

## SEE (Grade Increment) - 2082 (2026)

## अनिवार्य गणित

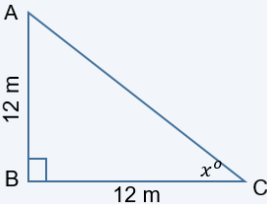
## उत्तरकुञ्जिका

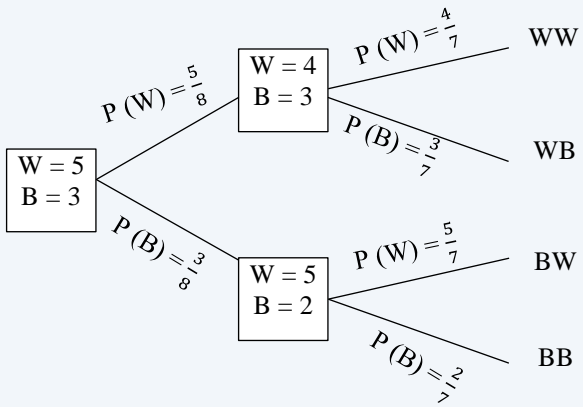
अन्य बैकल्पिक तरिकाबाट समस्या समाधान गरेमा पनि अङ्क प्रदान गर्नुपर्ने छ । उत्तरकुञ्जिकामा प्रत्येक चरणको प्राप्ताङ्क १ भएतापनि विद्यार्थीहरूले आंशिक समाधान गरेको अवस्थामा तथा सामान्य कुराहरू (जस्तै: एकाइ) छुट हुन गएमा समेत ०.५ अङ्क प्रदान गर्नुपर्नेछ ।

Q.No.	Item	Marking Scheme	Marks
1	(a)	Correct cardinality notation: $n_o(S) = 60$	1
	(b)	Correct Venn-diagram	1
	(c)	From Venn diagram, $60 + 100 + x + 3x = 320$	1
		For, $160 + 4x = 320 \rightarrow x = 40$	1
		Number of people who like to sing $n(S) = 60 + 40 = 100$	1
	(d)	Percentage = $\left(\frac{120}{320}\right) \times 100\% = 37.5\%$	1
2	(a)	$CI = P \left\{ \left(1 + \frac{R}{200}\right)^{2T} - 1 \right\}$	1
	(b)	For correct Substitution: $500000 \left\{ \left(1 + \frac{4.5}{200}\right)^{2 \times 2} - 1 \right\}$	1
		Compound Interest = Rs 46,541.66 (approx)	1
	(c)	Yearly compound interest = Rs 51,250 and Half-yearly = Rs 46,541.66 Conclusion: Yearly compound proposal gives more interest, hence person should accept the yearly compounding proposal.	1
3	(a)	Correct relation: $P_T = P_o \left(1 + \frac{R}{100}\right)^T$	1
	(b)	For, $15606 = P_o \left(1 + \frac{2}{100}\right)^2$	1
		Hence, $P_o = 15,000$ (population 2 years ago)	1
	(c)	Population 1 year ago at 2% growth: $P1 = \frac{15606}{1.02} = 15,300$	1
		Applying 3% growth for the previous year: New present population = $15300 \times 1.03 = 15,759$	1

Q.No.	Item	Marking Scheme	Marks
4	(a)	USD = $80,640 \div 144 = \$560$	1
	(b)	New rate after 0.5% devaluation: Rs $144 \times 1.005 = \text{Rs } 144.72$ per USD	1
		NRs received = $560 \times 144.72 = \text{Rs } 81,043.20$	1
	(c)	Profit = $81,043.20 - 80,640 = \text{Rs } 403.20$ Profit% = $\left(\frac{403.20}{80640}\right) \times 100\% = 0.5\%$ .	1
5	(a)	Correct formula: $V = \left(\frac{1}{3}\right) a^2 h$	1
	(b)	For: $V = \left(\frac{1}{3}\right) \times (18)^2 \times (12) = 1296 \text{ cm}^3$	1
	(c)	Slant height ( $l$ ) = 15 cm	1
		Area of 4 triangular surfaces = $2 \times 18 \times 15 = 540 \text{ cm}^2$	1
6	(a)	2 surfaces	1
	(b)	Finding height of cone: $h = 31 - 7 = 24 \text{ cm}$	1
		Finding slant height of cone: $l = 25 \text{ cm}$	1
		CSA of cone = $\pi r l = (22/7) \times 7 \times 25 = 550 \text{ cm}^2$	1
	(c)	CSA of hemisphere = $2\pi r^2 = 2 \times (22/7) \times 7^2 = 308 \text{ cm}^2$	1
		Comparison: $550 - 308 = 242 \text{ cm}^2$ ; CSA of conical part is $242 \text{ cm}^2$ more than CSA of hemispherical part <b>OR</b> any other comparison.	1
7	(a)	Area of ABCD land = $\frac{1}{2} \times AC \times (BF + DE) = \frac{1}{2} \times 40 \times (15+10)$	1
		Area = $500 \text{ m}^2$	1
	(b)	Cost = $(500/100) \times 700 = \text{Rs } 3,500$ ; Since $\text{Rs } 34,000 > \text{Rs } 3,500$ , The amount is sufficient.	1
8	(a)	Correct formula: $S_n = \frac{n}{2} [2a + (n - 1)d]$	1
	(b)	For: $100 = \frac{5}{2} [2(24) + (5 - 1)d]$	1
		Solving: $d = -2$	1
	(c)	For: $156 = \frac{n}{2} [2 \times 24 + (n - 1)(-2)]$ Thus, $n^2 - 25n + 156 = 0$	1
	Hence, $n = 12$ or $n = 13$ .	1	

Q.No.	Item	Marking Scheme	Marks
9	(a)	Correct roots are: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	1
	(b)	Let daughter's present age = x, mother's = y; Thus, $x \times y = 1500$ and $(y-10) = 2(x-10)$	1
		Forming quadratic equation: $x^2 - 5x - 750 = 0$	1
	(c)	Solving quadratic: $x = 30$ (rejecting negative root); $y = \frac{1500}{30} = 50$	1
		Final answer: Daughter's age = 30 years, Mother's age = 50 years	1
10	(a)	For: $\frac{1}{m-n} - \frac{(m-n)}{(m+n)(m-n)}$	1
		$= \frac{2n}{(m^2-n^2)}$	1
	(b)	Let $a = 4^x$ , equation becomes $a^2 - 20a + 64 = 0$	1
		Solving: $a = 4$ or $a = 16$	1
		Hence, $x = 1$ or $2$	1
11	(a)	Area of parallelogram PQRS = Area of parallelogram TQRM	1
	(b)	Area of parallelogram TQRM = $2 \times$ Area of $\Delta TQR$ [with correct reason]	1
		Area of parallelogram PQRS = $2 \times$ Area of $\Delta TQR$ [with correct reason]	1
	(c)	Correct construction of quadrilateral ABCD with given measurements ( $AB = 5.4\text{cm}$ , $BC = 5.6\text{cm}$ , $CD = 5.4\text{cm}$ , $AD = 6.8\text{cm}$ , $\angle ABC = 75^\circ$ )	1
		Correct construction of diagonal and locating any point (E) on extended base line through parallel line from D (or C) to required diagonal, to form equal-area triangle.	1
	Correct final triangle drawn with area equal to quadrilateral ABCD.	1	
12	(a)	$\angle ADB = \angle ACB$	1
	(b)	For: $5x = 2(2x+10)$ Thus, $x = 20$	1
	(c)	Drawing two circles with radius $\geq 3$ cm, marking centre O, chord AB, and points C, D on the circumference on the same arc.	1
		Measuring $\angle ADB$ and $\angle ACB$ in each circle and showing/tabulating that $\angle ADB = \angle ACB$ in both cases, verifying the relationship experimentally.	1

Q.No.	Item	Marking Scheme	Marks
13	(a)	Since, $\angle ABC + \angle BAD = 180^\circ$ and $\angle BAD + \angle BED = 180^\circ$ Thus, $\angle ABC = \angle BED$	1
		Also, $\angle ABC = \angle DCE$ Then $\angle BED = \angle DCE$ Hence, DC = DE	1
	(b)	Since, AB = DC Then AB = DE Hence, Quadrilateral ADEB is an isosceles trapezium.	1
14	(a)	Sample definition: The angle of elevation is the angle formed between the horizontal line and the line of sight when an observer looks upward at an object above the horizontal level	1
	(b)	Correct right-angled triangle diagram showing tower height 12 m, horizontal distance 12 m, and angle of elevation $x^\circ$ marked at the observation point.	1
			
	(c)	$\tan x = \frac{12}{12} = 1 \rightarrow x = 45^\circ$	1
	(d)	Distance moved further = $12\sqrt{3} - 12 = 20.78 - 12 \approx 8.78$ m	1
15	(a)	Q1 class: 20 – 30	1
	(b)	$25 = 20 + \left\{ \frac{\frac{86+p}{4} - 20}{p} \right\} \times 10$	1
		Thus, $p = 6$	1
	(c)	Here, $\sum fm = 3290$ and $N = 92$	1
		Mean = 35.76	1
	(d)	Number of people below 20 years = $9 + 11 = 20$ ; Percentage = $\frac{20}{92} \times 100 \approx 21.74\%$	1

Q.No.	Item	Marking Scheme	Marks
16	(a)	Sample definition: Mutually exclusive events are events that cannot occur at the same time/simultaneously (occurrence of one excludes the occurrence of the other)	1
	(b)	<p>Correct tree diagram as follows:</p> <p>(b) Let, White ball and Black ball are denoted by W and B respectively.</p> 	1 + 1
	(c)	$P(\text{both white, without replacement}) = \left(\frac{5}{8}\right) \times \left(\frac{4}{7}\right) = \frac{5}{14}$	1
	(d)	$P(\text{both white, with replacement}) = \left(\frac{5}{8}\right) \times \left(\frac{5}{8}\right) = \frac{25}{64}$ Difference = $\frac{25}{64} - \frac{5}{14} = \frac{15}{448}$ (or, $\approx 0.0335$ )	1
<b>Full Marks</b>			<b>75</b>