SAMPLE QUESTION PAPER
MARKING SCHEME
SUBJECT: MATHEMATICS- STANDARD
CLASS X

SECTION - A

1	(c) 35	1
2	(b) $x^2-(p+1)x +p=0$	1
3	(b) 2/3	1
4	(d) 2	1
5	(c) (2,-1)	1
6	(d) 2:3	1
7	(b) tan 30°	1
8	(b) 2	1
9	(c) $x= \frac{ay}{a+b}$	1
10	(c) 8cm	1
11	(d) $3\sqrt{3}$cm	1
12	(d) 9π cm^2	1
13	(c) 96 cm^2	1
14	(b) 12	1
15	(d) 7000	1
16	(b) 25	1
17	(c) 11/36	1
18	(a) 1/3	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

SECTION – B

21   Adding the two equations and dividing by 10, we get : x+y = 10   ½

Subtracting the two equations and dividing by -2, we get : x-y =1   ½

Solving these two new equations, we get, **x = 11/2**   ½

y = 9/2   ½

22   In ΔABC,
∠1 = ∠2
∴ AB = BD ………………………(**i**)   ½
Given,
AD/AE = AC/BD
Using equation (**i**), we get   ½
AD/AE = AC/AB ………………..(**ii**)
In ΔBAE and ΔCAD, by equation (ii),
AC/AB = AD/AE   ½
∠A= ∠A (common)
∴ ΔBAE ~ ΔCAD [By SAS similarity criterion]   ½

23   ∠PAO = ∠ PBO = 90° (angle b/w radius and tangent)   ½

∠AOB = 105° (By angle sum property of a triangle)   ½

∠AQB = ½ x105° = 52.5° (Angle at the remaining part of the circle is half the   1

angle subtended by the arc at the centre)

24
We know that, in 60 minutes, the tip of minute hand moves 360°

In 1 minute, it will move =360°/60 = 6°   ½

∴ From 7 : 05 pm to 7: 40 pm i.e. 35 min, it will move through = $35 \times 6° = 210°$ ½

∴ Area of swept by the minute hand in 35 min = Area of sector with sectorial angle θ

of $210°$ and radius of 6 cm

$= \frac{210}{360}$x π x 6^2 ½

$= \frac{7}{12}$x$\frac{22}{7}$ x 6 x 6

=66cm^2 ½

OR

Let the measure of ∠A, ∠B, ∠C and ∠D be θ₁, θ₂, θ₃ and θ₄ respectively
Required area = Area of sector with centre A + Area of sector with centre B   ½
        + Area of sector with centre C + Area of sector with centre D

$$= \frac{\theta_1}{360} \times \pi \times 7^2 + \frac{\theta_2}{360} \times \pi \times 7^2 + \frac{\theta_3}{360} \times \pi \times 7^2 + \frac{\theta_4}{360} \times \pi \times 7^2$$ ½

$$= \frac{(\theta_1 + \theta_2 + \theta_3 + \theta_4)}{360} \times \pi \times 7^2$$

$$= \frac{(360)}{360} \times \frac{22}{7} \times 7 \times 7 \text{ (By angle sum property of a triangle)}$$ ½

$$= 154 \text{ cm}^2$$ ½

25   sin(A+B) =1 = sin 90, so A+B = 90……………….(i)   ½

cos(A-B)= √3/2 = cos 30, so A-B= 30……………(ii)   ½

From (i) & (ii) ∠A = 60°   ½

And ∠B = 30°   ½

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OR

</div>

$$\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$$

Dividing the numerator and denominator of LHS by cosθ, we get   ½

$$\frac{1 - \tan\theta}{1 + \tan\theta} = \frac{1-\sqrt{3}}{1+\sqrt{3}}$$ ½

Which on simplification (or comparison) gives tanθ = √3   ½

Or θ= 60°   ½

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SECTION - C

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26   Let us assume 5 + 2√3 is rational, then it must be in the form of p/q where p and q are co-prime integers and q ≠ 0   1

i.e 5 + 2√3 = p/q   ½

So √3 = $\frac{p-5q}{2q}$…………………….(i)   ½

Since p, q, 5 and 2 are integers and q ≠ 0, HS of equation (i) is rational. But LHS of (i) is √3 which is irrational. This is not possible.   ½

This contradiction has arisen due to our wrong assumption that 5 + 2√3 is rational. So, 5 + 2√3 is irrational.   ½

27   Let α and β be the zeros of the polynomial $2x^2$ -5x -3

Then α + β = 5/2   ½

And αβ = -3/2.   ½

Let 2α and 2β be the zeros x^2 + px +q

Then 2α + 2β = -p   ½

2(α + β) = -p

2 x 5/2 =-p

So p = -5   ½

And 2α x 2β = q   ½

4 αβ = q

So q = 4 x-3/2

= -6   ½

28 Let the actual speed of the train be x km/hr and let the actual time taken be y hours.   ½

Distance covered is xy km

If the speed is increased by 6 km/hr, then time of journey is reduced by 4 hours i.e.,

when speed is (x+6)km/hr, time of journey is (y−4) hours.

∴ Distance covered =(x+6)(y−4)

⇒xy=(x+6)(y−4)

⇒−4x+6y−24=0   ½

⇒−2x+3y−12=0 …………………………….(i)

Similarly xy=(x−6)(y+6)

⇒6x−6y−36=0

⇒x−y−6=0 …………………………………………(ii)   ½

Solving (i) and (ii) we get x=30 and y=24   1

Putting the values of x and y in equation (i), we obtain

Distance =(30×24)km =720km.   ½

Hence, the length of the journey is 720km.

OR

Let the number of chocolates in lot A be x   ½

And let the number of chocolates in lot B be y

∴ total number of chocolates =x+y

Price of 1 chocolate = ₹ 2/3 , so for x chocolates $=\frac{2}{3}$x

and price of y chocolates at the rate of ₹ 1 per chocolate =y.

∴ by the given condition $\frac{2}{3}$x +y=400

⇒2x+3y=1200 ....(i)   ½

Similarly x+$\frac{4}{5}$y = 460

⇒5x+4y=2300   .... (ii)   ½

Solving (i) and (ii) we get

x=300 and y=200

∴x+y=300+200=500   1

So, Anuj had 500 chocolates.   ½

29 LHS : $\dfrac{\sin^3\theta/\cos^3\theta}{1+\sin^2\theta/\cos^2\theta}$ + $\dfrac{\cos^3\theta/\sin^3\theta}{1+\cos^2\theta/\sin^2\theta}$ ½

$$= \frac{\sin^3\theta/\cos^3\theta}{(\cos^2\theta + \sin^2\theta)/\cos^2\theta} + \frac{\cos^3\theta/\sin^3\theta}{(\sin^2\theta + \cos^2\theta)/\sin^2\theta}$$

$$= \frac{\sin^3\theta}{\cos\theta} + \frac{\cos^3\theta}{\sin\theta}$$ ½

$$= \frac{\sin^4\theta + \cos^4\theta}{\cos\theta\sin\theta}$$ ½

$$= \frac{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta}$$ ½

$$= \frac{1 - 2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta}$$ ½

$$= \frac{1}{\cos\theta\sin\theta} - \frac{2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta}$$

$$= \sec\theta\csc\theta - 2\sin\theta\cos\theta$$ ½
$$= RHS$$

30

Let ABCD be the rhombus circumscribing the circle with centre O, such that AB, BC, CD and DA touch the circle at points P, Q, R and S respectively.
We know that the tangents drawn to a circle from an exterior point are equal in length.

∴ AP = AS………….(1)
 BP = BQ……………(2)
CR = CQ …………...(3)   1
DR = DS……………(4).
Adding (1), (2), (3) and (4) we get
AP+BP+CR+DR = AS+BQ+CQ+DS
(AP+BP) + (CR+DR) = (AS+DS) + (BQ+CQ)
∴ AB+CD=AD+BC-----------(5)   1
Since AB=DC and AD=BC (opposite sides of parallelogram ABCD)   ½
putting in (5) we get, 2AB=2AD
or AB = AD.
∴ AB=BC=DC=AD
 Since a parallelogram with equal adjacent sides is a rhombus, so ABCD is a rhombus   ½

OR
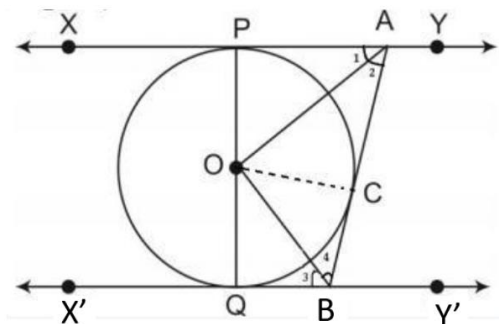
Join OC

In Δ OPA and Δ OCA

OP = OC (radii of same circle)

PA = CA (length of two tangents from an external point)

AO = AO (Common)

1

Therefore, Δ OPA ≅ Δ OCA (By SSS congruency criterion)

½

Hence, ∠ 1 = ∠ 2 (CPCT)

½

Similarly ∠ 3 = ∠ 4

∠PAB + ∠QBA =180°(co interior angles are supplementary as XY∥X'Y')

½

2∠2 + 2∠4 = 180°

∠2 + ∠4 = 90°------------------------(1)

½

∠2 + ∠4 +∠AOB = 180° (Angle sum property)

Using (1), we get, ∠AOB = 90°

31   (i)   P (At least one head) = $\frac{3}{4}$ 1

   (ii)   P(At most one tail) = $\frac{3}{4}$ 1

   (iii)   P(A head and a tail) = $\frac{2}{4} = \frac{1}{2}$ 1

SECTION D

32   Let the time taken by larger pipe alone to fill the tank= x hours   ½
Therefore, the time taken by the smaller pipe = x+10 hours

Water filled by larger pipe running for 4 hours = $\frac{4}{x}$ litres

Water filled by smaller pipe running for 9 hours = $\frac{9}{x+10}$ litres

We know that

$$\frac{4}{x} + \frac{9}{x+10} = \frac{1}{2}$$ 1

Which on simplification gives: 1

$x^2 - 16x - 80 = 0$

$x^2 - 20x + 4x - 80 = 0$

$x(x-20) + 4(x-20) = 0$

$(x +4)(x-20) = 0$

$x = -4, 20$ 1

x cannot be negative.

Thus, x=20 ½

x+10= 30 ½

Larger pipe would alone fill the tank in 20 hours and smaller pipe would fill the tank alone in 30 hours. ½

OR

Let the usual speed of plane be x km/hr ½

and the reduced speed of the plane be (x-200) km/hr

Distance =600 km [Given]

According to the question,

(time taken at reduced speed) - (Schedule time) = 30 minutes = 0.5 hours.

1

$$\frac{600}{x-200} - \frac{600}{x} = \frac{1}{2}$$

Which on simplification gives: 1

$x^2 - 200x - 240000 = 0$

$x^2 - 600x + 400x - 240000 = 0$

$x(x- 600) + 400(x-600) = 0$

$(x-600)(x+400) = 0$ 1
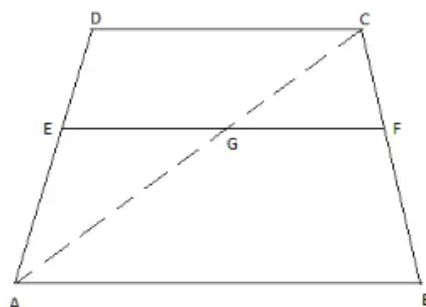
x=600 or x=−400 ½

But speed cannot be negative. ½

∴ The usual speed is 600 km/hr and ½

the scheduled duration of the flight is $\frac{600}{600}$ =1hour

33 For the Theorem :

Given, To prove, Construction and figure 1½

Proof

1½

½

Let ABCD be a trapezium DC||AB and EF is a line parallel to AB and hence to DC.

To prove : $\dfrac{DE}{EA} = \dfrac{CF}{FB}$

Construction : Join AC, meeting EF in G.

Proof :

In △ABC, we have

GF||AB

CG/GA=CF/FB   [By BPT]   ......(1)   ½

In △ADC, we have

EG||DC (EF ||AB & AB ||DC)

DE/EA= CG/GA [By BPT]   .....(2)   ½

From (1) & (2), we get,
$\dfrac{DE}{EA} = \dfrac{CF}{FB}$ ½

34. Radius of the base of cylinder (r) = 2.8 m = Radius of the base of the cone (r)

Height of the cylinder (h)=3.5 m

Height of the cone (H)=2.1 m.

Slant height of conical part (l)=$\sqrt{r^2+H^2}$

$= \sqrt{(2.8)^2+(2.1)^2}$

$= \sqrt{7.84+4.41}$ 1

$= \sqrt{12.25} = 3.5$ m   1

Area of canvas used to make tent = CSA of cylinder + CSA of cone   1

$= 2\times\pi\times2.8\times3.5 + \pi\times2.8\times3.5$

$= 61.6+30.8$

$= 92.4 m^2$ 1

1

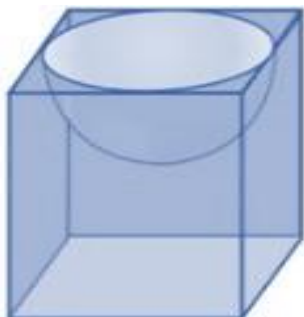Cost of 1500 tents at ₹120 per sq.m

$= 1500\times120\times92.4$

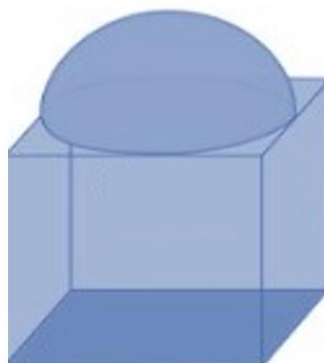$= 16,632,000$

Share of each school to set up the tents = 16632000/50 = ₹332,640

OR

First Solid   Second Solid

(i)   SA for first new solid (S_1):

$6 \times 7 \times 7 + 2\pi \times 3.5^2 - \pi \times 3.5^2$ 1

$= 294 + 77 - 38.5$

$= 332.5 cm^2$

SA for second new solid (S_2):

$6 \times 7 \times 7 + 2\pi \times 3.5^2 - \pi \times 3.5^2$ 1

$= 294 + 77 - 38.5$ 1

$= 332.5 cm^2$

So $S_1 : S_2 = 1:1$

(ii)   Volume for first new solid (V_1) $= 7 \times 7 \times 7 - \frac{2}{3}\pi \times 3.5^3$

$= 343 - \frac{539}{6} = \frac{1519}{6} cm^3$ 1

Volume for second new solid (V_2) $= 7 \times 7 \times 7 + \frac{2}{3}\pi \times 3.5^3$

$= 343 + \frac{539}{6} = \frac{2597}{6} cm^3$ 1

35   Median = 525, so Median Class = 500 – 600   ½

Class interval	Frequency	Cumulative Frequency
0−100	2	2
100−200	5	7
200−300	x	7+x
300−400	12	19+x
400−500	17	36+x
500−600	20	56+x
600−700	y	56+x+y
700−800	9	65+x +y
800−900	7	72+x+y
900−1000	4	76+x+y

1½

$76+x+y=100 \Rightarrow x+y=24$ ….(i)   1

Median $= l + \dfrac{\frac{n}{2}-cf}{f} \times h$ ½

Since, l=500, h=100, f=20, cf=36+x and n=100

Therefore, putting the value in the Median formula, we get;

$525 = 500 + \dfrac{50-(36+x)}{20} \times 100$ ½

so x = 9

y = 24 – x (from eq.i)

y = 24 – 9 = 15

Therefore, the value of x = 9   ½

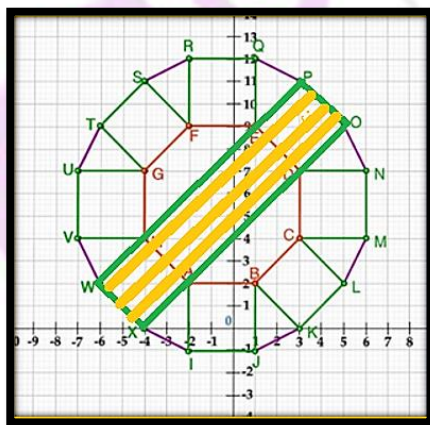and y = 15.   ½

36   (i)   B(1,2), F(-2,9)
$BF^2 = (-2-1)^2 + (9-2)^2$
$= (-3)^2 + (7)^2$
$= 9 + 49$
$= 58$
So, BF = √58 units   1

(ii)

W(-6,2), X(-4,0), O(5,9), P(3,11)   ½
Clearly WXOP is a rectangle
Point of intersection of diagonals of a rectangle is the mid point of
the diagonals. So the required point is mid point of WO or XP
$= (\dfrac{-6+5}{2}, \dfrac{2+9}{2})$
$= (\dfrac{-1}{2}, \dfrac{11}{2})$ ½

(iii)   A(-2,2), G(-4,7)
Let the point on y-axis be Z(0,y)   ½
$AZ^2 = GZ^2$ ½

$(0+2)^2 + (y-2)^2 = (0+4)^2 + (y-7)^2$

$(2)^2 + y^2 + 4 -4y = (4)^2 + y^2 + 49 -14y$

$8-4y = 65-14y$

$10y = 57$

So, y= 5.7   ½

i.e. the required point is (0, 5.7)   ½

OR
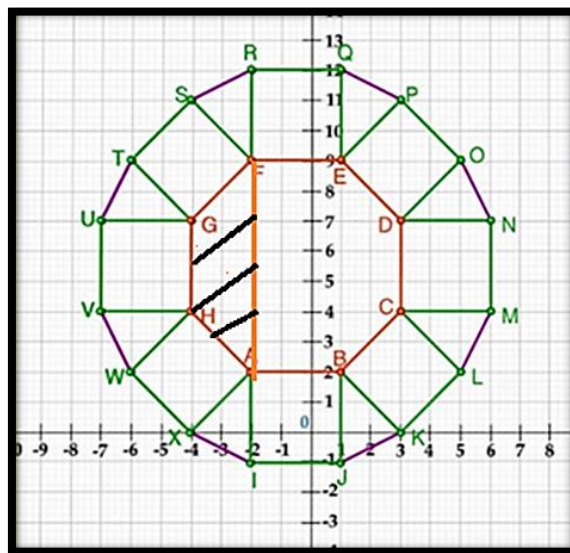
A(-2,2), F(-2,9), G(-4,7), H(-4,4)

Clearly GH = 7-4=3units   ½

AF = 9-2=7 units   ½

So, height of the trapezium AFGH = 2 units

So, area of AFGH = $\frac{1}{2}$(AF + GH) x height

$= \frac{1}{2}$(7+3) x 2   ½

= 10 sq. units   ½

37.   (i) Since each row is increasing by 10 seats, so it is an AP with first term a= 30, and common difference d=10.   ½

So number of seats in 10th row = a_{10} = a+ 9d

= 30 + 9×10 = 120   ½

(ii) $S_n = \frac{n}{2}(2a + (n-1)d)$ ½

$1500 = \frac{n}{2}(2 \times 30 + (n-1)10)$

$3000 = 50n + 10n^2$

$n^2 +5n -300 =0$ ½

$n^2 + 20n -15n – 300 =0$

$(n+20) (n-15) =0$ ½

Rejecting the negative value, n= 15   ½

OR

No. of seats already put up to the 10th row = S_{10} ½

$S_{10} = \frac{10}{2} \{2 \times 30 + (10\text{-}1)10)\}$ ½

$= 5(60 + 90) = 750$ ½

So, the number of seats still required to be put are $1500 - 750 = 750$ ½

(iii) If no. of rows $= 17$

then the middle row is the 9th row ½

$a_8 = a + 8d$
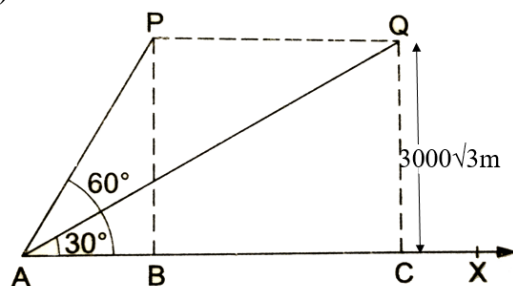
$= 30 + 80$

$= 110$ seats ½

38 (i)

1

P and Q are the two positions of the plane flying at a height of $3000\sqrt{3}$m. A is the point of observation.

(ii) In △ PAB, $\tan 60° = PB/AB$

Or $\sqrt{3} = 3000\sqrt{3}/ AB$

So $AB = 3000$m 1

$\tan 30° = QC/AC$

$1/\sqrt{3} = 3000\sqrt{3} / AC$

$AC = 9000$m ½

distance covered $= 9000 - 3000$

$= 6000$ m. ½

OR

½
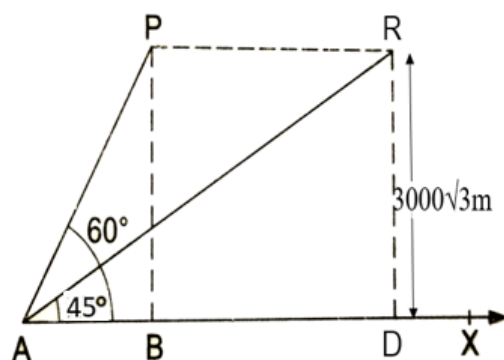
In △ PAB, $\tan 60° = PB/AB$

Or $\sqrt{3} = 3000\sqrt{3}/ AB$

So $AB = 3000$m ½

$\tan 45° = RD/AD$

$1 = 3000\sqrt{3} / AD$ ½

AD = 3000√3 m
distance covered = 3000√3 - 3000   ½
= 3000(√3 -1)m.

(iii) speed = 6000/ 30   ½
        = 200 m/s
      = 200 x 3600/1000   ½
      = 720km/hr

Alternatively: speed = $\frac{3000(\sqrt{3}-1)}{15(\sqrt{3}-1)}$ ½
        = 200 m/s
      = 200 x 3600/1000   ½
      = 720km/hr