KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION
PRE-BOARD - SESSION 2026-27
CLASS X **MATHEMATICS BASIC (241)**

MARKING SCHEME

Question. No.	ANSWER	HINTS/SOLUTIONS	
Q 1.	(C)	product of numbers	1
Q 2.	(D)	$\frac{-3}{7}$	1
Q 3.	(C)	$\frac{25}{2}$	1
Q 4.	(A)	0	1
Q 5.	(C)	k= 14 or k = 12	
Q 6.	(B)	1620	1
Q 7.	(B)	15^{TH}	1
Q 8.	(C)	106cm	
Q 9.	(B)	1	1
Q 10.	(B)	$3\sqrt{2}$ cm	1
Q 11.	(B)	6cm	1
Q 12.	(B)	(-4, 2)	1
Q 13.	(D)	10	1
Q 14.	(C)	(2, 0)	1
Q 15.	(A)	$51.33cm^2$	1
Q 16.	(C)	16.8 cm	1
Q 17.	(B)	$6\pi r^2$	1
Q 18.	(C)	45°	1
Q 19.	(D)	Both (A) and (R) are true and (R) is the correct explanation of (A).	1
Q 20.	(A)	Both (A) and (R) are true and (R) is the correct explanation of (A).	1
		Section –B	
Q 21.		Product of two numbers=LCM×HCF Given: Product = 228096, LCM = 66 Formula: HCF=Product/LCM Substitute: HCF=228096/66 Divide:228096÷66=3456	1 1
Q 22.		**Sum of zeros (α + β) = 3** **Product of zeros (αβ) = -2/5** $p(x)=x^2-(\text{sum of zeros})x+(\text{product of zeros})$ $p(x)=x^2-(3)x+(-2/5)$ $p(x)=x^2-3x-2/5$	1 1
Q 23.		**Write the distance condition**	

		$\sqrt{(x-7)^2+(y-1)^2}=\sqrt{(x-3)^2+(y-5)^2}$ **Square both sides** $(x-7)^2+(y-1)^2=(x-3)^2+(y-5)^2$ **Expand** $X^2-14x+49+y^2-2y+1=x^2-6x+9+y^2-10y+25$ **Simplify** Cancel x^2 and y^2: $-14x-2y+50=-6x-10y+34$ **Rearrange** $-14x+-2y+50+6x+10y-34=0$ $-8x+8y+16=0$ **Final relation** $x-y=2$	1 1
Q 24.		$8\tan x=15\Rightarrow \tan x=15/8$ **Represent triangle sides** Opposite side = 15 Adjacent side = 8 Hypotenuse = $\sqrt{15^2+8^2}=\sqrt{225+64}=\sqrt{289}=17$ **Find sin and cos** $\sin x=$Opposite/Hypotenuse$=15/17$ $\cos x=$Adjacent/Hypotenuse$=8/17$ **Compute $\sin x-\cos x$** $\sin x-\cos x=15/17-8/17=7/17$	1 1
Q 25.		Given: Tangents PR and PQ from an external point P to a circle with centre O. To prove: Quadrilateral QORP is cyclic. Proof: RO and RP are the radius and tangent respectively at contact point R. $\therefore \angle PRO=90^\circ$ Similarly $\angle PQO=90^\circ$ In quadrilateral OQPR, we have $\angle P+\angle R+\angle O+\angle Q=360^\circ$ $\Rightarrow \angle P+\angle 90^\circ+\angle O+\angle 90^\circ=360^\circ \Rightarrow \angle P+\angle O=360^\circ-180^\circ=180^\circ$ These are opposite angles of quadrilateral QORP and are supplementary. $\therefore$ Quadrilateral QORP is cyclic, hence, proved.	1 1
		Section – C	

Q 26.		**Assume the opposite** Suppose $\sqrt{7}$ is rational. Then it can be expressed as: $\sqrt{7}=p/q$ where p,q are integers with no common factors (in lowest terms), and $q\neq0$. **Square both sides** $7=p^2/q^2$ $p^2=7q^2$ **Analyze divisibility** This equation shows that p^2 is divisible by 7. Hence, p must also be divisible by 7. Let p=7k. **Substitute back** $(7k)^2=7q^2$ $49k^2=7q^2$ $q^2=7k^2$ So q^2 is divisible by 7, meaning q is also divisible by 7. **Contradiction** Thus, both p and q are divisible by 7, which contradict our assumption that p/q is in lowest terms. **Conclusion** Therefore, our assumption is false. $\sqrt{7}$ is irrational	1 1 1
Q 27.		$Let\ Anu's\ age = x$ $Father's\ age = y$ y = 3x…….(1) after 5 years y+5 =(2.5)(x+5) put value of y from equation 3x+5=2.5x+2.5*5 3x-2.5x=12.5-5 0.5x=7.5 X=15 Then y=3x=3*15=45	1 1 1
Q 28.		**Coordinates of A and B** A(1,−5) B(−4,5) We want the point P(x,0) on the **x-axis** that divides AB. **Section formula**	

		If P divides AB in the ratio m:n, then: $x=\frac{mx2+nx1}{m+n}$,$y=\frac{my2+ny1}{m+n}$ Here y=0 because P lies on the x-axis. **Apply condition** $0=\frac{m(5)+n(-5)}{m+n}$ $0=\frac{5m-5n}{m+n}$ $5m-5n=0\Rightarrow m=n$ So the ratio is **1:1**. **Coordinates of point** $x=\frac{1(-4)+1(1)}{1+1}=\frac{-4+1}{2}=-3/2=-1.5$ $y=0$ So point P=(−1.5,0).	1 1 1
Q 29.		$\cos(A+4B)=0\Rightarrow A+4B=90°$…….(1) $\sin(A+2B)=\sqrt{3}/2\Rightarrow A+2B=60°$…….(2) Subtract (1) from (2): $(A+4B)-(A+2B)=90°-60°$ $2B=30°\Rightarrow B=15°$ Substitute into (1): $A+2(15°)=60°\Rightarrow A=30°$ $A=30°,B=15°$	1 1 1
Q 30.		Height of pedestal = h Height of statue = 1.6 m Distance from point on ground to pedestal = d From the same point, angle of elevation to **top of pedestal** = 45° $\tan45°=h/d\Rightarrow d=h$ Angle of elevation to **top of statue** = 60° $\tan60°=\frac{h+1.6}{d}$ Since d=h: $\tan60°=\frac{h+1.6}{h}$	1 1

		$\sqrt{3}=\frac{h+1.6}{h}$ Using $\sqrt{3}=1.73$: $1.73=\frac{h+1.6}{h}$ $1.73h=h+1.6$ $0.73h=1.6$ $h=1.6/0.73\approx 2.19$ m	1
Q 31.		**Given:** Two circles with centres A and B touch externally at K. PA=13 cm BQ=5 cm PS=12 cm (tangent from P) QT=3 cm (tangent from Q) We need to find PQ. **Radii of circles** Radius of circle with centre A: $AS=\sqrt{PA^2-PS^2}=\sqrt{13^2-12^2}=\sqrt{169-144}=\sqrt{25}=5$ cm So radius of circle A = 5 cm. Radius of circle with centre B: $BT=\sqrt{BQ^2-QT^2}=\sqrt{5^2-3^2}=\sqrt{25-9}=\sqrt{16}=4$ cm So radius of circle B = 4 cm. **Distance between centres** Since circles touch externally at K: AB=AS+BT=5+4=9 cm **Length of PQ** Now, PQ=PA+AB+BQ. PQ=13+9+5=27 cm	1 1 1
		Section –D	
Q 32.		Let the original number of persons = n. Each person's share = $\frac{9000}{n}$.	

If there were 20 more persons, each share $=\frac{9000}{n+20}$. It is given that this new share is **₹160 less**:

$\frac{9000}{n}-\frac{9000}{n+20}. = 160$

$\frac{9000(n+20)-9000n}{n(n+20)}=160$

$\frac{180000}{n(n+20)}=160$

$n(n+20)=180000/160=1125$

$n^2+20n-1125=0$

Factorize

$n^2+45n-25n-1125=0$

$(n+45)(n-25)=0$

So n=25 (positive solution).

Original number of persons = 25

OR

Let total herd = x.

One fourth in forest = x/4.

Twice the square root in mountains = $2\sqrt{x}$.

Remaining = 15 at river.

Equation:

$x-x/4-2\sqrt{x}=15$

$3x/4-2\sqrt{x}=15$

Multiply through by 4

$3x-8\sqrt{x}=60$

Substitution

Let $\sqrt{x}=y \Rightarrow x=y^2$.

$3y^2-8y=60$

$3y^2-8y-60=0$

Solve quadratic

$y=8 \pm \sqrt{(-8)2-4(3)(-60)}/2\cdot 3$

$y=8\pm\sqrt{64+720}/6=8\pm\sqrt{784}/6$

$y=\frac{8\pm 28}{6}$

So y=6 (positive root). $\sqrt{x}=6 \Rightarrow x=36$.

Total number of camels =36

Q 33.		(a)Given, △NSQ ≋ △MTR Then, by CPCT, ∠NQS = ∠MRT ie, ∠PRQ = ∠PQR ---------- (1) In △PST, ∠P + ∠1 + ∠2 = 180° ∠P + 2∠1 = 180° ---------- (2) In △PQR, ∠P + ∠PQR + ∠PRQ = 180° ∠P + 2∠PQR = 180° ---------- (3) Equating (2) and (3), ∠P + 2∠1 = ∠P + 2∠PQR ∠PQR = ∠1 So, ∠PST = ∠PQR --------- (4) In △PTS and △PRQ, ∠P = ∠P = common angle. From (4) ∠PST = ∠PQR (b)$\frac{AD}{DB}=\frac{AE}{EC}$ $\frac{DB}{AD}+1=\frac{EC}{AE}+1$ $\frac{AB}{AD}=\frac{AC}{AE}$ …….(i) Since ∠ADE=∠AED, AD=AE Then from(i), AB=AC and ΔABC is isosceles. OR	1 1 1 1 1 1

Theorem 6.1 : *If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.*

Proof : We are given a triangle ABC in which a line parallel to side BC intersects other two sides AB and AC at D and E respectively (see Fig. 6.10).

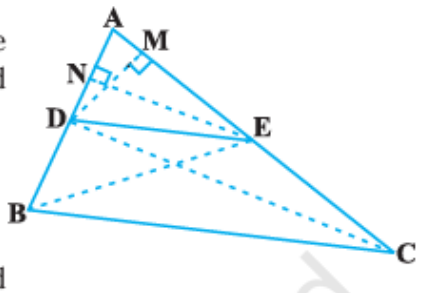


Fig. 6.10

We need to prove that $\frac{AD}{DB} = \frac{AE}{EC}$. 1

Let us join BE and CD and then draw DM ⊥ AC and EN ⊥ AB.

Now, area of Δ ADE $\left(= \frac{1}{2} \text{ base} \times \text{height}\right) = \frac{1}{2} AD \times EN$.

Recall from Class IX, that area of Δ ADE is denoted as ar(ADE).

So, $\quad ar(ADE) = \frac{1}{2} AD \times EN$

Similarly, $\quad ar(BDE) = \frac{1}{2} DB \times EN,$ 1

$$ar(ADE) = \frac{1}{2} AE \times DM \text{ and } ar(DEC) = \frac{1}{2} EC \times DM.$$

Therefore, $\quad \frac{ar(ADE)}{ar(BDE)} = \frac{\frac{1}{2} AD \times EN}{\frac{1}{2} DB \times EN} = \frac{AD}{DB}$ (1)

and $\quad \frac{ar(ADE)}{ar(DEC)} = \frac{\frac{1}{2} AE \times DM}{\frac{1}{2} EC \times DM} = \frac{AE}{EC}$ (2)

Note that Δ BDE and DEC are on the same base DE and between the same parallels BC and DE.

So, $\quad ar(BDE) = ar(DEC)$ (3) 1

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Therefore, from (1), (2) and (3), we have :

$$\frac{AD}{DB} = \frac{AE}{EC}$$

Q 34.		Height of building = 60 m Height of lighthouse = H m Distance between building and lighthouse = d **Use trigonometry** **Angle of elevation of top of lighthouse from building top = 30°** $\tan 30° = H - 60/d$ **Angle of depression of bottom of lighthouse from building top = 60°** $\tan 60° = 60/d$ **Solve for d** $\tan 60° = \sqrt{3} = 1.732$ $1.732 = 60/d \Rightarrow d = 60/1.732 \approx 34.64$ m **Solve for H** $\tan 30° = 13 = 0.577$ $0.577 = H - 60/34.64$ $H - 60 = 0.577 \times 34.64 \approx 20$ $H \approx 80$ m **Final results** 1. Difference between heights = $H - 60 = 20$ m 2. Distance between lighthouse and building = 34.64 m (≈ 34.6 m)	1 1 1 1 1
Q 35.		Diameter of cylinder = 126 m → Radius r=63 m Height of cylindrical part = 12 m Total height of tent = 28 m Height of cone = 28−12=16 m **Surface area of cylindrical part** Curved surface area (CSA) of cylinder: $CSA = 2\pi rh = 2 \times 3.14 \times 63 \times 12$ $CSA = 4756.32$ m^2 **Surface area of conical part** Slant height of cone: $l = \sqrt{r^2 + h^2} = \sqrt{63^2 + 16^2} = \sqrt{3969 + 256} = \sqrt{4225} = 65$ m	1 1

		CSA of cone: CSA=πrl=3.14×63×65 CSA=12855.9 SQm **Total canvas area** Total area=4756.32+12855.9=17612.22 SQm **Cost of canvas** Cost=Area×Rate=17612.22×30 Cost≈528,366.6 Rs Total canvas area = **17,612.22 m²** Total cost = **₹5,28,367 (approx.)**	1 1 1
		Section –E	
Q 36.		i) a9 = a +8d =22600…(1), a6 = a +5d = 16000….(2) ,by solving the two equations we get d= 2200 Put the value of d in second equation, a+ 5x 2200 = 16000 , a+ 11000 = 16000, a = Rs 5000 ii) an = 29200, a+ (n-1)d = 29200, 5000 + (n-1)2200 = 29200 2200n -2200= 29200 -5000 2200n = 24200 + 2200 n = 26400/2200= 12	1 1 1 1
Q 37.		(1) (B) 90°(2) (D) All of these (3) (A) 4cm (4) (B) 120°(5) (C) AB+CD = AD +BC	
Q 38.		(1)35/2 (2) 110 mm (3) 285 mm (4) 385/4	