MODEL PRACTICE PAPER

DEMO PAPER

Key features of Model Practice Papers:

- Model Practice Papers are based on the syllabus prescribed by the CBSE Board.
- They are prepared exactly as per the guide lines suggested by the CBSE Board for class XI examination.
- The questions are selected /set in such a way that students get acquainted with each and every concept of the syllabus.
- All the questions provided in the practice papers have detailed and authentic solutions.
- Practice Papers will provide sufficient practice before the actual examination for obtaining high scores.
- It enables the student to use an effective study method and "have a go" before the term ending (final) examination.

Time allowed: 3 hours **Maximum Marks: 100**

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 29 questions divided into three Sections, A, B, and C. Section A comprises of 10 questions of one mark each, Section B comprises of 12 questions of four marks each and Section C comprises of 7 questions of six marks each.

(iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

(iv) Use of Calculators is not permitted.

SECTION – A

Question numbers 1 to 10 carry 1 mark each.

Q1. Use the properties of sets to prove that for all the sets A and B

$$A - (A \cap B) = A - B$$

Q2. If $A = \{2, 3\}$, from the set $A \times A \times A$.

Q3. Which of the following is true or false:

(i) $\sin(A + B) \cos\,(A - B) = \sin^2 A - \sin^2 B$

(ii) $\cos\,(A + B) \cos\,(A - B) = \cos^2 A - \sin^2 B$

Q4. Fill in the blanks:

(i) General solution of $\sin^2 \theta = \sin^2 \alpha \quad \Rightarrow \theta = \ldots\ldots\ldots$

(ii) General solution of $\tan^2 \theta = \tan^2 \alpha \quad \Rightarrow \theta = \ldots\ldots\ldots$

Q5. Find the equation of the hyperbola if foci $(0, \pm 13)$, the conjugate axis is of length 24.

Q6. Find the argument of $-\sqrt{3} - i$.

Q7. Find the total number of ways of answering 6 objective type question, each question having 4 choices.

Q8. Is 184 a term of the sequence 3, 7, 11, ……….?

Q9. If ${}^{n}C_{x} = {}^{n}C_{y}$ then, prove $x = y$ or $x + y = n$.

Q10. Two dice are thrown simultaneously. Find the probability of getting a multiples of 3 as the sum.

SECTION – B

Question numbers 11 to 22 carry 4 marks each.

Q11. Let R be the relation on the set B of natural numbers defined by

$$R = \{(a, b) : a + 3b = 12, a \in N, b \in N\}.$$

Find : (i) R (ii) Domain of R (iii) Range of R

Q12. If $\tan A - \tan B = x$ and $\cot B - \cot A = y$, prove that $\cot(A - B) = \frac{1}{x} + \frac{1}{y}$

Q13. Find the conjugate of $\frac{1}{3 + 4i}$

Q14. How many different signals can be given using any number of flags from 5 flags of different colours?

Q15. Solve the following equality:

(i) $\frac{x-1}{x+1} \geq 1$

(ii) $2x^2 - x < 1$

Q16. From a class of 30 students, 15 are to be chosen for an excursion party. There are 5 students who decide that either all of them will join or none of them will join. In how many ways can they be chosen?

Q17. Sum the following series to n terms : $5 + 7 + 13 + 31 + 85 + \ldots\ldots\ldots\ldots$

Q18. Show that the perpendicular drawn from the point $(4,\ 1)$ on the line segment joining $(6,\ 5)$ and $(2,\ -1)$ divides it internally in the ratio $8 : 5$.

Q19. Three vertices of a parallelogram ABCD are $A(3, -1, 2)$, $B(1, 2, -4)$and $C(-1, 1, 2)$.

Find the coordinates of the fourth vertex.

Q20. (i) Find the derivative of $f(x) = x + \frac{1}{x}, x \neq 0$ from the first principle.

(ii) Evaluate: $\underset{x \to 0}{Lim} (\text{cosec}\, x - \cot x)$

Q21. For the given statement identify the necessary and sufficient conditions:

p : " If you drive over 80 km per hour, then you will get a fine".

Q22. The odds in favour of an event are $3 : 5$. Find the probability of occurrence of this event.

SECTION – C

Question numbers 23 to 29 carry 6 marks each.

Q23. Let $f = \left\{\left(x, \frac{x^2}{1+x^2}\right) : x \in R\right\}$ be a function from R into R. Determine the range of function.

Q24. Proved that: $\tan 20^{o} \tan 40^{o} \tan 80^{o} = \sqrt{3}$

Q25. In the binomial expansion of $(1+x)^n$, the coefficients of the fifth, sixth and seventh terms are in A.P. Find all values of n for which this can happen.

Q26. Show that the locus of the mid-point of the distance between the axes of the variable line $x\cos\theta + y\sin\theta = p$ is $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$, where p is a constant.

Q27. Find the equation of the ellipse whose centre is at the origin, foci are $(1, 0)$ and $(-1, 0)$ and eccentricity is $\frac{1}{2}$.

Q28. Deepak has a suitcase with a 4 digit number lock in it. One day, he finds certain articles missing. Immediately, he changes the 4 digit code of his suitcase so as to further protect the items from it. The number lock of the suitcase has 4 wheels, each labeled with ten digits i.e. from 0 to 9. The lock opens with a sequence of four digits with no repeats.

(a) What is the probability of a person getting the right sequence to open the suitcase.

(b) What is value depicted by it ?

Q29. The scores of a batsman in 10 matches were as follows:

38, 70, 48,34, 42, 55, 63, 46, 54, 44

Compute the variance and standard deviation.

SOLUTION OF MODEL PRACTICE PAPER DEMO

SECTION – A

A1. We have $A-(A\cap B)=A\cap(A\cap B)'$ (Since $A-B=A\cap B'$)

$=A\cap(A'\cup B')$ (by De Morgan's law $(A\cap B)'=(A'\cup B')$)

$=(A\cap A')\cup(A\cap B')$ (by distributive law)

$=\phi\cup(A\cap B')$ (where $A\cap A'=\phi$)

$=A\cap B'=A-B$

A2. We have, $A=\{2,3\}$

$\therefore$ $A\times A=\{(2,2),(2,3),(3,2),(3,3)\}$

Again, $A\times A\times A=\{(2,2,2),(2,2,3),(2,3,2),(2,3,3),(3,2,2),(3,2,3),$

$(3,3,2),(3,3,3)\}$

A3. (i) True

(ii) True

A4. (i) General solution of $\sin^2\theta=\sin^2\alpha$ $\Rightarrow$ $\theta=n\pi\pm\alpha, n\in Z$

(ii) General solution of $\tan^2\theta=\tan^2\alpha$ $\Rightarrow$ $\theta=n\pi\pm\alpha, n\in Z$

A5. As the foci are at $(0,\pm13)$, therefore the transverse axis is along $y-axis$ and equation of the ellipse is $\frac{y^2}{a^2}-\frac{x^2}{b^2}=1$ with $ae=13$

Also, length of conjugate axis $=24$

$\Rightarrow$ $2b=24$ $\Rightarrow$ $b=12$

Further, $b^2 = a^2(e^2 - 1)$

$\Rightarrow \quad a^2 = a^2e^2 - b^2 = (13)^2 - (12)^2 = 25$

$\Rightarrow \quad a^2 = 25$

Hence, the equation of the hyperbola is

$$\frac{y^2}{25} - \frac{x^2}{144} = 1.$$

A6. Let $z = -\sqrt{3} - i$.

Let $\alpha = \tan^{-1}\left|\frac{Im\,(z)}{Re(z)}\right| = \left|\frac{-1}{-\sqrt{3}}\right| = \frac{1}{\sqrt{3}} = \frac{\pi}{6}$

Hence, Argument of $z = -(\pi - \alpha) = -\left(\pi - \frac{\pi}{6}\right) = \frac{-5\pi}{6}$

A7. Since each question can be answered in 4 ways. So, the total number of ways of answering 6 questions is $4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^6$

A8. Given sequence is 3, 7, 11, ……..

First term $= a = 3$, Common difference $= d = 4$.

Let the n^{th} term of the given sequence be 184. Then

$$a_n = 184 \quad \Rightarrow \quad a + (n-1)d = 184 \quad \Rightarrow \quad n = 46\tfrac{1}{4}.$$

Since n is not a natural number. So, 184 is not a term of the given sequence.

A9. We have, ${}^nC_x = {}^nC_y$

$\Rightarrow \quad {}^nC_x = {}^nC_y = {}^nC_{n-y}$ [By ${}^nC_y = {}^nC_{n-y}$]

$\Rightarrow$ Either $x = y$ or $x = n - y$ [By ${}^nC_x = {}^nC_y \quad \Rightarrow \quad x = y$]

$\Rightarrow$ Either $x = y$ or $x + y = n$.

A10. Let A be the event "getting a multiple of 3 as the sum" 3, 6, 9, 12 as the sum. Then,

$A = \{(1, 2), (2, 1), (1, 5), (5, 1), (2, 4), (4, 2), (3, 3), (3, 6), (6, 3), (5, 4),$

$(4, 5), (6, 6)\}$

$\therefore$ Favorable number of elementary events $= 12$

So, required probability $= \frac{12}{36} = \frac{1}{3}$.

SECTION – B

A11. (i) We have, $a + 3b = 12 \quad \Rightarrow \quad a = 12 - 3b$

Putting $b = 1, 2, 3$ we get $a = 9, 6, 3$ respectively.

For $b = 4$, we get $a = 0 \notin N$. Also, for $b > 4$, $a \notin N$.

$\therefore \quad R = \{(9,1),\ (6,2),\ (3,3)\}$

(ii) Domain of $R = \{9, 6, 3\}$

(iii) Range of $R = \{1, 2, 3\}$

A12. We have, $\tan A - \tan B = x$ and $\cot B - \cot A = y$

Now, $\cot B - \cot A = y$

$\Rightarrow \quad \frac{\tan A - \tan B}{\tan A\ \tan B} = y$

$\Rightarrow \quad \frac{x}{\tan A\ \tan B} = y$

$\Rightarrow \quad \tan A\ \tan B = \frac{x}{y}$

$\therefore \quad \cot(A - B) = \frac{1}{\tan(A-B)} = \frac{1 + \tan A\ \tan B}{\tan A - \tan B} = \frac{1+\frac{x}{y}}{x} = \frac{x+y}{xy} = \frac{1}{x} + \frac{1}{y}$ Proved.

A13. Let $z = \frac{1}{3+4i}$

Then, $z = \frac{1}{3+4i} \times \frac{3-4i}{3-4i} = \frac{3-4i}{9+16} = \frac{3-4i}{25} = \frac{3}{25} - \frac{4}{25}i$

$\therefore \quad \bar{z} = \frac{3}{25} + \frac{4}{25}i.$

A14. The signals can be made by using at a time one or two or three or four or five flags.

Hence, by the fundamental principle of addition, the total number of signals

$= {}^5P_1 + {}^5P_2 + {}^5P_3 + {}^5P_4 + {}^5P_5$

$= 5 + 20 + 60 + 120 + 120 = 325$

A15. (i) Given inequality is $\frac{x-1}{x+1} \geq 1$

Where, we not that $x + 1 \neq 0 \Rightarrow x \neq -1$

and $\frac{x-1}{x+1} \geq 1 \quad \Rightarrow \frac{(x+1)(x-1)}{(x+1)(x+1)} \geq 1$

$\Rightarrow \quad x^2 - 1 \geq (x+1)^2$

$\Rightarrow \quad x^2 - 1 \geq x^2 + 2x + 1$

$\Rightarrow \quad -2x \geq 2 \Rightarrow \quad x \leq -1$; but $x \neq -1$, therefore, solution set of the given inequation is $]-\infty, -1[$.

(ii) Given inequality is $2x^2 - x < 1$

$\Rightarrow (2x+1)(x-1) < 0$

$\Rightarrow$ either $2x + 1 > 0$ and $x - 1 < 0$ or $2x + 1 < 0$ and $x - 1 > 0$

$\Rightarrow$ either $x > -\frac{1}{2}$ and $x < 1$ or $x < -\frac{1}{2}$ and $x > 1$

$\Rightarrow -\frac{1}{2} < x < 1.$ or [where, $x < -\frac{1}{2}$ and $x > 1$ is not possible]

Hence, the solution set of the given inequality is $\left(-\frac{1}{2}, 1\right)$

A16. We have the following possibilities:

(i) Five particular students join the exclusion party.

We have to choose 10 students from the remaining 25 students = ${}^{25}C_{10}$ ways

(ii) Five particular students do not join the exclusion party.

We have to choose 15 students from the remaining 25 students = ${}^{25}C_{15}$ ways

Hence, the required number of ways = ${}^{25}C_{10} + {}^{25}C_{15}$.

A17. Given successive terms is $5 + 7 + 13 + 31 + 85 + \ldots\ldots\ldots\ldots\ldots$

Let T_n be the n^{th} term of the given series and S_n be the sum of its n terms. Then

$$S_n = 5 + 7 + 13 + 31 + 85 + \cdots \ldots\ldots\ldots\ldots.. + T_{n-1} + T_n \quad \ldots\text{(i)}$$

or $$S_n = \quad 5 + 7 + 13 + 31 + 85 + \cdots \ldots\ldots\ldots\ldots\ldots. + T_{n-1} + T_n \quad \ldots\text{(ii)}$$

Subtracting (ii) from (i), we get

$$0 = 5 + [2 + 6 + 18 + 54 + \cdots. + (T_n - T_{n-1})] - T_n$$

$$\Rightarrow \quad 0 = 5 + 2\frac{(3^{n-1} - 1)}{(3-1)} - T_n$$

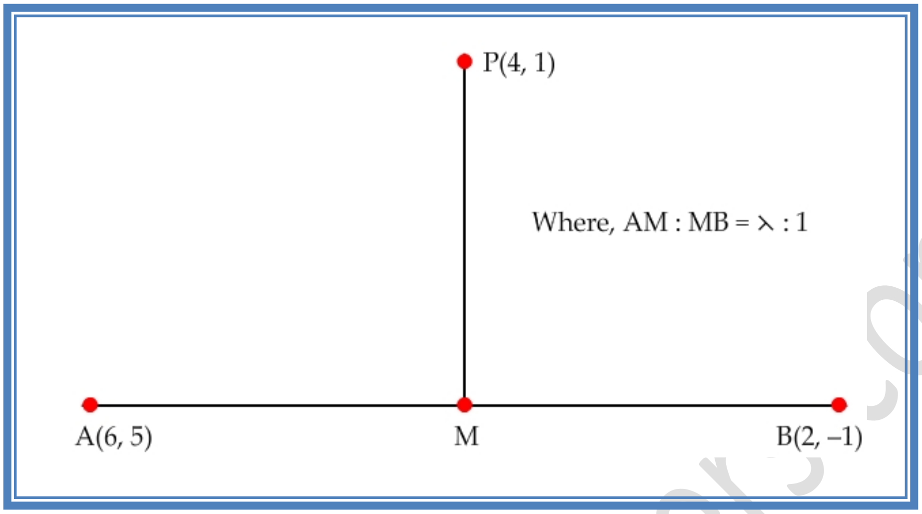
$$\Rightarrow \quad T_n = 5 + (3^{n-1} - 1) = 4 + 3^{n-1}$$

$$\Rightarrow \quad S_n = \sum T_n = \sum(4 + 3^{k-1}) = \sum 4 + \sum 3^{k-1}$$

$$\Rightarrow \quad S_n = 4n + (1 + 3 + 3^2 + \cdots + 3^{n-1})$$

$$\Rightarrow \quad S_n = 4n + 1 \times \frac{(3^n - 1)}{(3-1)} = \frac{1}{2}[3^n + 8n - 1]$$

A18. Suppose perpendicular drawn from $P(4,\ 1)$ on the line joining $A(6,\ 5)$ and $B(2,\ -1)$ meets AB at M.



Let m be the slope of PM.

Then, $PM \perp AB$

$\Rightarrow \quad m \times Slope\ of\ AB = -1$

$\Rightarrow \quad m \times \frac{-1-5}{2-6} = -1$

$\Rightarrow \quad m \times \frac{3}{2} = -1 \qquad \Rightarrow \qquad m = \frac{-2}{3}$

Clearly, PM passes through $P(4,\ 1)$ and has slope $m = \frac{-2}{3}$.

So, its equation is

$$y - 1 = \frac{-2}{3}(x-4) \qquad \Rightarrow \qquad 2x + 3y - 11 = 0$$

Suppose M divides line segment AB in the ratio $\lambda : 1$.

Then, coordinates of M are $\left(\frac{2\lambda+6}{\lambda+1},\ \frac{-\lambda+5}{\lambda+1}\right)$

Since M lies on line PM whose equation is $2x + 3y - 11 = 0$

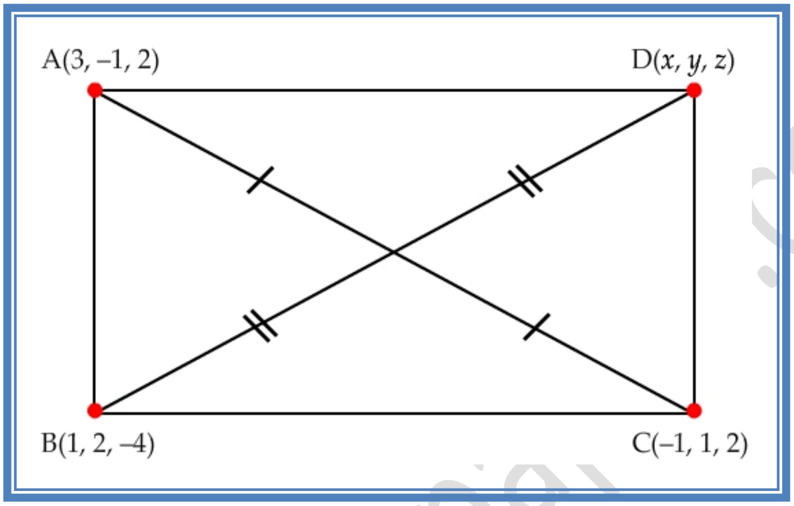
$\therefore \quad 2 \times \frac{2\lambda+6}{\lambda+1} + 3 \times \frac{-\lambda+5}{\lambda+1} - 11 = 0$

$\Rightarrow \quad \lambda = \frac{8}{5}$

Hence, M divides AB internally in the ratio $\lambda : 1 = 8 : 5$.

A19. Let the coordinates of the fourth vertex D be (x, y, z).

Since diagonals of a parallelogram bisect each other. Therefore, mid-point of AC and BD coincide.



$$\therefore \quad \left(\frac{3-1}{2}, \frac{-1+1}{2}, \frac{2+2}{2}\right) = \left(\frac{1+x}{2}, \frac{2+y}{2}, \frac{-4+z}{2}\right)$$

$$\Rightarrow \quad (1, 0, 2) = \left(\frac{1+x}{2}, \frac{2+y}{2}, \frac{-4+z}{2}\right)$$

$$\Rightarrow \quad x = 1, \; y = -2 \; and \; z = 8$$

Hence, the coordinates of the fourth vertex are $(1, -2, 8)$.

A20. (i) We have $f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

$$= \lim_{h \to 0} \frac{\left(x + h + \frac{1}{x+h}\right) - \left(x + \frac{1}{x}\right)}{h}$$

$$= \lim_{h \to 0} \frac{h + \frac{1}{x+h} - \frac{1}{x}}{h}$$

$$= \lim_{h \to 0} \frac{h + \frac{x - x - h}{x(x+h)}}{h} = \lim_{h \to 0} \frac{h\left(1 - \frac{1}{x(x+h)}\right)}{h}$$

$$= \lim_{h \to 0} \left[1 - \frac{1}{x(x+h)}\right] = 1 - \frac{1}{x^2}.$$

(ii) $\lim_{x \to 0} (\operatorname{cosec} x - \cot x) = \lim_{x \to 0} \frac{1-\cos x}{\sin x}$

$$= \lim_{x \to 0} \frac{(1-\cos x)(1+\cos x)}{\sin x(1+\cos x)}$$

$$= \lim_{x \to 0} \frac{\sin^2 x}{\sin x(1+\cos x)}$$

$$= \lim_{x \to 0} \frac{\sin x}{1+\cos x}$$

$$= \frac{0}{1+1} = 0$$

A21. Let p and q denote the statements :

p : You drive over 80 km per hour.

q : You will get a fine.

We know that the implications of "if p, then q" indicates that p is sufficient for q. It also indicates that q is necessary for p.

Therefore, sufficient condition is " Driving over 80 km per hour" and the necessary conditions is " getting a fine".

A22. It is given that the odds in favour of an event are 3 : 5. Therefore,

Favorable number of elementary events $= 3x$

Unfavorable number of elementary events $= 5x$

So, total number of elementary events $= 3x + 5x$

Hence, probability of the occurrence of the event $\frac{3x}{8x} = \frac{3}{8}$

SECTION – C

A23. Clearly, $f(x)$ is defined for all $x \in R$ as $x^2 + 1 \neq 0$ for any $x \in R$.

So, Domain of $f = y$. Then,

$\Rightarrow \quad \frac{x^2}{1+x^2} = y$

$\Rightarrow \quad x^2 = x^2 y + y$

$\Rightarrow \quad x^2(1-y) = y$

$\Rightarrow \quad x^2 = \frac{y}{1-y}$

$\Rightarrow \quad x = \pm\sqrt{\frac{y}{1-y}}$

Clearly, x will take real values, if

$\frac{y}{1-y} \geq 0$

$\Rightarrow \quad \frac{y-0}{y-1} \leq 0$

$\Rightarrow \quad 0 \leq y < 1$

$\Rightarrow \quad y \in [0, 1[$

Hence, range of function is $[0, 1[$.

A24. We have,

LHS = $\tan 20^o \tan 40^o \tan 80^o$

$= \frac{\sin 20^o \sin 40^o \sin 80^o}{\cos 20^o \cos 40^o \cos 80^o} \quad = \frac{(2\sin 20^o \sin 40^o) \sin 80^o}{(2\cos 20^o \cos 40^o) \cos 80^o}$

$= \frac{(\cos 20^o - \cos 60^o) \sin 80^o}{(\cos 60^o + \cos 20^o) \cos 80^o} \quad = \frac{\sin 80^o \cos 20^o - \frac{1}{2}\sin 80^o}{\frac{1}{2}\cos 80^o + \cos 80^o \cos 20^o}$

$$= \frac{2\sin 80^{o}\cos 20^{o} - \sin 80^{o}}{\cos 80^{o} + 2\cos 80^{o}\cos 20^{o}} \quad = \frac{\sin 100^{o} + \sin 60^{o} - \sin 80^{o}}{\cos 80^{o} + \cos 100^{o} + \cos 60^{o}}$$

$$= \frac{\sin(180^{o} - 80^{o}) + \sin 60^{o} - \sin 80^{o}}{\cos 80^{o} + \cos(180^{o} - 80^{o}) + \cos 60^{o}}$$

$$= \frac{\sin 80^{o} + \sin 60^{o} - \sin 80^{o}}{\cos 80^{o} - \cos 80^{o} + \cos 60^{o}}$$

$$= \frac{\sin 60^{o}}{\cos 60^{o}}$$

LHS $= \tan 60^{o} = \sqrt{3}$

A25. The coefficient of 5th, 6th and 7th terms in the binomial expansion of $(1 + x)^n$ are ${}^nC_4$, ${}^nC_5$ and ${}^nC_6$ respectively.

We are given that, ${}^nC_4$, ${}^nC_5$ and ${}^nC_6$ are in A.P.

$\Rightarrow \quad 2\,{}^nC_5 = {}^nC_4 + {}^nC_6$

$\Rightarrow \quad 2 = \frac{{}^nC_4}{{}^nC_5} + \frac{{}^nC_6}{{}^nC_5}$

$\Rightarrow \quad 2 = \frac{5}{n-4} + \frac{n-5}{6}$

$\Rightarrow \quad 2 = \frac{30 + (n-4)(n-5)}{6(n-4)}$

$\Rightarrow \quad 12n - 48 = 30 + n^2 - 9n + 20$

$\Rightarrow \quad n^2 - 21n + 98 = 0$

$\Rightarrow \quad (n - 14)(n - 7) = 0$

$\Rightarrow \quad n = 7, 14.$

A26. Changing the given equation of the line into intercept form,

we have $\frac{x}{\left(\frac{p}{\cos\alpha}\right)} + \frac{y}{\left(\frac{p}{\sin\alpha}\right)} = 1$ which gives the coordinates $\left(\frac{p}{\cos\alpha}, 0\right)$ and $\left(0, \frac{p}{\sin\alpha}\right)$,

where the line intersects $x - axis$ and $y - axis$, respectively.

Let (h, k) denote the mid-point of the line segment joining the points

$\left(\frac{p}{\cos\alpha}, 0\right)$ and $\left(0, \frac{p}{\sin\alpha}\right)$

Then $h = \frac{p}{2\cos\alpha}$ and $k = \frac{p}{2\sin\alpha}$

This gives $\cos\alpha = \frac{p}{2h}$ and $\sin\alpha = \frac{p}{2k}$

Squaring and adding we get

$\frac{p^2}{4h^2} + \frac{p^2}{4k^2} = 1$ or $\frac{1}{h^2} + \frac{1}{k^2} = \frac{4}{p^2}$

Therefore, the required locus is $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$.

A27. Here coordinates of two foci S and S' are $(1, 0)$ and $(-1, 0)$ respectively.

$\therefore \quad SS' = 2$

Let $2a$ and $2b$ be the length of the major and minor axes of the required ellipse and e be the eccentricity

Then $SS' = 2ae \quad \Rightarrow \quad 2 = 2ae \quad \Rightarrow \quad ae = 1$

$\Rightarrow \quad a\left(\frac{1}{2}\right) = 1 \quad \Rightarrow \quad a = 2$

Let $P(x, y)$ be any point on the ellipse.

Then $SP + S'P = 2a$ (say)

$\Rightarrow \quad SP + S'P = 4$

$\Rightarrow \quad \sqrt{(x-1)^2+(y-0)^2}+\sqrt{(x+1)^2+(y-0)^2}=4$

$\Rightarrow \quad \sqrt{(x-1)^2+y^2} = 4-\sqrt{(x+1)^2+y^2}$

Squaring both sides, we get

$\Rightarrow \quad \left(\sqrt{(x-1)^2+(y-0)^2}\right)^2 = \left(4-\sqrt{(x+1)^2+y^2}\right)^2$

$\Rightarrow \quad (x-1)^2+y^2=16+(x+1)^2+y^2-8\sqrt{(x+1)^2+y^2}$

$\Rightarrow \quad 8\sqrt{(x+1)^2+y^2}=16+\ (x+1)^2-(x-1)^2$

$\Rightarrow \quad 2\sqrt{(x+1)^2+y^2}=4+x$

$\Rightarrow \quad 4[(x+1)^2+y^2]=(4+x)^2$

$\Rightarrow \quad 3x^2+4y^2-12=0$

This is the required equation of the ellipse.

A28. (a) There are ${}^{10}C_4\ \times 4! = 5040$ sequences of 4 distinct digits out of which there is only one sequence in which the lock opens.

∴ Required probability = $\frac{1}{5040}$

(b) The above situation shows that one should keep the passwords/ number lock sequences very safe and should keep changing them at regular intervals so as to avoid theft. At the same time, he should try to memorize the passwords.

A29. Let the assumed mean be A $= 48$.

Table for calculation of variance

x_i	$d_i = x_i - A$	d_i^2
38	-10	100
70	22	484
48	0	0
34	-14	196
42	-6	36
55	7	49
63	15	225
46	-2	4
54	6	36
44	-4	16
	$\sum d_i = 14$	$\sum d_i^2 = 1146$

Hence, $n = 10,\ \sum d_i = 14$ and $\sum d_i^2 = 1146$

$\therefore$ Var $(X) = \frac{1}{n}\sum d_i^2 - \left(\frac{1}{n}\sum d_i\right)^2 = \frac{1146}{10} - \left(\frac{14}{10}\right)^2 = 112.64$

Hence, $S.D. = \sqrt{\text{Var }(X)} = \sqrt{112.64} = 10.61$