# SSLC MATHS EXAM-01 KEY ANSWERS-2025

## MATHEMATICS 81 E

## KEY ANSWERS

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**MARKS:80** **DATE: 24-03-2025** **DURATION: 3 Hours 15min**

**I. *Four* alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet.** **1x8=8**

1. D) 6
2. A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
3. D)$X^2+3x+4=0$
4. A)Any two equilateral triangles
5. **B)** $V=\frac{4}{3}\pi r^3$ cubic units
6. C) $\sqrt{x^2 + y^2}$
7. C)-2
8. B)$80^0$.

**II. Answer the following questions** **1x8=8**

9. Only one (1)
10. TSA of cube = 6a where a is side of cube.
11. Modal class = 3-5.
12. Zero
13. Only one solution
14. Two zeroes
15. Roots are 0 and -2
16. $\frac{AB}{QR} = \frac{BC}{RP} = \frac{AC}{QP} ==\rightarrow \frac{2}{4} = \frac{2.5}{5} = \frac{3}{6}$

**III. Answer the following questions** **2x8=16**

17. $\text{Sin}\alpha=\frac{3}{5}$ and $\tan\Theta=\frac{4}{3}$
18. Let $6 + \sqrt{2} = p/q$ be a rational number, where p and q are co-prime and $q \neq 0$.
    Then, $\sqrt{2} = p/q - 6 = p-6q / q$
    $\Rightarrow \sqrt{2} = p-6q/q$

since p–6q/q is a rational number,
therefore, √2 is a rational number. But, it is a contradiction.
Hence, 6 + √2 is irrational. Hence, proved.

19. we have 2x+y=10 --------→(1) and x-y=2-----------→(2)

By elimination method 2x+y=10

x-y=2

by subtracting above two we get **x=4**

Put this x value in any one of the above equation we get **y=2**

20. Given equation is $x^2+8x+12=0$. Factors of 12 is 6 and 2

$x^2+8x+12=0$

$x^2+6x+2x+12=0$

$x(x+6)+2(x+6) =0$

$(x+6) = 0$ or $x+2=0$

$x=-6$ or $x=-2$

OR

$x^2+4x+5=0$

a=1, b=4 and c=5

$\Delta=b^2-4ac$

$= 4^2-4x1x5$

$= 16-20$

$= -4$

There is No roots

21. Here a=5, d=4 and n=20

We are going to find $S_{20}$

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

$S_{20}=\frac{20}{2}\{2x5+(20-1)4\}$

$=10\{10+(19)4\}$

$=10x86$

$=860.$

22. Measure of AOB = $120^0$, and length of PB= 4cm (tangents are same)

23. Given that $40=x^y.z$

$2x2x2x5 = 2^3x5$

Therefore x=2, y=3 and z=5

24. Coordinates of BD = Coordinates of AC

By midpoint formula, $(\frac{7}{2},4) = (\frac{1+x}{2},\frac{6+y}{2})$

Therefore x= 6 and y=2

**IV. Answer the following questions** **3x9=27**

25. we have $p(x)= x^2+7x+10$

$x^2+5x+2x+10$

x(x+5)+2(x+5)

(x+5) (x+2)

Two zeroes are x=-2 and x=-5

$\alpha=-2$ and $\beta=-5$

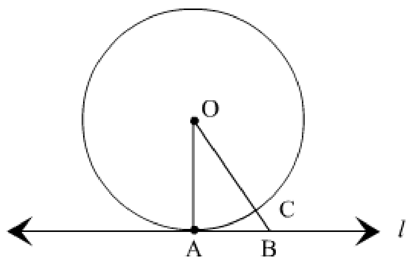
verification:

And we know $\alpha+\beta=\frac{-b}{a}$ and $\alpha\beta=\frac{c}{a}$

$\alpha+\beta=\frac{-(-7)}{1}$ and $\alpha\beta=\frac{10}{1}$

7= 7 and 10 = 10 hence verified

26.




**Given:** a circle C(0, r) and a tangent l at point A.

To prove: OA ⊥ l

**Construction:** Take a point B, other than A, on the tangent l.

join OB. Suppose OB meets the circle in C.

**Proof:** In figure

OA=OC (Radius of the same circle)

Now, OB=OC+BC.

∴ OB>OC

⇒OB>OA

⇒OA<OB

Thus, OA is shorter than any other line segment joining O to any point on l.

Here OA ⊥ l.

27.

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

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

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

$= 2\sec A$

OR

we have $\frac{5cos^2 60+4sec^2 30-tan^2 45}{sins^2 30+cos2\ 30}$

$$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$

$$= \frac{5\times\left(\frac{1}{2}\right)^2 + 4\times\left(\frac{2}{\sqrt{3}}\right)^2 - 1}{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2} = \frac{\frac{5}{4} + 4\times\frac{4}{3} - 1}{\frac{1}{4} + \frac{3}{4}}$$

$$= \frac{\frac{5}{4} + \frac{16}{3} - 1}{\frac{4}{4}} = \frac{15 + 64 - 12}{12} = \frac{67}{12}.$$

28. Given that r=21cm ϴ=$60^0$.

Area of the sector AOB= $\frac{\theta}{360^0} x\ \pi r^2$

= 231 sq cm

Now area of the Segment APB= Ar of sector AOB- Ar of triangle ABO.

= 231- Ar of an equilateral triangle

= 231 - $\frac{\sqrt{3}}{4}$x21x21

= 231 – 190.73

= 40.27 sq cm.

29.Coordinates of (-1, 7) and (4, -3) in the ratio 2:3

By section formula

$$(x, y)=\left[\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right]$$

$$(x, y) = \left[\frac{2(4)+3(-1)}{2+3}, \frac{2(-3)+3(7)}{2+3}\right]$$

$$= \left[\frac{8-3}{5}, \frac{-6+21}{5}\right]$$

$$= \left[\frac{5}{5}, \frac{15}{5}\right]$$

$$= [1,\ \ 3]$$

OR

Let point P (x, y) be equidistant from points A (3, 6) and B (- 3, 4).

Since they are equidistant, PA = PB

Hence by applying the distance formula for PA = PB, we get

$\sqrt{(x - 3)^2 + (y - 6)^2} = \sqrt{(x - (- 3))^2 + (y - 4)^2}$

$\sqrt{(x - 3)^2 + (y - 6)^2} = \sqrt{(x + 3)^2 + (y - 4)^2}$

By squaring, we get $PA^2 = PB^2$

$(x - 3)^2 + (y - 6)^2 = (x + 3)^2 + (y - 4)^2$

$x^2 + 9 - 6x + y^2 + 36 - 12y = x^2 + 9 + 6x + y^2 + 16 - 8y$

$6x + 6x + 12y - 8y = 36 - 16$ [On further simplifying]

$12x + 4y = 20$

$3x + y = 5$

3x + y - 5 = 0

Thus, the relation between x and y is given by 3x + y - 5 = 0

30.

| Class interval | Frequency |
|---|---|
| 10-20 | 2 |
| 20-30 | 3 |
| 30-40 | 6 |
| 40-50 | 5 |
| 50-60 | 4 |
| | N=20 |

**Solution**: We have formula by direct method,

mean $\bar{x} = \frac{\sum fx}{n}$

| C.I | f | x (midpoint of C.I) | fx |
|---|---|---|---|
| 10-20 | 2 | 15 | 30 |
| 20-30 | 3 | 25 | 75 |
| 30-40 | 6 | 35 | 210 |
| 40-50 | 5 | 45 | 225 |
| 50-60 | 4 | 55 | 220 |
| | N=20 | | $\sum fx = 760$ |

mean $\bar{x} = \frac{\sum fx}{n}$

$= \frac{760}{20}$

Mean= 38.

**OR**

| C.I | f | cf |
|---|---|---|
| 15-20 | 4 | 4 |
| 20-25 | 5 | 9 |
| 25-30 | 10 | 19 |
| 30-35 | 5 | 24 |
| 35-40 | 6 | 30 |
| | N=30 | |

n/2=15, f=10, cf=9 and h=5

Median= l+$\left\{\frac{\frac{n}{2}-fc}{f}\right\}$xh

Median= 25+$\left\{\frac{15-9}{10}\right\}$x5

= 25+$\frac{6}{10}$x5

= 25+3

**Median = 28**

31. We have cards from 1 to 20 = 20 = n(S)

i)A perfect square numbers, means = 1, 4, 9,16 = 4 = n(E)

Probability is P(E) = $\frac{n(E)}{n(S)}$ = $\frac{4}{20}$ =$\frac{1}{5}$

ii)A number which is divisible by both 2 and 3,means = 6, 12, 18= 3= n(E)

Probability is $P(E) = \frac{n(E)}{n(S)} = \frac{3}{20}$

32.

Let base of the triangle be = x and height is = 5+x

According to question

If its area is 150.

$\frac{1}{2}x(5+x) = 150$

$5x+x^2=300$

$x^2+5x-300=0$

$x^2+20x-15x-300=0$

$(x+20)(x-15) = 0$

$x=-20$ and $x=15$

therefore positive base of triangle is 15cm and height is 20cm.

OR

Let the two positive even consecutive numbers be x and x+2

By question $x^2+(x+2)^2= 164$

$x^2+2x-80=0$

$x^2+10x-8x-80=0$

$(x+10)(x-8) = 0$

$x=-10$ and $x=8$

consider positive number then two numbers are 8 and 10.

33.

Given: Two lines AB and CD such that AC || BD

To Prove : ΔAOB~BOD.

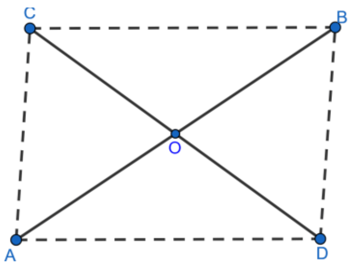
Proof: In the figure, AB intersects CD at O.

Then draw ∟AOC= ∟BOD (V.O.A)

AC is parallel to BD

∟CAB= ∟ABD (V.O.A)

Hence ΔAOB~BOD




**V. Answer the following questions** **4x4=16**

34. We have $x+2y=8$

For this we should have to find some solutions

If x=0, then y=4, and y=0, then x=8

Similarly for $x+y=5$, if x=0, then y=5, if y=0 then x=5.

Tables are

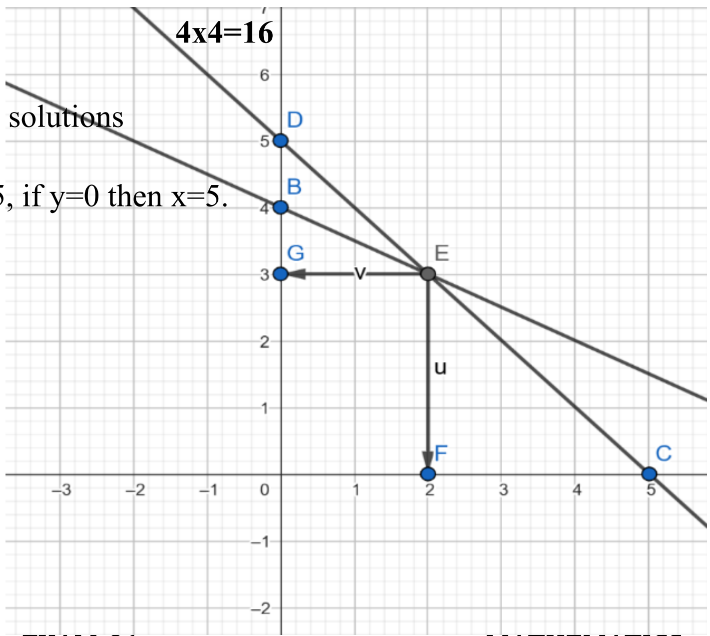
| | | |
|---|---|---|
| x | 0 | 8 |
| y | 4 | 0 |

And

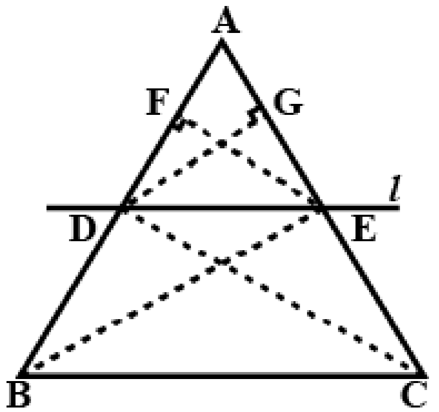
| | | |
|---|---|---|
| x | 0 | 5 |
| y | 5 | 0 |

Then by graphical method

**x=2 and y=3**



35.




Let **ABC** be the triangle.

The line **l** parallel to **BC** intersect **AB** at **D** and **AC** at **E**.

**To prove:** $\frac{DB}{AD}=\frac{CB}{AE}$

Join **BE,CD**

Draw **EF⊥AB, DG⊥CA**

Since **EF⊥AB**,

**EF** is the height of triangles **ADE** and **DBE**

Area of Δ**ADE=1/2×** base **×** height=**1/2xAD×EF**

Area of Δ**DBE=1/2×DB×EF**

$\frac{area of \Delta DBE}{area of \Delta ADE}=\frac{1/2\times DB\times EF}{1/2xAD\times EF}\times=\frac{DB}{AD}$ ........(1)

Similarly,

$\frac{area of \Delta DBE}{area of \Delta ADE}=\frac{1/2\times CB\times EF}{1/2xAE\times EF}\times=\frac{CB}{AE}$ ........(2)

But **ΔDBE** and **ΔDCE** are the same base **DE** and between the same parallel straight line **BC** and **DE**.

Area of **ΔDBE**= area of **ΔDCE** ....(3)

From (1), (2) and (3), we have

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

Hence proved.

36.

Given that cylinder, R=60cm, H=120cm

Cone, r=60cm, h=120-60 = 60cm

Hemisphere r=60cm

Now volume of water left in the cylinder in terms of π is

= vol of cylinder – (vol.of cone+vol.hemishpere)

$= \pi R^2H - (\frac{1}{3}\pi r^2h + \frac{2}{3}\pi r^3)$

= 432000π - 216000π

= 216000π cubic cm.

37. Given that n=16

$S_{16}$=768 and $a_{16}$=93

$$\frac{16}{2}\{2a + (16-1)d\} = 768$$

$$8\{2a + (15d)\} = 768$$

2a+15d= 96 ------------ >(1)

a+15d=93 ---------------→(2)

by elimination method **d=6** and **a= 3**

Then A.P is 3, 9, 15, …………..

Then we have to show 768=3(Sum of first 16 odd natural numbers)

= 3( 1+3+5+ ------ up to 16 terms )

= 3(256)

768= 768

**V. Answer the following questions** **5x1=5**

38. In triangle ABD, $\tan 30^0 = \frac{AB}{x}$

$x = 6\sqrt{3}$m -------------.(1)

In triangle ACE, $\tan 60^0 = \frac{CE}{x}$

CE=18 m -------------.(2)

From 1 and 2, height of the CD= 6+18 = 24m

Now in triangle ACE, $\sin 60^0 = \frac{CE}{AC}$

$AC = 12\sqrt{3}\ m$

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**Note:** This key answers not by board, its prepared by me.

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