UDAAN

2026

Coordinate Geometry

MATHS LECTURE-2

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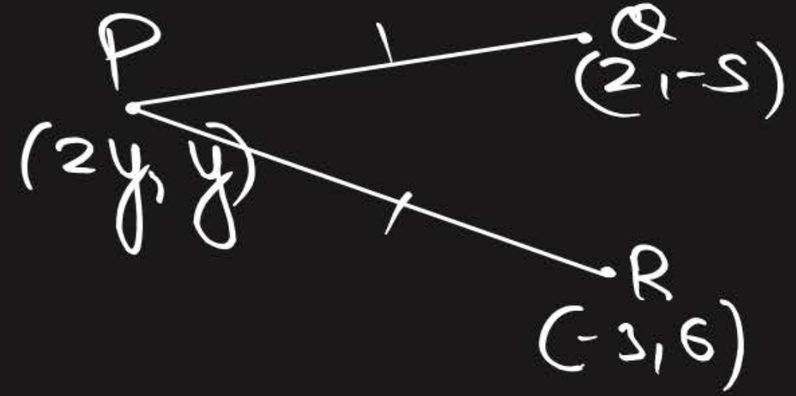
Topics *to be covered*

A Questions on distance formula

#Q. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from Q (2, –5) and R(–3, 6) then find the coordinates of P.

CBSE 2010, 14



$PQ = PR$

$\Rightarrow PQ^2 = PR^2$

$(y - -5)^2 + (2y - 2)^2 = (y - 6)^2 + (2y - -3)^2$

$(y+5)^2 + (2y-2)^2 = (y-6)^2 + (2y+3)^2$

$y^2 + 25 + 10y + 4y^2 + 4 - 8y = y^2 + 36 - 12y + 4y^2 + 9 + 12y$

$2y + 29 = 45$

$2y = 45 - 29$

$2y = 16$

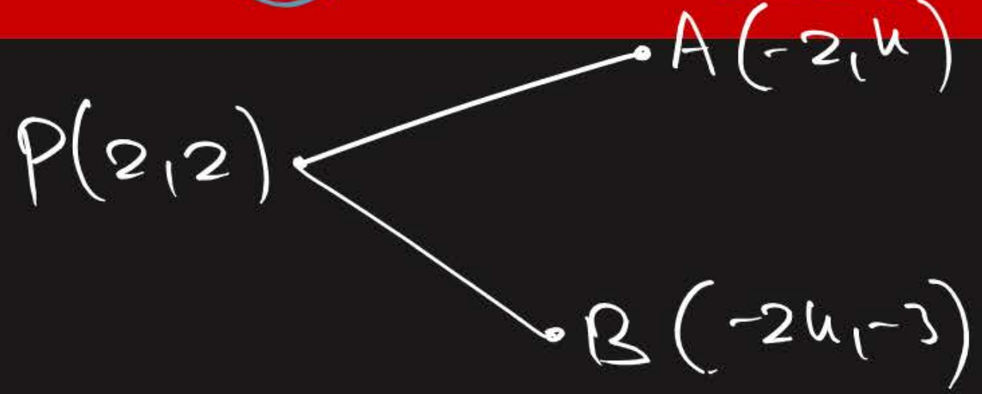
$y = 8$

Ans: P(16, 8)

#Q. If the point P(2, 2) is equidistant from the points A(–2, k) and B(–2k, –3), find k. Also, find the length of AP.

#GPH

CBSE 2014



$PA = PB$

$\Rightarrow PA^2 = PB^2$

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

$4 + k^2 - 4k + 16 = 25 + 4 + 4k^2 + 8k$

$k^2 - 4k + 16 - 25 - 4k^2 - 8k = 0$

$-3k^2 - 12k - 9 = 0$

$-3[k^2 + 4k + 3] = 0$

$k^2 + 4k + 3 = 0$

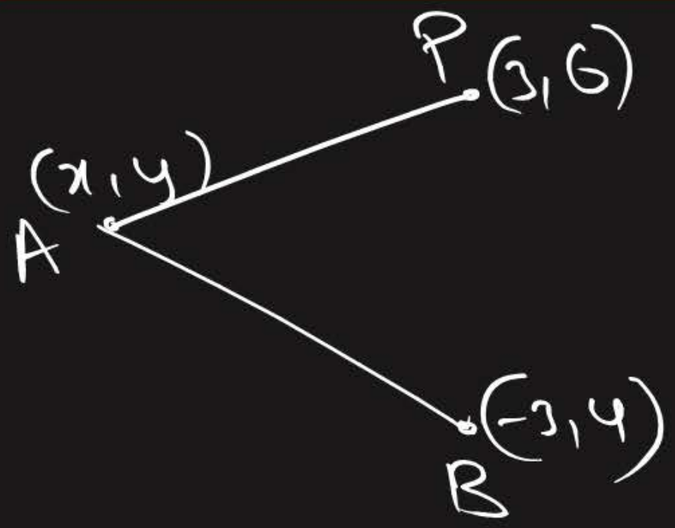
Sum = 4, Pro. = 3

3, 1

$k = -3, -1$

Formula / eqn.

#Q. Find a relation between x and y such that the point (x, y) is equidistant from the points (3, 6) and (–3, 4).



$AP = AB$

$\Rightarrow AP^2 = AB^2$

$(y-6)^2 + (x-3)^2 = (y-4)^2 + (x--3)^2$

$y^2 + 36 - 12y + x^2 + 9 - 6x = y^2 + 16 - 8y + x^2 + 9 + 6x$

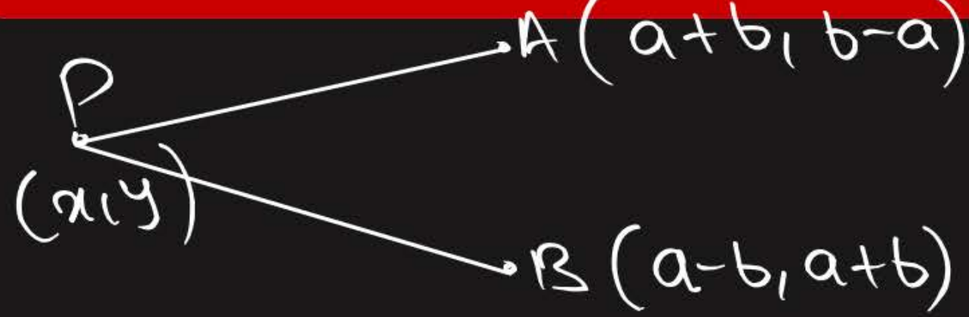
$45 - 12y - 6x = 25 - 8y + 6x$

$-4y - 12x + 20 = 0$

$-4[y + 3x - 5] = 0$

$\boxed{y + 3x - 5 = 0}$

#Q. If the point (x, y) is equidistant from the points (a + b, b – a) and (a – b, a + b), prove that bx = ay.



$PA = PB$

$\Rightarrow PA^2 = PB^2$

$$(b-a)-(y)^2 + (a+b)-(x)^2 = (a+b)-(y)^2 + (a-b)-(x)^2$$

$$(b-a)^2 + y^2 - 2(b-a)(y) + (a+b)^2 + x^2 - 2(a+b)(x) = (a+b)^2 + y^2 - 2(a+b)(y) + (a-b)^2 + x^2 - 2(a-b)(x)$$

$$-2(b-a)y-2(a+b)x=-2(a+b)y-2(a-b)x$$

$$-2by+2ay-2ax-2bx=-2ay-2by-2ax+2bx$$

$$2ay-2bx=-2ay+2bx$$

$$2ay+2ay=2bx+2bx$$

$$4ay=4bx$$

$$ay=bx$$ H.P

SOME USEFUL POINTS

(I) In order to prove that a given figure is a

(i) square, prove that the four sides are equal and the diagonals are also equal.

(ii) rhombus, prove that the four sides are equal.

(iii) rectangle, prove that opposite sides are equal and the diagonals are also equal.

(iv) parallelogram, prove that the opposite sides are equal.

(v) parallelogram but not a rectangle, prove that its opposite sides are equal but the diagonals are not equal.

(vi) rhombus but not a square, prove that its all sides are equal but the diagonals are not equal.

(II) For three points to be collinear, prove that the sum of the distances bētween two pairs of points is equal to the third pair of points.

#Q. Show that the points (–4, –1), (4, 4), (4, 0) and (2, 3) are the vertices of a rectangle.

CBSE 2006

$AB = \sqrt{(4--1)^2+(-2--4)^2} = \sqrt{9+4} = \sqrt{13}$ units.

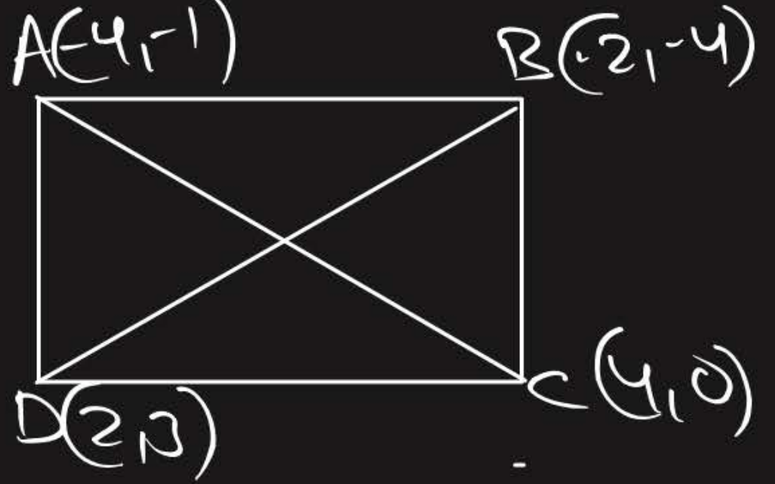
$BC = \sqrt{(0--4)^2+(4--2)^2} = \sqrt{16+36} = \sqrt{52}$ units.

$DC = (0-3)^2+(4-2)^2 = \sqrt{9+4} = \sqrt{13}$ units.

$AD = \sqrt{(3--1)^2+(2--4)^2} = \sqrt{16+36} = \sqrt{52}$

$AC = \sqrt{(0--1)^2+(4--4)^2} = \sqrt{1+64} = \sqrt{65}$ units.

$DB = \sqrt{(3-4)^2+(2--2)^2} = \sqrt{49+16} = \sqrt{65}$ units.



$\therefore$ AB = DC & AD = BC

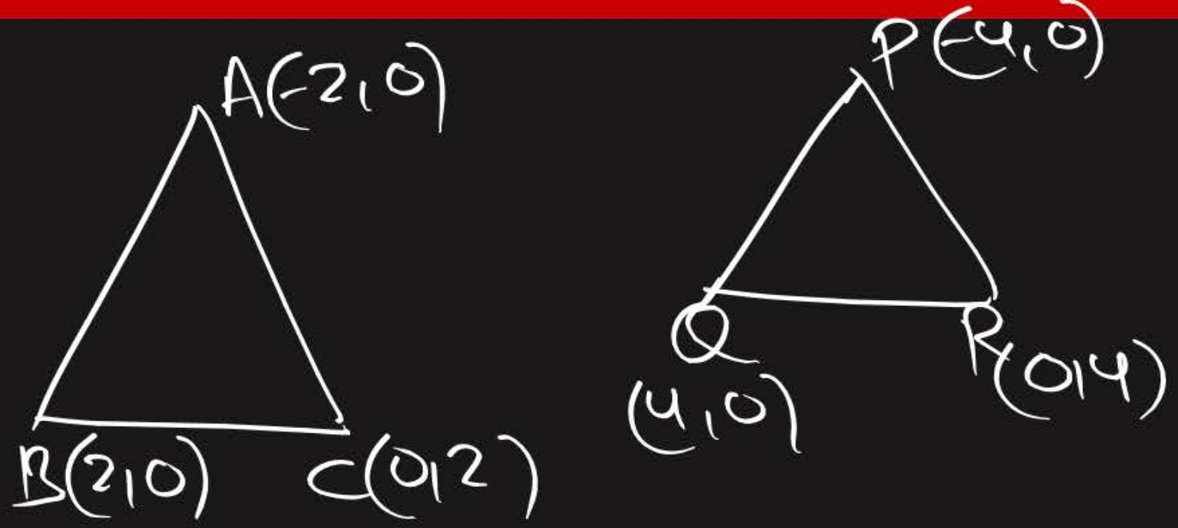
also, AC = DB

$\therefore$ ABCD is a rectangle.

#Q. Show that the points A (1, –2), B(3, 6), C(5, 10) and D(3, 2) are the vertices of a parallelogram.

#GPH

#Q. Show that ΔABC where $A(-2, 0)$, $B(2, 0)$, $C(0, 2)$ and ΔPQR, where $P(-4, 0)$, $Q(4, 0)$, $R(0, 4)$ are similar.



CBSE 2017

SSS

#Q. Prove that the points (3, 0), (6, 4) and (−1, 3) are vertices of a right-angled isosceles triangle.

A (3, 0), B (6, 4), C (−1, 3)

CBSE 2006, 13

$AB = \sqrt{(4-0)^2+(6-3)^2} = \sqrt{16+9} = \sqrt{25} = 5$

$BC = \sqrt{(3-4)^2+(1-6)^2} = \sqrt{1+49} = \sqrt{50} = \sqrt{5\times5\times2} = 5\sqrt{2}$

$AC = \sqrt{(3-0)^2+(1-3)^2} = \sqrt{9+16} = \sqrt{25} = 5$

$\because AB = AC$

$\Rightarrow$ ΔABC is right-angled Δ

$\therefore$ ΔABC is isosceles Δ.

$5^2 + 5^2 = (5\sqrt{2})^2$

$\therefore AB^2 + AC^2 = BC^2$

#Q. Prove that (2, –2), (–2, 1) and (5, 2) are the vertices of a right angled triangle. Find the area of the triangle and the length of the hypotenuse.

CBSE 2016

#GSP4

#Q. Prove that the points $(-2, 5)$, $(0, 1)$ and $(2, -3)$ are collinear.

A, B, C

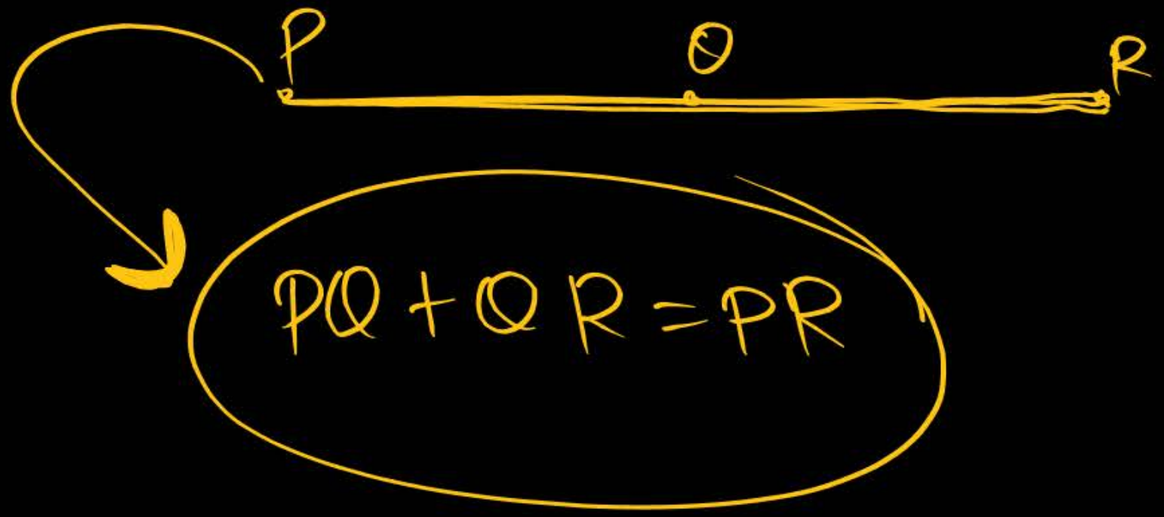
$$AB = \sqrt{(1-5)^2+(0--2)^2} = \sqrt{16+4} = \sqrt{20} = \sqrt{5\times2\times2} = 2\sqrt{5}$$

$$BC = \sqrt{(-3-1)^2+(2-0)^2} = \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$$

$$AC = \sqrt{(-3-5)^2+(2--2)^2} = \sqrt{64+16} = \sqrt{80} = \sqrt{5\times2\times2\times2\times2} = 4\sqrt{5}$$

$\therefore$ $AB + BC = AC$.

$\therefore$ A, B, Cax collinear


P
Q
R
PQ + QR = PR

#HOT

#Q. If (0, –3) and (0, 3) are the two vertices of an equilateral triangle, find the coordinates of its third vertex.

CBSE 2014

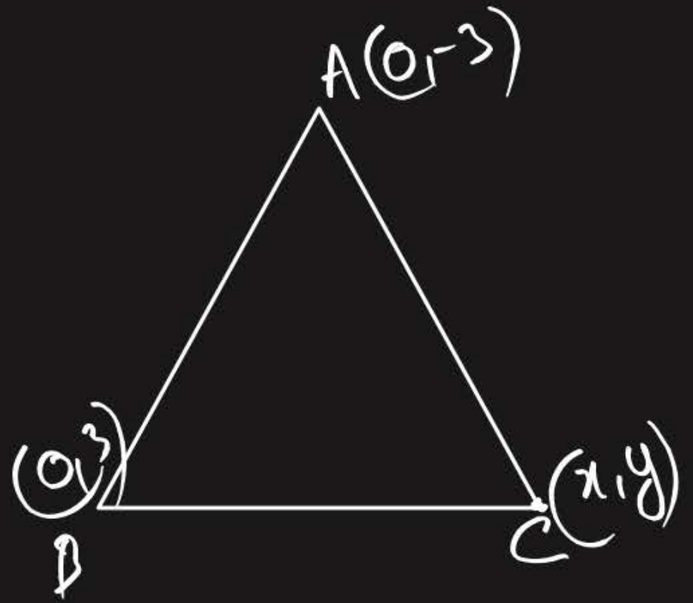
$\because$ ABC is an equilateral Δ.

$\therefore$ AB = BC = AC.

$$AB = \sqrt{(-3-3)^2 + (0-0)^2} = \sqrt{36} = 6$$

$$BC = \sqrt{(y-3)^2 + (x-0)^2} = \sqrt{y^2+9-6y+x^2}$$

$$AC = \sqrt{(y--3)^2 + (x-0)^2} = \sqrt{y^2+9+6y+x^2}$$



$$6 = \sqrt{y^2+9-6y+x^2} = \sqrt{y^2+9+6y+x^2}$$

Squaring all sides..

$$\therefore \quad 36 = y^2+9-6y+x^2 = y^2+9+6y+x^2$$

$$\cancel{y^2}+\cancel{9}-6y+\cancel{x^2} = \cancel{y^2}+\cancel{9}+6y+\cancel{x^2}$$

$$-6y-6y=0$$

$$-12y=0$$

$$y=0/-12$$

$$\boxed{y=0}$$

$$36 = y^2+9-6y+x^2$$

$$36 = 9+x^2$$

$$27 = x^2$$

$$\pm\sqrt{27} = x$$

$$\boxed{\pm 3\sqrt{3} = x}$$

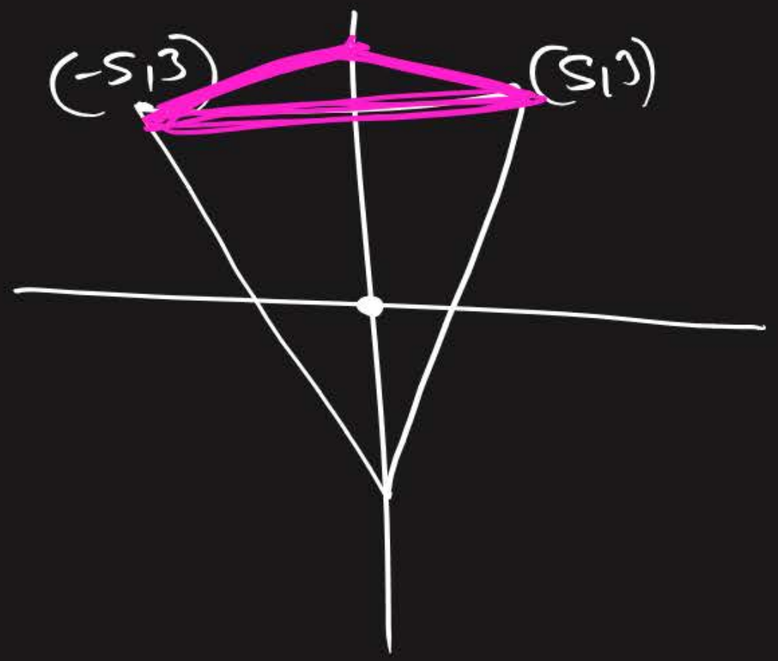
Ans: Coordinates of third vertex $(3\sqrt{3},0)$ or $(-3\sqrt{3},0)$.

#OT

#Q. If (–5, 3) and (5, 3) are two vertices of an equilateral triangle, then find the coordinates of third vertex, given that origin lies inside the triangle.
(Take $\sqrt{3} = 1.7$)

CBSE 2023

#Gph



$(0,-6), (0,6)$

#Q. Show that the points (a, a), $(-a, -a)$ and $(-\sqrt{3}a, \sqrt{3}a)$ are the vertices of an equilateral triangle. Also, find its area.

CBSE 2015

#GPH

Area of equilateral $\triangle = \frac{\sqrt{3}}{4}(\text{side})^2$

Homework From Questions Bank

Page 257 – 1

Page 260 – 6

Page 261 – 3

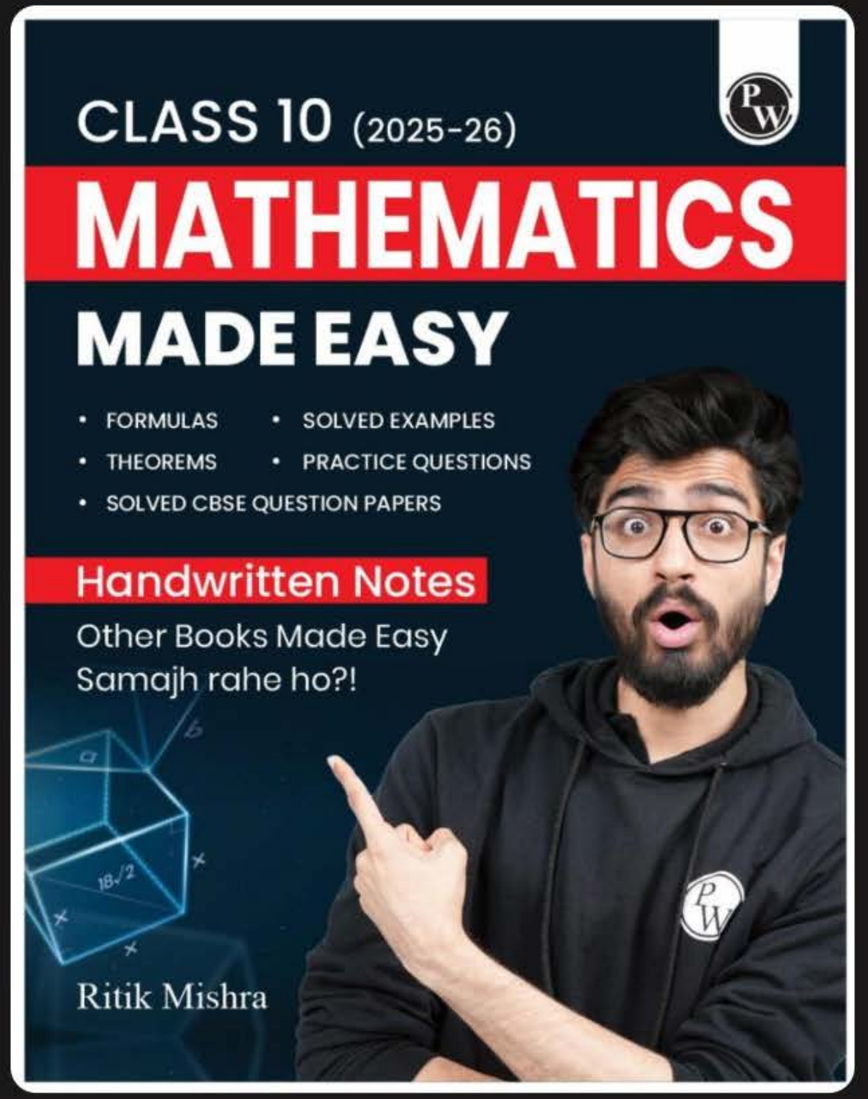
Page 262 – 4, 5, 6

Page 263 – 7

Page 264 – 6, 1, Case based 1

Page 265 – Case based 3

Trigonometry



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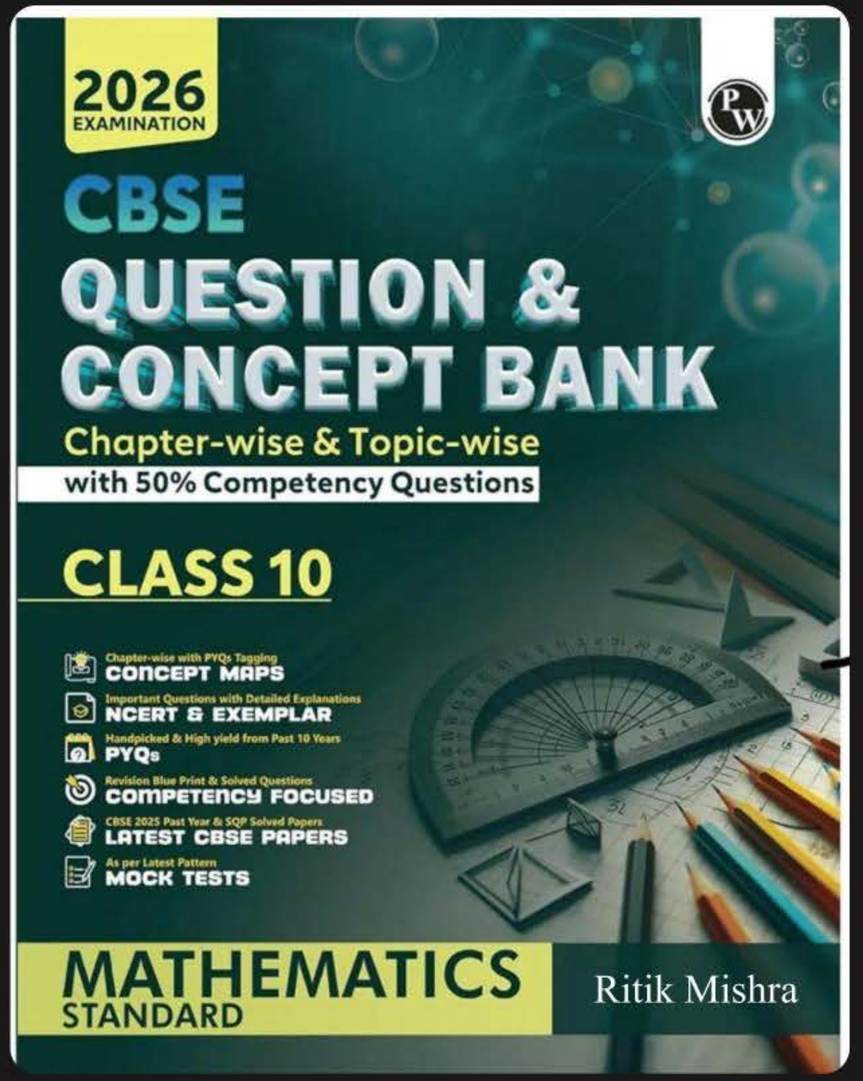


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