\image99.png = C:\fake\image100.png | C:\fake\image101.png | |  |
|  |  |  |
| 16 | A solid iron rectangular block of dimensions 4.4 m, 2.6 m and 1 m is cast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe. | 3 |
|  |  |  |
|  | ANS:     Volume of iron in rectangular block = volume of the cylindrical pipe Let length of pipe be h m 4.4 × 2.6 × 1 = external volume of pipe – internal volume of pipe = C:\fake\image102.png× hC:\fake\image103.png C:\fake\image104.png4.4 × 2.6 × 1 = C:\fake\image105.png× hC:\fake\image106.png C:\fake\image107.png4.4 × 2.6 × 1 × C:\fake\image108.png C:\fake\image109.png4.4 × 2.6 × 1 × C:\fake\image110.png C:\fake\image111.pngh = 112 m |  |
|  |  |  |
| 17 | Find the mode of the following distribution: C:\fake\image112.png | 3 |
|  |  |  |
|  | ANS:     Modal Class 40 – 50, Mode = C:\fake\image113.pngl = lower limit of the modal class f1 = frequency of the modal class f0 = frequency of the class preceding the modal class f2 = frequency of the class succeeding the modal class. h = Class size C:\fake\image114.pngC:\fake\image115.png |  |
|  |  |  |
| 18 | Cards numbered 1 to 30 are put in a bag. A card is drawn at random from this bag. Find the probability that the number on the drawn card is (i) not divisible by 3. (ii) a prime number greater than 7. (iii) not a perfect square number. | 3 |
|  |  |  |
|  | ANS:     Total possible outcomes of drawing a card from a bag out of 30 cards = 30. (i) Favourable outcomes for a card numbered not divisible by 3 = 20 (i.e. 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 22, 23, 25, 26, 28 and 29). C:\fake\image116.png  Probability of drawing a card numbered not divisible by 3 = C:\fake\image117.png (ii) Favourable outcomes for a prime numbered card greater than 7 = 6 (i.e. 11, 13, 17, 19, 23 and 29) C:\fake\image118.png  Probability of drawing a prime number card, greater than 7 = C:\fake\image119.png (iii) Favourable outcomes for not a perfect square numbered card = 25 (leaving 1, 4, 9, 16 and 25) C:\fake\image120.png  Probability of drawing a card which is not a perfect square = C:\fake\image121.png |  |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| 19 | A rectangular water reservoir is 10.8 m by 3.75 m at the base. Water flows into it at the rate of 18 m/s through a pipe having the cross section 7.5 cm × 4.5 cm. Find the height to which the water will rise in the reservoir in 30 minutes. | 4 |
|  |  |  |
|  | ANS:     Length of the reservoir = 10.8 m Breadth of the reservoir = 3.75 m Volume of water flowing in one sec. = C:\fake\image122.png× 18 m3 Volume of water flowing in 30 min = C:\fake\image123.png× 18 × 60 × 30 m3 = Volume of water collected in the reservoir Let the level of water be raised by h m C:\fake\image124.png10.8 × 3.75 × h = C:\fake\image125.png× 18 × 60 × 30 C:\fake\image126.pngh = C:\fake\image127.png= 2.7 m |  |
|  |  |  |
| 20 | Draw ‘less than ogive’ and ‘more than ogive’ for the following distribution and hence find its median. C:\fake\image128.png | 4 |
|  |  |  |
|  | ANS:     C:\fake\image129.png ‘Less than ogive’ & ‘more than ogive’ curves C:\fake\image130.pngWe notice both the curves intersect at (60, 50) C:\fake\image131.pngMedian = 60. |  |
|  |  |  |
| 21 | A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is (i) a card of spade or an ace (ii) a red king (iii) neither a king nor a queen (iv) either a king or queen. | 4 |
|  |  |  |
|  | ANS:     (i) Total number of spade = 13 Number of ace = 3 [There are 4 ace but 1 ace is of spade which has been included in spades] Total number of ace or spades = 16 C:\fake\image132.png  Probability of drawing a spade or ace = C:\fake\image133.png= C:\fake\image134.png (ii) There are 2 red kings. Therefore probability of drawing a red king = C:\fake\image135.png= C:\fake\image136.png (iii) Total number of kings and queens = 4 kings + 4 queens = 8 Number of cards which are neither kings nor queens = 52 – 8 = 44 C:\fake\image137.png  Probability of drawing neither a king nor a queen = C:\fake\image138.png (iv) Number of kings and queens = 4 kings + 4 queens = 8 C:\fake\image139.png  Probability of drawing a king or queen = C:\fake\image140.png= C:\fake\image141.png |  |
|  |  |  |