Mathematics Part I (Algebra)

SSC Board Exam March 2027 – Practice Paper

Model Answer Paper

Time: 2 hours **Max. Marks: 40**

Model answers show one correct method; any other correct method gets full marks.

Q.1 (A) Four alternative answers are given for every sub-question. Select the correct alternative and write its alphabet with the sub-question number. **[4]**

(i) The graph of the equation $3x - 4y = 12$ intersects the Y-axis at the point .....

(A) (4, 0) (B) (0, 3)
(C) (0, −3) (D) (−3, 0)

Answer (1 mark)
(C) (0, −3)
On the Y-axis $x = 0$, so $-4y = 12$, i.e. $y = -3$.

(ii) The sum of the roots of the quadratic equation $3x^2 - 12x + 7 = 0$ is .....

(A) −4 (B) 4
(C) 7/3 (D) −7/3

Answer (1 mark)
(B) 4
$\alpha + \beta = -b/a = -(-12)/3 = 4$.

(iii) For the A.P. 7, 11, 15, 19, ..., the value of t_{10} is .....

(A) 43 (B) 47
(C) 39 (D) 40

Answer (1 mark)
(A) 43
$t_n = a + (n - 1)d = 7 + 9 \times 4 = 43$.

(iv) A shopkeeper in Pune charges GST at 18% on a mixer grinder. The rate of SGST charged is .....

(A) 18% (B) 36%
(C) 4.5% (D) 9%

Answer (1 mark)
(D) 9%
GST is shared equally between CGST and SGST, so SGST = 18% ÷ 2 = 9%.

Q.1 (B) Solve the following sub-questions. **[4]**

(i) Find the value of the determinant: $\begin{vmatrix} 7 & 3 \\ -2 & 5 \end{vmatrix}$

Answer (1 mark)
$\begin{vmatrix} 7 & 3 \\ -2 & 5 \end{vmatrix} = (7 \times 5) - (3 \times -2) = 35 + 6 = 41$
Value of the determinant = 41

(ii) Find the common difference of the A.P. 3/2, 1, 1/2, 0, ...

Answer (1 mark)
$d = t_2 - t_1 = 1 - 3/2 = -1/2$
Common difference $d = -1/2$

(iii) A card is drawn at random from 25 cards numbered 1 to 25. Find the probability that the number on the card is a multiple of 6.

Answer (1 mark)
$n(S) = 25$. Let A: multiple of 6. $A = \{6, 12, 18, 24\}$, $n(A) = 4$
$P(A) = n(A)/n(S) = 4/25$

(iv) The market value of a share is ₹250 and the rate of brokerage is 0.2%. Find the brokerage paid per share.

Answer (1 mark)
Brokerage = $250 \times 0.2/100$ = ₹0.50 per share

Q.2 (A) Complete and write any two activities from the following. **[4]**

(i) Complete the following activity to form the quadratic equation whose roots are 3 and −5.
Activity: Let $\alpha = 3$ and $\beta = -5$.
$\alpha + \beta = 3 + (-5) =$ ☐
$\alpha \times \beta = 3 \times (-5) =$ ☐
The quadratic equation is $x^2 - (\alpha + \beta)x + \alpha\beta = 0$
$\therefore x^2 - ($☐$)x + ($☐$) = 0$
$\therefore$ ☐ $= 0$

Answer (2 marks)
$\alpha + \beta = 3 + (-5) = \mathbf{-2}$
$\alpha \times \beta = 3 \times (-5) = \mathbf{-15}$
$x^2 - (\mathbf{-2})x + (\mathbf{-15}) = 0$
$\therefore \mathbf{x^2 + 2x - 15 = 0}$ is the required equation.
Marking: $\alpha + \beta = -2$ and $\alpha\beta = -15$ – 1 mark · Correct final equation $x^2 + 2x - 15 = 0$ – 1 mark
Examiner tip: Watch the sign: $-(\alpha + \beta)x$ with $\alpha + \beta = -2$ gives $+2x$. Writing $x^2 - 2x - 15 = 0$ is the most common slip.

(ii) Complete the following activity to solve the simultaneous equations $43x + 27y = 59$ and $27x + 43y = 11$.
Activity: Adding the two equations,
☐$x +$ ☐$y = 70$
$\therefore x + y =$ ☐ ...(I)
Subtracting the second equation from the first,
$16x - 16y =$ ☐
$\therefore x - y = 3$ ...(II)
Adding (I) and (II), $2x =$ ☐ $\therefore x =$ ☐ and $y =$ ☐

Answer (2 marks)
Adding: $\mathbf{70}x + \mathbf{70}y = 70$
$\therefore x + y = \mathbf{1}$ ...(I)
Subtracting: $16x - 16y = \mathbf{48}$
$\therefore x - y = 3$ ...(II)
Adding (I) and (II): $2x = \mathbf{4} \therefore x = \mathbf{2}$

From (I): 2 + y = 1 ∴ y = **−1**
Solution: (x, y) = (2, −1)
Check: 43(2) + 27(−1) = 59 ✓ and 27(2) + 43(−1) = 11 ✓
Marking: Boxes 70, 70, 1, 48 – 1 mark · 2x = 4, x = 2, y = −1 – 1 mark
Examiner tip: When coefficients of x and y are interchanged, add and subtract the equations. It is faster than elimination.

(iii) Sneha bought 100 shares of face value ₹10 at a market value of ₹50 through a broker in Pune. The brokerage is 0.2% and GST is 18% on brokerage. Complete the activity to find the total amount she paid.
Activity: Purchase value of shares = 100 × ☐ = ₹5000
Brokerage = 5000 × 0.2/100 = ₹☐
GST on brokerage = ☐ × 18/100 = ₹☐
Total amount paid = 5000 + ☐ + ☐ = ₹☐

Answer (2 marks)
Purchase value = 100 × **50** = ₹5000
Brokerage = 5000 × 0.2/100 = ₹**10**
GST = **10** × 18/100 = ₹**1.80**
Total amount paid = 5000 + **10** + **1.80** = ₹**5011.80**
Marking: Brokerage ₹10 and GST ₹1.80 – 1 mark · Total ₹5011.80 – 1 mark
Examiner tip: Shares are bought at market value, not face value. While buying, brokerage and GST are added; while selling, they are subtracted.

Q.2 (B) Solve any four sub-questions. **[8]**

(i) Solve the simultaneous equations: 3x + 2y = 29; 5x − y = 18

Answer (2 marks)
3x + 2y = 29 ...(I)
5x − y = 18 ...(II)
Multiplying (II) by 2: 10x − 2y = 36 ...(III)
Adding (I) and (III): 13x = 65 ∴ x = 5
Substituting x = 5 in (II): 25 − y = 18 ∴ y = 7
Solution: (x, y) = (5, 7)
Marking: Elimination step and x = 5 – 1 mark · y = 7 – 1 mark
Examiner tip: Check your answer in both equations: 3(5) + 2(7) = 29 ✓ and 5(5) − 7 = 18 ✓.

(ii) Solve the quadratic equation by factorisation: $6x^2 - 7x - 3 = 0$

Answer (2 marks)
$6x^2 - 7x - 3 = 0$
(Product = 6 × (−3) = −18; −9 × 2 = −18 and −9 + 2 = −7)
$6x^2 - 9x + 2x - 3 = 0$
3x(2x − 3) + 1(2x − 3) = 0
(2x − 3)(3x + 1) = 0
2x − 3 = 0 or 3x + 1 = 0
x = 3/2 or x = −1/3
Roots: 3/2 and −1/3
Marking: Correct splitting of middle term and factors – 1 mark · Both roots – 1 mark
Examiner tip: Write both roots. Leaving one root out loses half the marks.

(iii) In an auditorium in Pune, the first row has 5 seats, the second row has 9 seats, the third row has 13 seats, and so on. Which row has 85 seats?

Answer (2 marks)

Seats per row: 5, 9, 13, … form an A.P. with $a = 5$, $d = 4$, $t_n = 85$

$t_n = a + (n - 1)d$

$85 = 5 + (n - 1) \times 4$

$80 = (n - 1) \times 4$

$n - 1 = 20 \therefore n = 21$

The 21st row has 85 seats.

Marking: Formula and substitution – 1 mark · n = 21 with conclusion – 1 mark

(iv) A bag contains 5 red, 4 green and 3 blue balls. One ball is drawn at random. Find the probability that the ball drawn is (a) green (b) not red.

Answer (2 marks)

Total balls = 5 + 4 + 3 = 12 $\therefore$ n(S) = 12

(a) A: ball is green, n(A) = 4

P(A) = 4/12 = 1/3

(b) B: ball is not red (green or blue), n(B) = 4 + 3 = 7

P(B) = 7/12

Marking: n(S) and P(green) = 1/3 – 1 mark · P(not red) = 7/12 – 1 mark

(v) The table shows the time (in minutes) taken by 20 students to reach school. Find the mean time by direct method.

Class (minutes)	0–10	10–20	20–30	30–40
No. of students	3	5	8	4

Answer (2 marks)

Class (minutes)	**Class mark x_i**	**Frequency f_i**	**$f_i x_i$**
0–10	5	3	15
10–20	15	5	75
20–30	25	8	200
30–40	35	4	140
		$\Sigma f_i = 20$	$\Sigma f_i x_i = 430$

Mean $\bar{x} = \Sigma f_i x_i / \Sigma f_i = 430/20 = 21.5$

Mean time = 21.5 minutes

Marking: Table with class marks and $f_i x_i$ – 1 mark · Mean = 21.5 minutes – 1 mark

Q.3 (A) Complete and write any one activity from the following. **[3]**

(i) A dealer in Pune bought a refrigerator for a taxable value of ₹20,000 and sold it to a customer for a taxable value of ₹22,500. The rate of GST is 18%. Complete the activity to find the CGST and SGST payable by the dealer.

Activity: Input tax credit (ITC) = 20,000 × 18/100 = ₹ ☐

Output tax = 22,500 × 18/100 = ₹ ☐

GST payable = Output tax − ITC = ☐ − 3600 = ₹ ☐

CGST payable = SGST payable = ☐ ÷ 2 = ₹ ☐

Answer (3 marks)

Input tax credit (ITC) = 20,000 × 18/100 = ₹**3600**

Output tax = 22,500 × 18/100 = ₹**4050**

GST payable = **4050** − 3600 = ₹**450**

CGST payable = SGST payable = **450** ÷ 2 = ₹**225** each

Marking: ITC ₹3600 – 1 mark · Output tax ₹4050 and GST payable ₹450 – 1 mark · CGST = SGST = ₹225 – 1 mark

Examiner tip: The dealer pays only the difference (output tax − input tax credit), not the full tax collected.

(ii) The daily time (in minutes) that 50 students of a Pune school spend on a mobile phone is given below. Complete the activity to find the median.

Class (minutes)	Frequency	Cumulative frequency (less than type)
0–20	6	6
20–40	10	☐
40–60	18	34
60–80	9	☐
80–100	7	50
	N = 50	

Activity: N = 50 ∴ N/2 = ☐

Median class = ☐

L = ☐, f = ☐, cf = ☐, h = 20

Median = L + [(N/2 − cf)/f] × h = ☐ + [(25 − ☐)/☐] × 20 = ☐ minutes

Answer (3 marks)

Class (minutes)	Frequency	Cumulative frequency (less than type)
0–20	6	6
20–40	10	**16**
40–60	18	34
60–80	9	**43**
80–100	7	50

N/2 = **25**

Median class = **40–60** (first cf greater than 25 is 34)

L = **40**, f = **18**, cf = **16**, h = 20

Median = **40** + [(25 − **16**)/**18**] × 20 = 40 + (9/18) × 20 = 40 + 10 = **50** minutes

Marking: Cumulative frequencies and N/2 – 1 mark · Median class 40–60 with L = 40, f = 18, cf = 16 – 1 mark · Median = 50 minutes – 1 mark

Examiner tip: cf in the formula is the cumulative frequency of the class just before the median class (16), not of the median class itself (34).

Q.3 (B) Solve any two sub-questions. **[6]**

(i) Solve the following simultaneous equations by Cramer's rule: $4x + 3y = 18$; $3x - 2y = 5$

Answer (3 marks)

Comparing with $a_1x + b_1y = c_1$, $a_2x + b_2y = c_2$: $a_1 = 4$, $b_1 = 3$, $c_1 = 18$; $a_2 = 3$, $b_2 = -2$, $c_2 = 5$

$$D = \begin{vmatrix} 4 & 3 \\ 3 & -2 \end{vmatrix} = (4)(-2) - (3)(3) = -8 - 9 = -17$$

$$D_x = \begin{vmatrix} 18 & 3 \\ 5 & -2 \end{vmatrix} = (18)(-2) - (3)(5) = -36 - 15 = -51$$

$$D_y = \begin{vmatrix} 4 & 18 \\ 3 & 5 \end{vmatrix} = (4)(5) - (18)(3) = 20 - 54 = -34$$

$x = D_x/D = -51/-17 = 3$

$y = D_y/D = -34/-17 = 2$

Solution: $(x, y) = (3, 2)$

Marking: $D = -17$ – 1 mark · $D_x = -51$ and $D_y = -34$ – 1 mark · $x = 3$, $y = 2$ – 1 mark

Examiner tip: Write equations in the form $ax + by = c$ first. Keep the sign of $b_2 = -2$ inside every determinant.

(ii) Solve the quadratic equation using the formula: $2x^2 - 4x - 3 = 0$

Answer (3 marks)

Comparing with $ax^2 + bx + c = 0$: $a = 2$, $b = -4$, $c = -3$

$b^2 - 4ac = (-4)^2 - 4(2)(-3) = 16 + 24 = 40$

$x = [-b \pm \sqrt{(b^2 - 4ac)}]/2a = [4 \pm \sqrt{40}]/4$

$\sqrt{40} = 2\sqrt{10}$

$x = (4 \pm 2\sqrt{10})/4 = (2 \pm \sqrt{10})/2$

Roots: $(2 + \sqrt{10})/2$ and $(2 - \sqrt{10})/2$

Marking: Values of a, b, c and $b^2 - 4ac = 40$ – 1 mark · Substitution in formula – 1 mark · Simplified roots – 1 mark

Examiner tip: Simplify $\sqrt{40} = 2\sqrt{10}$ and cancel the common factor 2. Unsimplified roots may lose ½ mark.

(iii) Two dice are rolled simultaneously. Find the probability of each event:
(a) A: the sum of the numbers on the upper faces is 8
(b) B: both dice show the same number
(c) C: the product of the numbers is 12

Answer (3 marks)

$n(S) = 6 \times 6 = 36$

(a) $A = \{(2,6), (3,5), (4,4), (5,3), (6,2)\}$, $n(A) = 5$

$P(A) = 5/36$

(b) $B = \{(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)\}$, $n(B) = 6$

$P(B) = 6/36 = 1/6$

(c) $C = \{(2,6), (3,4), (4,3), (6,2)\}$, $n(C) = 4$

$P(C) = 4/36 = 1/9$

Marking: $P(A) = 5/36$ – 1 mark · $P(B) = 1/6$ – 1 mark · $P(C) = 1/9$ – 1 mark

Examiner tip: Write each event as a set of ordered pairs. (3,4) and (4,3) are different outcomes.

(iv) Riya saves ₹100 in the first week, and each week she saves ₹25 more than the week before. How much will she have saved in total in 20 weeks?

Answer (3 marks)

Savings: 100, 125, 150, ... form an A.P. with $a = 100$, $d = 25$, $n = 20$

$S_n = n/2\ [2a + (n - 1)d]$

S_{20} = 20/2 [2 × 100 + 19 × 25]

= 10 [200 + 475]

= 10 × 675 = 6750

Riya will save ₹6750 in 20 weeks.

Marking: Identifying a, d, n – 1 mark · Correct formula and substitution – 1 mark · S_{20} = ₹6750 – 1 mark

Examiner tip: 'Total saved' means S_n, not t_n. Saving in the 20th week alone would be t_{20} = ₹575.

Q.4 Solve any two sub-questions. **[8]**

(i) A car travels 150 km from Pune to Mumbai at a uniform speed. If the speed had been 10 km/hr more, the journey would have taken 30 minutes less. Find the original speed of the car.

Answer (4 marks)

Let the original speed be x km/hr.

Time at original speed = 150/x hr; time at increased speed = 150/(x + 10) hr

30 minutes = 1/2 hr

150/x − 150/(x + 10) = 1/2

150[(x + 10) − x]/[x(x + 10)] = 1/2

1500/[x(x + 10)] = 1/2

x(x + 10) = 3000

x^2 + 10x − 3000 = 0

x^2 + 60x − 50x − 3000 = 0

x(x + 60) − 50(x + 60) = 0

(x + 60)(x − 50) = 0

x = −60 or x = 50

Speed cannot be negative ∴ x = 50

The original speed of the car is 50 km/hr.

Check: 150/50 = 3 hr and 150/60 = 2.5 hr; difference = 0.5 hr ✓

Marking: Forming the equation 150/x − 150/(x + 10) = 1/2 – 1 mark · Reducing to x^2 + 10x − 3000 = 0 – 1 mark · Solving: x = 50 or −60 – 1 mark · Rejecting negative value and conclusion – 1 mark

Examiner tip: Convert 30 minutes to 1/2 hour before forming the equation, and always reject the negative root with a reason.

(ii) A housing society in Pune plants 120 trees in the first year of a green drive, and every year it plants 15 trees more than the previous year.

(a) In which year will the society plant 300 trees?

(b) How many trees will be planted in total in the first 10 years?

Answer (4 marks)

Trees planted each year: 120, 135, 150, ... form an A.P. with a = 120, d = 15

(a) t_n = 300

t_n = a + (n − 1)d

300 = 120 + (n − 1) × 15

180 = (n − 1) × 15

n − 1 = 12 ∴ n = 13

The society will plant 300 trees in the 13th year.

(b) S_n = n/2 [2a + (n − 1)d]

S_{10} = 10/2 [2 × 120 + 9 × 15]

= 5 [240 + 135] = 5 × 375 = 1875

Total trees planted in the first 10 years = 1875

Marking: (a) Formula and substitution – 1 mark · (a) n = 13 – 1 mark · (b) Formula and substitution – 1 mark · (b) S_{10} = 1875 – 1 mark

(iii) Mr. Patil invested ₹25,000 in shares of face value ₹100 when the market value was ₹125. The company declared a dividend of 15%. (Ignore brokerage while buying.)
(a) Find the number of shares he bought, the dividend he received, and his rate of return.
(b) Later he sold all the shares at a market value of ₹140, paying 0.2% brokerage and 18% GST on brokerage. Find the amount he received.

Answer (4 marks)
(a) Number of shares = Investment/MV = 25,000/125 = 200
Dividend per share = 15% of FV = 15/100 × 100 = ₹15
Total dividend = 200 × 15 = ₹3000
Rate of return = (Dividend/Investment) × 100 = (3000/25,000) × 100 = 12%
(b) Selling value = 200 × 140 = ₹28,000
Brokerage = 28,000 × 0.2/100 = ₹56
GST on brokerage = 56 × 18/100 = ₹10.08
Amount received = 28,000 − (56 + 10.08) = 28,000 − 66.08 = ₹27,933.92

Marking: Number of shares = 200 – 1 mark · Dividend ₹3000 and rate of return 12% – 1 mark · Brokerage ₹56 and GST ₹10.08 – 1 mark · Amount received ₹27,933.92 – 1 mark

Examiner tip: Dividend is always calculated on face value, but rate of return is calculated on the amount invested (market value).

Q.5 Solve any one of the following sub-questions. **[3]**

(i) Two straight cycle tracks in a park are represented by the equations x + y = 6 and x − y = 2. Draw the graphs of both equations on the same graph paper. Write the coordinates of the point where the tracks cross, and find the area of the triangle formed by the two lines and the Y-axis.

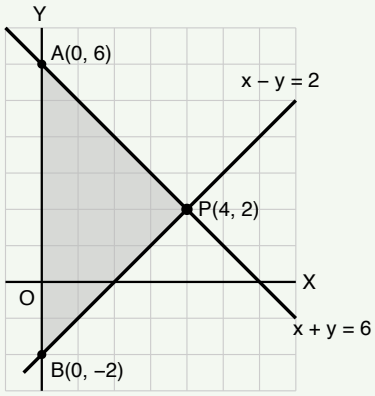
Answer (3 marks)
x + y = 6 ⇒ y = 6 − x

x	0	6	3
y	6	0	3
(x, y)	(0, 6)	(6, 0)	(3, 3)

x − y = 2 ⇒ y = x − 2

x	0	2	4
y	−2	0	2
(x, y)	(0, −2)	(2, 0)	(4, 2)

Plot the points and draw both lines (see figure).
The lines intersect at P(4, 2). ∴ The tracks cross at (4, 2), i.e. x = 4, y = 2.
The lines meet the Y-axis at A(0, 6) and B(0, −2).
Base AB = 6 − (−2) = 8 units; height = perpendicular distance of P from Y-axis = 4 units
Area of △PAB = 1/2 × base × height = 1/2 × 8 × 4 = 16 sq. units



Scale: 1 cm = 1 unit

Marking: Tables of points for both equations – 1 mark · Correct graphs with intersection point (4, 2) – 1 mark · Area of triangle = 16 sq. units – 1 mark

Examiner tip: Write the tables, choose a scale and mention it on the graph. Take the height as the x-coordinate of P (4), since the base lies on the Y-axis.

(ii) The monthly expenditure of a family in Pune is ₹36,000, as given below. Represent the information by a pie diagram.

Item	Food	House rent	Education	Transport	Savings
Expenditure (₹)	10,800	9,000	7,200	3,600	5,400

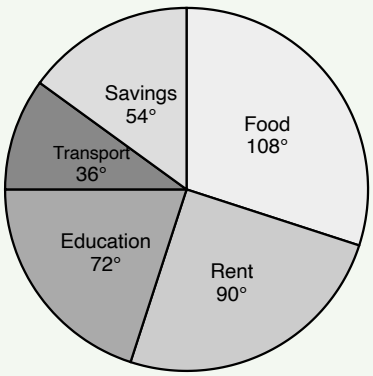
Answer (3 marks)

Central angle = (Amount/Total) × 360°

Item	**Expenditure (₹)**	**Central angle**
Food	10,800	10,800/36,000 × 360° = 108°
House rent	9,000	9,000/36,000 × 360° = 90°
Education	7,200	7,200/36,000 × 360° = 72°
Transport	3,600	3,600/36,000 × 360° = 36°
Savings	5,400	5,400/36,000 × 360° = 54°
Total	36,000	360°

Total = 108° + 90° + 72° + 36° + 54° = 360° ✓

Draw a circle and mark the sectors with these central angles using a protractor (see figure).



Marking: Formula for central angle – ½ mark · All five central angles correct – 1½ marks · Correct pie diagram with labels – 1 mark

Examiner tip: Check that the angles add up to 360° before drawing, and label every sector with its name and angle.

All the best for your exam!