CBSE Class 10 Maths Qs Paper 2019

Series JMS/5

Code No. 30/5/1

Please check that this question paper contains 11 printed pages.

Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

Please check that this question paper contains 30 questions.

Please write down the Serial Number of the question before attempting it.

15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

गणित

MATHEMATICS

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80
General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 30 questions divided into four sections — A, B, C and D.

(iii) Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 8 questions of 4 marks each.

(iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of calculators is not permitted.

SECTION A

Questions numbers 1 to 6 carry 1 mark each.

1. दो संख्याओं a तथा b का म.स. (HCF) 5 तथा उनका ल.स. (LCM) 200 है। गुणनफल ab ज्ञात कीजिए।
   The HCF of two numbers a and b is 5 and their LCM is 200. Find the product ab.

2. k का वह मान ज्ञात कीजिए, जिसके लिए \( x = 2 \) समीकरण \( kx^2 + 2x - 3 = 0 \) का एक हल है।

   अथवा
   k के वे मान ज्ञात कीजिए, जिनके लिए द्विघात समीकरण \( 3x^2 + kx + 3 = 0 \) के मूल वास्तविक तथा समान हों।
Find the value of k for which $x = 2$ is a solution of the equation $kx^2 + 2x - 3 = 0$.

**OR**

Find the value/s of k for which the quadratic equation $3x^2 + kx + 3 = 0$ has real and equal roots.

3. यदि एक समांतर श्रेणी में $a = 15$, $d = -3$ तथा $a_n = 0$ है, तो $n$ का मान ज्ञात कीजिए।

If in an A.P., $a = 15$, $d = -3$ and $a_n = 0$, then find the value of $n$.

4. यदि $\sin x + \cos y = 1$; $x = 30^\circ$ तथा $y$ एक न्यून कोण है, तो $y$ का मान ज्ञात कीजिए।

**अथवा**

$(\cos 48^\circ - \sin 42^\circ)$ का मान ज्ञात कीजिए।

If $\sin x + \cos y = 1$; $x = 30^\circ$ and $y$ is an acute angle, find the value of $y$.

**OR**

Find the value of $(\cos 48^\circ - \sin 42^\circ)$.

5. दो समरूप त्रिभुजों के क्षेत्रफल 25 वर्ग सेमी तथा 121 वर्ग सेमी हैं। इनकी संगत भुजाओं का अनुपात ज्ञात कीजिए।

The area of two similar triangles are 25 sq. cm and 121 sq. cm. Find the ratio of their corresponding sides.

6. यदि बिंदु $(3, a)$, $2x - 3y = 5$ द्वारा निर्देशित रेखा पर स्थित है, तो ‘$a$’ का मान ज्ञात कीजिए।

Find the value of ‘$a$’ so that the point $(3, a)$ lies on the line represented by $2x - 3y = 5$.

**खण्ड ब**

**SECTION B**

प्रश्न संख्या 7 से 12 तक प्रत्येक प्रश्न के 2 अंक हैं।

Question numbers 7 to 12 carry 2 marks each.

7. यदि एक समांतर श्रेणी के प्रथम $n$ पदों का योगफल $S_n$, $S_n = 2n^2 + n$ द्वारा प्रदत्त है, तो इसका $n$वाँ पद ज्ञात कीजिए।

**अथवा**

यदि एक समांतर श्रेणी का 17वाँ पद इसके 10वें पद से 7 अधिक है, तो सार्व अंतर ज्ञात कीजिए।

If $S_n$, the sum of the first $n$ terms of an A.P. is given by $S_n = 2n^2 + n$, then find its $n$th term.

**OR**

If the 17th term of an A.P. exceeds its 10th term by 7, find the common difference.
8. The mid-point of the line segment joining A(2a, 4) and B(−2, 3b) is (1, 2a + 1). Find the values of a and b.

9. A child has a die whose 6 faces show the letters given below:

```
A B C A A B
```

The die is thrown once. What is the probability of getting (i) A (ii) B?

10. Find the HCF of 612 and 1314 using prime factorisation.

OR

Show that any positive odd integer is of the form 6m + 1 or 6m + 3 or 6m + 5, where m is some integer.

11. Cards marked with numbers 5 to 50 (one number on one card) are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the card taken out is (i) a prime number less than 10, (ii) a number which is a perfect square.

12. For what value of k, does the system of linear equations

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2x + 3y = 7
(k − 1) x + (k + 2) y = 3k
```

have an infinite number of solutions?
SECTION C

Question numbers 13 to 22 carry 3 marks each.

13. Prove that $\sqrt{5}$ is an irrational number.

14. Find all the zeroes of the polynomial $x^4 + x^3 - 14x^2 - 2x + 24$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$. 

15. Point P divides the line segment joining the points A(2, 1) and B(5, -8) such that $\frac{AP}{AB} = \frac{1}{3}$. If P lies on the line $2x - y + k = 0$, find the value of k.

OR

For what value of p, are the points (2, 1), (p, -1) and (-1, 3) collinear?

16. Prove that:

$$\frac{\tan \theta}{1 - \tan \theta} - \frac{\cot \theta}{1 - \cot \theta} = \frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}$$

OR

If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.

17. A college hostel (hostel) provides food to its students for a month. A student, who has stayed for 25 days, has spent $4500$. Another student, who has stayed for 30 days, has spent $5200$. Prove that the food consumption for 30 days is $\sqrt{2}$ times the food consumption for 25 days.
A part of monthly hostel charges in a college hostel are fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 25 days, he has to pay ₹ 4,500, whereas a student B who takes food for 30 days, has to pay ₹ 5,200. Find the fixed charges per month and the cost of food per day.

18. \[ \triangle ABC \text{ with } \angle B = 90^\circ \] and D is the mid-point of BC. Prove that \[ AC^2 = AD^2 + 3CD^2. \]

**OR**

In Figure 1, E is a point on CB produced of an isosceles \( \triangle ABC \), with side \( AB = AC \). If \( AD \perp BC \) and \( EF \perp AC \), prove that \( \triangle ABD \sim \triangle ECF \).
19. Prove that the parallelogram circumscribing a circle is a rhombus.

20. In Figure 2, three sectors of a circle of radius 7 cm, making angles of 60°, 80° and 40° at the centre are shaded. Find the area of the shaded region.

21. The following table gives the number of participants in a yoga camp:

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
<th>60 – 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Participants</td>
<td>8</td>
<td>40</td>
<td>58</td>
<td>90</td>
<td>83</td>
</tr>
</tbody>
</table>

Find the modal age of the participants.
A juice seller was serving his customers using glasses as shown in Figure 3. The inner diameter of the cylindrical glass was 5 cm but bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was 10 cm, find the apparent and actual capacity of the glass. (Use $\pi = 3.14$)

![Figure 3](https://byjus.com)

OR

A girl empties a cylindrical bucket full of sand, of base radius 18 cm and height 32 cm on the floor to form a conical heap of sand. If the height of this conical heap is 24 cm, then find its slant height correct to one place of decimal.
SECTION D

Question numbers 23 to 30 carry 4 marks each.

23. A train travels 360 km at a uniform speed. If the speed had been 5 km/hr more, it would have taken 1 hr less for the same journey. Find the speed of the train.

OR

Solve for x:

\[
\frac{1}{a + b + x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}; \quad a \neq b \neq 0, \quad x \neq 0, \quad x \neq -(a + b)
\]

24. If the sum of the first p terms of an A.P. is q and the sum of the first q terms is p; then show that the sum of the first (p + q) terms is \(- (p + q)\).

25. In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then prove that the angle opposite to the first side is a right angle.
26. Construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then another triangle whose sides are \( \frac{3}{4} \) times the corresponding sides of the isosceles triangle.

27. A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of 30°. A girl standing on the roof of a 20 m high building, finds the elevation of the same bird to be 45°. The boy and the girl are on the opposite sides of the bird. Find the distance of the bird from the girl. (Given \( \sqrt{2} = 1.414 \))

OR

The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the plane is flying at a constant height of 3600√3 metres, find the speed of the aeroplane.

28. निम्न बारंबारता बंटन सारणी में बारंबारताएँ x तथा y के मान ज्ञात कीजिए जबकि N = 100 तथा माध्यक = 32 हैं।

<table>
<thead>
<tr>
<th>अंक</th>
<th>0 – 10</th>
<th>10 – 20</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
<th>योग</th>
</tr>
</thead>
<tbody>
<tr>
<td>विद्यार्थियों की संख्या</td>
<td>10</td>
<td>x</td>
<td>25</td>
<td>30</td>
<td>y</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>
Find the values of frequencies x and y in the following frequency distribution table, if N = 100 and median is 32.

<table>
<thead>
<tr>
<th>Marks</th>
<th>0 – 10</th>
<th>10 – 20</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
<th>60 – 70</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students</td>
<td>10</td>
<td>x</td>
<td>25</td>
<td>30</td>
<td>y</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**OR**

For the following frequency distribution, draw a cumulative frequency curve (ogive) of ‘more than type’ and hence obtain the median value.

<table>
<thead>
<tr>
<th>Class</th>
<th>0 – 10</th>
<th>10 – 20</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
<th>60 – 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>5</td>
<td>15</td>
<td>20</td>
<td>23</td>
<td>17</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

29. **सिद्ध कीजिए कि**:

\[ \frac{(1 + \cot \theta + \tan \theta)(\sin \theta - \cos \theta)}{(\sec^3 \theta - \csc^3 \theta)} = \sin^2 \theta \cos^2 \theta \]

Prove that:

\[ \frac{(1 + \cot \theta + \tan \theta)(\sin \theta - \cos \theta)}{(\sec^3 \theta - \csc^3 \theta)} = \sin^2 \theta \cos^2 \theta \]

30. **एक धातु की ऊपर से खुली बाल्टी, शंकु के छित्रक के आकार की है। यदि इसके ऊपरी तथा निचले वृत्तीय सिरों के व्यास क्रमशः 45 सेमी तथा 25 सेमी हैं तथा बाल्टी की सीधी (ऊर्ध्वाधर) ऊंचाई 24 सेमी है, तो इस बाल्टी को बनाने में लगी धातु की चादर का क्षेत्रफल ज्ञात कीजिए। यह भी ज्ञात कीजिए कि इसमें कितना पानी आ सकता है। (π = \frac{22}{7})**

An open metallic bucket is in the shape of a frustum of a cone. If the diameters of the two circular ends of the bucket are 45 cm and 25 cm and the vertical height of the bucket is 24 cm, find the area of the metallic sheet used to make the bucket. Also find the volume of the water it can hold. (Use π = \frac{22}{7})