**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) $9\pi$ $cm^2$ | 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 angle subtended by the arc at the centre) 1

**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 × 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

$= \frac{210}{360} \times \pi \times 6^2$ ½

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

$= 66 cm^2$ ½

**OR**

Let the measure of ∠A, ∠B, ∠C and ∠D be $\theta_1$, $\theta_2$, $\theta_3$ and $\theta_4$ respectively

Required area = Area of sector with centre A + Area of sector with centre B + Area of sector with centre C + Area of sector with centre D ½

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

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

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

$= 154\ cm^2$ 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

**OR**

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

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

## SECTION - C

**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 $\sqrt{3} = \frac{p-5q}{2q}$……………………(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. | |
| | $\therefore$ Distance covered =(x+6)(y−4) | |
| | $\Rightarrow xy=(x+6)(y-4)$ | |
| | $\Rightarrow -4x+6y-24=0$ | ½ |
| | $\Rightarrow -2x+3y-12=0$ …………………………….(i) | |
| | Similarly $xy=(x-6)(y+6)$ | |
| | $\Rightarrow 6x-6y-36=0$ | |
| | $\Rightarrow x-y-6=0$ ………………………………………(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 | |
| | $\therefore$ 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. | |
| | $\therefore$ by the given condition $\frac{2}{3}x+y=400$ | ½ |
| | $\Rightarrow 2x+3y=1200$ ..............(i) | |
| | Similarly $x+\frac{4}{5}y = 460$ | ½ |
| | $\Rightarrow 5x+4y=2300$ ........ (ii) | |
| | Solving (i) and (ii) we get | |
| | x=300 and y=200 | |
| | $\therefore x+y=300+200=500$ | 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

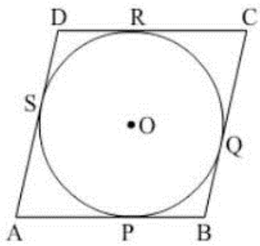
$$= \frac{1 - 2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta}$$ ½

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

$= \sec\theta\mathrm{cosec}\theta - 2\sin\theta\cos\theta$ ½

= RHS

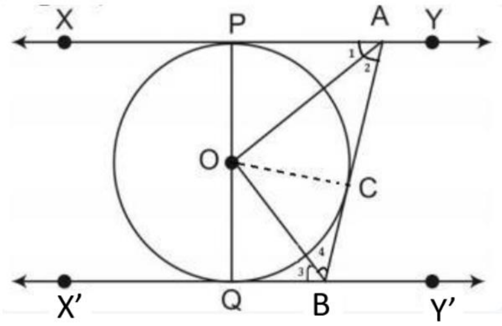
**30**




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) 1

AO = AO (Common)

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:

$x^2 - 16x - 80 = 0$ 1

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

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

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

$x = -4, 20$ 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.

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

Which on simplification gives:

$x^2 - 200x - 240000 = 0$ 1

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

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

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

$x = 600$ or $x = -400$ 1

But speed cannot be negative. ½

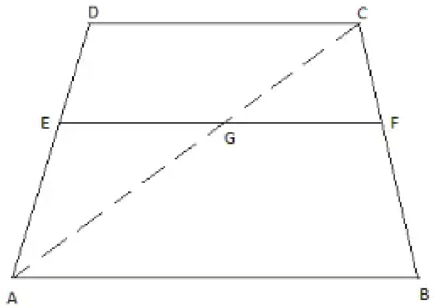
∴ The usual speed is 600 km/hr and ½

the scheduled duration of the flight is $\frac{600}{600}$ =1hour ½

**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 : $\frac{DE}{EA} = \frac{CF}{FB}$

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) ½

DE/EA= CG/GA [By BPT] .....(2)

From (1) & (2), we get,

$\frac{DE}{EA} = \frac{CF}{FB}$ 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×π×2.8×3.5 + π×2.8×3.5

= 61.6+30.8

= 92.4$m^2$ 1

1

Cost of 1500 tents at ₹120 per sq.m

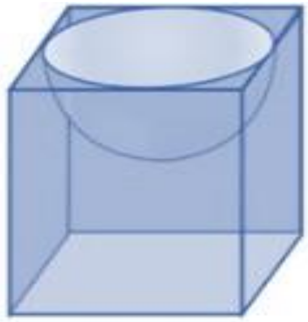
= 1500×120×92.4

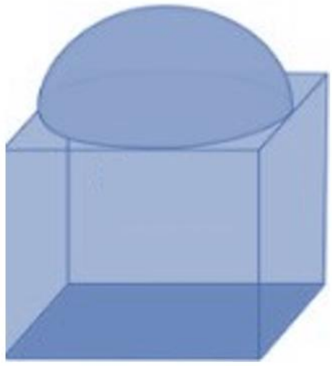
= 16,632,000

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

**OR**

First Solid Second Solid





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

$6\times7\times7 + 2\pi\times3.5^2 - \pi\times3.5^2$ 1

$= 294 + 77 - 38.5$

$= 332.5 cm^2$

SA for second new solid ($S_2$):

$6\times7\times7 + 2\pi\times3.5^2 - \pi\times3.5^2$ 1

$= 294 + 77 - 38.5$ 1

$= 332.5 cm^2$

So $S_1 : S_2 = 1:1$

(ii) Volume for first new solid ($V_1$)= $7\times7\times7 - \frac{2}{3}\pi\times3.5^3$

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

Volume for second new solid ($V_2$)= $7\times7\times7 + \frac{2}{3}\pi\times3.5^3$

$= 343 + \frac{539}{6} = \frac{2597}{6} cm^3$ 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⇒x+y=24 ….(i) 1

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

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

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

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

$BF^2 = (-2-1)^2 + (9-2)^2$

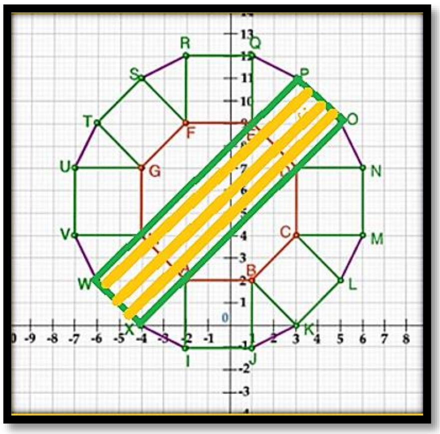
$= (-3)^2 + (7)^2$

$= 9 + 49$

$= 58$

So, BF = $\sqrt{58}$ 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

$= \left(\frac{-6+5}{2}, \frac{2+9}{2}\right)$ ½

$= \left(\frac{-1}{2}, \frac{11}{2}\right)$

(iii) A(-2,2), G(-4,7)

Let the point on y-axis be Z(0,y) ½

$AZ^2 = GZ^2$ ½

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

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

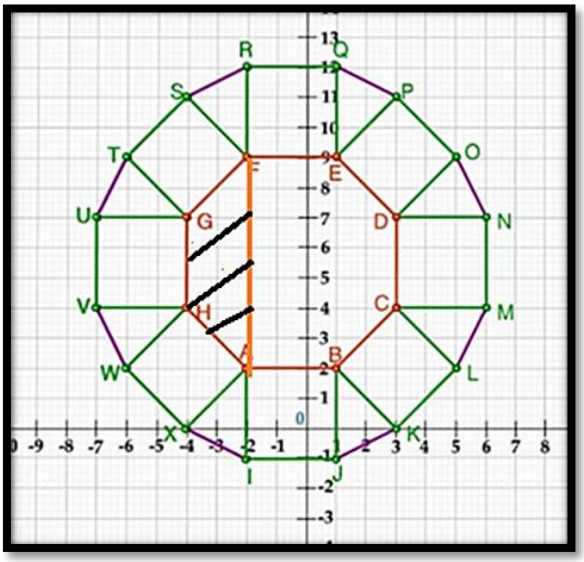
$8 - 4y = 65 - 14y$

$10y = 57$

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 $10^{th}$ 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 $10^{th}$ row = $S_{10}$ ½

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

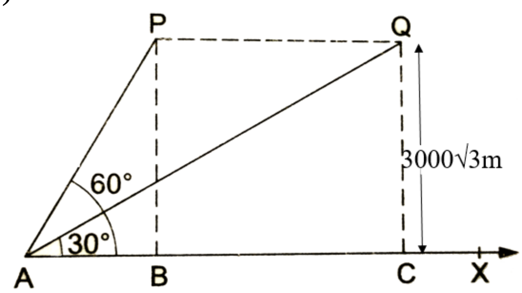
then the middle row is the 9th row ½

$a_8$ = 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√3m.
A is the point of observation.

(ii) In △ PAB, tan60° =PB/AB

Or √3 = 3000√3/ AB

So AB=3000m 1

tan30°= QC/AC

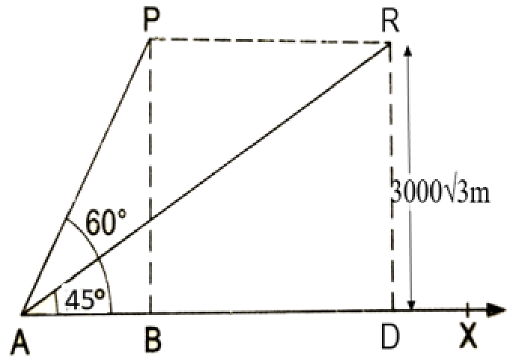
1/√3= 3000√3 / AC

AC = 9000m ½

distance covered = 9000- 3000

= 6000 m. ½

**OR**




½

In △ PAB, tan60° =PB/AB

Or √3 = 3000√3/ AB

So AB=3000m ½

tan45° = RD/AD

1= 3000√3 / AD ½

AD = $3000\sqrt{3}$ m

distance covered = $3000\sqrt{3} - 3000$ ½

= $3000(\sqrt{3} - 1)$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