KSEEB SSLC MODEL QUETSION PAPER – 03
MATHEMATICS 81 E
QUESTION PAPER & KEY ANSWERS
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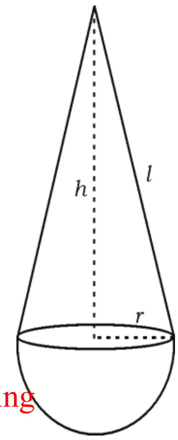
MARKS:80 **DATE: 12-02-2025** **DURATION: 3 Hours 15min**

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. The product of prime factors of 90 is
   A) 9x10 B) 6x15 C) 2x3x3x5 D) 1x2x3x15
   Solution: A) 2x3x3x5
2. If the lines represented by linear equations $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ are parallel lines then
   A) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ B) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c}$ C) $\frac{a_1}{a_2}\neq\frac{a_1}{a_2}$, D) $\frac{a_1}{a_2}=\frac{a_1}{a_2}$,
   Solution: B) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c}$
   Explanation: We know that $\frac{a_1}{a_2}\neq\frac{a_1}{a_2}$, there is intersecting lines (Only one solution) – consistent lines
   $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ Coincident lines (infinitely many solutions) - consistent lines
   $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c}$ Parallel lines (No solutions) – Inconsistent lines
3. If the graph of the quadratic polynomial passes through the coordinate points (-3, 0), (-1, -5), (0, -6) and (2, 0) then the zeroes of the quadratic polynomial
   A) -3 and -6 B)0, and -3 C)-1 and -5 D)-3, and 2
   Solution: **D)** -3, and 2
4. In an A.P, if an=2n-1 then the common difference is
   A) 2 B)-2 C) 3 D) -1
   Solution: **A)2**
5. The coordinates of the midpoint of the line joining the two points (-4, 2)and (-2, 6) is
   A) (3, 2) B) (-3, 4) C) (-2, 3) D) (-4, 1)
   Solution: A) (-3, 4)
6. If tanΘ=1, then the value of secΘ is
   A)$\frac{1}{\sqrt{3}}$ B) 3 C)$\sqrt{2}$ D)$\frac{1}{\sqrt{2}}$
   Solution: C)$\sqrt{2}$
7. In the figure, A toy is made up of a cone mounted on a hemisphere as shown in the figure. Then the formula to find out the volume of the toy is
   A) $\pi r^3+\pi rl$ B) $3\pi r^2 + \pi r^2 h$ C) $\frac{1}{3}\pi r^2 h+\frac{2}{3}\pi r^3$ D) $\pi r^2 h+\frac{2}{3}\pi r^3$
   Solution: **C)** $\frac{1}{3}\pi r^2 h+\frac{2}{3}\pi r^3$



8. If the probability of loosing a game of kabaddi team is 0.25 then the probability of winning
   A)0.95 B) 0.75 C)9.75 D)0.70
   Solution: B) 0.75

II. Answer the following questions 1x8=8

9. Write the HCF of 7 and 12
   Solution: 1

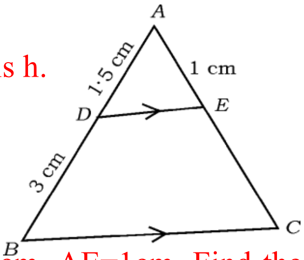
Explanation:HCF of any prime number is always 1

10. Write the general form of a quadratic polynomial where a, b and c are real numbers and x is a variable.

Solution: ax^2+bx+c

11. Write the formula to find the quadrant of a circle.

Solution: $\frac{\pi r^2}{4}$



12. Write the formula to find the volume of a cylinder whose radius r and height is h.

Solution: $\pi r^2 h$

13. What does l represent in the formula, median = $l+\left\{\frac{\frac{n}{2}-fc}{f}\right\}xh$

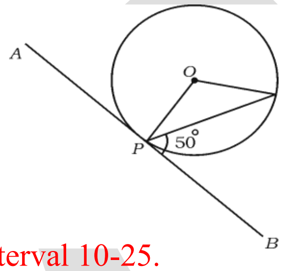
Solution:Lower real limit of the median class

14. In the given figure, ABC is a triangle in which DE||BC, AD=1.5cm, BD=3cm, AE=1cm. Find the value of EC.

Solution: EC=2cm

15. In the following figure, *'O'* is the centre of circle and *AB* is tangent at *P*. if ∟BPQ=50 Find the value of ∟POQ

Solution: 100



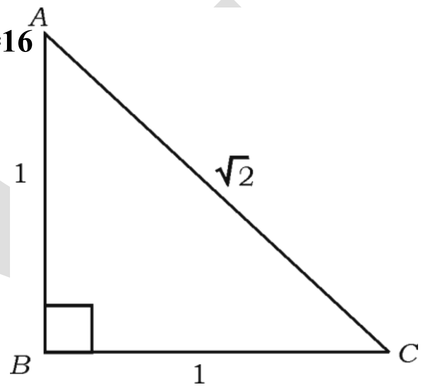
16. Find the class mark in the class interval 10-25.

Solution: 17.5

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

17. In the given figure, find the value of cosA and cosecC.

Solution:



In triangle ABC, CosA=$\frac{Adj}{hyp}=\frac{1}{\sqrt{2}}$

CosecC=$\frac{HYP}{OPP}=\frac{\sqrt{2}}{1}$

18. Solve 2x+y=8 and 3x-y=7.

Solution: we have 2x+y=8 --------→(1) and 3x-y=7-----------→(2)

By elimination method 2x+y=8

3x-y=7

by adding above two we get **x=3**

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

19. Find how many two digit numbers are divisible by 5 using formula?.

Solution: Two digit numbers started from 10 and end with 99.

A.P is 10, 15, 20, ………. 95.

a=10, d=5 and an=95

a+(n-1)d=95

10+(n-1)x5=95

n=18

then sum of first 18 terms are $\frac{18}{2}\{2X10+(17)5\}=945$

OR

An arithmetic progression consists of 20 terms whose first and last terms are 12 and 106 respectively. Find the sum of progression.

Solution: a=12 and an=106, n=20

We know that Sn=$\frac{n}{2}\{a+an\}$

= 10(12+106)

= 1180

20. Solve x-$\frac{3}{x}$ = 2

Solution: we have x-$\frac{3}{x}$ = 2

x^2-2x-3=0

by factorization method

(x+1) (x-3)

x=-1 and x=3

21. Find the coordinates of the line segment joining the two points (1, 6) and (4, 3) in the ratio 1:2.

Solution: Given points are (1, 6) and B(4, 3) ratio 1:2.

$(x_1, y_1)$and (x_2, y_2) m:n

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

P(x, y) = $\left[\frac{1(4)+2(1)}{1+2}, \frac{1(3)+2(6)}{1+2}\right]$

=$\left[\frac{6}{3}, \frac{15}{3}\right]$

= (2, 5)

22. A bag contains some cards of consecutive natural numbers from 1. If the probability of drawing an even natural number card is $\frac{4}{9}$. Then find the probability of getting a prime number card.

Solution: Given that probability of getting even natural number from 1 is $\frac{4}{9}$

Total number of cards is 9.

Then probability of drawing prime number card = 2, 3, 5, 7

= $\frac{4}{9}$

23. ABCD is a trapezium in which AB||DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

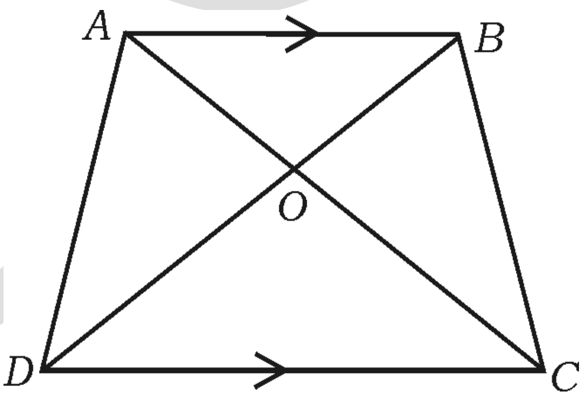
Solution: Given:

ABCD is a trapezium and AB||DC

To Prove: AO/BO=CO/DO

Construction:

Draw OE||DC such that E lies on BC.



Proof:

In △BDC,

By Basic Proportionality Theorem,

BO/OD=BE/EC............(1)

Now, In △ABC,

By Basic Proportionality Theorem,

AO/OC=BE/EC............(2)

∴ From (1), and (2),

AO/OC=BO/OD

i.e., AO/BO=CO/DO

24. Find the value of the discriminant of the quadratic equation $3x^2$-7x+4=0 and write the nature of its roots.

Solution: $3x^2$-7x+4=0

a=3, b=-7 and c=4

b^2-4ac= 1 >0

hence two distincts real roots

IV. Answer the following questions 3x9=27

25. Prove that $\sqrt{5}$ is an irrational number.

Solution: Let us assume that is rational.

∴ There exists co-prime integers a and b (b ≠ 0) such that

$\sqrt{5}$ = a/b ⇒ $\sqrt{5}$b= a

Squaring on both sides, we get
$5b^2 = a^2$...... (i)
$\Rightarrow$ 5 divides a^2 $\Rightarrow$ 5 divides a
So, we can write a = 5c for some integer c.
From (i) and (ii)
$5b^2 = 25c^2$
$\Rightarrow b^2 = 5c^2$ $\Rightarrow$ 5 divides b^2
$\Rightarrow$ 5 divides b
$\therefore$ 5 is a common factor of a and b.
But this contradicts the fact that a and b are co-primes.
This contradiction has arisen because of our incorrect assumption that $\sqrt{5}$ is rational.
Hence, $\sqrt{5}$ is irrational.

26. If the zeroes of the quadratic polynomial -3 and 4 respectively. Then find the quadratic polynomial and also verify the relation between zeroes and coefficients.

Solution: let two zeroes are -3 and 4 then

x^2-(sum of zeroes)x+product of zeroes
$x^2-(-1)x+(-12)$
$x^2-1x-12$
x=-3 or x=-4
α=3 and β=-4
a=1, b=-1 and c=-12

sum of zeroes, $\alpha+\beta=\frac{-b}{a}$ and product $\alpha\beta=\frac{c}{a}$

$-3+4=\frac{-(-1)}{1}$ $(-3)(4)=\frac{-12}{1}$

1 = 1 -12=-12 Hence verified

OR

α and β are the zeroes of the polynomial. If α+β=-3 and αβ=2, then find the quadratic polynomial and also find the value of (α-β).

Solution: Given that α+β=-3 and αβ=2
We know x^2- (sum of zeroes)x+product of zeroes
x^2+3x+2
by factorization method,
(x+1) (x+2)
x=-1 and x=-2
α=-1 and β=-2
then the value of **(α-β) = -1+2= 1**

27. Evaluate: $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$

Solution:

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

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

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

OR

Prove that $\frac{1+secA}{SecA} = \frac{Sin^2A}{1-CosA}$

Solution: Simplify separately LHS and RHS

LHS is $\frac{1+secA}{SecA}$

=1+cosA ----------→(1)

RHS is $\frac{Sin^2A}{1-CosA}$

= 1+CosA --------------→(2)

From 1 and 2 LHS= RHS

(For proof watch my youtube channel, https://youtu.be/0BPpdZI9RE4?si=cWKA4sgthjwXX3GI

28. Find the area of rhombus ABCD whose coordinates of the vertices are A(2, 4), C(8, 12) and length of BD is 5 units.

Solution: area of rhombus ABCD= $\frac{1}{2}$x d_1xd_2

Diagonals of rhombus are AC and BD.

Here BD=5 unis, we need to find distance AC.

By using distance formula, d=$\sqrt{(8-2)^2+(12-4)^2}$

D=10 units

area of rhombus ABCD= $\frac{1}{2}$x 5x10

= 25 sq units

29. Find the mean for the following grouped data by direct method.

Class interval	Frequency
5-15	6
15-25	11
25-35	21
35-45	23
45-55	14
55-66	5
	N=80

Solution: We have formula by direct method,

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

C.I	f	x (midpoint of C.I)	fx
5-15	6	10	60
15-25	11	20	220
25-35	21	30	630
35-45	23	40	920
45-55	14	50	700
55-66	5	60.5	302.5
	N=80		$\sum fx = 2832.5$

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

$=\frac{2832.5}{80}$

Mean= 35.40.

OR

Find the median for the following grouped data.

Class interval	Frequency
0-20	10
20-40	35
40-60	52
60-80	61
80-100	38
100-120	29

Solution: Data, h=20, f1=61, f0= 52 and f2=38

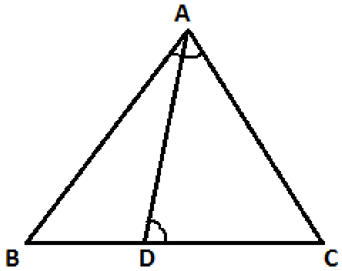
Mode=l+$\left\{\frac{f_1-f_0}{2f_1-f_0-f_2}\right\}$xh.

= 60+$\left\{\frac{61-52}{2x61-52-38}\right\}$x20.

= 60+5.625

=65.625

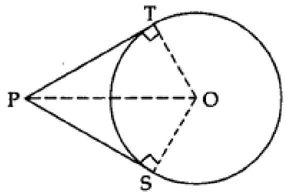
30. If D is the point on a side BC of a triangle ABC, Such that ∟ADC= ∟BAC. Then prove that CA2=CBxCD.



Solution: In △ADC and △BAC
∠ADC=∠BAC (Given)
∠C is Common
∴ by AA Criterion of Similarity, △ADC ~ △BAC
⇒AD/BA=DC/AC=AC/BC
⇒DC/AC=AC/BC
∴ CA2=CB.CD

31. Prove that "the lengths of the tangents drawn from an external point to the circle are equal".

Solution: **Given:** PT and PS are tangents from an external point P to the circle with centre O.
To prove: PT = PS
Construction: Join O to P, T and S.



Proof: In ΔOTP and ΔOSP.
OT = OS …[radii of the same circle]
OP = OP …[common]
∠OTP = ∠OSP …[each 90°]
ΔOTP ≡ ΔOSP …[R.H.S.]
PT = PS …[c.p.c.t.]

32. The age of the father is 30 years more than his son. After 5 years, the product of their ages is 400. Find the present age of both son and his father.

Solution:let father be x years and his son age is y years.
According to question, x=y+30 ----------→(1)
5 years hence,
Father age is x+5 and his son age is y+5 (present)
(x+5)(y+5)=400
xy+5x+5y+25=400
put x=30+y in the above, we get a quadratic equation
$y^2+40y-225=0$
after solving this equation by factorisation method,
we get y=+5 and y=-45
negative will not consider. Hence age of son is 5 years.
Father age is 30+5= 35 years.
(Watch age related video class, https://youtu.be/0BPpdZI9RE4?si=cWKA4sgthjwXX3GI)

OR

The first number is three more than the second number. The sum of their squares is 29. Find the number.

Solution: let the first number be x and second number be y.
According to question, x=3+y
Sum of their squares is 29, $x^2+y^2=29$

$(3+y)^2+ y^2=29$
$9+6y+ y^2+y^2=29$
$2y^2+6y-20=0$
$y^2+3y-10=0$

by factorisation method, y=+2 and y=-5
hence the numbers are 5 and 2.

33. Prove that $(\sin A+\operatorname{cosec} A)^2+ (\cos A+\sec A)^2=7+\tan^2 A+\cot^2 A$.

Solution:
Given that area of sector AOB:area of circle = 1:5
Then $\frac{\theta}{360} = \frac{1}{5}$
$\theta=72^0$
Length of an arc AB of a circle = $\frac{\theta}{360}$x2πr
$= \frac{44}{5}$cm or 8.8cm.

V. Answer the following questions 4x4=16

34. Find the solution of the pair of linear equations by graphical method.
$x+2y=8$ and $x+y=5$

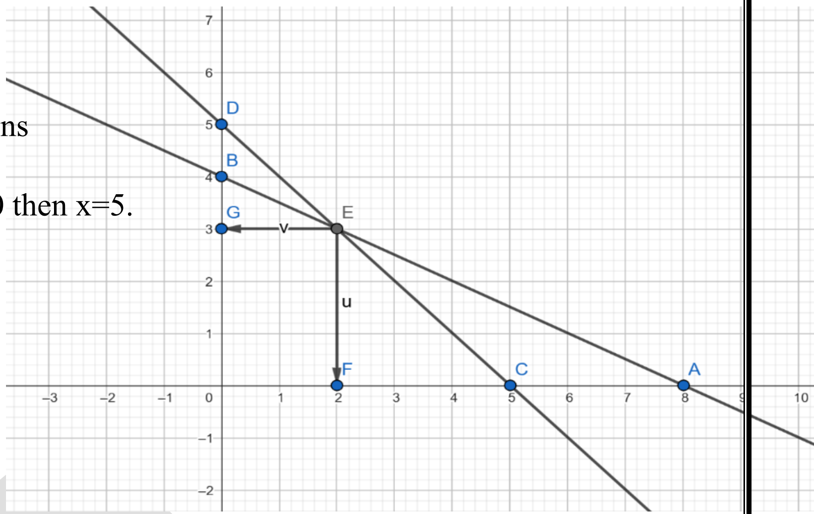
Solution:

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

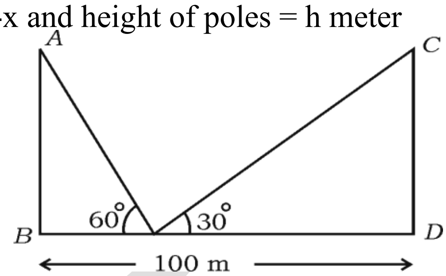
x	0	5
y	5	0

Then by graphical method

x=2 and y=3

35. **Two poles of equal heights are standing vertically on the level of the ground as shown in the figure. Wires are tied from top of the poles to a peg on the ground. The angles of elevation to the top of the poles are found to be 30^0 and 60^0. If the distance between the feet of the poles is 100m, then find the heights of the poles and lengths of wires.**

Solution: Mark T on BD, that wire is tied. Let BT=x &TD=100-x and height of poles = h meter



In triangle ABT, $\tan 60 = \frac{AB}{x}$

$x = \frac{h}{\sqrt{3}}$ ------------→(1)

similarly in triangle TDC, $\tan 30 = = \frac{AB}{x-100}$

$x = 100 - h\sqrt{3}$------------→(1)

from 1 and 2, $h = 25\sqrt{3}$m and x= 25m.

(**for full explanation, watch my youtube channel given in the link below**)

https://youtu.be/QguiOiJ3TQo?si=WYt2l0z39XXYtjJ3

36. Prove that "If in two triangles, corresponding angles are equal then corresponding sides are in the same ratio(proportion) and hence the two triangles are similar".

Data: Two △les △ABC & △DEF such that ∠A=∠D,∠B=∠E&∠C=∠F

Construction: Draw P and Q on DE & DF such that DP=AB & DQ=AC resp. Join PQ

Proof:

In△ ABC & △DPQ, AB=DP(by construction)

∠A=∠D(given)

AC=DQ(by construction)

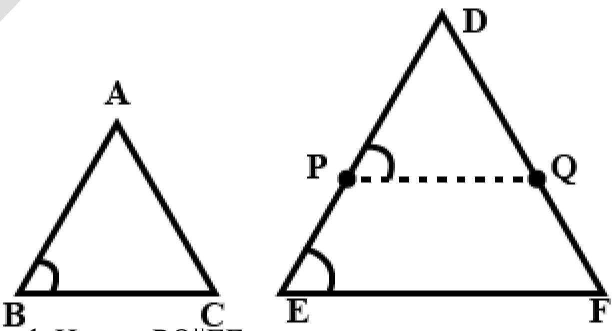
⟹△ABC≅△DPQ(by SAS criterion)

∠B=∠P{by CPCT}

∠B=∠E(given) implies ∠P=∠E

For lines PQ and EF with transversal PE,

∠P&∠E are corresponding angles and they Are equal. Hence, PQ||EF.



37. A Sphere of volume 38808 cubic cm is divided in to two equal parts. Find the total surface area of the each part.

Solution: Given that $\frac{4}{3}\pi r^3 = 38808$

$r^3 = 9261$

$r = 21$ cm

Now we have to find total surface area of 2 hemi-spheres, $= 3\pi r^2$.

= 4158 sq cm.

(For complete explanation, watch my youtube channel given the link below)
(https://youtu.be/s4aYXE4cuL8?si=IkwQRkarjtRIXPI6)

OR

A Toy is made up of a cylinder having diameter 10cm height 20cm and it is joined with a hemisphere of same diameter at one end and a cone of equal diameter and slant height 13cm at the other end. Find the surface area of the toy.

Solution: Given, Hemisphere r=5cm,

Cone, r=5cm, l=13cm and for height we need to find using $l=\sqrt{h^2+r^2}$

$13=\sqrt{h^2+5^2}$

Squaring on both side

Height h=12cm

Cylinder, r=5cm and H=20cm.

Surface area of the toy= CSA of cone +C.S.A of cylinder + CSA of hemisphere

$= \pi rl+2\pi rH+2\pi r^2$.

$= \pi r(l+2H+2r)$

$= \frac{22}{7}x5(13+40+10)$

= 990 sq cm.

38. If the sum of n terms of an A.P is $5n-n^2$. Then write the arithmetic progression. Also find the 21st term of this A.P then find the sum of first 21 terms of A.P.

Solution: Given, $S_n=5n-n^2$, first term $S_1=4=a$

Firs term is 4

$S_2-S_1= 2= a_2$ second term is 2

Then common difference is 2-4= -2

Then A.P is 4, 2, 0, …………

21st term is a+20d= 4+20x-2

= 4-40

=-36

Then sum of its first 21 terms is $\frac{n}{2}\{2a+(n-1)d\}$

$=\frac{21}{2}\{2x4+(21-1)x-2\}$

= -756

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

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For Detailed solutions all above, watch my youtube channel: Shiva the mathematical world.

Link is here: https://youtu.be/_38BRopRCmU?si=GLGkaUjHeh99z-aA