NAVODAYA VIDYALAYA SAMITI

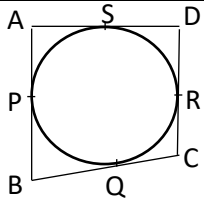
PRE-BOARD I EXAMINATION

MARKING SCHEME

CLASS X

SUBJECT: MATHEMATICS BASIC (241)

QUESTION NUMBER	ANSWER/HINTS	MARKS
1	(c) 4	1
2	(a) $4 = b$	1
3	(b) 5	1
4	(b) 9cm	1
5	(c) ± 6	1
6	(b) $\frac{17}{13}$	1
7	(b) 7 unit	1
8	(c)130^0	1
9	(d) $3:1$	1
10	(b) 21	1
11	(a) 3cm	1
12	(d) $\frac{25}{9}$	1
13	(c) 88^0	1
14	(b) -20	1
15	(c) $\frac{1}{13}$	1
16	(a) 30^0	1
17	(d) increases by 5	1
18	(d) $x + y = 1$	1
19	(a)	1
20	(d)	1
21	$96 = 2^5 \times 3^1$ $120 = 2^3 \times 3^1 \times 5^1$ $HCF(96, 120) = 2^3 \times 3^1 = 24$ $LCM(96, 120) = 2^5 \times 3^1 \times 5^1 = 480$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
22	LetP(0, y) be point on y-axis divide line segment joining $(5, -6)$ and $(-1, -4)$ in the ratio $k:1$	

	$(0,y)=\left(\frac{kx_2+x_1}{k+1},\frac{ky_2+y_1}{k+1}\right)$	$\frac{1}{2}$
	$=\left(\frac{-k+5}{k+1},\frac{-4k-6}{k+1}\right)$	$\frac{1}{2}$
	$0=\frac{-k+5}{k+1}, \qquad y=\frac{-4k-6}{k+1}$	$\frac{1}{2}$
	$\therefore k=5:1$	
	$y=\frac{-20-6}{5+1}=-\frac{13}{3}$	$\frac{1}{2}$
	OR	
	$AP=BP \therefore AP^2=BP^2$	$\frac{1}{2}$
	$\therefore (x-5)^2+(y-1)^2=(x-1)^2+(y-5)^2$	$\frac{1}{2}$
	$\therefore 10x+2y=2x+10y$	$\frac{1}{2}$
	$\therefore x=y$	$\frac{1}{2}$
23	$D(3,x)$	
	$Mid\ point\ of\ AC\ =\ Mid\ point\ of\ BD$	$\frac{1}{2}$
	$\left(\frac{1+6}{2},\frac{2+6}{2}\right)=\left(\frac{4+3}{2},\frac{3+x}{2}\right)$	$\frac{1}{2}$
	$\frac{2+6}{2}=\frac{3+x}{2}$	$\frac{1}{2}$
	$\therefore x=5,$ $D\equiv(3,5)$	$\frac{1}{2}$
24	$AP=AS$ $BP=BQ$ $CR=CQ$ $DR=DS$ 	1

	$AP + BP + CR + DR = AS + BQ + CQ + DS$ $AB + CD = AD + BC$	$\frac{1}{2}$ $\frac{1}{2}$
25	$\text{L. H. S.} = \sin(\text{A} + \text{B}) = \sin 90^0 = 1$ $\text{R. H. S.} = \sin\text{A}\cos\text{B} + \cos\text{A}\sin\text{B}$ $= \sin 60^0 cos 30^0 + cos 60^0 sin 30^0$ $= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2} = 1$ **Or** $sin\theta + sin^2\theta = 1$ $sin\theta = 1 - sin^2\theta = cos^2\theta$ $\therefore cos^2\theta + cos^4\theta = cos^2\theta + (cos^2\theta)^2$ $= cos^2\theta + sin^2\theta = 1$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ 1 $\frac{1}{2}$
26	Let$3 + 2\sqrt{\mathbf{5}}$ is not an irrational number. $\therefore 3 + 2\sqrt{\mathbf{5}}$ is a rational number. $\therefore 3 + 2\sqrt{\mathbf{5}} = \frac{\boldsymbol{p}}{\boldsymbol{q}}$ ….. Where p and q are co-prime $\therefore 2\sqrt{\mathbf{5}} = \frac{\boldsymbol{p}}{\boldsymbol{q}} - \mathbf{3}$ $\therefore 2\sqrt{\mathbf{5}} = \frac{\boldsymbol{p}}{\boldsymbol{q}} - \mathbf{3}$ $\therefore \sqrt{\mathbf{5}} = \frac{\boldsymbol{p - 3q}}{\boldsymbol{2q}}$ But p and q integers. $\therefore \frac{p-3q}{2q}$ is a rational number. $\therefore \sqrt{5}$ is rational number But this is contradiction to the fact that $\sqrt{\mathbf{5}}$ is an irrational number. $\therefore$ Our assumption that $3 + 2\sqrt{\mathbf{5}}$ is not an irrational number is wrong	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

	$\therefore 3+2\sqrt{5}$ is an irrational number	
27	Let three consecutive terms of A.P. be $a-d, a, a+d$ $\therefore (a-d)+a+(a+d)=30$ $\therefore a=10$ Now $(a-d)\times a\times(a+d)=910$ $\therefore 10(10-d)(10+d)=910$ $\therefore 100-d^2=91$ $\therefore d=\pm 3$ If $\therefore d=3$ then three terms are: 7, 10, 13 If $\therefore d=-3$ then three terms are: 13, 10, 7 **OR** $a=65, d=-4$ Let $a_n<0$ $\therefore a+(n-1)d<0$ $\therefore 65+(n-1)(-4)<0$ $\therefore (n-1)(-4)<-65$ $\therefore (n-1)>\frac{65}{4}$ $\therefore n>17\frac{1}{4}$ $\therefore 18^{th}\ term\ is\ first\ negative\ term.$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
28	In $\Delta BEP\ and\ \Delta CDP$, $\angle BEP=\angle CDP$----------($\because each\ 90^0$) $\angle BPE=\angle CPD$ ----------($\because$ $vertically\ opp.angles$) $\therefore \Delta BEP\sim\Delta CDP$ ----------($\because AA\ similarity$)	$\frac{1}{2}$ $\frac{1}{2}$ 1

	$\because \frac{BP}{CP} = \frac{EP}{PD}$ $\therefore BP \times PD = EP \times CP$	$\frac{1}{2}$ $\frac{1}{2}$
29	Correct table for both equations Correct graph Correct solution from graph **OR** Let money with him be ₹x And number of persons be y $x - 12y = -6$ ---- ---(1) $x - 9y = 42$ ----------(2) $\therefore x =$ ₹186 $\therefore y = 18$	1 1 1 1 1 1
30	$LHS = (cosecA - sinA)(secA - cosA)(tanA + cotA)$ $=\left(\frac{1}{sinA} - sinA\right)\left(\frac{1}{cosA} - cosA\right)\left(\frac{sinA}{cosA} + \frac{cosA}{sinA}\right)$ $= \frac{cos^2A}{cosA} \cdot \frac{sin^2A}{sinA}\left(\frac{sin^2A + cos^2A}{sinA.cosA}\right)$ $= sinA.cosA \times \frac{1}{sinA.cosA} = 1$ $= R.H.S.$	1 $\frac{1}{2}$ 1 $\frac{1}{2}$

<table>
<tr>
<td>31</td>
<td>Correct cummulative frequency table

<table>
<tr><th>Class interval</th><th>Frequency (f)</th><th>Cummulative freq. (cf)</th></tr>
<tr><td>120.130</td><td>2</td><td>2</td></tr>
<tr><td>130-140</td><td>8</td><td>10</td></tr>
<tr><td>140-150</td><td>12</td><td>22</td></tr>
<tr><td>150-160</td><td>20</td><td>42</td></tr>
<tr><td>160-170</td><td>8</td><td>50</td></tr>
<tr><td>TOTAL</td><td>50</td><td></td></tr>
</table>
$Median\ class\ =\ 150-160\ ,\therefore l=150, cf=22,$

$f=20, n=50\ , h=10$

$$median = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

$$median = 150 + \left(\frac{25-22}{20}\right) \times 10$$

$$median = 151.5\ cm$$</td>
<td>1

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$</td>
</tr>
<tr>
<td>32</td>
<td>Correct given and figure

To prove

Construction

Proof

Answer of related problem</td>
<td>1
$\frac{1}{2}$

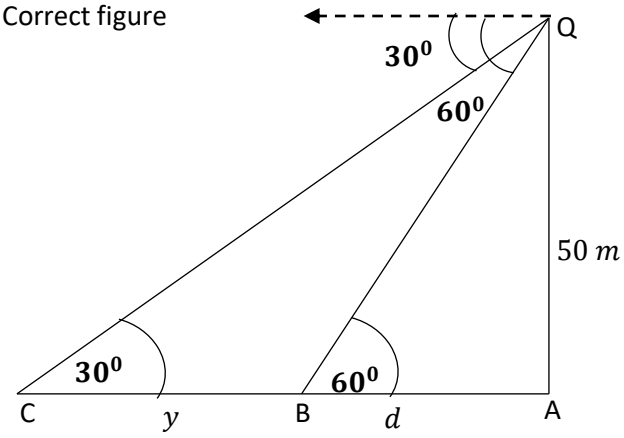
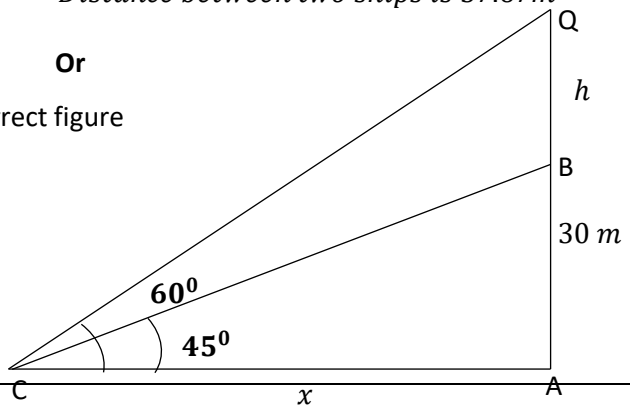
$\frac{1}{2}$

2

1</td>
</tr>
</table>

33.	Let the uniformspeed of train be x km/hr. ∴reduced Speed is $x-8$ km/hr $\therefore \frac{480}{x-8}-\frac{480}{x}=3$ $\therefore \frac{480(x-x+8)}{x(x-8)}=3$ $\therefore x^2-8x-1280=0$ $\therefore (x+32)(x-40)=0$ $\therefore x=-32 \; or \; x=40$ But $x \neq -32$ $\therefore x=40$ Hence speed of train is 40 km/hr **Or** Let the pipe with smaller diameter takes$x$ hours to fill the tank. ∴ Time taken by pipe with larger diameter is $x-9$ hours. . $\therefore \frac{1}{x}+\frac{1}{x-9}=\frac{1}{6}$ $\therefore \frac{(x-9+x)}{x(x-9)}=\frac{1}{6}$ $\therefore x^2-21x+54=0$ $\therefore x^2-18x-3x+54=0$	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

	$\therefore x(x-18)-3(x-18)=0$	$\frac{1}{2}$
	$\therefore (x-18)(x-3)=0$	$\frac{1}{2}$
	$\therefore x=18 \ or \ x=3$	
	But x cannot beless than 6	$\frac{1}{2}$
	$\therefore x=18$hr.	$\frac{1}{2}$
	∴ Tap with smaller diameter takes 18 hours and tap with larger diameter takes 9 hours to fill the tank separately.	
34	Given: side of square field (a)=20m, $r=7m$	$\frac{1}{2}$
	$Area \ of \ field \ horse \ can \ graze$	
	$= \ area \ of \ quadrant \ of \ circle$	$\frac{1}{2}$
	$=\frac{1}{4}\times\frac{22}{7}\times 7\times 7$	1
	$=\frac{77}{2}=38.5 \ sq.m.$	$\frac{1}{2}$
	$If \ r=14m \ then$	
	$Area \ of \ field \ horse \ can \ graze$	
	$= \ area \ of \ quadrant \ of \ circle$	1
	$=\frac{1}{4}\times\frac{22}{7}\times 14\times 14$	$\frac{1}{2}$
	$=154 \ sq.m$	
	$Increased \ in \ grazing \ area = 154-38.5$	1
	$=115.5 \ sq.m$	

35	Correct figure 	1
	In ΔABQ	
	$$tan60^0 = \frac{AQ}{AB}$$	$\frac{1}{2}$
	$$\therefore \sqrt{3} = \frac{50}{d}$$	$\frac{1}{2}$
	$\therefore d = \frac{50}{\sqrt{3}} = \frac{50}{3}\sqrt{3}\ m = 28.83m$ ..... (1)	
	Now, InΔACQ	$\frac{1}{2}$
	$$tan30^0 = \frac{AQ}{AC}$$	$\frac{1}{2}$
	$$\therefore \frac{1}{\sqrt{3}} = \frac{50}{d+y}$$	1
	$\therefore d + y = 50\sqrt{3}$=86.5	1
	$\therefore y = 86.5 - 28.83 = 57.67m$	
	$\therefore$ *Distance between two ships is* $57.67m$	
	Or	
	Correct figure 	1

	In ΔABC	$\frac{1}{2}$
	$tan45^0 = \frac{AB}{BC}$	
	$\therefore 1 = \frac{20}{x}$	$\frac{1}{2}$
	$\therefore x = 20\ m$ ..... (1)	
	Now, InΔACQ	$\frac{1}{2}$
	$tan60^0 = \frac{AQ}{AC}$	$\frac{1}{2}$
	$\therefore \sqrt{3} = \frac{20+h}{x}$	1
	$\therefore \sqrt{3}x = 20 + h$	1
	$\therefore h = 34.6 - 20 = 14.6m$	
	$\therefore height\ of\ tower\ if\ 14.6m$	
36	(i) $volume\ of\ material\ used\ in\ making\ mallet =$	$\frac{1}{2}$
	$\pi r^2 h$	$\frac{1}{2}$
	$= 3.14 \times 2^2 \times 10 = 125.6\ cub.cm$	
	(ii) $inner\ surface\ area\ of\ bowl = 2\pi r^2$	$\frac{1}{2}$ $\frac{1}{2}$
	$= 2 \times 3.14 \times 5^2 = 157\ sq.cm$	
	(iii) $volume\ of\ metal\ used\ to\ make\ bowl =$	1
	$= \frac{2}{3} \times 3.14 \times 6^3 - \frac{2}{3} \times 3.14 \times 5^3$	1
	$= 190.49\ cub.cm$	1

	Or $T.S.A\ of\ mallet = 2\pi r(h + r)$ $= 2 \times 3.14 \times 2 \times (10 + 2) = 150.72 sq.cm$	1
37	Number of all possible outcomes n(S) = 1000 (i) $P(favourite\ colour\ being\ white) = \frac{120}{360} = \frac{1}{3}$ (ii) $P(favourite\ colour\ being\ blue\ or\ greed) = \frac{60+60}{360}$ $= \frac{1}{3}$ (ii) $\frac{90}{360} = \frac{15}{number\ of\ students\ participated}$ $\therefore number\ of\ students\ participated = 60$ **OR** (iii) $P(favourite\ colour\ being\ red\ or\ blue) = \frac{60 + 30}{360}$ $= \frac{1}{4} = 0.25$	1 1 1 1 1 1
38	(i) The graph $y = f(x)$ intersect x-axis in two distict points. $\therefore y = f(x)$ has two zeroes. (ii) If graph of $y = f(x)$ do not intersect x-axis then it has no zeroes (iii) $p(x) = x^2 + (a + 1)x + b$ $\therefore p(2) = 0, \quad p(3) = 0$ $\therefore 2a + b = -6\ and\ 3a + b = -12$, on solving	$\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

	$a = -6, b = 6$ **OR** (iii)4 $is\ zero\ of\ x^2 + 2x - (7p + 3)$. $\therefore 4^2 + 2 \times 4 - (7p + 3) = 0$ $\therefore p = 3$	 1 1