Kendriya Vidyalaya IIT campus, Chennai-36

X STD - Mathematics

PRESA1 - Marking Scheme

Section A $1 \times 4 = 4$

1) $k \neq 3$
2) $\theta = 45^\circ$
3) Median
4) 30

Section B

5) 6 simplificat (1) Ans (1) (2)

6) HCF × LCM = product of 2 numbers (1)
Ans = 72 (1) (2)

7) writing formula for cross multiplication (1)
Ans: $x = -2, y = -1$ (1) (2)

8) $80^\circ, 100^\circ$ (2)

9) $\frac{1}{\frac{1}{2}+\frac{\sqrt{3}}{2}}$ (1) getting $\frac{2}{\sqrt{3}+1}$ & on simplification $\sqrt{3}-1$ (2)

10) writing $\sin 3\theta = \cos(90-3\theta)$ ½
$\cos(90-3\theta) = \cos(\theta-6)$ ½
getting 24° (1)

Section C

11) Using Euclid's Algorithm and getting HCF = 28 (3)

(2)

13) zeroes $= \frac{3}{2}, \; -\frac{1}{3}$ $1\frac{1}{2}$

Verifying Relationship between the zeroes and the coeffts of the polynomial $1\frac{1}{2}$

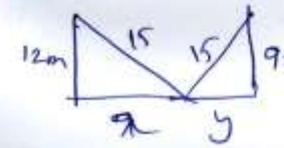
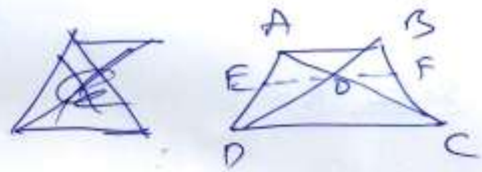
14) 

fig 1

(3)

Find x & y $x = 9$ & $y = 12$ m (1)

width $= 21$ m (1)

15) 

($\frac{1}{2}$)

Given, To prove, Construction (1) (3)

proving $\frac{AE}{ED} = \frac{BO}{DO}$ & $\frac{AE}{ED} = \frac{AO}{CO}$ (1)

Getting $\frac{CO}{DO} = \frac{AO}{BO}$

16) Given & To prove writing (1)

proving $\frac{z}{x} = \frac{DQ}{DB}$ & $\frac{z}{y} = \frac{BQ}{DB}$ (1) (3)

getting $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ (1)

17) $A+B+C = 180^\circ$, $\frac{B+C}{2} = 90 - \frac{A}{2}$ (1)

$\sin\left(\frac{B+C}{2}\right) = \sin\left(90 - \frac{A}{2}\right)$ (1) (3)

$= \cos\frac{A}{2}$ (1)

18) $\sqrt{\frac{1+\sin A}{1-\sin A}} \times \sqrt{\frac{1+\sin A}{1+\sin A}} = \sqrt{\frac{(1+\sin A)^2}{1-\sin^2 A}}$ $1\frac{1}{2}$ (3)

19) $x^2 = a^2\sec^2\theta$, $y^2 = b^2\tan^2\theta$ (1)

Simplifying $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ & getting

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$ (2)

20) Mode $= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ (1)

$= 4000 + \left(\frac{18-4}{36-4-9}\right) \times 1000$ (1)

Mode $= 4608.6$ (1)

Section D

21) $\sqrt{2} = \frac{a}{b}$ & $2b^2 = a^2$ (2)

2 divides b, a & b have common factor (1)

Arriving contradiction (1)

22) Drawing St. line $2x+y=8$ $1\frac{1}{2}$

$x-y=1$ $1\frac{1}{2}$

Shading Region (1)

23) $p(x) = g(x) \times q(x) + r(x)$ (1)

$g(x)\,[x^2-3x-5] = 4x^4-5x^3-39x^2-41x-10$ (1)

Ans: $g(x) = 4x^2+7x+2$ (2)

24) Let x & y people & money ($\frac{1}{2}$)

(4)

25) Given, To prove (1)

Construction ($\frac{1}{2}$) (4)

proof ($2\frac{1}{2}$)

26)  Fig ($\frac{1}{2}$)

Given & To prove ($\frac{1}{2}$)

Altitude $= \frac{\sqrt{3}a}{2}$ & $BD = \frac{1}{2}BC$ (1) (4)

Getting $16AD^2 = 12BC^2 + BC^2$ (1)

$16AD^2 = 13AB^2$ (1)

27) Given & To prove (1)

$\sin B = \cos(90-B)$ (1)

proving $\sin B = \sin D$ (2)

28) $LHS = \frac{\cot A + \operatorname{cosec} A - (\operatorname{cosec}^2 A - \cot^2 A)}{\cot A - \operatorname{cosec} A + 1}$ ($1\frac{1}{2}$)

getting $\frac{\cot A + \operatorname{cosec} A\,[1 - (\operatorname{cosec} A - \cot A)]}{\cot A - \operatorname{cosec} A + 1}$ $1\frac{1}{2}$ (4)

$= \cot A + \operatorname{cosec} A$ (1)

29) writing the table for less than 120 (2)

Finding Median = 130 (2)

30) Median = $l + \left[\frac{\frac{n}{2} - cf}{f}\right] \times h$ (1)

IX Key (practice 2016)

Section-A

1) $\left[(16)^{1/2}\right]^{1/2} = \left[(4^2)^{1/2}\right]^{1/2} = \underbrace{(4)^{1/2}}_{\rightarrow \frac{1}{2}m} = \underline{\underline{2}}$ $(\frac{1}{2}m)$

2) complementary angle of $60^\circ = 90^\circ - 60 = \underline{30^\circ}$
($\because$ Sum of complementary angles is 90°)

3) proof

4) $s = \frac{a+b+c}{2} = \frac{8+7+5}{2} = 10cm.$

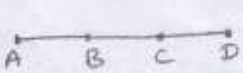
Section-B

5) Let $x = 0.\overline{3}$
$= 0.333 \text{----} ①$
multiplying 10 on bothsides,
$10x = 3.333 \text{----} ②$ (1m)

②−①, $9x = 3.0$
$\therefore x = \frac{3}{9} = \frac{1}{3}$ (1m).

6) $x^4y^4 - 256z^4 = (x^2y^2)^2 - (16z^2)^2 \rightarrow (\frac{1}{2}m)$
$= (x^2y^2 - 16z^2)(x^2y^2 + 16z^2)$ $(\frac{1}{2}m)$
$= \left[(xy)^2 - (4z)^2\right]\left[x^2y^2 + 16z^2\right]$ $(\frac{1}{2}m)$
$= (xy - 4z)(xy + 4z)(x^2y^2 + 16z^2)$ $(\frac{1}{2}m)$

7) $249 \times 251 = (250-1)(250+1)$ (1m)
$= (250)^2 - (1)^2$
$= 62500 - 1$ $(\frac{1}{2}m)$
$= \underline{62499}$ $(\frac{1}{2}m)$

8) 

$AC = BD$ ($\because$ given)
$AB + BC = BC + CD$ (1m)
$\underline{AB = CD}$ (1m)

9) $a + b = 180^\circ$ (L.P.) $(\frac{1}{2}m)$
$a - b = 80^\circ$ ($\because$ given)
Adding, $2a = 260^\circ$ $(\frac{1}{2}m)$
$a = 130^\circ$ $(\frac{1}{2}m)$
$b = 180^\circ - a = 180^\circ - 130^\circ = 50^\circ$ $(\frac{1}{2}m)$

10) $(2-a+b, b) = (6, 2)$

$b = 2$ $(\frac{1}{2}m)$

$\therefore 2-a+b = 6$ $(\frac{1}{2}m)$

$2-a+2 = 6 \Rightarrow -a = 6-4 = 2$

$\xrightarrow{} (\frac{1}{2}m) \therefore a = -2$ $(\frac{1}{2}m)$

11) LCM of '7' and '11' is 77.

$\therefore \frac{9}{11} = \frac{9}{11} \times \frac{7}{7} = \frac{63}{77} \times \frac{3}{3} = \frac{441}{539}$ (1m)

$\frac{5}{7} = \frac{5}{7} \times \frac{11}{11} = \frac{55}{77} \times \frac{3}{3} = \frac{385}{539}$ (1m)

$\therefore$ The three rational nos. between $\frac{5}{7}$ and $\frac{9}{11}$ are

$\frac{386}{539}, \frac{387}{539}, \frac{388}{539}$ (1m)

(or) Any method con

Let $a = 3$ & $b = 4$

$n = 6$ ($\because$ 6 r.nos)

$d = \frac{b-a}{n+1} = \frac{4-3}{6+1} = \frac{1}{7}$

$\therefore a+d = 3+\frac{1}{7} = \frac{22}{7}$ $(\frac{1}{2}$

$a+2d = 3$

$= \frac{23}{7}$

$a+3d = \frac{24}{7}$

$a+4d = \frac{25}{7}$

$a+5d = \frac{26}{7}$

$a+6d = \frac{27}{7}$

$\therefore \frac{22}{7}, \frac{23}{7}, \frac{24}{7}, \frac{25}{7}$

$\frac{27}{7}$

12) $\frac{5+\sqrt{3}}{7-4\sqrt{3}} \times \frac{7+4\sqrt{3}}{7+4\sqrt{3}} = \frac{5(7+4\sqrt{3}) + \sqrt{3}(7+4\sqrt{3})}{(7-4\sqrt{3})(7+4\sqrt{3})}$ $\rightarrow$ (1m)

$= \frac{35+20\sqrt{3}+7\sqrt{3}+12}{7^2-(4\sqrt{3})^2}$ (1m)

$= \frac{47+27\sqrt{3}}{49-48} = \underline{47+27\sqrt{3}}$

$47+27\sqrt{3} = 47a + \sqrt{3}b$

$\therefore \underline{a = 1, b = 27}$ (1m)

13) Let $P(x) = 3x^3 + x^2 - 20x + 12$

Given $(3x-2)$ is a factor of $P(x)$

$$
\begin{array}{r|l}
3x-2 & \overline{x^2+x-6} \\
 & 3x^3+x^2-20x+12 \\
 & \underline{-3x^3 \mp 2x^2} \\
 & 3x^2-20x+12 \\
 & \underline{-3x^2 \mp 2x} \\
 & -18x+12 \\
 & \underline{\mp 18x \pm 12} \\
 & 0
\end{array}
$$

$\rightarrow$ $\underline{(1\frac{1}{2}m)}$

$\therefore x^2+x-6 = x^2+3x-2x-6$ $(\frac{1}{2}m)$

$= x(x+3) - 2(x+3)$ $(\frac{1}{2}m)$

$= (x+3)(x-2)$ $(\frac{1}{2}m)$

$\therefore$ The other factors are: $(x-2)$ & $(x+3)$

14) $14 = a$, $13 = b$, $-27 = c$

$a+b+c = 14+13-27 = 0$ $(\frac{1}{2}m)$

$\therefore a^3+b^3+c^3 = 3abc$ (1m)

$(14)^3 + (13)^3 + (-27)^3 = 3 \times 14 \times 13 \times (-27)$

$= \underline{-14742}$ $(\frac{1}{2}m)$

15) $x+\frac{1}{x}=4$ ($\because$ given)

squaring on both sides,

$\left(x+\frac{1}{x}\right)^2=4^2$ (1m)

$x^2+\left(\frac{1}{x}\right)^2+2\times x\times\frac{1}{x}=16$ (1m)

$x^2+\frac{1}{x^2}+2=16$

$\therefore x^2+\frac{1}{x^2}=16-2=14$

$\therefore x^2+\frac{1}{x^2}=14$ (1m)

16) each postulate (1m)

17) since $AC \parallel DE$

$\angle ACB=\angle DEC$ ($\because$ corresponding angles) ($\frac{1}{2}$m)

$\therefore y=55^\circ$ (1m)

$\angle ABC=180^\circ-(70^\circ+55^\circ)=55^\circ$ ($\frac{1}{2}$m)

$x=\angle ABC=55^\circ$ ($\because$ corresponding angles) (1m)

18) For proof - (3m)

19) Given : ABC & DBC are two isosceles Δ's on the same base.

$\left.\begin{array}{l} AB=AC\ ,\ BD=DC \\ \text{To prove: } \angle ABD=\angle ACD. \end{array}\right\}\left(1\frac{1}{2}m\right)$

proof : In ΔABC,

$\angle ABC=\angle ACB$ —①

In ΔDCB, $\angle DBC=\angle DCB$ —②

$BC=BC$ ($\because$ common) $\left(1\frac{1}{2}m\right)$

Adding the corresponding sides ① & ②

$\angle ABC+\angle DBC=\angle ACB+\angle DCB$

$\angle ABD=\angle ACD$

20) In ΔQTR,

$\angle TQR + \angle QTR + \angle TRQ = 180^\circ$

$90^\circ + 40^\circ + \angle TRQ = 180^\circ$ (1m)

$\angle TRQ = 50^\circ$

$\angle x = 50^\circ$ (1m)

$\therefore \angle y = \angle SPR + \angle x$ ($\because$ By exterior prop. of Δ)

$= 30^\circ + 50^\circ$

$= 80^\circ$ (1m)

$\therefore \angle x = 50^\circ$ and $\angle y = 80^\circ$.

21) For fig. ($1\frac{1}{2}$m), for proof ($2\frac{1}{2}$m)

22) Let $x = 0.3\overline{28} = 0.328282828\ldots$ ($\frac{1}{2}$m)

$10x = 3.282828\ldots$ ($\frac{1}{2}$m)

$1000x = 328.282828\ldots$ ($\frac{1}{2}$m)

$\therefore 1000x - 10x = 328.2828\ldots - 3.2828\ldots$ ($\frac{1}{2}$m)

$990x = 325.000$ ($\frac{1}{2}$m)

$\therefore x = \frac{325}{990} = \frac{65}{198}$ (1m)

23) $p(x) = x^3 + 3x^2 - 2x + 4$

$p(2) = (2)^3 + 3(2)^2 - 2(2) + 4$ (1m)

$= 8 + 12 - 4 + 4 = 20$

$p(-2) = (-2)^3 + 3(-2)^2 - 2(-2) + 4$ (1m)

$= -8 + 12 + 4 + 4 = 12$ ($\frac{1}{2}$m)

$P(0) = 4$ ($\frac{1}{2}$m)

$\therefore P(2) + P(-2) + P(0) = 20 + 12 + 4 = 28$ (1m)

24) $x^8 - y^8 = (x^4)^2 - (y^4)^2$

$= (x^4 + y^4)(x^4 - y^4)$ (1m)

$= (x^4 + y^4)[(x^2)^2 - (y^2)^2]$ (1m)

$= (x^4 + y^4)(x^2 + y^2)(x^2 - y^2)$ (1m)

$= (x^4 + y^4)(x^2 + y^2)(x + y)(x - y)$ (1m)

25) $(a+b)^3 + (a-b)^3 + 6a(a^2 - b^2)$

$= (a+b)^3 + (a-b)^3 + 3 \times 2a(a-b)(a+b)$ (1m)

$= (a+b)^3 + (a-b)^3 + 3(a+b)(a-b)[(a+b) + (a-b)]$ (1m)

$= [(a+b) + (a-b)]^3$ (1m)

$= (2a)^3$

$= 8a^3$ (1m).

26) In $\triangle ABC$,

$\angle BCD = \angle BAC + \angle ABC$ ($\because$ Exterior angle equal to the sum of opp. two interior $\angle$s)

$6x+2 = 3x+15+2x-1$

$= 5x+14$

$\therefore 6x-5x = 14-2 = 12^\circ$

$\therefore x = 12^\circ$ (2m)

i) Exterior angle property of a $\triangle$ is used in the given problem (1m)

ii) By doing so, students exhibit the importance of water.

27) Given: $\angle DCA = \angle ECB$.

Adding $\angle DCE$ on both sides,

$\angle DCA + \angle DCE = \angle ECB + \angle DCE$

$\angle ECA = \angle DCB$ (1m) — ①

In $\triangle ACE$ and $\triangle BCD$,

$AC = BC$ ($\because$ Given)

$\angle ECA = \angle DCB$ ($\because$ from ① proved)

$\angle EAC = \angle DBC$ ($\because$ Given)

$\therefore \triangle ACE \cong \triangle BCD$ ($\because$ By AAS cong.) (2m)

$\therefore BD = AE$ ($\because$ CPCT) (1m)

28) Let $BE \perp AC$ and $CF \perp AB$

In $\triangle$s ABE and ACF,

$\angle AEB = \angle AFC$ ($\because$ each $\angle = 90^\circ$) (1m)

$\angle A = \angle A$ ($\because$ common)

$BE = CF$ ($\because$ Given) (1m)

$\therefore \triangle ABE \cong \triangle ACF$ ($\because$ by AAS rule) (1m)

$\therefore AB = AC$ ($\because$ C.P.C.T.) (1m)

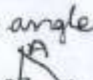
29) Let ABC be the rt. $\angle$ed $\triangle$ in which,

$\angle B = 90^\circ$ (1

$\angle B = \angle A + \angle C$ (1m)

$\angle B > \angle A$ & $\angle B > \angle C$ (1m)

$\therefore AC > BC$ ($\because$ side opp. to greater angle is longer) (1m)



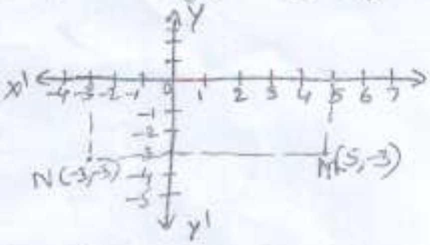
$AC > AB$

$\therefore$ AC is the longest side i.e. hyp. is the longest

30) i, Plot of pts $M(5,-3)$ & $N(-3,-3)$ on the graph paper is shown in the diagram.

ii, Length of $MN = 3+5 = 8$ units. $(\frac{1}{2}m)$

iii, From fig., $A(3,-3)$, $B(1,-3)$, $C(-1,-3)$ → $(1\frac{1}{2}m)$



(2m)

graph

31) Area of paper of Shade $I = 2 \times (\frac{1}{2} \times 16 \times 16)$

$= 256 cm^2$ (1m)

Ily ,, ,, $II = 256 cm^2$ (1m)

For area of ,, ,, III

$a = 8 cm$, $b = 6 cm$, $c = 6 cm$.

$\therefore s = \frac{a+b+c}{2} = \frac{8+6+6}{2} = 10 cm$ (1m)

$\therefore$ Area of paper of Shade III

$= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{10(10-8)(10-6)(10-6)}$

$= \sqrt{10(2)(4)(4)} = 8\sqrt{5} = \underline{17.89} cm^2$ (1m)