**JNV**

**PERIODIC WRITTEN TEST : 1 SESSION 2019-20**

**MATHEMATICS**

**Class : X**

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

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| 1 | Decompose 32760 into prime factors. | 1 |
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|  | ANS:     32760 = 2 × 2 × 2 × 3 × 3 × 5 × 7 × 13 = 23 × 32 × 5 × 7 × 13 |  |
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| 2 | The graph of y = f(x) is given, how many zeroes are there of f(x)? C:\fake\image1.png | 1 |
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|  | ANS:     C:\fake\image2.png  Graph y = f(x) does not intersect x-axis. C:\fake\image3.png  f(x) has no zeroes. |  |
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| 3 | Write whether the following pair of linear equations is consistent or not. x + y = 14, x – y = 4 | 1 |
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|  | ANS:     x + y = 14 and x – y = 4 Here C:\fake\image4.png= 1 and C:\fake\image5.png= –1 since   C:\fake\image6.pngC:\fake\image7.png The equations have unique solution. C:\fake\image8.png  Pair of linear equations is consistent. |  |
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| 4 | In figure, DE || BC in ΔABC such that BC = 8 cm, AB = 6 cm and DA = 1.5 cm. Find DE.  C:\fake\image9.png | 1 |
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|  | ANS:     DE || BC. In ΔADE and ΔABC, C:\fake\image10.pngADE = C:\fake\image11.pngABC (Corresponding angles) C:\fake\image12.pngA = C:\fake\image13.pngA (Common) C:\fake\image14.png  ΔADE ~ ΔABC (AA similarity) C:\fake\image15.pngC:\fake\image16.png Now C:\fake\image17.png DE = C:\fake\image18.png= 2 cm |  |
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| 5 | Find the area of triangle formed by the points P(2, 1), Q(6, 1) and R(2, 4). | 1 |
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|  | ANS:     Area of the triangle formed by the given points C:\fake\image19.png |  |
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| 6 | Find HCF and LCM of 26676 and 337554 using fundamental theorem of arithmetic. | 2 |
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|  | ANS:     26676 = 2 × 2 × 3 × 3 × 3 × 13 × 19 337554 = 2 × 3 × 3 × 3 × 7 × 19 × 47 C:\fake\image20.png  HCF = 2 × 3 × 3 × 3 × 19 = 1026 LCM = 22 × 33 × 13 × 19 × 7 × 47 = 8776404 |  |
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| 7 | For what value of k, is 3 a zero of the polynomial 2x2 + x + k ? | 2 |
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|  | ANS:     Since 3 is a zero of the polynomial 2x2 + x + k C:\fake\image21.png  p(3) = 0 C:\fake\image22.png  p(x) = 2x2 + x + k C:\fake\image23.png  p(3) = 2(3)2 + 3 + k C:\fake\image24.png  0 = 18 + 3 + k  C:\fake\image25.png  k = – 21 |  |
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| 8 | For what value of p will the following pair of linear equations have infinitely many solutions? (p – 3)x + 3y = p; px + py = 12 | 2 |
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|  | ANS:     Consider equations (p – 3)x + 3y = p and px + py = 12 For infinitely many solutions, C:\fake\image26.png...(i) Consider, C:\fake\image27.png  C:\fake\image28.png  p2 = 36  C:\fake\image29.png  p = ± 6 For p = 6, from (i) C:\fake\image30.pngtrue For p = – 6, from (i) C:\fake\image31.pngfalse. Hence, for p = 6, pair of linear equations has infinitely many solutions. |  |
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| 9 | Triangle ABC is right angled at B, and D is mid-point of BC. Prove that AC2 = 4AD2 – 3AB2. | 2 |
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|  | ANS:   |  |  | | --- | --- | | Given : ΔABC with C:\fake\image32.pngB = 90° D is the mid-point of BC To prove : AC2 = 4AD2 – 3AB2 Proof : In ΔABC, C:\fake\image33.pngB = 90° (Given) AC2 = AB2 + BC2 (By Pythagoras theorem) = AB2 + (2BD)2 = AB2 + 4BD2 ...(i) In ΔABD, AD2 = AB2 + BD2 (using Pythagoras theorem) C:\fake\image34.pngBD2 = AD2 – AB2 ...(ii) From (i) and (ii) we get AC2 = AB2 + 4(AD2 – AB2) = AB2 + 4AD2 – 4AB2 AC2 = 4AD2 – 3AB2   Hence proved. | C:\fake\image35.png | |  |
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| 10 | Find the ratio in which line formed by joining (–1, 1) and (5, 7) is divided by the line x + y = 4. | 2 |
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|  | ANS:     Let line x + y = 4 divides the line joining the points (– 1, 1) and (5, 7) at C in the ratio k : 1 C:\fake\image36.png  Coordinates of C are C:\fake\image37.png, C:\fake\image38.png  C lies on the line x + y = 4 C:\fake\image39.png  C:\fake\image40.png. Hence ratio 1 : 2. |  |
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| 11 | The decimal expansion of the rational number C:\fake\image41.pngwill terminate after how many places of decimal. | 3 |
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|  | ANS:     The decimal expansion of the rational number C:\fake\image42.pngwhere m and n are non negative integers, will terminate after (i) m places of decimal if m > n (ii) n places of decimal if n > m. Here the denominator 23 × 54 is of the form 2m × 5n where m and n are non-negative integers. Therefore its decimal expansion will terminate after 4 places of decimal. |  |
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| 12 | Find the zeroes of the quadratic polynomial 3x2 – 2 and verify the relationship between the zeroes and the coefficients. | 3 |
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|  | ANS:     Here p(x) = 3x2 – 2 For zeroes of p(x), p(x) = 0 C:\fake\image43.png  3x2 – 2 = 0  C:\fake\image44.png  3x2 = 2 C:\fake\image45.png  C:\fake\image46.png C:\fake\image47.png  zeroes are C:\fake\image48.pngand C:\fake\image49.png Also a = 3, b = 0 and c = – 2 Now sum of zeroes = C:\fake\image50.png= 0 Also C:\fake\image51.png= 0  C:\fake\image52.png  Sum of zeroes = C:\fake\image53.png and product of zeroes = C:\fake\image54.png Also C:\fake\image55.png  C:\fake\image56.png  Product of zeroes = C:\fake\image57.png |  |
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| 13 | Solve the following pair of linear equations for x and y : 2(ax – by) + (a + 4b) = 0; 2(bx + ay) + (b – 4a) = 0 | 3 |
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|  | ANS:     Consider equations: 2(ax – by) + (a + 4b) = 0 and 2(bx + ay) + (b – 4a) = 0 C:\fake\image58.png  2ax – 2by = – a – 4b ...(i) and 2bx + 2ay = 4a – b ...(ii) Multiply (i) by a and (ii) by b and adding, we get 2(a2 + b2)x = (– a – 4b)a + b(4a – b) = – a2 – 4ab + 4ab – b2 = – (a2+ b2) C:\fake\image59.png  x = C:\fake\image60.png Substituting in (i), we get – a – 2by = – a – 4b C:\fake\image61.png  – 2by = – 4b  C:\fake\image62.png  y = 2 C:\fake\image63.png  solution is x = C:\fake\image64.pngand y = 2. |  |
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| 14 | Two isosceles triangles have equal vertical angles and their areas are in the ratio 9 : 16. Find the ratio of their corresponding heights. | 3 |
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|  | ANS:   |  |  | | --- | --- | | Given : In ΔABC and ΔPQR, C:\fake\image65.pngA = C:\fake\image66.pngP, AB = AC, PQ = PR and C:\fake\image67.png ­To Find : C:\fake\image68.png Proof : In ΔABC and PQR C:\fake\image69.png C:\fake\image70.pngA = C:\fake\image71.pngP C:\fake\image72.png  ΔABC ~ ΔPQR (SAS similarity) C:\fake\image73.pngC:\fake\image74.png­  ­...(i) Also, C:\fake\image75.png C:\fake\image76.png ­C:\fake\image77.png [Using (i)] C:\fake\image78.png  C:\fake\image79.png | C:\fake\image80.png | |  |
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| 15 | Find the lengths of the medians of C:\fake\image81.pngABC having vertices at A(5, 1), B(1, 5) and C(– 3, – 1). | 3 |
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|  | ANS:   |  |  | | --- | --- | | Let P, Q and R be the mid-points of the sides BC, AB and AC respectively. So, P = C:\fake\image82.png and R = C:\fake\image83.png C:\fake\image84.png  P (–1, 2), Q (3, 3) and R (1, 0). C:\fake\image85.png  AP, BR and CQ are the medians. C:\fake\image86.png  AP = C:\fake\image87.png BR = C:\fake\image88.png CQ = C:\fake\image89.png | C:\fake\image90.png | |  |
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| 16 | Prove that 15 + 17C:\fake\image91.png be an irrational number. | 4 |
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|  | ANS:     Let C:\fake\image92.png, where a and b are coprime integers, b ≠ 0. Squaring both sides, we get 3 = C:\fake\image93.png. Multiplying with b on both sides, we get 3b = C:\fake\image94.png LHS = 3 × b = Integer RHS = C:\fake\image95.png= Rational number C:\fake\image96.png  LHS ≠ RHS C:\fake\image97.png  Our supposition is wrong. C:\fake\image98.png  C:\fake\image99.pngis irrational. Let 15 + 17C:\fake\image100.png is a rational number. C:\fake\image101.png  15 + 17C:\fake\image102.png, where a and b are coprime, b ≠ 0 C:\fake\image103.png  17C:\fake\image104.png – 15 C:\fake\image105.png= C:\fake\image106.png C:\fake\image107.pngis rational number. But C:\fake\image108.pngis irrational. C:\fake\image109.png  C:\fake\image110.png≠ C:\fake\image111.png C:\fake\image112.png  Our supposition is wrong. C:\fake\image113.png  15 + 17C:\fake\image114.png is irrational. |  |
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| 17 | What must be subtracted or added to p(x) = 8x4 + 14x3 – 2x2 + 8x – 12 so that 4x2 + 3x – 2 is a factor of p(x)? | 4 |
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|  | ANS:     C:\fake\image115.png Remainder = 15x – 14 ∴ If we subtract 15x – 14 or add – 15x + 14 then remainder will be 0. Then 4x2 + 3x – 2 will be a factor of given polynomial. |  |
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| 18 | Solve the following system of linear equations graphically: 3x + y – 12 = 0; x – 3y + 6 = 0 Shade the region bounded by the lines and x-axis. Also, find the area of shaded region. | 4 |
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|  | ANS:   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Table for 3x + y – 12 = 0   |  |  |  |  | | --- | --- | --- | --- | | x | 0 | 4 | 2 | | y | 12 | 0 | 6 |   Table for x – 3y + 6 = 0   |  |  |  |  | | --- | --- | --- | --- | | x | –6 | 0 | –3 | | y | 0 | 2 | 1 |   ΔABC is the region bounded by the lines and x-axis. Area ΔABC = C:\fake\image116.pngBC × AD = C:\fake\image117.png× 10 × 3 = 15 sq. units | C:\fake\image118.png | |  |
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| 19 | In figure AB || PQ || CD, AB = x units, CD = y units and PQ = z units, prove that C:\fake\image119.png  C:\fake\image120.png | 4 |
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|  | ANS:     Let BQ = a units, DQ = b units C:\fake\image121.pngC:\fake\image122.png  PQ || AB  C:\fake\image123.png  C:\fake\image124.png1 = C:\fake\image125.png2, and C:\fake\image126.pngADB = C:\fake\image127.pngPDQ C:\fake\image128.png  ΔADB ~ ΔPDQ Similarily ΔBCD ~ ΔBPQ C:\fake\image129.png  ΔADB ~ ΔPDQ C:\fake\image130.png  C:\fake\image131.png C:\fake\image132.png C:\fake\image133.png... (i) Also ΔBCD ~ ΔBPQ C:\fake\image134.png  C:\fake\image135.png C:\fake\image136.png C:\fake\image137.pngC:\fake\image138.png...(ii) From (i) and (ii) C:\fake\image139.png C:\fake\image140.png C:\fake\image141.png C:\fake\image142.png C:\fake\image143.png C:\fake\image144.pngC:\fake\image145.png  (Hence proved) |  |
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| 20 | The vertices of a triangle ABC are A(1, k), B(4, –3) and C(–9, 7). Area of the triangle is 15 square units. Find the altitude of the triangle with AB as the base. (k is an integer) | 4 |
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|  | ANS:     C:\fake\image146.png Area of C:\fake\image147.pngABC = C:\fake\image148.png|1(–3 – 7) + 4(7 – k) + (–9)(k + 3)| = C:\fake\image149.png|–10 + 28 – 4k – 9k – 27| = C:\fake\image150.png|–13k – 9| C:\fake\image151.png|–13k – 9| = 15 C:\fake\image152.png|–13k – 9| = 30 –13k – 9 = 30 or – 13k – 9 = – 30 k = – 3 or k = C:\fake\image153.png When k = – 3, coordinates of A are (1, – 3). AB = C:\fake\image154.png= 3 C:\fake\image155.png  Area of triangle = 15 sq units C:\fake\image156.pngC:\fake\image157.png× AB × Altitude = 15 C:\fake\image158.pngC:\fake\image159.png× 3 × Altitude = 15 C:\fake\image160.pngAltitude = 10 units |  |
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