Brilliant Public School

Seepat Road, Bahatarai, Bilaspur (C.G.)

Pre- Board Exam – 2017-18

Class - X

Subject – Mathematics

Time: 3:00 Hrs. M.M. 80

Date: 08 Jan. 2018 Monday

General Instructions:

i) All questions are **compulsory**

ii) The question paper consists of **30** questions divided into four **sections A, B, C and D**. **Section-A** comprises of **6** questions of **1 mark** each, **section-B** comprises of **6** questions of **2** marks each, **Section-C** comprises of **10** questions of **3 marks** each, **Section-D** comprises of **8** questions of **4** marks each.

iii) There is no overall choice in this question paper

iv) Use of calculator is not permitted.

Section-A

1. For what value of K will the consecutive terms $2k+1,\ 3k+3\ and\ 5k-1$ form an A.P?

2. Find the 25th term of the A.P, $-5, \frac{-5}{2}, 0, \frac{5}{2}, ...$

3. To divide the line segment AB in the ratio 2:3, a ray AX is drawn such that $\angle BAX$ is acute, AX is then marked at equal intervals. Find minimum number of these marks.

4. What is the maximum number of parallel tangents a circle can have on a diameter?

5. For two given positive integers p and q such that $p = m \times q + n$, where m and n are unique integers, write the relation between q and n.

6. Explain why 5 x 7 x 9 + 7 is a composite number.

Section-B

7. Can two numbers have 15 as their HCF and 175 as their LCM? Give reason.

8. Find 100 is a term of the A.P, 25, 28, 31… or not.

9. Find the values of p for which the quadratic equation $4x^2 + px + 3 = 0$ has equal roots.

10. In an equilateral triangle ABC, AD is drawn perpendicular to BC meeting BC in D. prove that $AD^2 = 3BD^2$

11. Show that a number of the form 14^n, where n is a natural number, can never end with digit zero.

12. Prove that: $\sec^4\theta - \sec^2\theta = \tan^4\theta + \tan^2\theta$

Section-C

13. If $\sec\theta = x + \frac{1}{4x}$, prove that $\sec\theta + \tan\theta = 2x\ or\ \frac{1}{2x}$.

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14. ABC is a triangle. A circle touches sides AB and AC produced and side BC at X, Y and Z respectively. Show that $AX = \frac{1}{2}\, perimeter\ of\ \Delta ABC$

15. If $\tan A + \cot A = 2$, then find the value of $\tan^2 A + \cot^2 A$.

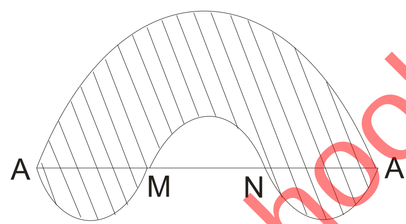
16. The co-ordinates of the vertices of ΔABC are A(14, 4), B (18, 20) and C (2, 8). If E and F are the mid points of AB and AC respectively, prove that $EF = \frac{1}{2} BC$

17. Find the area of the quadrilateral ABCD, the co-ordinates of whose vertices are A(5, -2), B(-3,-1), C(2,1) and D(6,0).

18. Solve the pair of equations for x and y :
$$\frac{a^2}{x} - \frac{b^2}{y} = 0\ ,\ \frac{a^2 b}{x} + \frac{b^2 a}{y} = a + b, \quad x \neq 0; y \neq 0$$

19. Find the value of a and b so that $8x^4 + 14x^3 - 2x^2 + ax + b$ is exactly divisible by $4x^2 + 3x - 2$

20. In the given figure, AB is the diameter of the larger semi-circle. AB = 21 cm, AM = MN = NB. Semi-circles are drawn with AM, MN and NB. Using $\pi = \frac{22}{7}$, calculate the area of the shaded region.



21. A game consists of tossing a one rupee coin 3 times and noting the outcome each time. Ramesh will win the game if all the tosses show same result, loses the game otherwise. Find the probability that Ramesh will lose the game.

22. Water is flowing at 7 m/s through a circular pipe of internal diameter of 4 cm onto a cylindrical tank, the radius of whose base is 40 cm. find the increase in water level in 30 minutes.

Section-D

23. A passenger while boarding the plane slipped from the stairs and got hurt. The pilot took the passenger in the emergency clinic at the airport for treatment. Due to this, plane got delayed by half an hour. To reach the destination 1500 Km away in time, so that the passengers could catch the connecting flight, the speed of the train was increased by 250 Km/hrs. Than the usual speed. What is the usual speed of the plane? What value is depicted in this question?

24. The minimum age of children to be eligible to participate in a painting competition is 8 yrs. It is observed that the age of youngest boy was 8 years and the ages of rest of the participants are having a common difference of 4 months. If the sum of ages of rest of participants is 168 years, find the age of eldest participant in the competition.

25. In $\Delta ABC,\ if\ \angle ADE = \angle B,$ then prove that $\Delta ADE \approx \Delta ABC$. Also if AD = 7.6 cm, AE = 7.2 cm, BE=4.2 cm and BC 8.4 cm, then find DE.

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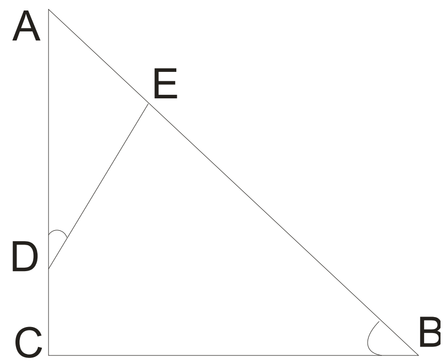

26. Construct an isosceles triangle whose base is 6 cm and altitude 4 cm. then construct another triangle sides are ¾ times the corresponding sides of the isosceles triangle.
27. a, b and c are the sides of a right triangle, where c is the hypotenuse. A circle of radius r, touches the sides of the triangle. Prove that $r = \frac{a+b-c}{2}$.
28. The angle of elevation of a jet plane from a point A on the ground is 60^0. After a flight of 15 seconds, the angle of elevation changes to 30^0. If the jet plane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the jet plane.
29. On annual day of a school, 400 students participated in the function. Frequency distribution showing their ages is as shown in the following table:

Ages(in years)	**5-7**	**7-9**	**9-11**	**11-13**	**13-15**	**15-17**	**17-19**
Number of students	**70**	**120**	**32**	**100**	**45**	**28**	**5**

Find the mean and median of the above data.

30. A game of chance consists of spinning an arrow on a circular board, divided into 8 equal parts, which comes to rest pointing at one of the numbers 1, 2, 3, ……, 8, which are equally likely outcomes. What is the probability that the arrow will point at:

i) An odd number.
ii) A number greater than 3.
iii) A number less than 9.
iv) A number greater than 8.

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