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, $\mathbf{x = 11/2}$ ½

$\mathbf{y = 9/2}$ ½

22 In ΔABC,
$\angle 1 = \angle 2$
$\therefore AB = BD$ ……………………….**(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
$\angle A = \angle A$ (common)
$\therefore \Delta BAE \sim \Delta CAD$ [By SAS similarity criterion] ½

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

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

$\angle AQB = ½ \times 105° = 52.5°$ (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

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

$\therefore$ 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 $\angle A, \angle B, \angle C$ and $\angle D$ be $\theta_1, \theta_2, \theta_3$ and θ_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

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

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

$= \frac{(360)}{360} \text{ x } \frac{22}{7} \text{ x } 7 \text{x } 7$ (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

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.

∴ 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

∴ 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 $\frac{2}{3}x+y=400$

$\Rightarrow 2x+3y=1200$ ....(i) ½

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

$\Rightarrow 5x+4y=2300$ .... (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

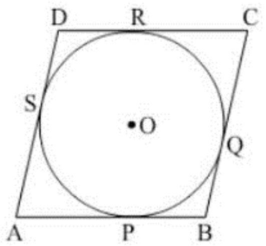
$= \frac{1 - 2\sin^2\theta\cos^2\theta}{\cos\theta\sin\theta}$ ½

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

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

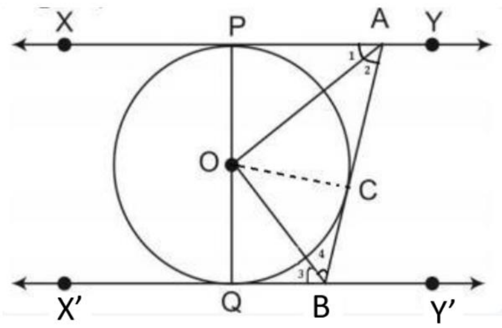
putting in (5) we get, 2AB=2AD

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: 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. ½

Thus, x=20 ½

x+10= 30

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

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

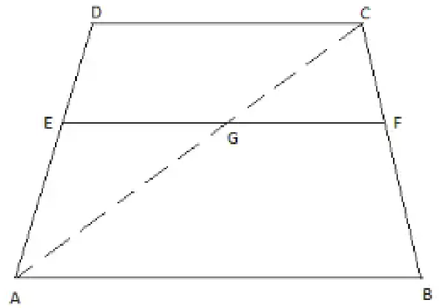
33 For the Theorem :

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)

DE/EA= CG/GA [By BPT] .....(2) ½

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

= 92.4m^2 1

1

Cost of 1500 tents at ₹120 per sq.m

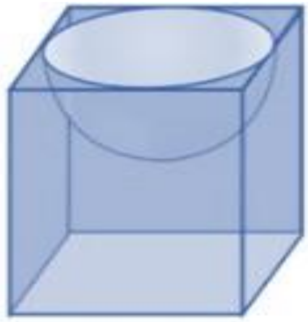
= 1500×120×92.4

= 16,632,000

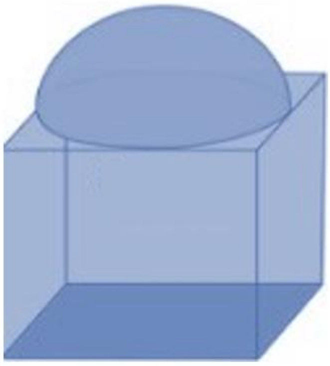
Share of each school to set up the tents = 16632000/50 = ₹332,640

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
$= 294 + 77 - 38.5$
$= 332.5cm^2$
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)

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

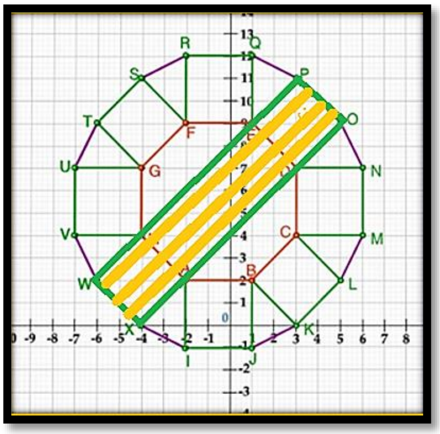
$= (-3)^2 + (7)^2$

$= 9 + 49$

$= 58$

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

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

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

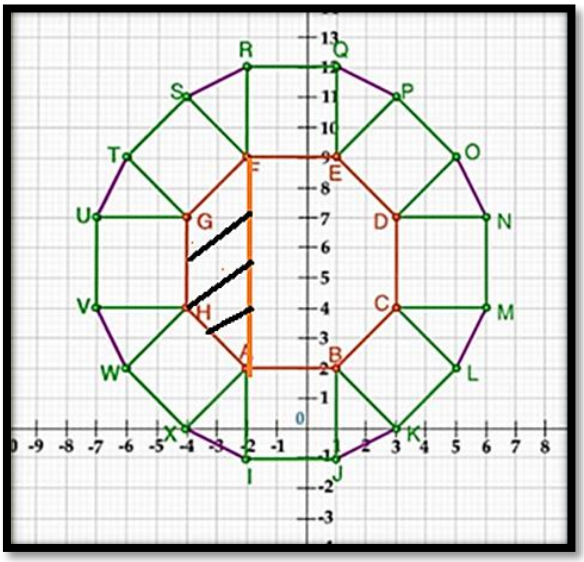
$8 - 4y = 65 - 14y$

$10y = 57$

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 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

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

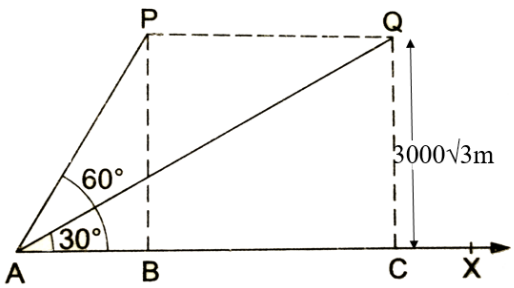
then the middle row is the 9th row ½

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

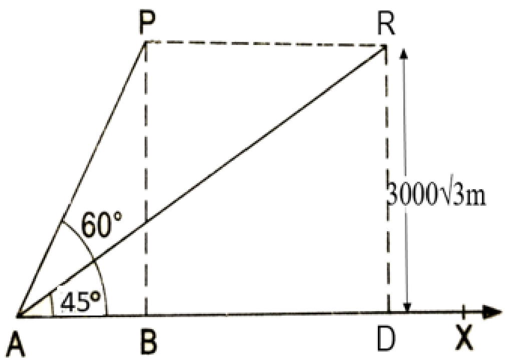
1/√3= 3000√3 / AC

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√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