

INDIAN SCHOOL AL WADI AL KABIR

Class X, Mathematics - *Sample Paper 20-21*

Time Allowed: 3 Hours

Maximum Marks: 80

05/01/21

General Instructions:

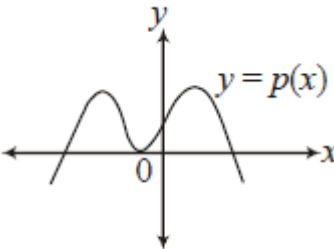
1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

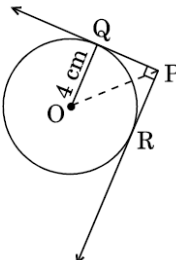
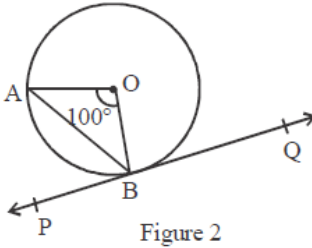
Part – A:

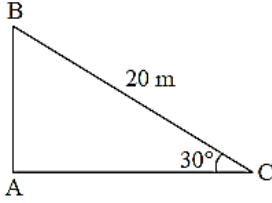
1. It consists three sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:

1. Question No 21 to 26 are Very short answer Type questions of 2 mark each,
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks

Q. No.	PART A
	Section 1: Q1 to Q16 carries 1 Mark each.
1.	<p>The sum of exponents of prime factors in the prime-factorisation of 196 is</p> <p style="text-align: center;">Or</p> <p>The HCF of 135 and 225 is</p>
2.	The value(s) of k for which the quadratic equation $2x^2 + kx + 2 = 0$ has equal roots, is
3.	<p>The number of zeroes for a polynomial p(x) where graph of $y = p(x)$ is given in Figure-1, is</p> <div style="text-align: center;">  <p>Fig. 1</p> </div>

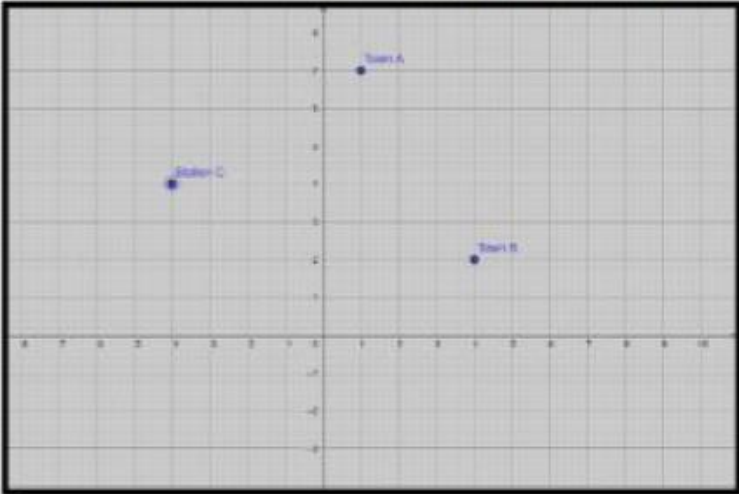
4.	The value of k , for which the pair of linear equations $kx + y = k^2$ and $x + ky = 1$ have infinitely many solutions is
5.	The n th term of the A.P. $a, 3a, 5a, \dots$ is Or The first term of an A.P. is 5 and the last term is 45. If the sum of all the terms is 400, the number of terms is
6.	The value of k for which the system of linear equations $x + 2y = 3$, $5x + ky + 7 = 0$ is inconsistent is
7.	The value of λ for which $(x^2 + 4x + \lambda)$ is a perfect square, is Or The quadratic equation $x^2 - 4x + k = 0$ has distinct real roots if
8.	In the given figure, from an external point P , two tangents PQ and PR are drawn to a circle of radius 4 cm with centre O . If $\angle QPR = 90^\circ$, then length of PQ is 
9.	In Figure 2, PQ is tangent to the circle with centre at O , at the point B . If $\angle AOB = 100^\circ$, then $\angle ABP$ is equal to 
10.	In the ΔABC , D and E are points on side AB and AC respectively such that $DE \parallel BC$. If $AE=4$ cm, $AD=6$ cm and $BD=9$ cm, then find CE . Or Let $\Delta ABC \sim \Delta DEF$ and their areas be respectively 81 cm^2 and 144 cm^2 . If $EF = 24$ cm, then length of side BC is _____ cm.
11.	To draw a pair of tangents to a circle which are inclined to each other at an angle of 45° , it is required to draw tangents at the endpoints of those two radii of the circle, the angle between which is:
12.	The value of $(\tan 1^\circ \tan 2^\circ \dots \tan 89^\circ)$ is equal to _____.

13.	What is the value of $\left(\frac{1}{1 + \cot^2 \theta} + \frac{1}{1 + \tan^2 \theta}\right)$?
14.	<p>In the given figure, a tightly stretched rope of length 20 m is tied from the top of a vertical pole to the ground. Find the height of the pole if the angle made by the rope with the ground is 30°.</p> 
15.	Two right circular cones have their heights in the ratio 1 : 3 and radii is in the ratio 3 : 1, what is the ratio of their volumes?
16.	<p>The probability that it will rain tomorrow is 0.85. What is the probability that it will not rain tomorrow?</p> <p style="text-align: center;">Or</p> <p>Two dice are thrown simultaneously. What is the probability that the sum of the two numbers appearing on the top is 13?</p>

Section-II: Q17-Q20

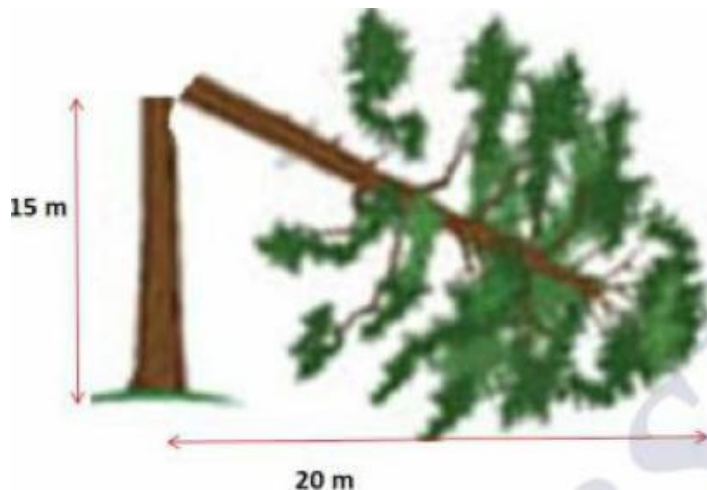
Case study-based questions are compulsory. Attempt any 4 sub parts from each question.

Each question carries 1 mark

17.	<p>2-DIMENSINAL PLANE/ CARTESIAN PLANE</p> <p>Read the information given above and below and answer the questions that follow:</p> <p>Two friends Seema and Aditya work in the same office in Delhi. In the Christmas vacations, both decided to go their hometowns represented by Town A and Town B respectively in the figure given below. Town A and Town B are connected by trains from the same station C (in the given figure) in Delhi.</p> 
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a	Who will travel more distance to reach to their hometown?							
	A	Seema	B	Aditya	C	Both travelled the same distance	D	None of these
b	Seema and Aditya planned to meet at a location D situated at a point D represented by the mid-point of the line joining the point represented by Town A and Town B. Then the coordinates of the point represented by the point D are:							
	A	$\left(\frac{2}{5}, \frac{9}{2}\right)$	B	$\left(\frac{5}{2}, \frac{2}{9}\right)$	C	$\left(\frac{9}{2}, \frac{5}{2}\right)$	D	$\left(\frac{5}{2}, \frac{9}{2}\right)$
c	The area of the triangle formed by joining the points represented by A, B and C is							
	A	17 Squits	B	27 Squits	C	7 Squits	D	15 Squits
d	The location of the station is given by:							
	A	(4, -4)	B	(-4, 4)	C	(-2, 4)	D	(4, 2)
e	The location of the Town B is given by:							
	A	(4, -4)	B	(1, 7)	C	(2, 4)	D	(4, 2)

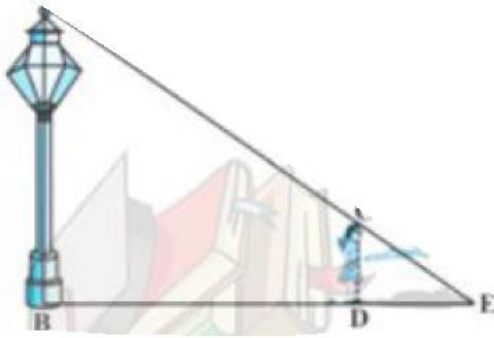
18. Suresh is having a garden near Delhi. In the garden, there are different types of trees and flower plants. One day due to heavy rain and storm one of the trees got broken as shown in the figure.



The height of the unbroken part is 15 m and the broken part of the tree has fallen at 20 m away from the base of the tree. Using the Pythagoras answer the following questions:

a	What is the length of the broken part?							
b	What was the height of the full tree?							
c	In the formed right-angle triangle what is the length of the hypotenuse?							
d	What is the area of the formed right angle triangle?							
e	What is the perimeter of the formed triangle?							

19. Some kindergarten students were playing near a lamp-post. They were so excited to see their shadows and trying to show their shadow is the longest. The lamp was 3.6 m above the ground. One of the of height 90 cm was walking away from the base of the lamp-post at a speed of 1.2m/s



a	Which of the following line segment shows the length of the shadow?							
	A	CE	B	BE	C	DE	D	CD
b	What would be length of her shadow after 4 seconds?							
	A	1.2 m	B	1.6 m	C	2.3 m	D	1.4 m
c	How far is the girl from the lamp-post?							
	A	4.8 m	B	1.2 m	C	12 m	D	6.4 m

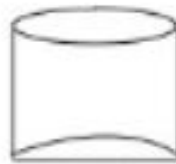
d	Triangles ABE and CDE are similar because:							
	A	All sides are equal	B	The shadow of the girl equal to the height of the lamppost		Angle B and angle E are common		Both are related to the same length of the shadow
e	What AB and CD denotes after walking for 4 seconds away from the lamp-post?							
	A	Girl & Lamp-post	B	Shadow & Girl	C	Girl & Shadow	D	Lamp-post & girl

20.

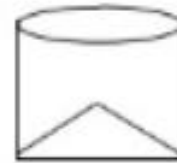
Ganesh a juice seller has his juice shop near Kutub Minar in Delhi. He has three types of glasses, Type A - A glass with a plane bottom, Type B - A glass with a hemispherical raised bottom, and Type C - A glass with the conical raised bottom of height 1.5 cm. The inner diameter of all types of glass is the same as 5cm to serve the customer. The height of the glasses is 10cm (use $\pi = 3.14$)



Type A



Type B



Type C

a	The volume of the glass of type A:							
	A	196.25 cm ³	B	169.52 cm ³	C	187.25 cm ³	D	172.55 cm ³
b	The volume of the hemisphere in the glass of type B:							
	A	37.71cm ³	B	32.71cm ³	C	33.71cm ³	D	43.34cm ³
c	The volume of a glass of type B:							
	A	136.54cm ³	B	166.45cm ³	C	163.54cm ³	D	176.54cm ³
d	The volume of the cone in the glass of type C:							
	A	8.33 cm ³	B	9.81 cm ³	C	10.81 cm ³	D	11.88 cm ³
e	The volume of a glass of type C:							
	A	188.88cm ³	B	189.99cm ³	C	196.89cm ³	D	186.44cm ³


PART -B:

Q21 to Q26 are Very Short Answer Questions of 2 marks each

21.	If HCF of 144 and 180 is expressed in the form $13m - 16$. Find the value of m .
22.	If zeroes of the polynomial $x^2 + 4x + 2a$ are a and $\frac{2}{a}$, then find the value of a .
23.	If the mid-point of the line segment joining the points $A(3, 4)$ and $B(k, 6)$ is $P(x, y)$ and $x + y - 10 = 0$, find the value of k .
24.	Draw a circle of radius 3.5 cm. Take two points P and Q on one of its extended diameters each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q .
25.	Prove that $1 + \frac{\cot^2 \alpha}{1 + \operatorname{cosec} \alpha} = \operatorname{cosec} \alpha$ or Prove that : $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$.
26.	A circle is inscribed in a ΔABC touching AB , BC and AC at P , Q and R respectively. If $AB = 10$ cm $AR = 7$ cm and $CR = 5$ cm, then find the length of BC

PART B:

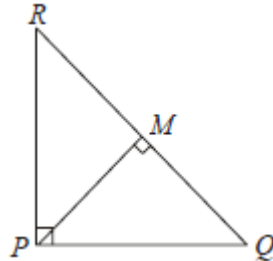
Q27 to Q 33 are Short Answer Questions of 3 marks each

27.	Prove that $\sqrt{2}$ is an irrational number
28.	If one the zero of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k . Or Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β . Now form a quadratic polynomial whose zeroes are 3α and 3β .
29.	In the given figure, find the area of the shaded region where a circular arc of radius 7 cm has been drawn with vertex O of an equilateral triangle OAB of side 14 cm as centre. (Use $\pi = 22/7$ & $\sqrt{3} = 1.73$) 

30. The perimeters of two similar triangles are 30 cm and 20 cm respectively. If one side of the first triangle is 9 cm long, find the length of the corresponding side of the second triangle.

Or

In the given figure, ΔPQR is right-angled at P. M is a point on QR such that PM is perpendicular to QR. Show that $PQ^2 = QM \times QR$.



31. The distribution given below shows that the number of wickets taken by bowler in one-day cricket matches. Find the mean number of wickets taken.

Number of wickets :	20-60	60-100	100-140	140-180	180-220	230-260
Number of bowlers :	7	5	16	12	2	3

32. A statue 1.6 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of pedestal is 45° . Find the height of the pedestal. (Use $\sqrt{3} = 1.73$)

33. The mode of the following frequency distribution is 36. Find the missing frequency (f).

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	8	10	f	16	12	6	7

PART B:

Q34 to Q 36 are Long Answer Questions of 5 marks each

34. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on opposite bank is 60° . When he moves 30 m away from the bank, he finds the angle of elevation to be 30° . Find the height of the tree and width of the river. [Take $\sqrt{3} = 1.732$]

Or

From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° , and the angle of depression of its foot is 45° . Find the height of the tower. Given that $\sqrt{3} = 1.732$

35. A solid metallic cylinder of diameter 12 cm and height 15 cm is melted and recast into 12 toys in the shape of a right circular cone mounted on a hemisphere of same radius. Find the radius of the hemisphere and total height of the toy, if the height of the cone is 3 times the radius.

36. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

Answers

Answers	1	4 and 45	2	± 4	3.	3	4	1
	5	$(2n - 1)a$ & 17	6	1	7	4 and $K < 4$	8	4 cm
	9	50	10	6cm and 18cm	11	135	12	1
	13	1	14	10 m	15	3:1	16	0.15 and 0
	17		18		19		20	
	21		22		23		24	
	25		26		27		28	
	31		32		33		34	
	35		36					