RS Aggarwal Solutions for Class 10 Maths Chapter 16 Exercise 16.3: The Physics Wallah academic team has produced a comprehensive answer for Chapter 16: Coordinate Geometry in the RS Aggarwal class 10 textbook. The RS Aggarwal class 10 solution for chapter 16 Coordinate Geometry Exercise-16C is uploaded for reference only; do not copy the solutions.

Before going through the solution of Chapter 16 Coordinate Geometry Exercise-16C, one must have a clear understanding of Chapter 16 Coordinate Geometry. Read the theory of chapter 16 Coordinate Geometry and then try to solve all numerical of exercise-16C. Complete the NCERT exercise questions and utilize them as a guide. You need assistance to get through the Class 10 Math questions in Physics Wallah NCERT solutions. Class 10 Math NCERT solutions were uploaded by Physics Wallah.

RS Aggarwal Solutions for Class 10 Maths Chapter 16 Exercise 16.3 Coordinate Geometry Overview

Chapter 16 of RS Aggarwal's Class 10 Maths textbook focuses on coordinate geometry, a branch of mathematics that deals with the study of geometric figures using the coordinate system. Exercise 16.3 specifically delves into the various concepts and applications of the coordinate plane, including the calculation of distances between points, the determination of the coordinates of a point dividing a line segment in a given ratio, and the finding of areas of triangles formed by given points.

By working through Exercise 16.3, students enhance their understanding of the spatial relationships between points in a plane and develop problem-solving skills essential for higher mathematics. The questions are designed to solidify the theoretical concepts of coordinate geometry through practical application, ensuring a comprehensive grasp of the topic.

RS Aggarwal Solutions for Class 10 Maths Chapter 16 Exercise 16.3

Below we have provided RS Aggarwal Solutions for Class 10 Maths Chapter 16 Exercise 16.3 for the ease of the students –

Question

Find the area of $\triangle ABC$ whose vertices are :

(i) A(1, 2), B (-2, 3) and C(-3, -4)

(ii) A (-5,7),B(-4, -5) and C(4,5)

(iii) A(3, 8), B(-4, 2) and C(5, -1)

(iv) A (10, -6),B (2,5) and C(-1, 3)

Solution

(i) A (1, 2), B (-2, 3) and C (-3, -4) are the vertices of ΔABC. Then

(x1=1,y1=2),(x2=−2,y2=3),(x3=−3,y3=−4)

Area of triangle ABC

=12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]=12[1(3−(−4))+(−2)(−4−2)+(−3)(2−3)]=12[1(3+4)−2(−6)−3(−1)]=12[7+12+3]=12[22]=11 sq.units

(ii) A(-5, 7), B(-4, -5) and C(4, 5)

A (-5, 7), B (-4, -5) and C (4, 5) are the vertices of ΔABC. Then

(x1=−5,y1=7),(x2=−4,y2=−5),(x3=4,y3=5)

Area of triangle ABC

=12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]=12[−5(−5−5)+(−4)(5−7)+4(7−(−5))]=12[−5(−10)−4(−2)+4(12)]=12[50+8+48]=12[106]=53 sq.units

(iii) A(3, 8), B(-4, 2) and C(5, -1)

A (3, 8), B (-4, 2) and C (5, -1) are the vertices of ΔABC. Then

(x1=3,y1=8),(x2=−4,y2=2),(x3=5,y3=−1)

Area of triangle ABC

=12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]=12[3(2–(−1))+(−4)(−1–8)+5(8–2))]=12[3(2+1)–4(−9)+5(6)]=12[9+36+30]=12[75]=37.5 sq.units

(iv) A(10, -6), B(2, 5) and C(-1, 3)

A (10, -6), B (2, 5) and C (-1, -3) are the vertices of ΔABC. Then

(x1=10,y1=−6),(x2=2,y2=5),(x3=−1,y3=3)

Area of triangle ABC

=12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]=12[10(5−3)+(2)(3−(−6))+(−1)(−6–5)]=12[10(2)+2(9)–1(11)]=12[20+18+11]=12[49]=24.5 sq.units

Question

Find the area of quadrilateral ABCD whose vertices are A(3, -1), B(9, -5), C(14, 0) and D(9, 19).

Solution

By joining A and C, we get two triangles ABC and ACD

Let A (3, -1), B (9, -5) and C (14, 0) and D (9, 19)

$(x_1=3, y_1=-1), (x_2=9, y_2=-5), (x_3=14, y_3=0), (x_4=9, y_4=19)$

Then

Area of triangle ABC

$=12(x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2))$

$=12\times(3(-5-0)+(9)(0+1)+(14)(-1+5))$

$=12\times(3(-5)+9(1)+14(4))$

$=12\times(-15+9+56)$

$=12\times(50)$

$= 25$ sq.units

Area of triangle ACD

$12\times(x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2))$

$=12\times(3(0-19)+(14)(19+(1))+(9)(-1-0)))$

$=12\times(3(-19)+14(20)+9(-1))$

$=12\times(-57+280-9)$

$=12\times(214)$

$= 107$ sq.units

So, the area of the quadrilateral is $25 + 107 = 132$ sq. units

Question

Find the area of quadrilateral PQRS whose vertices are P(-5, -3), Q(-4,-6), R(2,-3) and S(1,2).

Solution

By joining P and R, we get two triangles PQR and PRS

Let P (-5, -3), Q (- 4, – 6) and R (2, -3) and S (1, 2)

$(x1=-5,y1=-3),(x2=–4,y2=–6),(x3=2,y3=-3),(x4=1,y4=2)$

Then

Area of triangle PQR

$=12(x1(y2-y3)+x2(y3-y1)+x3(y1-y2))$

$=12\times(-5(-6+3)-4(-3+3)+2(-3+6))$

$=12\times(-5(-3)–4(0)+2(3))$

$=12\times(15–0+6)$

$=12\times(21)$

= 10.5 sq.units

Area of triangle PRS

$12\times(x1(y2-y3)+x2(y3-y1)+x3(y1-y2))$

$=12\times(-5(-3-2)+2(2+3)+1(-3+3))$

$=12\times(-5(-5)+2(5)+1(0))$

$=12\times(25+10+0)$

$=12\times(35)$

= 17.5 sq.units

So, the area of the quadrilateral is 10.5 + 17.5 = 28 sq. units

Question

If A(-7, 5), B(-6, -7), C (-3,-8) and D(2,3) are the vertices of a quadrilateral ABCD then find the area of the quadrilateral.

Solution

By joining A and C, we get two triangles ABC and ACD

Let A (-7,5), B (-6, -7) and C (-3, -8) and D (2, 3)

$(x_1=-7,y_1=5),(x_2=-6,y_2=-7),(x_3=-3,y_3=-8),(x_4=2,y_4=3)$

Then

Area of triangle ABC

$=12(x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2))$

$=12\times(-7(-7+8)-6(-8-5)-3(5+7))$

$=12\times(-7(1)-6(-13)-3(12))$

$=12\times(-7+78-36)$

$=12\times(35)$

= 17.5 sq.units

Area of triangle ACD

$=12\times(x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2))$

$=12\times(-7(-8-3)-3(3-5)+2(5+8))$

$=12\times(-7(-11)-3(-2)+2(13))$

$=12\times(74+6+26)$

$=12\times(106)$

= 53 sq.units

So, the area of the quadrilateral is 53+ 17.5 = 70.5 sq. units

Question

Find the area of △ABC with A(1, -4) and midpoints of sides through A being (2, -1) and (0, -1)

Solution

Let x_2,y_2 and x_3,y_3 be the co-ordinates of B and C respectively.

Since, the co-ordinates of A (1, -4) hence let us name midpoint of AB be D = x_2,y_2 and midpoint of AC be E= x_3,y_3 .

Now D (2,−1)=(1+x2)2, (1+y2)2

→ 2 =(1+x2)2,

→4=1+x2

→3=x2

→x2=3

Again −1=(−4+y2)2

−4+y2=−2

→y2=−2+4=2

Similarly Now E 0,−1

→0=(1+x3)2

→0=−1+x3

→−1=x3

→x3=−1

From E 0,−1

-1=(−4+y3)2

→y3=2

Let A {x1,y1)=A(1,−4)
Let B {x2,y2)=B(3,2)
Let C {x3,y3)=C(−1,2)

Now

Area of △ABC

=12[(x1(y2−y3)]+[x2(y3−y1]+[x3(y1−y2)]

= 12×[1(2–2)+3(2+4)−1(−4–2)]

= 12×[1(0)+3(6)−1(−6)]

= 12×[0+18+6]

= 12×[24]

= 12 sq.unit

Thus, Area of △ABC = 12 sq.units

Question

(i) If the vertices of △ABC be A(1, -3), B(4, p) and C(-9, 7) and its area is 15 square units, find the values of p.

(ii) The area of a triangle is 5 sq units. Two of its vertices are (2, 1) and (3, -2). If the third vertex is (72,y), find the value of y.

Solution

(i)
Let A(x1,y1)=A(1,−3),
B(x2,y2)=B(4,p) and
C(x3,y3)=C(−9,7).

Now

Area(ΔABC=12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]⇒15=12[1(p–7)+4(7+3)–9(−3−p)]⇒15=12[10p+60]⇒|10p+60|=30⇒10p+60=−30 or 30⇒10p=−90 or −30⇒p=−9 or −3

Hence, p = -9 or p = -3

(ii)
Let A(x1,y1)=A((2,1)),
B(x2,y2)=B(3,−2) and
C(x3,y3)=C(72,y).

Now

Area(ΔABC=12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]⇒5=12[2(−2−y)+3(y−1)+72(1+2)]⇒5=12[−4−2y+3y−3+212]⇒10=[y−7212]⇒10=|2y−14+212|⇒10=|2y+72|⇒20=|2y+7|⇒20=2y+7 or −20=2y+7⇒2y=20−7 or 2y=−20−7⇒2y=13 or 2y=−27⇒y=132 or y=−272

Question

The are of △ABC with vertices A(a, 0), O(0, 0) and B(0, b) in square units is

(a) ab (b) 12ab (c) 12a2b2 (d) 12b2

Solution

A (a , 0), O (0 , 0) and B (0 , b) are the vertices of ΔABC. Then

(x1=a,y1=0),(x2=0,y2=0),(x3=0,y3=b)

Area of triangle ABC

= 12[x1(y2−y3)+x2(y3−y1)+x3(y1−y2)]

= 12[a(0−b)+0(b−0)+0(0−0)]

= 12[a(−b)]

= |12[a(−b)]|

= 12ab

answer :- (b) 12ab

Question

If P (a2,4)is the midpoint of the line segment joining the points A (-6, 5) and B(-2, 3) then the value of a is

(a) -8 (b) 3 (c) -4 (d) 4

Solution

Question

Find the coordinates of point A, where AB is the diameter of a circle whose centre is (2, – 3) and B is (1, 4).

Solution:

Let the coordinates of point A be (x, y).

Mid-point of AB is (2, – 3), which is the centre of the circle.

Coordinate of B = (1, 4)

$(2, -3) = ((x+1)/2 , (y+4)/2)$

$(x+1)/2 = 2$ and $(y+4)/2 = -3$

$x + 1 = 4$ and $y + 4 = -6$

$x = 3$ and $y = -10$

The coordinates of A(3,-10).

Question

If the point A (x, 2) is equidistant from the points B(8, -2) and C(2, -2) find the value of x. Also, find the length of AB.

Solution

As per the question, we have
AB=AC
√x−8)2+(2+2)2=√(x−2)2+(2+2)2

√x2+64−16×x+16=√x2+4−4×x+16

√x2−16×x+80=√x2−4×x+20

squaring both sides we get
x2−16x+80=x2−4x+2080-20=-4x+16x
80-20=-4x+16x
x=5
AB=√(x−8)2+(2+2)2
√(5−8)2+(4)2
=√9+16=√25 = \pm5 \)

hence AB=5

Question

Determine the ratio in which the line 2x + y – 4 = 0 divides the line segment joining the points A(2, –2) and B(3, 7).

Solution

Consider line 2x + y – 4 = 0 divides line AB joined by the two points A(2, -2) and B(3, 7) in k:1 ratio.

Coordinates of point of division can be given as follows:

x = (2 + 3k)/(k + 1) and y = (-2 + 7k)/(k + 1)

Substituting the values of x and y given equation, i.e. 2x + y – 4 = 0, we have

2{(2 + 3k)/(k + 1)} + {(-2 + 7k)/(k + 1)} – 4 = 0

(4 + 6k)/(k + 1) + (-2 + 7k)/(k + 1) = 4

4 + 6k – 2 + 7k = 4(k+1)

$-2 + 9k = 0$

Or $k = 2/9$

Hence, the ratio is 2:9.

Question

Find the centre of a circle passing through points (6, -6), (3, -7) and (3, 3).

Solution

Let A = (6, -6), B = (3, -7), and C = (3, 3) are the points on a circle.

If O is the centre, then OA = OB = OC (radii are equal)

If O = (x, y), then

$OA = \sqrt{[(x - 6)^2 + (y + 6)^2]}$

$OB = \sqrt{[(x - 3)^2 + (y + 7)^2]}$

$OC = \sqrt{[(x - 3)^2 + (y - 3)^2]}$

Choose: OA = OB, we have

After simplifying above, we get $-6x = 2y - 14$ ….(1)

Similarly, OB = OC

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

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

$y^2 + 14y + 49 = y^2 - 6y + 9$

$20y = -40$

or $y = -2$

Substituting the value of y in equation (1), we get

$-6x = 2y - 14$

$-6x = -4 - 14 = -18$

$x = 3$

Hence, the centre of the circle is located at point (3,-2).

Question

Find the ratio in which the line segment joining the points (-3, 10) and (6, – 8) is divided by (-1, 6).

Solution:

Consider the ratio in which the line segment joining (-3, 10) and (6, -8) is divided by point (-1, 6) be k :1.

Therefore, -1 = (6*k*-3)/(*k*+1)

–*k* – 1 = 6*k* -3

7*k* = 2

k = 2/7

Therefore, the required ratio is 2: 7.

Question

In each of the following, find the value of 'k', for which the points are collinear.

(i) (7, -2), (5, 1), (3, -k)

(ii) (8, 1), (k, -4), (2, -5)

Solution:

(i) For collinear points, the area of triangle formed by them is always zero.

Let points (7, -2), (5, 1), and (3, k) are vertices of a triangle.

Area of triangle = 1/2 [7 { 1- k} + 5(k-(-2)) + 3{(-2) – 1}] = 0

7 – 7k + 5k +10 -9 = 0

-2k + 8 = 0

k = 4

(ii) For collinear points, the area of triangle formed by them is zero.

Therefore, for points (8, 1), (k, – 4), and (2, – 5), area = 0

1/2 [8 { -4- (-5)} + k{(-5)-(1)} + 2{1 -(-4)}] = 0

8 – 6k + 10 = 0

6k = 18

k = 3

Question

Find the area of the triangle whose vertices are:

(i) (2, 3), (-1, 0), (2, -4)

(ii) (-5, -1), (3, -5), (5, 2)

Solution:

Area of a triangle formula = 1/2 × $[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

(i) Here,

$x_1 = 2$, $x_2 = -1$, $x_3 = 2$, $y_1 = 3$, $y_2 = 0$ and $y_3 = -4$

Substitute all the values in the above formula, we get

Area of triangle = 1/2 [2 {0- (-4)} + (-1) {(-4) – (3)} + 2 (3 – 0)]

= 1/2 {8 + 7 + 6}

= 21/2

So, the area of the triangle is 21/2 square units.

(ii) Here,

$x_1 = -5$, $x_2 = 3$, $x_3 = 5$, $y_1 = -1$, $y_2 = -5$ and $y_3 = 2$

Area of the triangle = 1/2 [-5 { (-5)- (2)} + 3(2-(-1)) + 5{-1 – (-5)}]

= 1/2{35 + 9 + 20} = 32

Therefore, the area of the triangle is 32 square units.

Benefits of RS Aggarwal Solutions for Class 10 Maths Chapter 16 Exercise 16.3

The RS Aggarwal Solutions for Class 10 Maths Chapter 16 Exercise 16.3 offer numerous benefits to students studying coordinate geometry:

Conceptual Clarity: The solutions provide step-by-step explanations for each problem, helping students understand the fundamental concepts of coordinate geometry such as the distance formula, section formula, and area of triangles.

Enhanced Problem-Solving Skills: By working through various types of problems, students can develop strong problem-solving skills. The solutions illustrate different methods to approach and solve coordinate geometry problems, making students adept at tackling similar questions in exams.

Time Management: With clear and concise solutions, students can learn to solve problems more efficiently, improving their time management skills during exams.

Accuracy: The solutions ensure that students follow the correct procedures and calculations, reducing errors and increasing accuracy in their work.

Confidence Building: Regular practice with accurate solutions builds confidence in students, as they can verify their answers and understand their mistakes, leading to improved performance in tests and exams.