CKS CODE:1316

CLASS X MODEL EXAMINATION 2023-2024

MATHEMATICS(STANDARD)

Marking Scheme

1	(d) 12/13	1
2	(d) -3/7	1
3	(c) 12cm	1
4	Mode=3 Median-2Mean	1
5	(c) 60,2	1
6	(c) 4.18	1
7	(c) 47	1
8	(c) ± 4	1
9	(b) 15/4	1
10	(c) $2\pi rh+4\pi r^2$	1
11	(c) $1-\sqrt{3}$	1
12	(b) 13 and 14	1
13	(c) $75\sqrt{3}$	1
14	(d) 16^{th}	1

15	(a) xy^2	1
16	(b) 38.33	1
17	(c) 1/3	1
18	(d) 12cm	1
19	(b) Both assertion(A) and reason(R) are true and reason(R) is not the correct explanation of assertion(A).	1
20	(a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A). (1)	1

SECTION B

21.	$6x^2+11x+3=0$ $\Rightarrow 6x^2+9x+2x+3=0$ $\Rightarrow 3x(2x+3)+1(2x+3)=0$ $\Rightarrow (3x+1)(2x+3)=0$ $\therefore 3x+1=0 \ or \ 2x+3=0$ $\Rightarrow x=\frac{-1}{3} \quad or \quad x=\frac{-3}{2}$	2
22	$T_4=11$ $T_5+T_7=34$ a+3d=11, a+4d+a+6d=34 2a+10d=34 a+5d=17	2

$\Rightarrow (a+5d)-(a+3d)=17-11$

$\Rightarrow 2d=6$

$\Rightarrow d=3$

23 (Marks: 2)

Let the point P (4,m) divide the line segment joining A (2,3) and B (6,-3) in the ratio k:1.

Applying the section formula

{(mx2+nx1)/(m+n), (my2+ny1)/(m+n)},

we have (4,m) = {(6k+2)/(k+1), (-3k+3)/(k+1)}

So 4 = (6k+2)/(k+1). Solving we get k= 1.

So the ratio is 1:1. i.e., P is the mid point of AB.

Also m = (-3k+3)/(k+1) = (-3+3)/1+1 = 0. So m= 0.

24 (Marks: 2)

Answer:

Median = 721.875

Step-by-step explanation:

We are given the following frequency distribution;

Classes	Frequency (f)	Cumulative frequency (cf)
500 - 600	36	36
600 - 700	32	68
700 - 800	32	100
800 - 900	20	120
900 - 1000	30	150
	∑f = 150	

Firstly, we will calculate $\frac{N}{2}$, (where N = ∑f), $\frac{N}{2}$ = $\frac{150}{2}$ = 75.

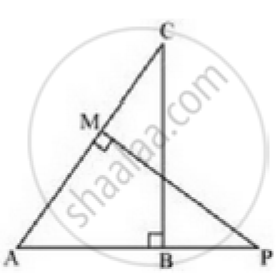
So, the value of cumulative frequency just greater than or equal to 75 is 100.

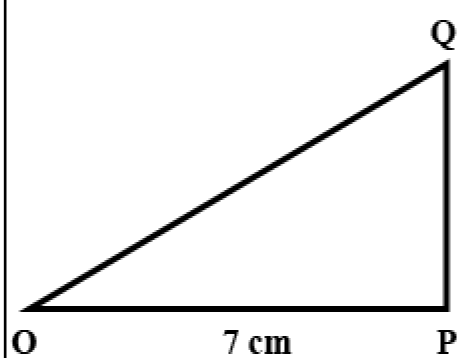
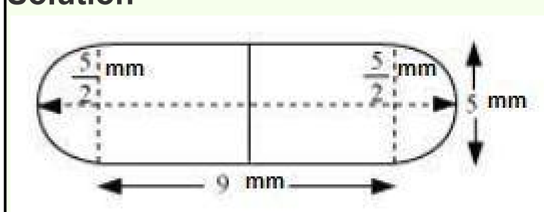
Therefore, median class is 700 - 800 .

Now, Median formula = $x_L + \frac{\frac{N}{2} - cf}{f_m} * c$

where, x_L = lower limit of median class = 700

	N = $\sum f$ = 150 f_m = frequency of median class = 32 cf = cumulative frequency just above the median class = 68 c = width of class interval = 100 So, Median = $700+\frac{\frac{150}{2}-68}{32}*100$ = $700+\frac{7}{32}*100$ = 700 + 21.875 = 721.875 **Therefore, Median of given distribution is 721.875** .	
25	$\sqrt{1-Sin\theta/1+sin\theta}$ =$\sqrt{(1-sin\theta)(1-sin\theta)/(1+sin\theta)(1-sin\theta)}$ =1-sinθ$/cos\theta$ =1/cosθ $-$ $sin\theta/cos\theta$ =secθ $-$ $tan\theta$	2
	SECTION -C	
26	Let 3+$\sqrt{7}$/2 be a rational number. 3+$\sqrt{7}$/2=p/q ,q≠0 3q+$\sqrt{7\ q}$=2p $\sqrt{7\ q}$=2p-3q $\sqrt{7}$ =2p-3q/q RHS is a rational no.where as LHS is an irrational number.which is wrong therefor 3+$\sqrt{7}$/2 is an irrational number.	3
27	Given System of Equations are: 2x+y=23 ...(1) 4x−y=19 ...(2) Now adding both the equation will have: 6x=42 x=7 Now substituting x=7 in in equation (1) ⇒2(7)+y=23	

	⇒14+y=23 ⇒y=9 Now substituting x=7 and y=9 in 5y−2x ⇒5(9)−2(7) ⇒45−14 ⇒31 Now Substituting Now substituting x=7 and y=9 in yx−2 ⇒97−2 ⇒9−147 ⇒−57	
28	Let the speed of train be x km/h. Distance = 180 km So, time = 180x When speed is 9 km/h more, time taken = 180x+9 According to the given information, 180x−180x+9=1 ⇒180(x+9)−180x=x(x+9)⇒x^2+9x−1620=0⇒x^2+45x−36x−1620=0 ⇒x(x+45)−36(x+45)=0⇒x=−45,36 Discarding the negative value, speed of the train = 36 kmph.	3
29	In △ABC and △AMP, ∠ABC=∠AMP=90° ∠A is common ∴ By AA criterion of similarity, △ABC ~ △AMP ∴ CA/PA=BC/MP (Corresponding Sides of Similar Triangles) Hence Proved 	3
30	In Δ OPQ, we have	3

	$OQ^2=OP^2+PQ^2$ $\Rightarrow (PQ+1)^2=OP^2+PQ^2$ [$\because OQ-PQ=1 \Rightarrow OQ=1+PQ$] $\Rightarrow PQ^2+2PQ+1=OP^2+PQ^2$ $\Rightarrow 2PQ+1=49$ $\Rightarrow PQ=24cm$ $\therefore OQ-PQ=1cm$ $\Rightarrow OQ=(PQ+1)cm=25cm$ Now, $\sin Q=OP/OQ=7/25$ and, $\cos Q=PQ/OQ=24/25$ 	
31	**Solution**  **It can be observed that** **Radius** (r) **of cylindrical part** = **Radius**(r) **of hemispherical part =** $\frac{5}{2}$ mm **Length of cylindrical part** (h)=**Length of the entire capsule**−(2×r) =14−5=9 cm **Surface area of capsule** =2× **CSA of hemispherical part** + **CSA of cylindrical part** $=2\times2\pi r^2+2\pi rh=4\pi(\frac{5}{2})^2+2\pi(\frac{5}{2})\times9=25\pi+45\pi=70\pi=70\times\frac{22}{7}=220$ mm^2	3
	SECTION-D	
32	Given : $\bar{x}=62.8$, $\Sigma f_i=50$	5

Class	x_i	Frequency (f_i)	$f_i x_i$
0-20	10	5	50
20-40	30	f_1	$30f_1$
40-60	50	10	500
60-80	70	f_2	$70f_2$
80-100	90	7	630
100-120	110	8	880
		$\Sigma f_i=30+f_1+f_2$	$\Sigma f_i x_i=2060+30f_1+70f_2$

$\Sigma f_i=30+f_1+f_2$

$50=30+f_1+f_2$

$f_1+f_2=20 \longrightarrow eq_n(1)$

$\overline{x}=\Sigma f_i x_i \Sigma f_i$

$\Rightarrow 62.8=2060+30f_1+70f_2 30+f_1+f_2$

$\Rightarrow 1884+62.8f_1+62.8f_2=2060+30f_1+70f_2$

$\Rightarrow 62.8f_1-30f_1+62.8f_2-70f_2=2060-1884$

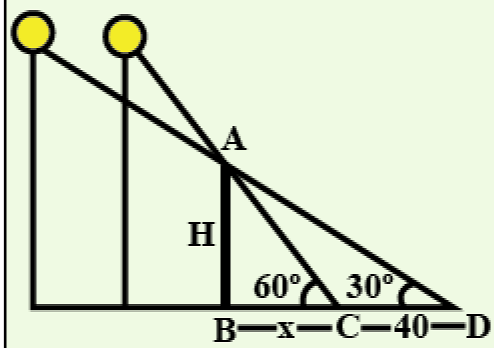
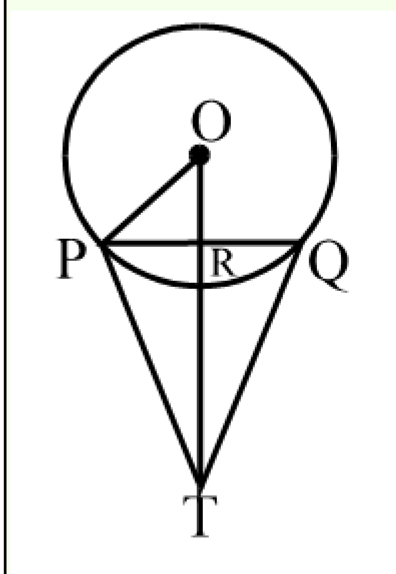
$\Rightarrow 32.8f_1-7.2f_2=176 \longrightarrow eq_n(2)$

On solving $eq_n(1)$&(2) we get,

$f_1=8$ and $f_2=12$.

33	(a) $2x2+3x-14$ $2x2+7x-4x-14$ $x(2x+7)-2(2x-7)$ $2x+7=0 \quad x-2=0$	5

	x=-7/2 x=2 $\alpha = -7/2 \quad \beta = 2$ $\alpha + \beta = -3/2$ $\alpha\beta = -7$ $\alpha + \beta = -b/a = -3/2$ $\alpha\beta = c/a = -7$ hence verified. (b) f(x)=px2-2x+3p $\alpha + \beta = 2/p$ $\alpha\beta = 3p/p = 3$ 2/p=3 2=3p p=2/3	
34	According to Question, Shadow of tower at 30o elevation is 40 m more than Shadow of tower at 60o Let us assume that the Length of Shadow due to 60o elevation be x Now, it is Given That CD=40 So, in △ABD tan45o=Hx+40⇒H=x+40................(1) and in △ABC tan60o=Hx⇒√3=Hx⇒H=x√3.............(2) from (1) and (2) x+40=x√3 ⇒√3x−x=40 ⇒x=40√3−1=54.8 m (Take√3=1.73) and H=40+54.8=94.8 m	5

	 	
35	**Solution**  **Join OP and OT** **Let OT intersect PQ at a point R.** **Then,** TP=TQ and ∠PTR=∠QTR**.** ∴TR⊥PQ **and TR bisects PQ.** ∴PR=RQ=4 cm**.** **Also** $OR=\sqrt{OP^2-PR^2}=\sqrt{5^2-4^2}$ **cm** $=\sqrt{25-16}$ cm $=\sqrt{9}$ cm $=3$cm**.** **Let** TP=x cm	5

	and TR=y cm **From right** ΔTRP**, we get** $TP^2=TR^2+PR^2$ $\Rightarrow x^2=y^2+16$ $\Rightarrow x^2-y^2=16$……(i) **From right** ΔOPT**, we get** $TP^2+OP^2=OT^2$ $\Rightarrow x^2+5^2=(y+3)^2$ $[OT^2=(OR+RT)^2]$ $\Rightarrow x^2-y^2=6y-16$……(ii) **From (i) and (ii) , we get** $6y-16=16\Rightarrow 6y=32\Rightarrow y=16/3$ **Putting** $y=16/3$ **in (i) we get** $x^2=16+(16/3)^2=16/9(16+9)=16\times 25 \div 9$ $\Rightarrow x=20/3$ **Hence , length** TP=x cm=6.67 cm	
	SECTION E	
36	House is situated at H(2,4) Bank is situated at B(5,8) School is situated at S(13,14) Office is situated at O(13,26) By distance formula $HO=\sqrt{(13-2)^2+(26-4)^2}$	4

	$HO=\sqrt{121+484}=\sqrt{605}$ $HO=24.59km$ $HB=\sqrt{(5-2)^2+(8-4)^2}$ $HB=\sqrt{9+16}=\sqrt{25}$ $HB=5km$ $BS=\sqrt{(13-5)^2+(14-8)^2}$ $BS=\sqrt{64+36}=\sqrt{100}$ $BS=10km$ $SO=\sqrt{(13-13)^2+(26-14)^2}$ $SO=\sqrt{144}$ $SO=12km$ Total distance travelled by Ayush is =HB+BS+SO Total=5+10+12=27km	
37	value of $PA=(6+X)^2 = 64 + 36$ $X^2+12X-64=0$ $X=4$ $PA=6+4=10$ VALUE OF $BQ=Y^2+8Y-9=0$ $Y=1$ $BQ=4+1=5$ Value of $PK=10+6=16$	4
38	Area of the grass field=225 m^2 The area of that part of the field in which the horse can graze=19.625 The grazing area if the rope were 10m long instead of 5m=78.5m^2	4