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CLASS X · MATHEMATICS BASIC (241) · CBSE BOARD EXAMINATION 2027

CHAPTER 7 BASIC

Coordinate Geometry

Answer Booklet · Full worked solutions with CBSE-style step marks

Every question of the Basic booklet | Step marks shown line by line | MCQ keys with working

INSIDE THIS BOOKLET

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HOW TO USE THE ANSWERS

1. Solve the question in your notebook **first**. Open this booklet only to check.
2. The orange number beside each line is the **step mark** an examiner gives for that line, as in the CBSE marking scheme.
3. Give yourself marks line by line. A right final answer without the working can lose step marks.
4. Check a found point by putting it back: equal distances must come out equal, and a point that divides AB internally must lie between A and B.
5. Copy every wrong answer to the My Mistakes page of your booklet.

READ THIS FIRST

Marking Guide

Full worked solutions to every question in the chapter booklet, set out the way a CBSE examiner marks them.

HOW MARKS ARE GIVEN IN COORDINATE GEOMETRY ANSWERS

1. **1-mark MCQ / assertion–reason:** only the correct option scores. The working here is for your understanding.
2. **Distance (2 marks):** formula with the values put in 1 · answer (both values if there are two) 1.
3. **Equidistant point (2–3 marks):** $PA^2 = PB^2$ written out 1 · simplified equation 1 · the point 1.
4. **Ratio by the section formula (3 marks):** point in terms of k 1 · k and the ratio 1 · the point 1.
5. **Type of figure (3–4 marks):** all sides 1–2 · diagonals 1 · conclusion with the reason 1.
6. Lines with no number are working that earns no separate mark but must be shown.

PART A · SOLUTIONS

A Guided Practice – Solutions

Worked solutions with step marks for every question in Part A.

Distance and midpoint

A1. Complete the steps to find the distance between $A(2,\ -1)$ and $B(5,\ 3)$. **[2]**

$x_2 - x_1 = 3,\ y_2 - y_1 = 4$ — 1

$AB = \sqrt{9 + 16} = 5$ units — 1

A2. Complete the steps to find the midpoint of $P(-3,\ 4)$ and $Q(7,\ -2)$. **[2]**

$x = \dfrac{-3 + 7}{2} = 2$ — 1

$y = \dfrac{4 - 2}{2} = 1$; midpoint $(2,\ 1)$ — 1

Section formula

A3. Complete the steps to find the point dividing the join of $A(1,\ 2)$ and $B(6,\ 7)$ in the ratio $2 : 3$. **[2]**

$x = \dfrac{2(6) + 3(1)}{5} = 3$ — 1

$y = \dfrac{2(7) + 3(2)}{5} = 4$; the point is $(3,\ 4)$ — 1

A4. Complete the steps to find the ratio in which the x-axis divides the join of $A(2,\ -4)$ and $B(5,\ 2)$, and the point of division. **[3]**

Ratio $k : 1$: $y = \dfrac{2k - 4}{k + 1}$ — 1

$y = 0 \to k = 2$: the ratio is $2 : 1$ — 1

$x = \dfrac{2(5) + 1(2)}{3} = 4$: the point is $(4,\ 0)$ — 1

Equidistant point and diameter

A5. Complete the steps to find the point on the x-axis equidistant from $A(2,\ 3)$ and $B(6,\ 1)$. **[3]**

$P(x,\ 0)$: $(x-2)^2+9=(x-6)^2+1$ — 1

$-4x+13=-12x+37 \rightarrow 8x=24 \rightarrow x=3$ — 1

The point is $(3,\ 0)$ — 1

A6. The centre of a circle is $O(1,\ 2)$ and one end of a diameter is $A(-2,\ 5)$. Complete the steps to find the other end B. **[2]**

O is the midpoint of AB: $\dfrac{-2+x}{2}=1,\ \dfrac{5+y}{2}=2$ — 1

$x=4,\ y=-1$: $B(4,\ -1)$ — 1

B

PART B · SOLUTIONS

NCERT Practice – Solutions

Worked solutions with step marks for every question in Part B.

Distance formula

Q	Answer	Working / reason
B1	**(c)** 10	$\sqrt{36+64}=\sqrt{100}=10$.

B2. Find the distance between the points: **(i)** $(3,\ 4)$ and $(-5,\ -2)$ **(ii)** $(a,\ b)$ and $(-a,\ -b)$ **[2]**

(i) $\sqrt{(-5-3)^2+(-2-4)^2}=\sqrt{64+36}=10$ units — 1

(ii) $\sqrt{(-a-a)^2+(-b-b)^2}=\sqrt{4a^2+4b^2}=2\sqrt{a^2+b^2}$ — 1

B3. Check whether the points $A(1,\ 5)$, $B(2,\ 3)$ and $C(-2,\ 11)$ are collinear. **[2]**

$AB=\sqrt{1+4}=\sqrt{5}$, $AC=\sqrt{9+36}=3\sqrt{5}$, $BC=\sqrt{16+64}=4\sqrt{5}$ — 1

$AB+AC=4\sqrt{5}=BC$, so the points are collinear — 1

B4. Show that $A(2,\ 1)$, $B(5,\ 3)$, $C(3,\ 6)$ and $D(0,\ 4)$ are the vertices of a square. **[3]**

$AB=\sqrt{9+4}=\sqrt{13}$, $BC=\sqrt{4+9}=\sqrt{13}$ — ½

$CD=\sqrt{9+4}=\sqrt{13}$, $DA=\sqrt{4+9}=\sqrt{13}$ — ½

Diagonals: $AC=\sqrt{1+25}=\sqrt{26}$, $BD=\sqrt{25+1}=\sqrt{26}$ — 1

All four sides equal and the diagonals equal: $ABCD$ is a square — 1

B5. Find the values of x for which the distance between $P(x,\ 3)$ and $Q(4,\ -1)$ is 5 units. **[2]**

$(x-4)^2+16=25 \rightarrow (x-4)^2=9$ — 1

$x-4=\pm 3 \rightarrow x=7$ or $x=1$ — 1

B6. Find the point on the y-axis which is equidistant from $A(5,\ -2)$ and $B(-3,\ 2)$. **[3]**

Let $P(0,\ y)$: $PA^2 = PB^2 \rightarrow 25 + (y+2)^2 = 9 + (y-2)^2$ — 1

$25 + 4y + 4 = 9 - 4y + 4 \rightarrow 8y = -16 \rightarrow y = -2$ — 1

The point is $(0,\ -2)$ (check: $PA = PB = 5$) — 1

B7. Find a relation between x and y such that the point $(x,\ y)$ is equidistant from $(1,\ 3)$ and $(5,\ 1)$. **[2]**

$(x-1)^2 + (y-3)^2 = (x-5)^2 + (y-1)^2 \rightarrow -2x - 6y + 10 = -10x - 2y + 26$ — 1

$8x - 4y = 16$, i.e. $2x - y = 4$ — 1

B8. Name the type of quadrilateral formed by $A(-2,\ 0)$, $B(2,\ 3)$, $C(6,\ 0)$ and $D(2,\ -3)$. Give reasons. **[3]**

$AB = \sqrt{16+9} = 5$, $BC = \sqrt{16+9} = 5$, $CD = 5$, $DA = 5$ — 1

Diagonals: $AC = 8$, $BD = 6$ — 1

Four equal sides but unequal diagonals: a **rhombus** — 1

B9. Show that $A(3,\ 0)$, $B(6,\ 4)$ and $C(-1,\ 3)$ are the vertices of a right-angled isosceles triangle. **[3]**

$AB = \sqrt{9+16} = 5$, $AC = \sqrt{16+9} = 5$, $BC = \sqrt{49+1} = \sqrt{50}$ — 1

$AB = AC$: isosceles — 1

$AB^2 + AC^2 = 50 = BC^2$: right-angled at A — 1

Section formula

Q	Answer	Working / reason
B10	**(b)** $(2,\ 2)$	$\left(\frac{-2+6}{2}, \frac{7-3}{2}\right) = (2,\ 2)$.

B11. Find the coordinates of the point which divides the join of $(-2,\ 3)$ and $(8,\ -7)$ in the ratio $3 : 2$. **[2]**

$x = \frac{3(8) + 2(-2)}{5} = 4$ — 1

$y = \frac{3(-7) + 2(3)}{5} = -3$; the point is $(4,\ -3)$ — 1

B12. Find the points of trisection of the segment joining $A(-3,\ 4)$ and $B(6,\ -2)$. **[3]**

P divides AB in $1 : 2$: $P\left(\frac{6-6}{3}, \frac{-2+8}{3}\right)$ — 1

$P = (0,\ 2)$ — ½

Q divides AB in $2 : 1$: $Q\left(\frac{12-3}{3}, \frac{-4+4}{3}\right)$ — 1

$Q = (3,\ 0)$ — ½

B13. In what ratio does the point $P(2,\ 1)$ divide the join of $A(-4,\ 5)$ and $B(5,\ -1)$? **[3]**

Let the ratio be $k:1$: $x = \dfrac{5k-4}{k+1}$ — 1

$\dfrac{5k-4}{k+1} = 2 \rightarrow 3k = 6 \rightarrow k = 2$: the ratio is $2:1$ — 1

Check: $y = \dfrac{-2+5}{3} = 1$ ✓ — 1

B14. Find the ratio in which the y-axis divides the join of $(6,\ -2)$ and $(-3,\ 7)$. Also find the point of division. **[3]**

Ratio $k:1$: $x = \dfrac{-3k+6}{k+1}$ — 1

$x = 0 \rightarrow k = 2$: the ratio is $2:1$ — 1

$y = \dfrac{2(7)+1(-2)}{3} = 4$: the point is $(0,\ 4)$ — 1

B15. The points $A(2,\ 3)$, $B(5,\ 4)$, $C(x,\ 6)$ and $D(1,\ y)$, taken in order, are the vertices of a parallelogram. Find x and y. **[2]**

Diagonals bisect each other: $\left(\dfrac{2+x}{2},\ \dfrac{9}{2}\right) = \left(\dfrac{6}{2},\ \dfrac{4+y}{2}\right)$ — 1

$x = 4,\ y = 5$ — 1

B16. $A(-1,\ 2)$ and $B(5,\ -6)$ are the ends of a diameter of a circle. Find its centre and radius. **[2]**

Centre = midpoint of $AB = (2,\ -2)$ — 1

Radius $= \sqrt{(5-2)^2+(-6+2)^2} = 5$ units — 1

B17. Find the coordinates of the points which divide the join of $A(-4,\ 0)$ and $B(0,\ 8)$ into four equal parts. **[3]**

Midpoint Q of AB: $(-2,\ 4)$ — 1

Midpoint of AQ: $(-3,\ 2)$ — 1

Midpoint of QB: $(-1,\ 6)$. The points are $(-3,\ 2)$, $(-2,\ 4)$, $(-1,\ 6)$ — 1

C

PART C · SOLUTIONS

Board Pattern Practice – Solutions

Worked solutions with step marks for every question in Part C.

Distance formula: unknowns, circles, equidistant points

Q	Answer	Working / reason
C1	**(b)** $5\sqrt{2}$	$\sqrt{25+25} = 5\sqrt{2}$.
C2	**(d)** 3	Distance from the x-axis $= \lvert y\rvert = 3$.
C3	**(d)** 8 or –4	$(k-2)^2 + 64 = 100 \rightarrow k-2 = \pm 6 \rightarrow k = 8$ or -4.

C4. Find the point on the x-axis which is equidistant from $A(7,\ 6)$ and $B(-3,\ 4)$. [2]

$P(x,\ 0)$: $(x-7)^2+36=(x+3)^2+16 \rightarrow -14x+85=6x+25$ 1

$x=3$: the point is $(3,\ 0)$ 1

C5. Show that $A(-1,\ 0)$, $B(3,\ 0)$ and $C(1,\ 2\sqrt{3})$ are the vertices of an equilateral triangle. [2]

$AB=4$, $AC=\sqrt{4+12}=4$, $BC=\sqrt{4+12}=4$ 1

All three sides equal: equilateral 1

Section formula: ratio and point of division

Q	Answer	Working / reason
C6	**(b)** $1:2$	$\frac{6k-6}{k+1}=-2 \rightarrow 8k=4 \rightarrow k=\frac{1}{2}$: $1:2$.
C7	**(a)** $1:3$	$\frac{6k-2}{k+1}=0 \rightarrow k=\frac{1}{3}$: $1:3$.
C8	**(c)** $(2,\ 1)$	$\frac{3x-2}{4}=1 \rightarrow x=2$; $\frac{3y+5}{4}=2 \rightarrow y=1$.
C9	**(a)**	$\left(\frac{0}{2},\ \frac{0}{2}\right)=(0,\ 0)$. Both true; R explains A.

C10. Find the ratio in which the y-axis divides the segment joining $(-4,\ 7)$ and $(8,\ -5)$. Also find the point of intersection. [3]

Ratio $k:1$: point $\left(\frac{8k-4}{k+1},\ \frac{-5k+7}{k+1}\right)$ 1

On the y-axis $x=0 \rightarrow k=\frac{1}{2}$: the ratio is $1:2$ 1

$y=\frac{1(-5)+2(7)}{3}=3$: the point is $(0,\ 3)$ 1

C11. Find the ratio in which the x-axis divides the join of $A(4,\ -6)$ and $B(-1,\ 4)$. Also find the point of division. [3]

Ratio $k:1$: $y=\frac{4k-6}{k+1}$ 1

$y=0 \rightarrow k=\frac{3}{2}$: the ratio is $3:2$ 1

$x=\frac{3(-1)+2(4)}{5}=1$: the point is $(1,\ 0)$ 1

Midpoint: median, diameter, parallelogram

Q	Answer	Working / reason
C12	**(b)** the y-axis	Midpoint $(0,\ 5)$ has $x=0$.
C13	**(d)** $(-1,\ -4)$	$(2\times 3-7,\ 2\times(-1)-2)=(-1,\ -4)$.

C14. $ABCD$ is a parallelogram with $A(-1,\ 3)$, $B(4,\ 5)$ and $D(1,\ -2)$. Find the vertex C. [2]

Midpoint of AC = midpoint of $BD=\left(\frac{5}{2},\ \frac{3}{2}\right)$ 1

$C=(5-(-1),\ 3-3)=(6,\ 0)$ 1

PART D · SOLUTIONS

D Case-Based Questions – Solutions

Worked solutions with step marks for every question in Part D.

D1. Case Study · School Garden [4]

(i) How far is the rose bed from the tap? **[1]**

$TR = \sqrt{36 + 64} = 10$ m — 1

(ii) A lamp is to be fixed midway between the rose bed and the bench. Where is it? **[1]**

$\left(\frac{8-4}{2}, \frac{11+11}{2}\right) = (2,\ 11)$ — 1

(iii) A sprinkler S is placed on TR so that $TS : SR = 1 : 3$. Find its position. **[2]**

$S = \left(\frac{1(8)+3(2)}{4}, \frac{1(11)+3(3)}{4}\right)$ — 1

$= (3.5,\ 5)$ — 1

OR

(iii) Show that T, R and B form an isosceles triangle. **[2]**

$TR = 10, TB = \sqrt{36+64} = 10, RB = 12$ — 1

$TR = TB$: isosceles — 1

D2. Case Study · Town Map [4]

(i) Find the length of the road SH. **[1]**

$SH = \sqrt{144 + 81} = 15$ km — 1

(ii) A bus stop is built at the midpoint of SH. Find its position. **[1]**

$\left(\frac{-2+10}{2}, \frac{1+10}{2}\right) = (4,\ 5.5)$ — 1

(iii) A metro station M on SH is twice as far from S as from H. Find M. **[2]**

$SM : MH = 2 : 1$: $M = \left(\frac{2(10)+1(-2)}{3}, \frac{2(10)+1(1)}{3}\right)$ — 1

$= (6,\ 7)$ — 1

OR

(iii) The road crosses the river at P. In what ratio does P divide SH? Find P. **[2]**

$\frac{10k-2}{k+1} = 0 \to k = \frac{1}{5}$: ratio $1 : 5$ — 1

$y = \frac{1(10)+5(1)}{6} = 2.5$: $P(0,\ 2.5)$ — 1

D3. Case Study · Drone Delivery [4]

(i) How far does the drone fly from A to B? **[1]**

$AB = \sqrt{144 + 25} = 13$ units $= 1.3$ km — 1

(ii) It drops a parcel at the midpoint of AB. Where is the parcel dropped? **[1]**

$\left(\frac{-3+9}{2}, \frac{-2+3}{2}\right) = (3,\ 0.5)$ 1

(iii) The drone crosses the highway at Q. Find the ratio $AQ : QB$ and the point Q. **[2]**

$\frac{3k-2}{k+1} = 0 \rightarrow k = \frac{2}{3}$: $AQ : QB = 2 : 3$ 1

$x = \frac{2(9)+3(-3)}{5} = 1.8$: $Q(1.8,\ 0)$ 1

OR

(iii) Find the point on AB that is one quarter of the way from A to B. **[2]**

Ratio $1 : 3$: $\left(\frac{9+3(-3)}{4}, \frac{3+3(-2)}{4}\right)$ 1

$= (0,\ -0.75)$ 1