O.S.D.A.V. Public School, Kaithal
September Exam 2024
Subject : Mathematics
Class :X

SET - A

Time:- 3 hrs. **M.M.:- 80**

General Instructions:

- **a)** This Question Paper has 5 Sections A-E.
- **b)** Section A has 20 MCQs carrying 1 mark each .Section B has 5 questions carrying 02 marks each.
- **c)** Section C has 6 questions carrying 03 marks each.Section D has 4 questions carrying 05 marks each.
- **d)** Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.

Q.No	Section A	Marks
1	The largest number which divides 70 and 125, leaving remainders 5 and 8 respectively is (a) 13 (b) 65 (c) 875 (d) 1750	1
2	If one root of the equation $4x^2-2x+(k-4) = 0$ be the reciprocal of the other then the value of k is (a) 8 (b) -8 (c) 4 (d) -4	1
3	If a and b are the zeroes of the polynomial $f(x) = x^2+px+q$, then a polynomial having $\frac{1}{a}$ and 1/b as its zeroes is (a) x^2+qx+p (b) x^2-px+q (c) qx^2+px+1 (d) px^2+qx+1X	1
4	If the system of equation kx-5y =2 and 6x+2y =7 is inconsistent, then k is equal to (a) -10 (b) -5 (c) -6 (d) -15	1
5	The pair of equations x = a and y = b graphically represents lines which are (a) parallel (b) coincident (c) intersecting at (b, a) (d) intersecting at (a, b)	1
6	Sin2A=2SinA is true when A equals (a) 0° (b) 30° (c) 45° (d) 60°	1
7	If x=a cosA, y=b sinA, then $b^2x^2+a^2y^2$ equals (a) a^2b^2 (b) ab (c) a^4b^4 (d) a^2+b^2	1
8	If Sin(A+B) =1 and Cos(A-B) =1, then (a) A=B=90° (b) A=B=0 (c) A=B=45° (d) A=2B	1
9	The P(A) denotes the probability of an event A, then (a) $P(A) < 0$ (b) $P(A) >1$ (c) $0 \leq P(A)\leq 1$ (d) $-1<P(A)$	1
10	The geometrical representation of a linear equation in two variables is (a) circle (b) a parabola (c) a straight line (d) a point only	1
11	The sum of first 20 terms of an AP whose nth term $a_n = 3n-5$ is 530 (b) 1060 (c) 55 (d) 20	1
12	Which of the following is a rational number (a) $\sqrt{2}+\sqrt{3}$ (b) $\sqrt{25}+\sqrt{9}$ (c) $\sqrt{16}-\sqrt{5}$ (d) $\sqrt{5}+\sqrt{3}$	1
13	If 17SinA =15, then the value of cot A is (a) $\frac{15}{8}$ (b) $\frac{8}{15}$ (c) $\frac{8}{17}$ (d) $\frac{17}{8}$	

14	The probability of 53 Sundays in a non leap year is (a) $\frac{2}{7}$ (b) $\frac{53}{365}$ (c) $\frac{1}{7}$ (d) $\frac{52}{53}$	1
15	The quadratic equation $\sqrt{2}x^2+5x-2=0$ has (a) two distinct real roots exist (b) more than two real roots exist (c) no real roots exist (d) two equal real roots exist	1
16	How many parallel tangents can a circle have (a) only two (b) infinite (c) three (d) zero	1
17	The tangent at any point of a circle to its radius through the point of contact is (a) Parallel (b) coinside (c) perpendicular (d) equal	1
18	The linear equation dependent to 2x-5y=4 is (a) 6x-5y=12 (b) -6x+15y=12 (c) 6x-15y = -12 (d) -6x+15y = -12	1
19	**Assertion:** 2k+2, 4k and 5k+1 are three consecutive terms of an AP, then the value of k is 3. **Reason:** The difference between two consecutive terms of an AP is always equal. a) Assertion and Reason are true and Reason is the correct explanation for Assertion b) both Assertion and reason are correct but reason is not correct explanation for Assertion c) Assertion is true and Reason is false. d) Both Assertion and Reason are false.	1
20.	**Assertion: The least number when divided by 24,36 and 12 gives remainder 3 is 75** **Reason: HCF of two numbers × LCM of two numbers= Product of two numbers.** a) Assertion and reason are correct and Reason is the correct explanation for Assertion. b) Both Assertion and reason are correct and Reason is not the correct explanation for Assertion. c) Assertion is true and Reason is false. d) Both Assertion and Reason are false.	1
	Section B	
21	The sum of two positive numbers 12 and one number is 3 less than the twice of other number. Find the numbers.	2
22	Check whether $(6)^n$ can end with digit zero for any natural number n.	2
23	If the sum of the zeroes of the quadratic polynomial $ky^2+2y-3k$ is equal to twice their product, find the value of k.	2
24	For what value of k the quadratic equation $x^2+2(k+1)x+k^2=0$ has equal roots.	2
25	Which term of the progression 65,61,57,53,.......is the first negative term.	2
	Section C	
26	If Cos A – Sin A=√2Sin A, prove that Cos A + Sin A=√2Cos A.	3
27	Prove that 2+√3 is an irrational number.	3
28	The angle of elevation of the top of a building from the foot of the tower is 30°and the angle of elevation of the top of the tower from the foot of the building is 45°.If the tower is 30m high, find the height of the building.	3

29	Prove that the tangents drawn from the external point to the circle are equal to each other.	3
30	Three different coins are tossed together. Find the probability of getting i) exactly two heads ii) at least two heads iii) at least two tails.	3
31	A man can row a boat downstream 20km in 2 hours and upstream 4km in2 hours. Find the speed of rowing in still water. Also find the speed of the stream.	3
	Section D	
32	Two poles of equal heights are standing opposite to each other on either side of the road, which 80m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60°and 30° respectively. Find the height of the poles and the distances of the point from the poles.	5
33	A train covers a distance of 480km at a uniform speed. If the speed had been 8km/hr less, then it would have taken 3 hours more to cover the same distance. Find the original speed of the train.	5
34	Prove that the opposite sides of a quadrilateral Circumscribing a circle subtend supplementary angles at the centre of the circle.	5
35	Prove that = $\frac{Sin\ A - Cos\ A + 1}{Sin\ A + Cos\ A - 1} = \frac{1}{Sec\ A - \tan A}$	5
	Section E	
36	**Case based questions** A seminar is being conducted by an educational organization, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60,84 and 108 respectively. Answer the following questions: i) In each room the same number of participants are to be seated and all of them being in the same subject, find the maximum number participants that can be accommodated in each room. ii) what is the minimum number of rooms required during the event. iii) Find the smallest number divisible by 60 and 84 and leaves the remainder 2.	1 1 2
37	During summer break, Ravi wanted to play with his friends but it was too hot outside, so he decided to play some indoor game with his friends. He collects 20 identical cards and writes the numbers 1 to 20 on them. He put them in a box. He and his friends make a bet for the chances of drawing various cards out of the box. Each was given a chance to tell the probability of picking one card out of the box. Based on the above, answer the following questions: i) Find the probability that the number on the card drawn is an odd prime number. ii) Find the probability that the number on the card drawn is a composite number. iii) Find the probability that the number on the card drawn is a multiple of 3,6 and 9.	1 1 2
38	In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third and so on. There are 5 rose plants in the last row. Now, based on the information answer the following: i) How many rows are there in the flower bed. ii) Find the total numbers of flowers. iii) write nth term of AP.	1 1 2

O.S.D.A.V. Public School, Kaithal
Half Yearly Exam 2024
Subject : Mathematics
Class :X

SET - B

Time:- 3 hrs. **M.M.:- 80**

General Instructions:

- **a)** This Question Paper has 5 Sections A-E.
- **b)** Section A has 20 MCQs carrying 1 mark each
- **c)** Section B has 5 questions carrying 02 marks each.
- **d)** Section C has 6 questions carrying 03 marks each.
- **e)** Section D has 4 questions carrying 05 marks each.
- **f)** Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.

Q.No.	Section A	Marks
1	The HCF of two numbers is 16and their product is 3072.Their LCM is: (a) 182 (b) 192 (c) 200 (d) 210	1
2	HCF of x^2y^2 and x^3y^2 (a) x^3y^3 (b) xy (c) x^4y^4 (d) x^2y^2	1
3	LCM of smallest two digit composite number and smallest composite number is: (a) 12 (b) 4 (c) 20 (d) 44	1
4	If a and b are the zeroes of the polynomial px^2-2x+3p and a+b=ab, then p is equal to: (a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) 3 (d) 2	1
5	If the degree of polynomial P(x) is n, then the maximum number of zeros it can have is: (a) n (b) n^2 (c) n^3 (d) n^4	1
6	For what value of k, do the equations 3x-y+8=0 and 6x-ky=-16 represent coincident lines (a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 2 (d) -2	1
7	One equation of a pair of dependent linear equation is -5x+7y=2.The second equation can be : (a) 10x+14y+4=0 (b) -10x-14y+4=0 (c) -10x+14y+4=0 (d) 10x-14y=-4	1
8	If a pair of linear equations is consistent, then the lines will be: (a) parallel (b) always coincident (c) intersecting or coincident (d) always intersecting	1
9	Value of k for which the quadratic equation $2x^2$-kx+k=0, has equal roots is: (a) 1 (b) 2 (c) 5 (d) 0,8	1
10	The quadratic equation $2x^2-\sqrt{5}x+1=0$ had: (a) Two distinct real roots (b) Two equal real roots (c) No real roots (d) More than two real roots	1
11	The 10th term of the A.P 5,8,11,14,........is: (a) 32 (b) 35 (c) 38 (d) 185	1
12	The sum of first five multiples of 3 is: (a) 45 (b) 55 (c) 65 (d) 75	1
13	If the sum of first n terms of an AP is $5n^2$-3n, then its 16th term is: (a) 150 (b) 152 (c) 154 (d) 156	1

14	The probability of 53 Mondays in a leap year is: (a) $\frac{2}{7}$ (b) $\frac{53}{365}$ (c) $\frac{1}{7}$ (d) $\frac{52}{53}$	1
15	If sin(A-B) = $\frac{1}{2}$, cos(A+B) = $\frac{1}{2}$, then sin(A+B) is equal to: (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{\sqrt{3}}{2}$ (d) 1	1
16	If 15 cot A=8, then sec A is equal to: (a) $\frac{8}{1}$ (b) $\frac{17}{8}$ (c) $\frac{15}{8}$ (d) $\frac{8}{15}$	1
17	If cot A=1/√3, then the value of $\sec^2 A+\operatorname{cosec}^2 A$ is: (a) 1 (b) $\frac{40}{9}$ (c) $\frac{38}{9}$ (d) $\frac{16}{3}$	1
18	The degree of zero polynomial is: (a) 0 (b) 1 (c) 2 (d) not defined	1
19	**Assertion: The tangents drawn at the ends of a diameter of a circle are parallel.** **Reason: The line segment joining the points of contact of two parallel tangents to a circle is a diameter of the circle.** a) Assertion and Reason are true and Reason is the correct explanation for Assertion b) both Assertion and reason are correct but reason is not correct explanation for Assertion c) Assertion is true and Reason is false. d) Both Assertion and Reason are false.	1
20.	**Assertion: When a die is rolled, the probability of getting a number which is a multiple of 3 and 5 both is zero.** **Reason: The probability of an impossible event is zero.** a) Both Assertion and reason are correct and Reason is the correct explanation for Assertion. (b) Both Assertion and reason are correct and Reason is not the correct explanation for Assertion. c) Assertion is true and Reason is false. d) Both Assertion and Reason are false.	1
	Section B	
21	Show that $(8)^n$ cannot end with digit zero for any natural number n.	2
22	If one zero of the polynomial p(x) =$6x^2+37x-(k-2)$ is reciprocal of the other, then find the value of k.	2
23	For what value of k, the following system of equations kx+2y=3, 3x+6y=10 has a unique solution.	2
24	Find the roots of the equation $\sqrt{3}x^2-2x-8\sqrt{3}=0$	2
25	Which term of the AP: 3,15,27,39,........will be 120 more than its 21st term?	2
	Section C	
26	Prove that $3\sqrt{5}$ is an irrational number.	3
27	If tan(A-B) = $\frac{1}{\sqrt{3}}$ and tan(A+B) =√3, then find A and B.	3
28	The sum of the third and the seventh term of an A.P is 6, and their product is 8. Find the sum of first sixteen terms of the A.P.	3

29	From a point on the ground, the angles of elevation of the bottom and top of a transmission tower fixed on the top of a 20m high building are 45°and 60°respectively.Find the height of the tower.	3
30	A card is drawn from a well shuffled pack of 52 playing cards. One card is drawn at random, what is the probability of getting: i) a red king ii) either jack or an ace iii) a face card.	3
31	Prove that the tangents drawn from the external point of a circle are equal to each other.	3
	Section D	
32	A 1.5m tall boy is standing at some distance from a 30m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building.	5
33	One- fourth of a herd of camels was seen in the forest. Twice the square root of the herd gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.	5
34	Prove that the parallelogram circumscribing a circle is a rhombus.	5
35	Prove that: $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.	5
	Section E	
36	**Case based questions:** During summer break,Ravi wanted to play with his friends but it was too hot outside, so he decided to play some indoor game with his friends. He collects 20 identical cards and writes the numbers 1 to 20 on them. He put them in a box. He and his friends make a bet for the chances of drawing various cards out of the box. Each was given a chance to tell the probability of picking one card out of the box. Based on the above, answer the following questions: i)Find the probability that the number on the card drawn is an odd prime number. ii) Find the probability that the number on the card drawn is a composite number. iii) Find the probability that the number on the card drawn is a multiple of 3,6 and 9.	1 1 2
37	In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third and so on. There are 5 rose plants in the last row. Now, based on the information answer the following: i) How many rows are there in the flower bed. ii) Find the total numbers of flowers. iii) Write nth term of AP	1 1 2
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Marking ~~Scahon~~ Scheme (Set A)
September 2024-25
Maths

Q1	(a)	(1)
Q2	(a)	(1)
Q3	(c)	(1)
Q4	(d)	(1)
Q5	(d)	(1)
Q6	(a)	(1)
Q7	(a)	(1)
Q8	(c)	(1)
Q9	(c)	(1)
Q10	(c)	(1)
Q11	(a)	(1)
Q12	(b)	(1)
Q13	(b)	(1)
Q14	(c)	(1)
Q15	(a)	(1)
Q16	(a)	(1)
Q17	(c)	(1)
Q18	(d)	(1)
Q19	(a)	(1)
Q20	(b)	

Section B

Q21 let two nos are $x, 12-x$ 1/2

$2x-3 = 12-x$ 1/2

$2x+x = 15$ 1/2

$3x = 15 \Rightarrow x = 5,\ 12-5 = 7$ 1/2

11)

Let 6^n can ends with digit 0, So its prime factors are 2 & 5 — ① 1

But $6^n = (2\times3)^n$, it shows its prime factors are 2 & 3 — ② 1/2

① & ② are contradictory because of uniqueness of fundamental Theorem of arithmetic. So 6^n can never ends with 0 1/2

1/2

Q(23) A.T.Q $\alpha+\beta = 2\alpha\beta$ 1

$$\frac{+2}{k} = +2\left(\frac{+3k}{k}\right)$$ 1/2

$$\frac{+2}{k} = 6 \Rightarrow k = \frac{1}{3}$$ 1/2

Q(24) $a_n < 0 \Rightarrow 65+(n-1)(-4) < 0$ 1/2

$$-4n+4 < -65$$ 1/2

$$-4n < -69$$

$$4n > 69$$ 1/2

$$n > 17.25$$

$$n = 18$$ 1/2

Q(26) $(\cos A - \sin A)^2 = (\sqrt{2}\sin A)^2$

$\cos^2 A + \sin^2 A - 2\cos A\sin A = 2\sin^2 A$ 1/2

$\cos^2 A - \sin^2 A = 2\cos A\sin A$. 1/2

$(\cos A+\sin A)(\cos A-\sin A) = 2\cos A\sin A$ 1

$$\cos A+\sin A = \frac{2\cos A\cancel{\sin A}}{\sqrt{2}\cancel{\sin A}}$$ 1/2

$\cos A + \sin A = \sqrt{2}\cos A$ 1/2

$D = 0 \Rightarrow b^2 - 4ac = 0$ 1/2

$(2k+2)^2 - 4k^2 = 0$ 1/2

$4 + 8k = 0$ 1/2

$8k = -4$

$k = \frac{-1}{2}$ 1/2

Q27) Let $2+\sqrt{3}$ is rational

$2+\sqrt{3} = r$ where r is rational 1/2

$\sqrt{3} = r-2$

Prove that $\sqrt{3}$ is irrational no. 2

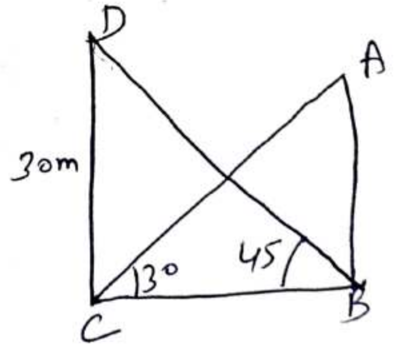
Now. L.H.S is irrational

So R.H.S must be irrational 1/2

So Our supposition is wrong

So $2+\sqrt{3}$ is irrational number.

Q28) Correct figure 1/2



ΔBCD

$\tan 45^\circ = \frac{30}{BC} \Rightarrow 1 = \frac{30}{BC} \Rightarrow BC = 30$ 1

ΔABC

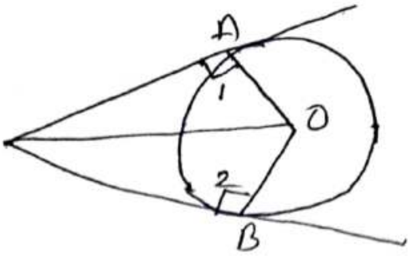
$\tan 30 = \frac{AB}{BC} \Rightarrow \frac{1}{\sqrt{3}} = \frac{AB}{30} \Rightarrow AB = \frac{30 \times \sqrt{3}}{\sqrt{3}\,\sqrt{3}}$ 1

$= \frac{30\sqrt{3}}{3}$

$AB = 10\sqrt{3}$ 1/2

Given , R.T.P , figure 1/2. 1/2

Proof:- 1/2



In ΔAPO & ΔBPO

$\angle 1 = \angle 2 = 90°$ (tangent ⊥ radius)

$OA = OB$ [Radii] 1/2

$OP = OP$ (common.)

$\Delta APO \cong \Delta BPO$ so $AP = BP$ (By C.P.C.T) 1/2

Q30 (i) $\frac{3}{8}$ 1

(ii) $\frac{4}{8} = \frac{1}{2}$ 1

(iii) $\frac{4}{8} = \frac{1}{2}$ 1

Q31 Speed of boat = x km/hr 1/2

" " stream = y km/h.

A.T.Q:- $2(x+y) = 20$ 1

$x + y = 10$ — (1)

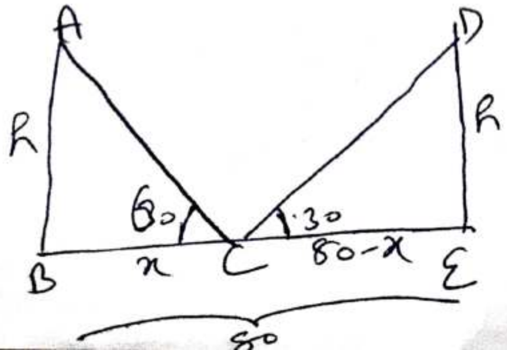
$2(x-y) = 4$ 1/2

$x - y = 2$ — (2)

On Solving $x = 6$, $y = 4$ $\frac{1}{2} + \frac{1}{2}$

Section D.

Q32



(1)

ΔABC

$\tan 60° = \frac{h}{x} \Rightarrow \sqrt{3} = \frac{h}{x}$ $1\frac{1}{2}$

$h = \sqrt{3}x$

ΔDEC

$\tan 30 = \frac{h}{80-x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{80-x}$ 1

$80 - x = \sqrt{3}h$

$80 - x = \sqrt{3} \times \sqrt{3} x$

$80 - x = 3x$ ½

$80 = 4x$

$20 = x$

$h = 20\sqrt{3}$ ½

Distance b/w Poles are $= 20, 60$ ½

Q33 Let Speed of Train $= x$ k.m/hr ½

Distance $= 480$ k.m

A.T.Q:-

$\frac{480}{x} = \frac{480}{x-8} - 3$ $1\frac{1}{2}$

On solving 1

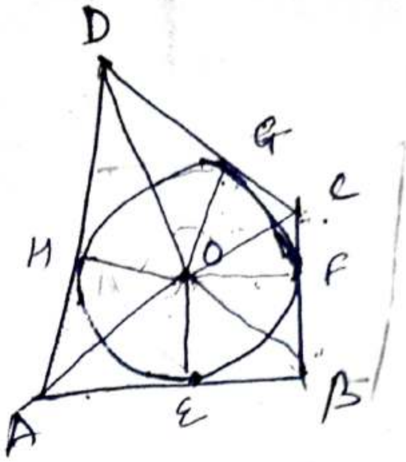
$x^2 - 8x - 1280 = 0$

$(x - 40)(x + 32) = 0$ 1

$x = 40, -32$ (rejected) ½

Speed of train $= 40$ k.m/h ½

34 Correct figure 1



R.T.P :-

$\angle AOB + \angle DOC = 180$ 1/2

$\angle AOD + \angle BOC = 180$

$\Delta GOC \cong \Delta BOC$ (By S-S-S) Prove here. 1

So $\angle 1 = \angle 2$

Illy $\angle 3 = \angle 4$ 1/2

$\angle 5 = \angle 6$

$\angle 7 = \angle 8$ 1/2

$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360$

$2(\angle 1 + \angle 8 + \angle 5 + \angle 4) = 360$ 1

$\angle 1 + \angle 8 + \angle 5 + \angle 4 = \frac{360}{2} = 180$

$\angle AOB + \angle DOC = 180$ 1/2

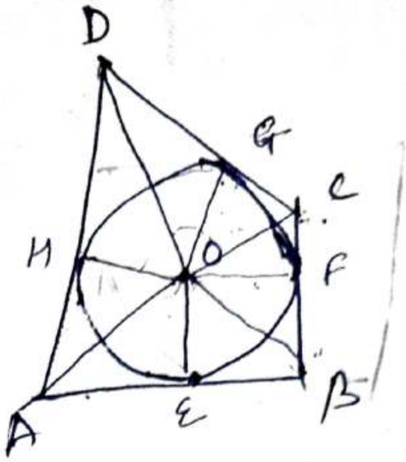
Illy $\angle AOD + \angle BOC = 180$

Q 35

L.H.S

$$\frac{\sin A - \cos A + 1}{\sin A + \cos A + 1}$$

$$\frac{\frac{\sin A}{\cos A} - \frac{\cos A}{\cos A} + \frac{1}{\cos A}}{\frac{\sin A}{\cos A} + \frac{\cos A}{\cos A} - \frac{1}{\cos A}}$$ 1

34 Correct figure 

1

R.T.P:-

$\angle AOB + \angle DOC = 180$

$\angle AOD + \angle BOC = 180$ 1/2

$\Delta GOC \cong \Delta BOC$ (By S-S-S) Prove here. 1

So $\angle 1 = \angle 2$

Illy $\angle 3 = \angle 4$ 1/2

$\angle 5 = \angle 6$

$\angle 7 = \angle 8$ 1/2

$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360$

$2(\angle 1 + \angle 8 + \angle 5 + \angle 4) = 360$ 1

$\angle 1 + \angle 8 + \angle 5 + \angle 4 = \frac{360}{2} = 180$

$\angle AOB + \angle DOC = 180$ 1/2

Illy $\angle AOD + \angle BOC = 180$

Q35 L.H.S

$$\frac{\sin A - \cos A + 1}{\sin A + \cos A + 1}$$

$$\frac{\frac{\sin A}{\cos A} - \frac{\cos A}{\cos A} + \frac{1}{\cos A}}{\frac{\sin A}{\cos A} + \frac{\cos A}{\cos A} - \frac{1}{\cos A}}$$ 1

37

Q36

in Set B

(i) $\frac{7}{20}$ (1)

(ii) $\frac{11}{20}$ (1)

(iii) $\frac{1}{20}$ (2)

Q 38

Q 37 in

Set B

$23, 21, 19 \ldots$

$a_n = 5$

$a + (n-1)d = 5$

$23 + (n-1)(-2) = 5$ (1)

On solving $n = 10$

(ii) $S_n = \frac{n}{2}(a + a_n)$

$= \frac{10}{2}(23+5) = \frac{10}{2} \times 28$ (1)

$= 140$

(iii) $a_n = a + (n-1)d$

$= 23 + (n-1)(-2)$ (1)

$= 23 - 2n + 2$

$= 25 - 2n$ (1)

$= 25 - 2(10)$

$= 25 - 20$ $\quad\because n = 10.$

$= 5$

Marking Scheme
September 2024-25 (Set B)
Maths

Q1) (b) (1)
Q2) (d) (1)
Q3) (c) (1)
Q4) (b) (1)
Q5) (a) (1)
Q6) (c) (1)
Q7) (d) (1)
Q8) (c) (1)
Q9) (d) (1)
Q10) (c) (1)
Q11) (a) (1)
Q12) (a) (1)
Q13) (b) (1)
Q14) (a) (1)
Q15) (c) (1)
Q16) (b) (1)
Q17) (d) (1)
Q18) (d) (1)
Q19) (a) (1)
Q20) (a) (1)

Q21) Let 8^n can ends with digit 0, so its prime factors are 2 and 5 —— (1)
But $8^n = (2^3)^n$, It show that it has 5 as a prime factor — (2) 1
(1) and (2) are Contradictory because of $\frac{1}{2}$

Uniqueness of fundamental theorem of arithmetic. $\frac{1}{2}$
So 8^n can never ends with digit 0.

Q22) $P(x) = 6x^2 + 37x - (k-2)$

Let α and $\frac{1}{\alpha}$ are zeroes of $P(x)$ $\frac{1}{2}$

ATQ

$\alpha\beta = \frac{c}{a}$ $\frac{1}{2}$

$\alpha \times \frac{1}{\alpha} = \frac{-(k-2)}{6}$

$1 = \frac{-k+2}{6}$ 1

$-4 = k$

Q23) $kx + 2y = 3$

$kx + 2y - 3 = 0$

For unique solution

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ $\frac{1}{2}$

$\frac{k}{3} \neq \frac{2}{6}$ $\frac{1}{2}$

$k \neq \frac{2 \times 3}{6}$ $\frac{1}{2}$

$k \neq 1$

Any value of k except 1 $\frac{1}{2}$

Q24) $\sqrt{3}x^2 - 2x - 8\sqrt{3} = 0$

$\sqrt{3}x^2 - 6x + 4x - 8\sqrt{3} = 0$ $\frac{1}{2}$

$\sqrt{3}x(x - 2\sqrt{3}) + 4(x - 2\sqrt{3}) = 0$ $\frac{1}{2}$

$(x - 2\sqrt{3})(\sqrt{3}x + 4) = 0$ $\frac{1}{2}$

Either $x - 2\sqrt{3} = 0$ | or $\sqrt{3}x + 4 = 0$ $\frac{1}{2}$

$x = 2\sqrt{3}$ | $x = -4/\sqrt{3} = -\frac{4\sqrt{3}}{3}$ $\frac{1}{2}$

Q25) A.P is 3, 15, 27, 39 - - ——

$a = 3$, $d = 15 - 3 = 12$ $\frac{1}{2}$

$a_{21} = a + 20d$

$= 243$ $\frac{1}{2}$

ATQ

$a_n = a_{21} + 120$

$a + (n-1)d = 243 + 120$ $\frac{1}{2}$

$3 + (n-1)12 = 363$

$3 + 12n - 12 = 363$

$12n = 363 - 3 + 12$

$12n = 372$

$n = \frac{372}{12} = 31$ $\frac{1}{2}$

Section — (C)

Q26)

Prove that $\sqrt{5}$ is Irrational 2

We know that product of rational and Irrational is Irrational. 1

So $3\sqrt{5}$ is an Irrational number.

Q27) $\tan(A-B) = \frac{1}{\sqrt{3}}$

$\tan(A-B) = \tan 30^\circ$

$\Rightarrow A - B = 30^\circ$ — (1)

$\tan(A+B) = \sqrt{3}$

$\tan(A+B) = \tan 60^\circ$

$\Rightarrow A + B = 60^\circ$ — (2) 1, 1

Solving (1) and (2)

$A = 45^\circ$ and $B = 15^\circ$ $\frac{1}{2}, \frac{1}{2}$

Q28) ATQ

$a_3 + a_7 = 6$

$a+2d+a+6d = 6$

$2a+8d = 6$

$a+4d = 3$

$a = 3-4d$ — (1)

$a_3 \times a_7 = 8$

$(a+2d)(a+6d) = 8$ — (2)

Put $a = 3-4d$ in Eq. (2)

$(3-4d+2d)(3-4d+6d) = 8$

$(3-2d)(3+2d) = 8$ $\frac{1}{2}, \frac{1}{2}$

$3^2 - 4d^2 = 8$

$-4d^2 = 8-9$

$d^2 = \frac{-1}{-4} = \frac{1}{4}$ 1

$d = \pm \frac{1}{2}$

If $d = 1/2$

$a = 3 - 4 \times \frac{1}{2} = 1$

$S_n = \frac{n}{2}(2a+(n-1)d)$

$S_{16} = \frac{16}{2}(2\times1+(16-1)\frac{1}{2})$

$= 8(2+\frac{15}{2})$

$= 8 \times \frac{19}{2}$ $\frac{1}{2}$

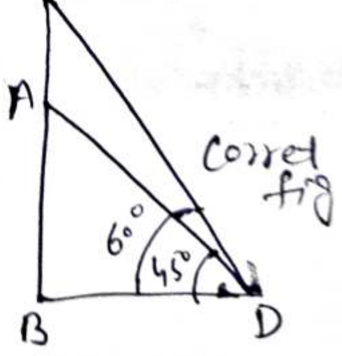
$= 76$

If $d = -\frac{1}{2}$, then by solving $\frac{1}{2}$

$S_{\cancel{16}} = 20$

Q29) Let $AC = x$

In $\triangle ABD$ $\frac{1}{2}$



$\frac{AB}{BD} = \tan 45°$

$\frac{AB}{BD} = 1$

$AB = BD = 20m$ 1

In $\triangle BCD$

$$\frac{BC}{BD} = \tan 60$$

$$\frac{AB+AC}{BD} = \sqrt{3}$$

$$\frac{20+x}{20} = \sqrt{3} \quad (1)$$

$$x = 20(\sqrt{3}-1)\,m \quad (\tfrac{1}{2})$$

Q30) (i) $\frac{2}{52} = \frac{1}{26}$ (1)

(ii) $\frac{8}{52} = \frac{2}{13}$ (1)

(iii) $\frac{12}{52} = \frac{3}{13}$ (1)

Q.

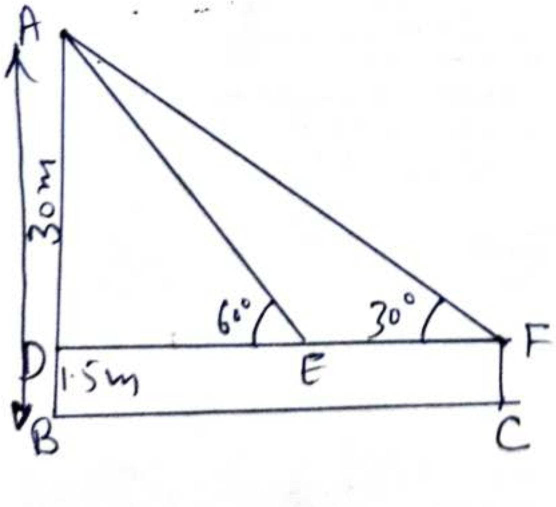
(Section-D)

Q32)

$AB = 30m$

$AD = AB - DB = 30 - 1.5$ $(\tfrac{1}{2})$

$= 28.5\,m$ Fig-(1)



In $\triangle ADE$

$$\tan 60 = \frac{AD}{DE}$$

$$\sqrt{3} = \frac{28.5}{DE}$$

$$DE = \frac{28.5}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$DE = 9.5\sqrt{3}\,m \quad 1\tfrac{1}{2}$$

In $\triangle ADF$

$$\tan 30^\circ = \frac{AD}{DF}$$

$$\frac{1}{\sqrt{3}} = \frac{28.5}{DF}$$

$$DF = 28.5\sqrt{3}$$ (1)

Distance travelled $= DF - DE$ (1)

$= 28.5 - 9.5\sqrt{3}$

$= 19\sqrt{3}$

Q33) Let total camel $= x$ $\frac{1}{2}$

ATQ $2\frac{1}{2}$

$$\frac{1}{4}x + 2\sqrt{x} + 15 = x$$

$$\frac{x + 8\sqrt{x} + 60}{4} = x$$

$$x + 8\sqrt{x} + 60 = 4x$$

$$3x - 8\sqrt{x} - 60 = 0$$

Let $\sqrt{x} = a$ 1

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

$$3a^2 - 18a + 10a - 60 = 0$$

$$3a(a-6) + 10(a-6) = 0$$

$$(a-6)(3a+10) = 0$$ $(\frac{1}{2})$

Either $a - 6 = 0$ or $3a + 10 = 0$

$a = 6$ $\quad$ $a = -10/3$

$\sqrt{x} = 6$ $\quad$ $\sqrt{x} = -10/3$

Sq. on both sides $\quad$ $x = \frac{100}{3}$ $(\frac{1}{2})$

$x = 36$

But $x \neq \frac{100}{3}$ ($\because$ x is no. of camels)

So $x = 36$

Q34) Because tangent from external pt. are equal $(\frac{1}{2})$

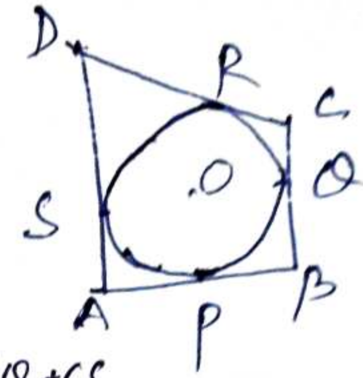
$\therefore$ $AP = AQ$ — (1)

$PD = DS$ — (2)

$BR = BQ$ — (3)

$CR = CS$ — (4)

Fig(1)



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

Add (1), (2), (3) and (4)

$(AP + PD) + (BR + CR) = AQ + DS + BQ + CS$ $(\frac{1}{2})$

$AD + BC = (AQ + BQ) + (DS + CS)$

$AD + BC = AB + CD$ $(\frac{1}{2})$

$AD = BC$, $AB = DC$ [opposides of ||gm are equal)

$AD + AD = AB + AB$

$2AD = 2AB$ $(\frac{1}{2})$

$\Rightarrow$ $AD = AB$

We know that If adjacent sides of a ||gm are equal, then it is a Rhombus $(\frac{1}{2})$

So ABCD is a Rhombus.

Q35) $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

LHS –

$= \sin^2 A + \operatorname{cosec}^2 A + 2 + \cos^2 A + \sec^2 A + 2$ $(1\frac{1}{2}, 1\frac{1}{2})$

$= (\sin^2 A + \cos^2 A) + (1 + \cot^2 A) + (1 + \tan^2 A) + 4$

$= 1 + 1 + 4 + 1 + \cot^2 A + \tan^2 A$ (1)

$= 7 + \cot^2 A + \tan^2 A$ (1)

$=$ RHS

Hence Proved