Kendriya Vidyalaya Sangathan, Bhopal Region

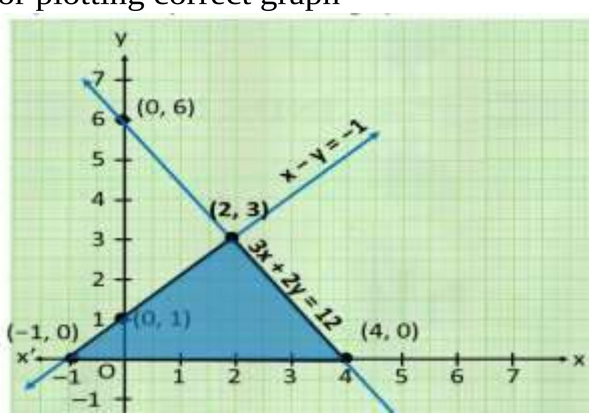
Marking Scheme

First Pre Board Exam – (2025-26)

Subject: - Mathematics (SET-3)

Ans.1	(a) 8	1 mark
Ans.2	(d)51	1 mark
Ans.3	(c) 4.8cm	1 mark
Ans.4	(b) -m, m+3	1 mark
Ans.5	(b)(2,0)	1 mark
Ans.6	(c)$\sqrt{a^2+b^2}$	1 mark
Ans.7	(a)30^0	1 mark
Ans.8	(b) $\frac{2}{7}$	1 mark
Ans.9	(b)$\frac{ac}{b+c}$	1 mark
Ans.10	(c)25cm	1 mark
Ans.11	(c)20	1 mark
Ans.12	(a)75m	1 mark
Ans.13	(b) 15°	1 mark
Ans.14	(a) 4/3	1 mark
Ans.15	(d) 25π cm²	1 mark
Ans.16	(d) 12:1	1 mark
Ans.17	(d) 0, 8	1 mark
Ans.18	(a) 2	1 mark
Ans.19	(a) Bothassertion(A)andreason(R)aretrueandreason(R)isthecorrectexplanationofassertion(A).	1 mark
Ans.20	(a) Bothassertion(A)andreason(R)aretrueandreason(R)isthecorrectexplanationofassertion(A).	1 mark
Ans.21	AB = AC (GIVEN) AD + BD = AF+ CF (FROM FIG.)	 1/2

	AF+ BE = AF+ CE (AF=AD,CF=CE Tangent drawn from external point to a BE = CE circle equal in lengths)	mark 1 mark 1/2 mark
Ans.22	Finding LCM Of 28 and 32 =224 it is the smallest no. which is exactly divisible by 28 and 32 We require remainder 8 and 12 when devided by 28 and 32 hence the require no, is 224 -8 -12 =204 OR Finding LCM of 40 and 60 =120 mint. 120 mints. = 2hour i.e. both bells' rings together at 11:00 hour again.	1mark 1 mark 1 mark 1 mark
Ans.23	Writing CotA =3/4 Consider B=3k,P=4k and then find H= 5k Find TanA =4/3 and SinA = 4/5 and Cos A= 3/5 Finding LHS $1\text{-}Tan^2A/1+tan^2A = 7/16$ Finding RHS $Cos^2A\text{-}Sin^2A = 7/16$	1 mark 1 mark
Ans.24	Writing $2\pi r = 2r + 16.5$ Writing $2r(\pi-1) = 16.5$ Finding $r = \frac{16.5 x 7}{2x 15} = \frac{7.7}{2} = 3.85$ cm. OR Finding OP= 8 cm Finding area of sector $= \pi r^2\theta/360 = \frac{3179}{21}$ cm^2 Finding area of Δ OPA $= \frac{1}{2}$x 15x8 = 60 cm^2 Finding area of shaded region $= \frac{3179}{21} - 60 = \frac{1919}{21}$cm^2	1/2 1/2 1 OR 1/2 1/2 1/2 1/2
Ans.25	WRITING .$\frac{PS}{SQ} = \frac{PT}{TR}$hence ST ll QR(by the converse of B.P.T.) writing ∠ PST = ∠ PQR -----------(1) (corresponding angles) ∠ PST = ∠ PRQ------------(2) (given) From eq. 1^{st}, and 2^{nd} ∠ PQR = ∠ PRQ Hence PQ = PR (Sides opposite toequal angles of triangle.	1/2 1/2 1/2 1/2
Ans.26	Writing toal no. of possible outcomes N(T) = { (1,1) (1,2)-------------------(6.5) (6,6)} = 36 For (i) part	1/2 mark

	Favorable out comes N(E_1) ={ (5,1),(5,2),(5,3),(5,4),(5,),(5,6) (1, 5) (2, 5) (3, 5) (4, 5) (6, 5)} =*11* So probability of getting 5atleast once P(E_1) = $\frac{N(E1)}{N(T)} = \frac{11}{36}$ For (ii) part Probability that 5 will not come up either time = 1 – P(E_1) = $1 - \frac{11}{36} = \frac{25}{36}$	1/2 1/2 $1\frac{1}{2}$
Ans.27	Let BN=BL =xcm { *length of tangents drawn from external point to a circle are equal in length*} *AM=AN -------(1)* *CM= CL--------(2)* *Now AN=AB-BN = 10-x* *Similarly CL= BC- BL= 12-x* *Now from fig. AC=AM+CM* $AC = AN+CL\{BY\ EQUATION\ 1\ AND\ 2\}$ *12 = 10-x + 12-x* *2x =10* $x=\frac{10}{2}$ *=5 cm.* *now BL=x=5cm., CM=12-x =12-5=7cm.,AN=10-x =10-5=5cm.*	1 mark 1 mark 1 mark
Ans.28	$\text{LHS} = \frac{\cos A - \sin A + 1}{\cos A + \sin A - 1}$ $= \frac{\frac{\cos A}{\sin A} - \frac{\sin A}{\sin A} + \frac{1}{\sin A}}{\frac{\cos A}{\sin A} + \frac{\sin A}{\sin A} - \frac{1}{\sin A}}$ $= \frac{\cot A - 1 + \operatorname{cosec} A}{\cot A + 1 - \operatorname{cosec} A}$ $= \frac{\operatorname{cosec} A + \cot A - (\operatorname{cosec}^2 A - \cot^2 A)}{(\cot A - \operatorname{cosec} A + 1)}$ $[\because \operatorname{cosec}^2 A = 1 + \cot^2 A \Rightarrow \operatorname{cosec}^2 A - \cot^2 A = 1]$ $= \frac{\operatorname{cosec} A + \cot A - (\operatorname{cosec} A + \cot A)(\operatorname{cosec} A - \cot A)}{(\cot A - \operatorname{cosec} A + 1)}$ $= \frac{(\operatorname{cosec} A + \cot A)(1 - \operatorname{cosec} A + \cot A)}{(\cot A - \operatorname{cosec} A + 1)}$ $= \operatorname{cosec} A + \cot A = \text{RHS}.$	1 mark 1 mark 1 mark
Ans.29	For plotting correct graph  	2 marks

	Writing correct vertices (2,3) (-1,4) &(4,0) OR Let number of rows = x And number of students in each row = y Therefore total number of students in class = xy **Condition 1:** If 3 students are extra in a row, there would be 1 row less $(x - 1)(y + 3) = xy$ $xy + 3x - y - 3 = xy$ $3x - y = 3$ ....(1) **Condition 2:** If 3 students are less in a row, there would be 2 rows more $(x + 2)(y - 3) = xy$ $xy - 3x + 2y - 6 = xy$ $- 3x + 2y = 6$ ....(2) Adding equations (1) and (2), we obtain $3x - y + (- 3x + 2y) = 3 + 6$ $y = 9$ Substituting $y = 9$ in equation (1), we obtain $3x - 9 = 3$ $3x = 12$ $x = 4$ Hence, number of students in the class, $xy = 4 \times 9 = 36$	1 mark 1 mark 1 mark 1 mark
Ans.30	By splitting the middle term, we get $f(x) = \sqrt{3}\, x^2 - 6x - 2x + 4\sqrt{3}$ $=\sqrt{3}\, x(x - 2\sqrt{3}) - 2(x - 2\sqrt{3})$ $= (\sqrt{3}\, x - 2)(x - 2\sqrt{3})$ On putting $f(x) = 0$, we get $(\sqrt{3}\, x - 2)(x - 2\sqrt{3}) = 0$ $\Rightarrow \sqrt{3}\, x - 2 = 0$ or $x - 2\sqrt{(3} = 0$ $x = 2/\sqrt{3}$ or $x = 2\sqrt{3}$ verification sum of zeros = $-b/a$ product of zeros = $\frac{c}{a}$ $2/\sqrt{3} + 2\sqrt{3} = -(-8)/\sqrt{3}$ $\frac{2}{\sqrt{3}} \times 2\sqrt{3} = \frac{4\sqrt{3}}{\sqrt{3}}$ $8/\sqrt{3} = 8/\sqrt{3}$ $4 = 4$ OR Given sum of Zeros=6 and product of zeros = 9 Polynomial $P(x) = k(x^2 - (\text{sum of zeroes})x + \text{product of zeroes})$ $P(x) = K(x^2 - 6x + 9)$ For finding zeroes Applying splitting middle terms $P(x) = K(x^2 - 3x - 3x + 9)$ $P(x) = K(x-3)(x-3)$ For zeroes compare $P(x) = 0$ Gives x=3 and x=3	1 mark 1 mark 1 mark 1 mark 1 mark 1 mark
Ans.31	Full marks for correct proof	3

Ans.32	Let us first draw the diagram Let P be the required location of the pole.  Let the distance of the pole from the gate B be x m, i.e., BP = x m. Now the difference of the distances of the pole from the two gates = AP – BP (or, BP – AP) = 7 m. Therefore, AP = (x + 7) m. Now, AB = 13m, and since AB is a diameter, $\angle APB = 90°$ Therefore, $AP^2 + PB^2 = AB^2$ (By Pythagoras theorem) i.e., $(x + 7)^2 + x^2 = 13^2$ i.e., $x^2 + 14x + 49 + x2 = 169$ i.e., $2x^2 + 14x – 120 = 0$ $x^2 + 7x – 60 = 0$ So, it would be possible to place the pole if this equation has real roots. To see if this is so or not, let us consider its discriminant. The discriminant is $D=b^2 – 4ac = 72 – 4 \times 1 \times (– 60) = 289 > 0$. So, the given quadratic equation has two real roots, and it is possible to erect the pole on the boundary of the park. Solving the quadratic equation $x^2 + 7x – 60 = 0$, by the quadratic formula, we get x = 5 or – 12. Since x is the distance between the pole and the gate B, it must be positive. Therefore, x = – 12 will have to be ignored. So, x = 5. Thus, the pole has to be erected on the boundary of the park at a distance of 5m from the gate B and 12m from the gate A.	1 mark 1 mark 1 mark 1 mark 1 mark
Ans.33	For correct statement For correct digram writing given ,to prove, For correct proof In the given figure, DE || AC and DF || AE. Prove that BF/FE=BE/EC· In ΔBAC, DE || AC [Given] $\therefore \frac{BE}{EC} = \frac{BD}{AD}$ ...(i) [By Basic Proportionality Theorem] Similarly, in ΔBAE, DF || AE [Given] $\therefore \frac{BF}{FE} = \frac{BD}{DA}$ ...(ii) [By Basic Proportionality Theorem] From equations (i) and (ii), we get: $\frac{BE}{EC} = \frac{BF}{FE}$ Hence, **proved**.	1 mark 1 mark 1 mark 1 mark 1 mark

Ans.34

DailyWages(inRs.)	Numberof Workers (f_i)	Class mark X_i	A= 170 $U_i = \frac{Xi - A}{h}$ h=20	f_ix U_i
100-120	10	110	-3	-30
120-140	15	130	-2	-30
140-160	20 f_0	150	-1	-20
160-180	22 f_1	170	0	0
180-200	18 f_2	190	1	18
200-220	12	210	2	24
220-240	13	230	3	39
	$\sum f_i$ =100			$\sum f_i x U_i$= -80 +81=1

1 mark

Applying formula of mean

$\bar{x}$= A + $\frac{\sum fixU}{\sum fi}$x h

$\bar{x}$ = 170 +$\frac{1}{100}$x 20 $1\frac{1}{2}$ marks

$\bar{x}$ = 170 + 0.2 =172.02

Mode of the data Z = l + $\frac{f1 - f0}{2f1 - f0 - f2}$x h

Z = 160 + $\frac{22 - 20}{2x22 - 20 - 18}$x20 1 mark

Z = 160 + 6.67= 166.67

OR

Class	Frequency (f)	Cumulative frequency (cf)
0-10	f_1	f_1
10-20	5	5+ f_1
20-30	9	14+ f_1
30-40	12	26+ f_1
40-50	f_2	26+ f_1+ f_2
50-60	3	29+ f_1+ f_2
60-70	2	31+ f_1+ f_2
Total	$\sum f_i$ =40	

$1\frac{1}{2}$ marks

$1\frac{1}{2}$ mark

Given median = 32.5 hence median class is30-40, l=30N=40 ,f =12, C= 14+ f_1, h=10

Median = 32.5

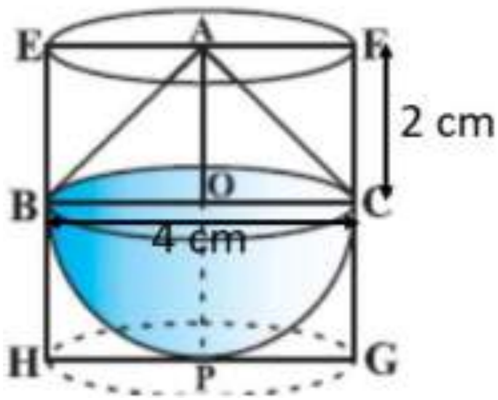
l + $\frac{\frac{N}{2} - C}{f}$ x h = 32.5 1 mark

30 + $\frac{\frac{40}{2} - (14 + f1)}{12}$ x 10 =32.5

$\frac{20 - 14 - f1}{12}$ x 10 = 32.5 -30

$\frac{6 - f1}{12} = \frac{2.5}{10}$

6-f_1= $\frac{12}{4}$

	$6-3 = f_1$ $f_1 = 3$ now $\sum f_i = 40$, $f_1 + f_2 + 31 = 40$ $3 + f_2 = 9$ $F_2 = 6$	$1\frac{1}{2}$ 1 mark
Ans.35	 : Let BPC be the hemisphere and ABC be the cone standing on the base of the hemisphere The radius BO of the hemisphere (as well as of the cone) = 1/2 × 4 cm = 2 cm. So, volume of the toy = $\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h$ $V = \frac{2}{3}x3.14\ x2x2x2 + \frac{1}{3}\ x3.14x2x2x2 = 25.12\ cm^3$ Now, let the right circular cylinder EFGH circumscribe the given solid. The radius of the base of the right circular cylinder = HP = BO = 2 cm, and its height is EH = AO + OP = (2 + 2) cm = 4 cm So, the volume required = volume of the right circular cylinder – volume of the toy $= (3.14 \times 2^2 \times 4 - 25.12)\ cm^3$ $= 25.12\ cm^3$ Hence, the required difference of the two volumes = $25.12\ cm^3$.	½ 1/2 $1\frac{1}{2}$ ½ 2
Ans.36	(i) R(200,400) and S(-200,400) (ii) (a) Side of square PQRS= 400 units. So, area of square PQRS=$(400)^2$ =16000 sq.units. OR (ii) (b) Length of diagonal PR=$\sqrt{(-200-200)^2+(0-400)^2} = \sqrt{320000} = 400\sqrt{2}\ units$ (iii) Using the section formula for the x-coordinate $-200 = \frac{1 \times 600 + k \times 200}{1+k}$ => -200-200k=600+200k => -400k=800 => k=-2	1 2 2 1
Ans.37	(i)Here a= 5, d=3 $a_n = a + (n-1)\ d$ $59 = 5 + (n-1)\ 3$ n= 19 (ii) $a_n = a + (n-1)\ d$ $a_{31} = 5 + (31-1)\ 3 = 95$	1 1

	(iii)(a)To earn Rs.5000 on a specific day, the no. of people on that day=5000/100=50 now using nth term formula 50= 5+(n-1)3 => n=16 (iii)(b) Total people joined in 16 days $S_{16} = \frac{16}{2}[2\times5 + (16-1)3]$ $S_{16} = 8(10+45)$ $S_{16} = 8 \times 55 = 440$ So, total amount earned= 440×100=Rs.44000	2 2
Ans.38	(i) In Δ PAD, $\tan 30^0 = \frac{PD}{AD}$ $\frac{1}{\sqrt{3}} = \frac{20}{AD}$ AD= $20\sqrt{3}$= 34.6 m (ii) In Δ PBD, $\tan 45^0 = \frac{PD}{BD}$ $1 = \frac{20}{BD}$ BD = 20 m Width of the river= AB= AD + BD=34.6+20=54.6m (iii)(a) Time taken by boat A to reach D= $\frac{34.6}{10} = 3.46\ seconds$ Time taken by boat A to reach D= $\frac{20}{5} = 4\ seconds$ So, boat A will reach point D first. OR (iii)(b) Distance covered by boat A in 3 seconds= 10×3=30m Distance covered by boat A in 3 seconds= 5×3=15m So, distance between the two boats after 3 seconds= AB-(30+15) = 54.6-45 =9.6m	1 1 2 2