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CLASS 10 MATH TEST PAPER 21 (FULL SYLLABUS, 80 MARKS, PYQ BASED) Class 10 - Mathematics

Time Allowed: 3 hours

General Instructions:

Read the following instructions carefully and follow them:

- 1. This question paper contains 38 questions.
- 2. This Question Paper is divided into 5 Sections A, B, C, D and E.
- 3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
- 4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
- 5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
- 6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
- 7. In Section E, Questions no. 36-38 are case study-based questions carrying 4 marks each with sub-parts of the values of 1,1 and 2 marks each respectively.
- 8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
- 9. Draw neat and clean figures wherever required.
- 10. Take $\pi = 22/7$ wherever required if not stated.
- 11. Use of calculators is not allowed.

Section A

- 1. The LCM of smallest 2-digit number and smallest composite number is
 [1]

 a) 4
 b) 20
 - c) 40 d) 12
- 2. The graph of y = p(x) is given in the adjoining figure. Zeroes of the polynomial p(x) are

3. The pair of linear equations y = 0 and y = -6 has:

[1]

[1]

Maximum Marks: 80

	2		
	-10 -8 -6 -4 -2 0 2 4 6		
	-4		
	-6		
	a) no solution	b) only solution (0, 0)	
	c) infinitely many solutions	d) a unique solution	
4.	If the quadratic equation $9x^2 + bx + \frac{1}{4} = 0$ has equal a	roots, then the value of b is:	[1]
	a) 3 only	b) 0	
	c) -3 only	d) ± 3	
5.	The 13th term of an AP is 4 times its 3rd term. If its 5	oth term is 16 then the sum of its first ten terms is	[1]
	a) 135	b) 175	
	c) 150	d) 160	
6.	The distance of the point (4, 7) from the x-axis is		[1]
	a) 7	b) 4	
	c) 11	d) $\sqrt{65}$	
7.	If (a, b) is the mid-point of the line segment joining th	he points $A(10, -6)$ and $B(k, 4)$ and $a - 2b = 18$, the value	[1]
	of k is		
	a) 40	b) 4	
	c) 30	d) 22	
8.	In the given figure, DE \parallel BC. The value of x is:		[1]
	2 m^{A}		
	3 cm 4 cm		
	$B \times cm$ C	b) 6	
		d) 10	
		u) 10	

9. In the given figure, PA and PB are tangents from external point P to a circle with centre C and Q is any point on [1] the circle. Then the measure of ∠AQB is



10. Quadrilateral ABCD is circumscribed to a circle. If AB = 6 cm, BC = 7 cm and CD = 4 cm then the length of [1] AD is

 $\frac{1}{6}$

a) 6 cm b) 4 cm

11. $\left[\frac{3}{4} \tan^2 30^\circ - \sec^2 45^\circ + \sin^2 60^\circ\right]$ is equal to

a)
$$\frac{5}{6}$$
 b)

c)
$$\frac{-3}{2}$$
 d) -1

12. If $\tan \theta = \frac{x}{y}$, then $\cos \theta$ is equal to

a)
$$\frac{y}{\sqrt{x^2 - y^2}}$$

b) $\frac{x}{\sqrt{x^2 - y^2}}$
c) $\frac{x}{\sqrt{x^2 + y^2}}$
d) $\frac{y}{\sqrt{x^2 + y^2}}$

13. An adult and a minor boy, standing on the ground, are 4 meters apart. The height of the adult is 4 times the [1] height of the minor boy. If at the mid-point of the line segment joining their feet, the angles of elevation of their tops are complementary, then the height of the minor boy is

a) 1.5 m b) 1.3 m

14. A piece of paper in the shape of a sector of a circle (see figure 1) is rolled up to form a right-circular cone (see [1] figure 2). The value of angle θ is:

m



- 15. If the perimeter of a sector of a circle of radius 6.5 cm is 29 cm, then its area is
 - a) 56 cm² c) 52 cm² b) 58 cm² d) 25 cm²
- 16. A card is drawn at random from a well-shuffled deck of 52 cards. The probability of getting a red card is: [1]

a) $\frac{1}{4}$	b) $\frac{1}{2}$
c) $\frac{1}{13}$	d) $\frac{1}{26}$

- 17. Which of the following numbers **cannot** be the probability of an event?
 - a) 5% b) 0.5

c)
$$\frac{1}{0.5}$$
 d) $\frac{0.5}{14}$

18. Mean and median of some data are 32 and 30 respectively. Using empirical relation, mode of the data is: [1]

a) 36 b) 30

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[1]

[1]

[1]

[1]

	c) 20	d) 26	
19.	Assertion (A): A sphere of radius 7 cm is mounted	on the solid cone of radius 6 cm and height 8 cm. The	[1]
	volume of the combined solid is 1737.97 cm^3 .		
	Reason (R): Volume of sphere is $\frac{4}{3}\pi r^3$.		
	a) Both A and R are true and R is the correct	b) Both A and R are true but R is not the	
	explanation of A.	correct explanation of A.	
	c) A is true but R is false.	d) A is false but R is true.	
20.	Assertion (A): The sum of the series with the nth te	erm. $t_n = (9 - 5n)$ is (465), when no. of terms $n = 15$.	[1]
	Reason (R): Given series is in A.P. and sum of n ter	rms of an A.P. is S _n = $\frac{n}{2}[2a + (n-1)d]$	
	a) Both A and R are true and R is the correct	b) Both A and R are true but R is not the	
	explanation of A.	correct explanation of A.	
	c) A is true but R is false.	d) A is false but R is true.	
	S	ection B	
21.	Find the HCF of 96 and 404 by prime factorisation	method. Hence, find their LCM.	[2]

22. In the given figure, $\angle A = \angle B$ and AD = BE. Show that $DE \parallel AB$.



In the adjoining figure, a circle touches all the four sides of a quadrilateral ABCD whose sides are AB = 6 cm, [2]
 BC = 9 cm and CD = 8 cm. Find the length of side AD.



24. Prove that: $\frac{\cos A}{1-\tan A} + \frac{\sin^2 A}{\sin A - \cos A} = \sin A + \cos A.$

If $\csc^2\theta(1 + \cos\theta)(1 - \cos\theta) = \lambda$, then find the value of λ .

25. If a chord of a circle of radius 10 cm subtends an angle of 60° at the centre of the circle, find the area of the corresponding minor segment of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)

OR

OR

A horse is tethered to one corner of a field which is in the shape of an equilateral triangle of side 12 m. If the length of the rope is 7 m, find the area of the field which the horse cannot graze. Take $\sqrt{3}$ = 1.732. Write the answer correct to 2 places of decimal.

Section C

- 26. Show that $\sqrt{6} + \sqrt{2}$ is irrational.
- 27. Find the quadratic polynomial, sum and product of whose zeroes are -1 and -20 respectively. Also find the [3] zeroes of the polynomial so obtained.
- 28. If the last term of an A.P. of 30 terms is 119 and the 8th term from the end (towards the first term) is 91, then find **[3]** the common difference of the A.P. Hence, find the sum of all the terms of the A.P.

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[3]

[2]

[2]

OR

If the mth term of an AP be $\frac{1}{n}$ and its nth term be $\frac{1}{m}$, then show that its (mn)th term is 1.

29. In the given figure, O is the centre of a circle. PT and PQ are tangents to the circle from an external point P. If [3] $\angle TPQ = 70^{\circ}$, find $\angle TRQ$.



OR

From a point P, two tangents PA and PB are drawn to a circle C(O r). If OP = 2r, show that $\triangle APB$ is equilateral.



30. Find the acute angle θ , when $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$.

31. If the mean of the following frequency distribution is 65.6, find the missing frequencies f_1 and f_2 .

Class	10 - 30	30 - 50	50 - 70	70 - 90	90 - 110	110 - 130	Total
Frequency	5	8	f ₁	20	f ₂	2	50
	-				·		

Section D

32. A journey of 192 km from a town A to town B takes 2 hours more by an ordinary passenger train than a super [5] fast train. If the speed of the faster train is 16 km/h more, find the speed of the faster and the passenger train.

OR

Two pipes together can fill a tank in $\frac{15}{8}$ hours. The pipe with larger diameter takes 2 hours less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately.

One observer estimates the angle of elevation to the basket of a hot air balloon to be 60°, while another observer [5]
 100 m away estimates the angle of elevation to be 30°. Find:

a. The height of the basket from the ground.

- b. The distance of the basket from the first observer's eye.
- c. The horizontal distance of the second observer from the basket.
- 34. In Figure, from a solid cube of side 7 cm, a cylinder of radius 2.1 cm and height 7 cm is scooped out. Find the [5] total surface area of the remaining solid.



OR

From a solid cylinder of height 30 cm and radius 7 cm, a conical cavity of height 24 cm and same radius is hollowed out. Find the total surface area of the remaining solid.

35. The median of the following data is 16. Find the missing frequencies a and b if the total of frequencies is 70. [5]

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[3]

[3]

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40
Frequency	12	а	12	15	b	6	6	4

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36. **Read the following text carefully and answer the questions that follow:**



Lokesh, a production manager in Mumbai, hires a taxi everyday to go to his office. The taxi charges in Mumbai consists of a fixed charges together with the charges for the distance covered. His office is at a distance of 10 km from his home. For a distance of 10 km to his office, Lokesh paid ₹ 105. While coming back home, he took another route. He covered a distance of 15 km and the charges paid by him were ₹ 155.

- i. What are the fixed charges? (1)
- ii. What are the charges per km? (1)
- iii. If fixed charges are ₹ 20 and charges per km are ₹ 10, then how much Lokesh have to pay for travelling a distance of 10 km? (2)

OR

Find the total amount paid by Lokesh for travelling 10 km from home to office and 25 km from office to home. [Fixed charges and charges per km are as in (i) & (ii). (2)

37. Read the following text carefully and answer the questions that follow:

The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti-clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.



In the given figure, AB is one such tangent to a circle of radius 75 cm. Point O is centre of the circle and $\angle ABO = 30^{\circ}$. PQ is parallel to OA.



- i. find the length of AB. (1)
- ii. find the length of OB. (1)
- iii. find the length of AP. (2)

OR

find the length of PQ. (2)

[4]

[4]

38. Read the following text carefully and answer the questions that follow:

The design of Christmas tree is shown in the following graph:



i. What is the distance of point A from x-axis? (1)

ii. What is the Length of BC? (1)

iii. What is the Length of FG? (2)

OR

What is the perimeter of its trunk LMPN? (2)

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