Roll No. :_____

D.A.V. INSTITUTIONS, CHHATTISGARH
PRACTICE PAPER 4
CLASS: X
SUBJECT: MATHEMATICS (STANDARD)

TIME: 3 HOURS   MAX MARKS: 80
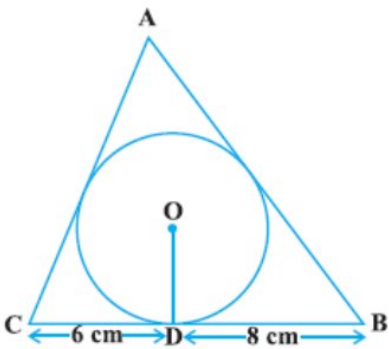
General Instructions:

1. **This Question Paper has 5 sections A – E.**

2. **Section A has 20 MCQs carrying 1 mark each.**

3. **Section B has 5 questions carrying 2 marks each.**

4. **Section C has 6 questions carrying 3 marks each.**

5. **Section D has 4 questions carrying 5 marks each.**

6. **Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.**

7. **All questions are compulsory. However, an internal choice of 2 questions of 5 marks, 2 questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.**

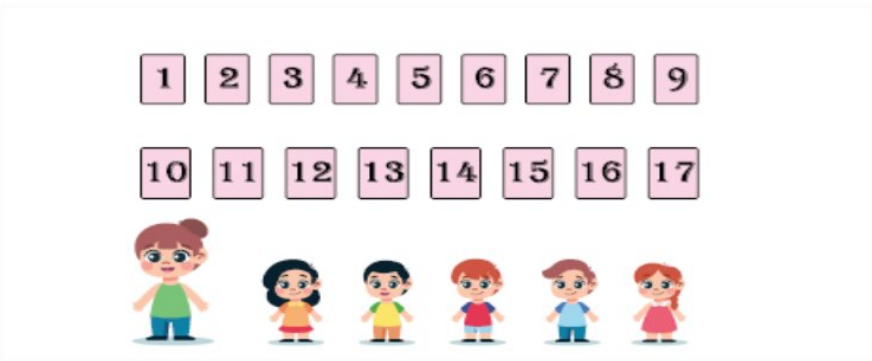8. **Draw neat figures wherever required. Take** $\pi = \frac{22}{7}$ **wherever required if not stated.**

SECTION A	
Section A consists of 20 questions of 1 mark each.	

| Q. No.		Marks
1	If two positive integers p and q can be expressed as $p = a\,b^2$ and $q = a^3b$ where a, b being prime numbers, then LCM (p, q) is equal to (a) ab (b) $a^2 b^2$ (c) $a^3 b^2$ (d) $a^2\ b^3$	1
2	What is the common difference of an AP in which $a_{18} - a_{14} = 32$? (a) -8 (b) -4 (c) 4 (d) 8	1
3	The sum of the zeroes of the given quadratic polynomial $-3x^2 + k$ is (a) k (b) 0 (c) -3 (d) $\frac{k}{-3}$	1
4	In $\triangle ABC$, DE || BC, the value of x will be	1

(a) 1   (b) 2   (c) 3   (d) 4

5	The distance of the point (3,4) from the Origin is	1
	(a) 3 (b) 4 (c) 5 (d) 7	
6	If 4tanA = 3, the value of $\frac{\sin A - \cos A}{\sin A + \cos A}$ is	1
	(a) $\frac{1}{7}$ (b) 7 (c) 5 (d) $\frac{-1}{7}$	
7	A circle can have _____ parallel tangents at the most.	1
	(a) 1 (b) 2 (c) 3 (d) infinite	
8	If α, β are the roots $x^2+px+q = 0$, then the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ is	1
	(a) $\frac{p^2-2q}{q}$ (b) $\frac{2q-p^2}{q}$ (c) $\frac{p^2+2q}{q}$ (d) none of these	
9	The pair of equations x = a and y = b graphically represents lines which are	1
	(a) parallel (b) coincident (c) intersecting at (b, a) (d) intersecting at (a, b)	
10	A bag contains 15 orange candies. If one candy is taken out of the bag, then probability of the candy to be an orange candy is	1
	(a) $\frac{1}{15}$ (b) 15 (c) 0 (d) 1	

11	Consider the following frequency distribution of the heights of 60 students of a class						1

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
No of students	15	13	10	8	9	5

The upper limit of the median class in the given data is

(a) 155   (b)160   (c) 165   (d) 170

12	If sinA + cosA =$\sqrt{2}$, then tanA + cotA =	1
	(a) 1 (b) 2 (c) 3 (d) 4	
13	Which of the following cannot be the probability of an event?	1

	(a) 0	(b) 1	(c) 2	(d) 20%	
14	A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm, length of PQ is (a) 12 cm (b) 13 cm (c) 8.5 cm (d) $\sqrt{119}$ cm				`1
15	Which term of the A.P. 3,8,13,18,………………….. is 78? (a) 15 (b) 16 (c) 17 (d) 18				1
16	If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then ∠POA is equal to (a) 50° (b) 60° (c) 70° (d) 80°				1
17	In triangles ABC and DEF, ∠B = ∠E, ∠F =∠C and AB = 3 DE. Then, the two triangles are (a) congruent but not similar (b) congruent as well as similar (c) neither congruent nor similar (d) similar but not congruent				1
18	Volumes of two spheres are in the ratio 64:27. The ratio of their surface areas is (a) 3 : 4 (b) 4 : 3 (c) 9 : 16 (d) 16 : 9				1
19	**Assertion (A):** If end points of the diameter of a circle is (-2,5) and (4,9), then the centre of the circle is (3,7) **Reason (R):** The mid point of the line segment joining (x_1, y_1) and (x_2, y_2) is $\left(\frac{x_1+y_1}{2}, \frac{x_2+y_2}{2}\right)$ **Choose the correct option:-** a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). c) Assertion (A) is true but Reason (R) is false. d) Assertion (A) is false but Reason (R) is true.				1
20	**Assertion (A):** If mode= 10 and mean =10, then the median is 10 **Reason (R):** mode = 3 median -2 mean **Choose the correct option:-** a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).				1

	c) Assertion (A) is true but Reason (R) is false.	
	d) Assertion (A) is false but Reason (R) is true.	

<div align="center">SECTION B</div>

<div align="center">Section B consists of 5 questions of 2 marks each.</div>

21	Evaluate the following: $$\frac{5\cos^2 60^0 + 4\sec^2 30^0 - \tan^2 45^0}{\cos^2 30^0 + \sin^2 30^0}$$ **OR** Prove that: $$\frac{\cos A}{1 - \tan A} + \frac{\sin^2 A}{\sin A - \cos A} = \sin A + \cos A$$	2
22	Find a point on the y-axis which is equidistant from the points (5, -2) and (-3,2).	2
23	Two concentric circles are of radii 4 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.	2
24	If the LCM of 480 and 256 is 10m+4. Find the value of m.	2
25	Find the ratio in which the line segment joining the points (-3,10) and (-6,8) is divided by the point (-1,6). **OR** Show that the points (1, 7), (4, 2), (–1, –1) and (– 4, 4) are the vertices of a square.	2

<div align="center">SECTION C</div>

<div align="center">Section C consists of 6 questions of 3 marks each.</div>

26	If sin θ + cos θ = 3, then prove that tan θ + cot θ = 1	3
27	If mode of the following frequency distribution is 55, then find the value of x.	3

Class	0-15	15-30	30-45	45-60	60-75	75-90
Frequency	10	7	x	15	10	12

28	Prove that $\sqrt{2}$ is irrational. **OR** Prove that $\sqrt{2} + \sqrt{5}$ is irrational.	3
29	Solve: $21x + 47y = 110$	3

	47x + 21y = 162	
30	Find how many integers between 200 and 500 are divisible by 8. **OR** The first and the last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum?	3
31	If ∆ABC ~ ∆DEF, AB = 4 cm, DE = 6 cm, EF = 9 cm and FD = 12 cm, find the perimeter of ∆ ABC.	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each.	
32	As observed from the top of a 100 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships. **OR** From the top of a building 60 m high, the angles of depression of the top and bottom of a tower are observed to be 45° and 60°, respectively. Then, find the height of the tower. [Take, √3 = 1.7321]	5
33	A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively (see figure). Find the sides AB and AC. 	5

34	Area of a sector of a circle of radius 36 cm is 54 cm². Find
	
	    i. the length of the corresponding arc of the sector.
	
	   ii. area of the major sector.
		5

35	A motor boat whose speed is 18 km/hr in still water takes 1 hr more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. **OR**	5

	Two taps running together can fill a tank in $3\frac{1}{13}$ hours. If one tap takes 3 hours more than the other to fill the tank, then how much time will each tap take to fill the tank?	
	SECTION E	
	Section E consists of 3 questions of 4 marks each.	
36	Five friends and one of their mothers are having a picnic. The mother deicide to play cards game. 17 cards numbered 1, 2, 3 ... 17 are put in a box and mixed thoroughly. The mother asks each boy to draw a card and after each draw she shows some magic tricks based on card number. On the basis of the above information, answer the following questions: (i) What is the probability of drawing an odd number card in the first draw by the first boy? (ii) What is the probability of not drawing an odd number card in the first draw by the first boy? (iii) Now in the second draw, the card drawn in the first draw is replaced. What is the probability of drawing a prime number card by the second boy? **OR** If in the second draw, the boy got number 2 and the card is not replaced, what is the probability of drawing a card bearing a multiple of 3 greater than 5 by the third boy?	1 1 2
37	The boiler is essentially a closed vessel inside which water is stored. Fuel (generally coal) is burnt in a furnace and hot gasses are produced. These hot gasses come in contact with water vessel where the heat of these hot gasses transfer to the water and consequently steam is produced in the boiler. Then this steam is piped to the turbine of the thermal power plant. There are many different types of boiler utilized for different purposes like running a production unit, sanitizing some area, sterilizing equipment, to warm up the surroundings etc.	
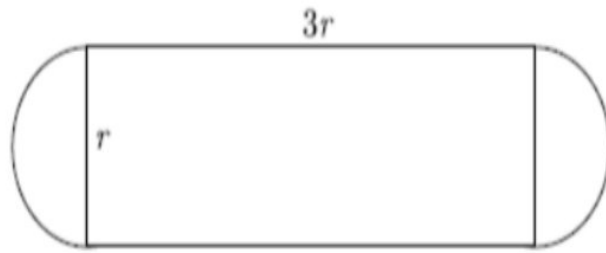
Rajesh has been given the task of designing a boiler for NTPC. Boiler consist of a cylindrical part in the middle and two hemispherical parts at both ends. The cross section of boiler is given below. Length of the cylindrical part is 3 times the radius of the hemispherical part.

On the basis of the above information, answer the following questions:

    i.   Write an expression for the curved surface area of the cylindrical part of Boiler?   1

    ii.   What is the total surface area of Boiler?   1

    iii.   How much is the volume of the boiler?   2

OR

What is the ratio of volume to the surface area of the boiler?

| 38 | Lavanya throws a ball upwards, from a rooftop, which is 20 m above the ground. It will reach a maximum height and then fall back to the ground. The height of the ball from the ground at time t is h, which is given by $h = -4t^2 + 16t + 20$. |
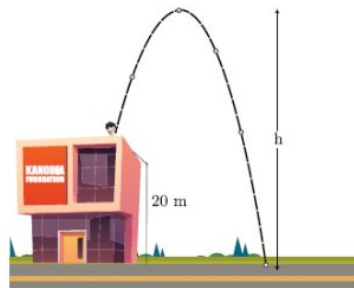
On the basis of the above information, answer the following questions:

    i.   What is the height of the ball at t=0?   1

    ii.   What is the height reached by the ball after 1 second?   1

    iii.   How long will the ball take to hit the ground?   2

OR

What are the two possible times to reach the same height of 32 m?