4/3/2023

SSLC EXAM 2022-23

MATHEMATICS 81 E MODEL KEY ANSWERS

MODEL KEY ANSWERS ANNUAL EXAM-2022-23

1. **Answer: (A) 3**
2. **Answer : (B) 0.25**
3. **Answer :** (D) $2\prod r(r+h)$
4. **Answer: (C)** 1
5. **Answer: (A) 45^0**
6. **Answer: (C)** $\frac{AD}{DB}=\frac{AE}{EC}$
7. **Option (D) Parallel lines**
8. **Option (B) 3 units**
9. **$80=2^4X5^1$**
10. **a=3, b=6**
11. **PQ=10cm**
12. **$x^2+2x+3=0$**
13. $\Delta=b^2-4ac$

    $\Delta=(-4)^2-4x2x3$

    $\Delta=16-24$

    $\Delta=-8$

    Hence No real roots
14. The coordinates of the line joining the midpoints of two vertices are

    $P(x, y) = \left[\frac{mx2+nx1}{2}, \frac{my2+ny1}{2}\right]$

    $= \left[\frac{6+4}{2}, \frac{3+7}{2}\right]$

    $= \left[\frac{10}{2}, \frac{10}{2}\right]$

    = **(5, 5)**
15. **Degree is 4**
16. Volume of the frustum of a cone is given by **$V=\frac{1}{3}\Pi h(r_1^2+r_2^2+r_1r^2)$**
17. Solution:

    Let us assume that $5+\sqrt{3}$ is a rational number with p and q as co-prime integer and $q \neq 0$

    $\Rightarrow 5+\sqrt{3} = p / q$

    $\Rightarrow \sqrt{3} = p / q - 5$

    $\Rightarrow \sqrt{3} = p / q - 5$

    $\Rightarrow p / q - 5$ is a rational number

    However, $\sqrt{3}$ is in irrational number

This leads to a contradiction that $5+\sqrt{3}$ is a rational number wrong

Hence $5+\sqrt{3}$ is an irrational number.

OR

Let the three numbers are 72 & 120

By Euclid's division algorithm, 72)120(1

72

48)72(1

48

24)48(2

48

0

Hence HCF of 72 & 120 is 24

18. Consider the given equation.

$3x+y=12$ .... (1)

$x+y=6$ .... (2)

On subtracting both equation (1) and (2), we get

$2x=6$

$x=3$

Now, put the value of x in equation (2), we get

$3+y=6$

$y=3$

Hence, the value of x is **3** and y is **3**

19. Solution: Given A.P is 4, 7, 10, ...

here a=4, d=3 we have to find 20^{th} term means $a_{20}=a+19d$

$=4+19x3$

$=4+57$

$= 61$

Hence 20^{th} term of this A.P is 61

20.

Given equation is $2x^2-5x+3=0$

By using formula method,

$2x^2-5x+3=0$

Here a= 2, b=-5 & c=3

We have $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{-(-5)\pm\sqrt{-5^2-4x2x(3)}}{2x2} = \frac{5\pm\sqrt{25-24}}{4} = \frac{-5\pm\sqrt{1}}{4}$

$x=\frac{5+1}{4}$ or $x=\frac{5-1}{4}$

$x=\frac{3}{2}$ or **$x=1$**

21. **Sin $\theta = \frac{1}{2}$**

Cos α =$\frac{1}{2}$

22. Solution: possible outcomes:{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 }

Among them prime numbers are { 11, 13, 17, 19 }=4

Probability is $\frac{n(E)}{n(S)} = \frac{4}{11}$

23. Mark point E on DC, Such that EC=6cm.

In ΔADE

$AD^2=AE^2+DE^2$

$5^2= AE^2+4^2$

$25= AE^2+16$

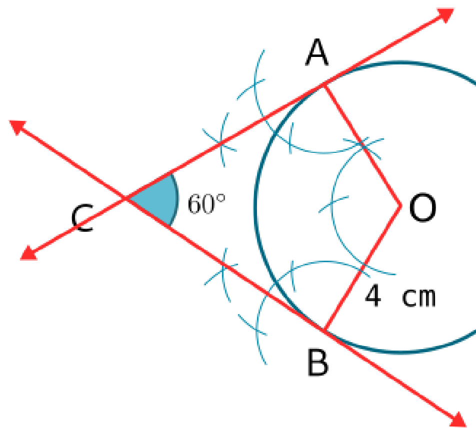
$25-16= AE^2$

$AE^2=9$

AE=3cm

Hence the distance between two parallel lines is 3cm

24. Solution:



25. Solution:

$$\begin{array}{r|l} & 3x - 5 \\ \hline x^2 + 2x + 1 & 3x^3 + x^2 + 2x + 5 \\ & 3x^3 + 6x^2 + 3x \\ & - \quad - \quad - \\ \hline & -5x^2 - x + 5 \\ & -5x^2 - 10x - 5 \\ & + \quad + \quad + \\ \hline & 9x + 10 \\ \hline \end{array}$$

Hence quotient is 3x-5 and remainder is 9x+10

OR

Given polynomial is $p(x)=x^2+7x+10$.

Its zeroes are by factorization method,

$x^2+7x+10$

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

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

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

$\boldsymbol{\alpha}$ =-5 & ©=-2

Verification: we know that $x^2-(\boldsymbol{\alpha}+©)x+\boldsymbol{\alpha}©$

$x^2-(-5-2)+-7x-2$

$x^2+7x+10$

Hence the proof

26. Solution:

We have $\sqrt{\frac{1+cosA}{1-CosA}} = \sqrt{\frac{1+cosA\ (1+cosA)}{1-CosA(1+cosA)}}$

$= \sqrt{\frac{(1+cosA)2}{(1-CosA)2}}$

$= \sqrt{\frac{1+cosA)2}{sin2A}}$

$= \frac{1}{SinA}+\frac{cosA}{SinA}$

= CosecA+CotA

OR

We have $\frac{SinA}{1+CosA}+\frac{1+CosA}{SinA}$

$= \frac{Sin2A+(1+CosA)2}{SinA(1+CosA)}$

$= \frac{Sin2A+(1+Cos2A+2CosA)}{SinA(1+CosA)}$

$= \frac{Sin2A+Cos2A+1+2CosA}{SinA(1+CosA)}$

$=\frac{1+1+2CosA}{SinA(1+CosA)}$

$= \frac{2+2CosA}{SinA(1+CosA)}$

$= \frac{2(1+CosA)}{SinA(1+CosA)}$

= 2 CosecA

27. Solution:

We have to find mean

C.I	f	x	fx
1-5	4	3	12
6-10	3	8	24
11-15	2	13	26
16-20	1	18	18
21-25	5	23	115
	N=15		195

Mean = $\frac{\sum fx}{N}$ = $\frac{195}{15}$ = 13

OR

We have to find Mode for the following frequency data

C.I	f
1-3	9
3-5	9 f0
5-7	15 f1
7-9	9 f2
9-11	1
	N=60

LRL=5, f1=15, f0=9, f2=9 and h=3

We have formula Mode=LRL+$\left\{\frac{f1-f0}{2f1-f0-f2}\right.$x h

$= 5+\frac{15-9}{30-9-9}$x2

$=5+\frac{6}{6}$

=5+1

Mode=6

28. Solution:

We have (-6, 10) and (3, -8) is divided by (-4, 6)

By section formula,

$-4=(\frac{m(3)+n(-6)}{m+n})$and $6=(\frac{m(-8)+n(10)}{m+n})$

$m+n=(\frac{3m-6n}{-4})$ and $m+n=(\frac{-8m+10n}{6})$

on comparing both we get $\frac{3m-6n}{-4} = \frac{-8m+10n}{6}$

18m-36n=32m-40n

4n=14m

m/n=2/7

The ratio is 2:7

OR

(1, -1), (-4, 6) & (-3, -5)

(x1, y1), (x2, y2) & (x3, y3)

Area of the triangle is A=$\frac{1}{2}\{x1(y2-y3)+x2(y3-y1)+x3(y1-y2)\}$

$=\frac{1}{2}\{1(6+5)-4(-5+1)+(-3)(-1-6)\}$

$=\frac{1}{2}$(11+16+21)

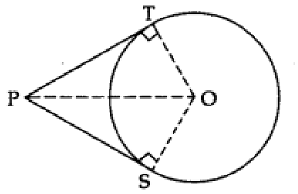
$=\frac{1}{2}$(48)

= 24 sq units.

29.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.]

30. Solution:

Area of shaded region= area of circle – area of sector of a circle OPQ----(1)

In the given figure, OAB is an equilateral triangle.

Its area is $36\sqrt{3}$ sq cm.

We know A=$\frac{\sqrt{3}}{4}a^2$ (area of an equilateral triangle)

$$36\sqrt{3} = \frac{\sqrt{3}}{4}a^2$$

Then side of the triangle is 12cm, then radius of circle is 6cm (mid-point)

At O angle should be 60^0.

Area of sector = $\frac{60}{360}$ x $\frac{22}{7}$ x 6x 6

$= \frac{132}{7}$

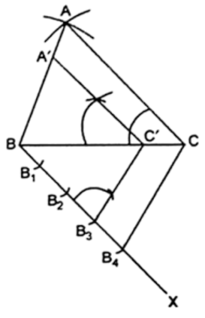
Area of a circle = $\frac{22}{7}$ x 6x 6

$= \frac{792}{7}$

Equation 1 becomes

$\frac{792}{7} - \frac{132}{7}$ = 94.28 sq cm.

31. Solution:



32. Solution :

Let us say, the current average speed of car = x km/h.

If it goes 11km/hr more then it would take 1 hour less

Total distance between the two city is 132km. Therefore, according to question

$(132/x) - (132/(x+11)) = 1$

$132(x+11-x)/(x(x+11)) = 1$

$132 \times 11 /(x(x+11)) = 1$

$\Rightarrow 132 \times 11 = x(x+11)$

$\Rightarrow x^2 + 11x - 1452 = 0$

$\Rightarrow x^2 + 44x - 33x - 1452 = 0$

$\Rightarrow x(x+44) - 33(x+44) = 0$

$\Rightarrow (x+44)(x-33) = 0$

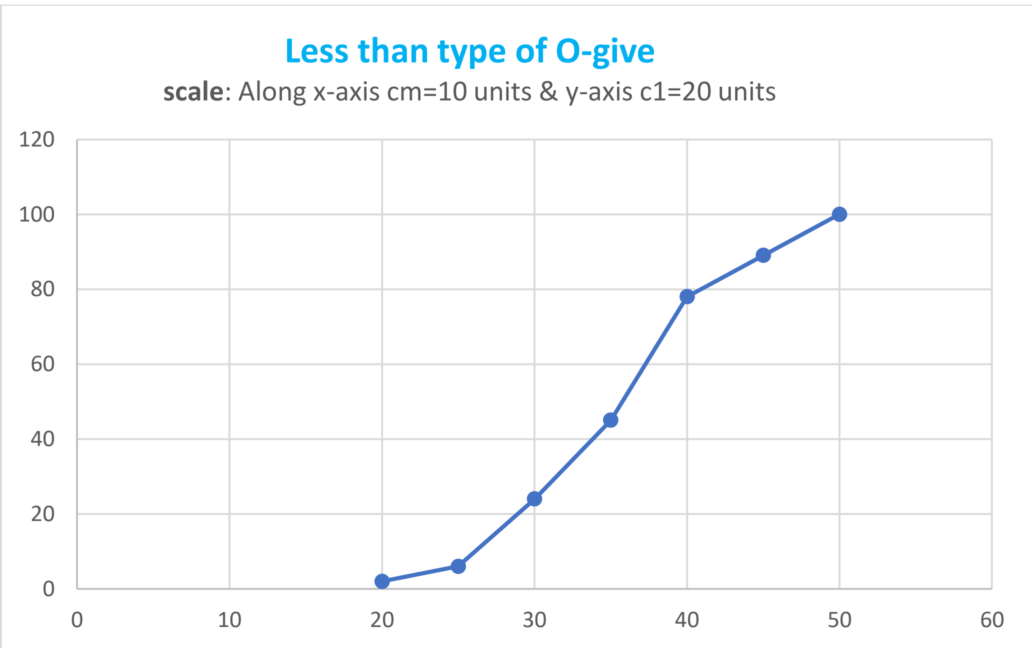
$\Rightarrow x = -44, 33$

As we know, Speed cannot be negative.

Therefore, the speed of the car 33 km/h.

33. Solution:

C.I	Frequency	Coordinates
<20	2	(20, 2)
<25	6	(25, 6)
<30	24	(30, 24)
<35	45	(35, 45)
<40	78	(40, 78)
<45	89	(45, 89)
<50	100	(50, 100)



34. Solution:

The sum of second and fourth term of the arithmetic progression is 54

a2+a4=54 and S11=693

a+d+a+3d=54 $\frac{11}{2}$(2a+10d)=693

2a+4d=54----(1) 2a+10d=126-----------(2)

From 1 and 2, subtract above we get

6d=72

d=12

thus common diffrence is 12, put this in equation 1 we get

2a+4(12)=54

2a=54-48

a=3

hene first term is 3

A.P is 3, 15, 27..........

Its 54th term is a+53d=3+53x12 = 3+636 = 639

According to question, 132+639=771 this will be an

an=771

a+(n-1)d=771

3+12n-12=771

12n=768+12

12n=780

n=65

then 65th term is 132 more than its 54th term.

OR

Given: a=3 and l=253 and also a20=98

We know Sn=$\frac{n}{2}$(a+l) a+19d=98 =➔ 3+19d=98 =➔ d=5

Sn=$\frac{n}{2}$(3+253)

Sn=$\frac{n}{2}$(256)

Sn=nx128----→(1)

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

= $\frac{n}{2}$(6+5n-5)

= $\frac{n}{2}$(5n+1) ---------→(2)

From 1 and 2

nx128= $\frac{n}{2}$(5n+1)

256=5n+1

5n=255

n=51

Then A.P from last is 253, 248, 243, ...

a=253, d=-5

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

$$=\frac{10}{2}(506+9(-5))$$

$$=\frac{10}{2}(506-45)$$

= 5x461

= 2305

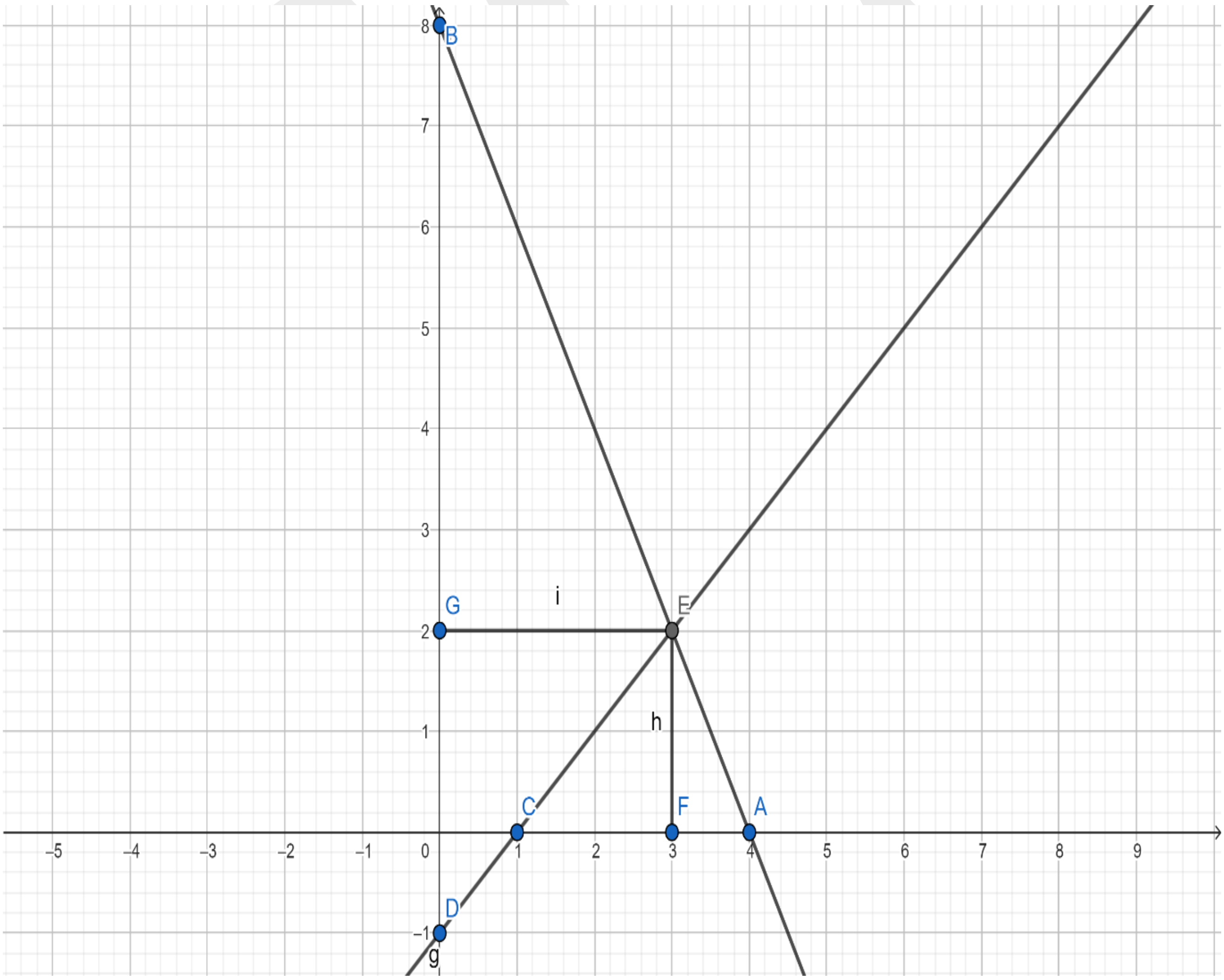
Thus the sum of all 10 terms from last is 2305

35. Given equations are 2x+y=8 and x-y=1

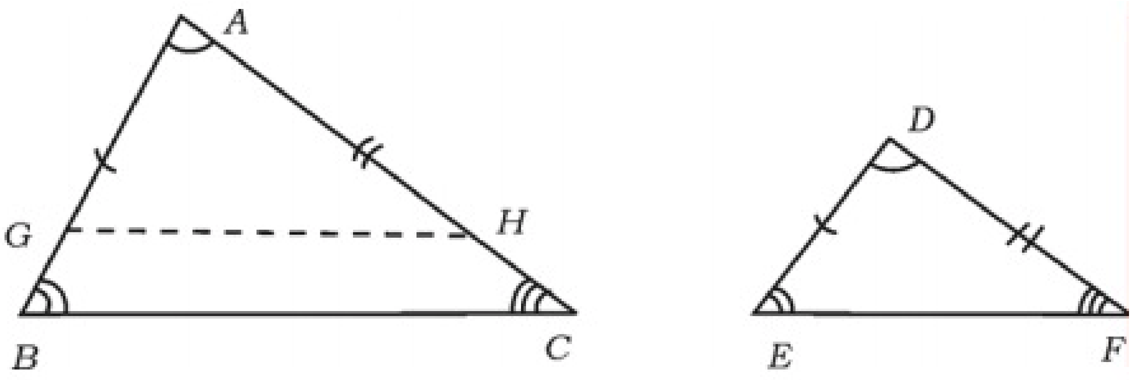
x	0	4
y	8	0

x-y=1

x	0	1
y	-1	0



36.''If two triangles are equiangular, then their corresponding sides are proportional''.



Given: ∠BAC=∠EDF

∠ABC=∠DEF

To prove: $\frac{AB}{DE}=\frac{BC}{EF}=\frac{CA}{FD}$

Construction: Mark points G and H on the side AB and AC such that

AG=DE , AH=DF

proof: in triangle AGH and DEF

AG=DE.....by construction

AH=DF ..... by contsruction

∠GAH=∠EDF...Given

therefore ,

$\triangle AGH \cong \triangle FED$ by SAS congruency thus

∠AGH=∠DEF ....by CPCT

but

∠ABC=∠DEF

∠AGH=∠ABC

thus

GH∥BC

Now , In triangle ABC

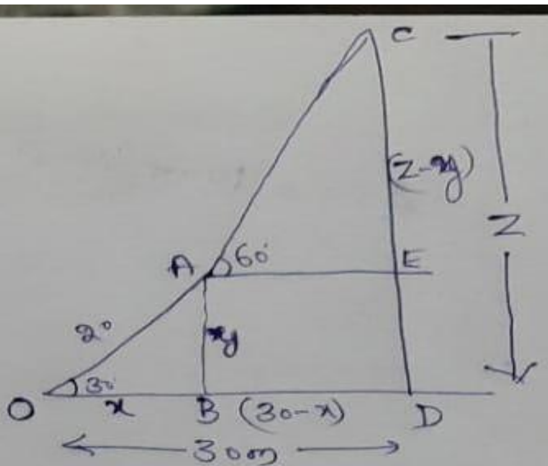
$\frac{AB}{AG}=\frac{BC}{GH}=\frac{CA}{HA}$

Hence ,

$\frac{AB}{DE}=\frac{BC}{EF}=\frac{CA}{FD}$

hence proved .

37. In ΔOAB, take OB=x m



Let 'x' be the distance b/w OB, then BD = 30−x = AE
'y' be the distance b/w AB, then ED = y.

In Δ^{le} OAB

$\tan 30° = \frac{AB}{OB}$

$\frac{1}{\sqrt{3}} = \frac{y}{x}$

$x = \sqrt{3}y \longrightarrow (1)$

In Δ^{le} CAE

$\tan 60° = \frac{CE}{AE}$

$\sqrt{3} = \frac{Z-y}{30-x}$

$30 - x = \frac{Z-y}{\sqrt{3}}$

$x = 30 - \frac{Z-y}{\sqrt{3}} \longrightarrow (2)$

From (1) & (2)

$\sqrt{3}y = 30 - \frac{Z-y}{\sqrt{3}}$

$\sqrt{3}y + \frac{Z-y}{\sqrt{3}} = 30$

$\frac{3y + Z - y}{\sqrt{3}} = 30$

$2y + Z = 30\sqrt{3}$

In Δ^{le} OAB.

$OA^2 = x^2 + y^2$

$20^2 = x^2 + y^2$

$400 = x^2 + y^2 \longrightarrow (3)$

From (1) & (3)

$400 = 4y^2$

$\frac{400}{4} = y^2$

$\therefore y^2 = 100$

$\boxed{y = 10\text{ m}}$

Date : ....

Then eqⁿ (1) becomes

$$x = \sqrt{3}\, y.$$

$$\boxed{x = 10\sqrt{3}\ m}$$

Then equation (3) becomes

$$x = 30 - \frac{z - y}{\sqrt{3}}$$

$$10\sqrt{3} = 30 - \frac{z - 10}{\sqrt{3}}$$

$$10\sqrt{3} + \frac{z-10}{\sqrt{3}} = 30.$$

$$\frac{10 \times 3 + z - 10}{\sqrt{3}} = 30.$$

$$\frac{20 + z}{\sqrt{3}} = 30$$

$$20 + z = 30\sqrt{3}.$$

$$z = 30\sqrt{3} - 20.$$ use $\sqrt{3} = 1.73$

$$z = 30(1.73) - 20$$

$$= 51.9 - 20$$

$$\boxed{z = 31.9}$$

Date : ....

38. Given :

Cone: area A=38.5 sq cm. we know area of circle $A=\prod r^2$

$$38.5=\frac{22}{7}r^2$$

$$r^2=12.25$$

$$r=3.5cm$$

Then radius of the base of the cone as well as hemisphere is 3.5cm.

Height of the cone is 15.5-3.5= 12cm, slant height of cone

$l=\sqrt{122+3.52}$

$=\sqrt{144+12.25}$

$=\sqrt{156.25}$

l=12.5cm

TSA of toy=CSA of cone+CSA of hemisphere

$=\prod rl+2\prod r^2$

$=\prod r(l+2r)$

$=\frac{22}{7}x3.5(12.5+7)$

$=11(19.5)$

$=214.5$ sq cm.

Volume of Toy=volume of cone+volume of hemisphere

$=\frac{1}{3}\prod r^2h+\frac{2}{3}\prod r^3$

$=\frac{1}{3}\prod r^2(h+2r)$

$=\frac{1}{3}x\frac{22}{7}x\ 3.5x3.5(12.5+7)$

$=\frac{11x3.5}{3}(19.5)$

$=250.25$ cubic cm.