



## MATHS

### BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

#### COORDINATE SYSTEM (2D)

#### Solved Examples

1. If  $(2, -2)$  and  $(5, 2)$  are the opposite ends of a square, then the length of the side of the square is

A. 5

B.  $\sqrt{5}$

C.  $5\sqrt{2}$

D.  $5/\sqrt{2}$

**Answer: D**



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2. If  $A(2, 2)$ ,  $B(6, 3)$  and  $C(4, 11)$  are vertices of a triangle  $ABC$  and  $D, E$  are the midpoints of  $\overline{BC}$  and  $\overline{CA}$  respectively, then the length of  $\overline{DE}$  is

A. 4

B.  $\sqrt{17}$

C.  $\frac{\sqrt{17}}{2}$

D.  $\frac{\sqrt{18}}{2}$

**Answer: C**



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3. If  $A, B, C$  are collinear points such that  $A = (3, 4)$ ,  $B = (7, 7)$  and  $AC = 10$  then  $C =$

A.  $(5, 2)$

B.  $(-5, 2)$

C.  $(-5, -2)$

D.  $(5, -2)$

**Answer: C**



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## Exercise 1

1. The distance between the points  $(\tan \alpha, 1)$ ,  $(0, 2)$  is

A.  $|\tan \alpha|$

B.  $|\sec \alpha|$

C.  $|\cos \alpha|$

D.  $|\sin \alpha|$

**Answer: B**



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## Exercise 2

1. The distance between the points  $(\cos \theta, \sin \theta)$ ,  $(-\sin \theta, \cos \theta)$  is

A. 1

B. 2

C.  $\sqrt{2}$

D.  $\sqrt{6}$

**Answer: C**



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## Exercise 3

1. If  $\pi/2 < \theta < \pi$  then the distance between the points  $(\cot \theta, 3)$ ,  $(0, 2)$  is

- A.  $\sec \theta$
- B.  $\operatorname{cosec} \theta$
- C.  $-\sec \theta$
- D.  $-\operatorname{cosec} \theta$

**Answer: B**



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#### Exercise 4

1. If the distance between the points  $(a, 2)$  and  $(3, 4)$  is 8 then  $a =$

- A.  $\sqrt{60}$
- B.  $-\sqrt{60}$

C. 3

D.  $3 \pm \sqrt{60}$

**Answer: D**



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### Exercise 5

1. If the distance between the points  $(a \cos \theta, a \sin \theta)$  and  $(a \cos \phi, a \sin \phi)$  is  $2a$ ,  $\theta =$

A.  $2n\pi \pm \pi + \phi, n \in \mathbb{Z}$

B.  $n\pi + \frac{\pi}{2} + \phi, n \in \mathbb{Z}$

C.  $n\pi - \phi, n \in \mathbb{Z}$

D.  $2n\pi + \phi, n \in \mathbb{Z}$

**Answer: A**





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## Exercise 6

1. A line is of length 10 unit and one end is at  $(2, -3)$ . If the abscissa of the other end is 10. Then its ordinate is

A. 9

B. 3

C. -3

D. 6

**Answer: B**



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## Exercise 7

1. The distance between two points is 5. One of them is (3, 2) and the ordinate of the second is -1 then its x coordinates are

A. 7, - 1

B. - 7, 1

C. - 7, - 1

D. 7, 1

**Answer: A**



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## Exercise 8

1. If the distance between the points  $(a \cos 48^\circ, 0)$  and  $(0, a \cos 12^\circ)$  is  $d$  then  $d^2 - a^2 =$

A.  $a^2(\sqrt{5} - 1) / 4$



B.  $a^2(\sqrt{5} + 1) / 4$

C.  $a(\sqrt{5} - 1) / 8$

D.  $a^2(\sqrt{5} + 1) / 8$

**Answer: D**



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### Exercise 9

1. If  $A = (at^2, 2at)$ ,  $B = \left(\frac{a}{t^2}, -\frac{2a}{t}\right)$ ,  $S(a, 0)$  then  $\frac{1}{SA} + \frac{1}{SB} =$

A.  $a$

B.  $1/a$

C.  $2/a$

D.  $2a/3$

**Answer: B**



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## Exercise 10

1. The point on Y- axis which is equidistant from  $(6, -1)$  and  $(2, 3)$  is

A.  $(0, -1)$

B.  $(0, 1)$

C.  $(0, -3)$

D.  $(0, 3)$

**Answer: C**



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## Exercise 11

1. The points  $(2, -2)$ ,  $(-1, 2)$ ,  $(3, 5)$  are the vertices of

- A. equilateral triangle
- B. isosceles triangle
- C. right angled triangle
- D. right angled isosceles triangle

**Answer: D**



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## Exercise 12

1. The points  $(2, 4)$ ,  $(2, 6)$ ,  $(2 + \sqrt{3}, 5)$  are the vertices of

- A. equilateral triangle
- B. isosceles triangle
- C. right angled triangle

D. right angled isosceles triangle

**Answer: A**



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### Exercise 13

1. The points  $(7, 9)$ ,  $(3, -7)$ ,  $(-3, 3)$  are the vertices of

- A. equilateral triangle
- B. isosceles triangle
- C. right angled triangle
- D. right angled isosceles triangle

**Answer: D**



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## Exercise 14

1. The three points  $(2, -4)$ ,  $(4, -2)$ ,  $(7, 1)$

- A. are collinear
- B. form an equilateral triangle
- C. form a right angled triangle
- D. form an isosceles triangle

**Answer: A**



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## Exercise 15

1. If  $x_1, x_2, x_3$  are in A.P. and  $y_1, y_2, y_3$  are in A.P. then the points  $(x_1, y_1)$ ,  $(x_2, y_2)$ ,  $(x_3, y_3)$

A. form a right angled triangle

B. form an equilateral triangle

C. form an isosceles triangle

D. are collinear

**Answer: D**

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## Exercise 16

1. If  $A(5, 3)$ ,  $B(11, -5)$ ,  $P(12, \lambda)$  and  $\angle APB = 90^\circ$ , then  $\lambda =$

A. 2 or 3

B. 3 or 4

C. 2 or -4

D. 3 or -2

**Answer: C**



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### Exercise 17

1. If the points  $(0, 0)$ ,  $(3, \sqrt{3})$ ,  $(x, y)$  form an equilateral triangle, then  $(x, y) =$

A.  $(0, 2\sqrt{3})$ ,  $(3, -\sqrt{3})$

B.  $(1, 2\sqrt{3})$ ,  $(3, \sqrt{3})$

C.  $(1, \sqrt{3})$ ,  $(3, -\sqrt{3})$

D. none

**Answer: A**



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## Exercise 18

1. If  $(3, 2)$ ,  $(-3, 2)$ ,  $(0, h)$  are the vertices of an equilateral triangle and  $h < 0$  then the value of  $h$  is

A.  $2 - \sqrt{3}$

B.  $2 - 2\sqrt{3}$

C.  $2 - 3\sqrt{3}$

D.  $3 - 2\sqrt{3}$

**Answer: C**



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## Exercise 19

1. If  $(2, 4)$ ,  $(2, 6)$  are two vertices of an equilateral triangle then the third vertex is



A.  $(2 + \sqrt{3}, 5)$

B.  $(\sqrt{3} - 2, 5)$

C.  $(5, 2 + \sqrt{3})$

D.  $(5, 2 - \sqrt{3})$

**Answer: A**



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## Exercise 20

1. If  $(2, 4)$ ,  $(4, 2)$  are extremities of the hypotenuse of a right angled isosceles triangle, then the third vertex is

A.  $(2, 2)$  or  $(4, 4)$

B.  $(3, 3)$  or  $(4, 4)$

C.  $(2, 2)$  or  $(3, 3)$

D.  $(2, 3)$  or  $(3, 2)$

**Answer: A**



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## Exercise 21

1. If ABC is an isosceles triangle where  $B = (1, 3)$  and  $C = (-2, 7)$  then  $A =$

A.  $(5/6, 6)$

B.  $(6, 5/6)$

C.  $(7, 1/8)$

D. none

**Answer: A**



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## Exercise 22

1. If  $A(x, 4)$ ,  $B(1, -2)$ ,  $C(-3, 4)$  form an isosceles triangle with vertex at B then

$x =$

A. 3

B. -5

C. 3 or -5

D. 5 or -3

**Answer: D**



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### Exercise 23

1. If O is the origin and if  $A(x_1, y_1)$ ,  $B(x_2, y_2)$  are two points then

$OA \cdot OB \cdot \cos \angle AOB =$

A.  $x_1^2 + y_1^2$

B.  $x_1y_2 + x_2y_1$

C.  $x_1x_2 + y_1y_2$

D.  $x_1y_2 - x_2y_1$

**Answer: C**



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## Exercise 24

1. If  $O$  is the origin and  $P = (2, 3)$ ,  $Q = (4, 5)$  then  $OP \cdot OQ \cos \angle POQ =$

A. 8

B. 15

C. 22

D. 23

**Answer: D**



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## Exercise 25

1. If  $O$  is the origin and  $A(x_1, y_1), B(x_2, y_2)$  are two points then  
 $OA \cdot OB \cdot \sin \angle AOB =$

A.  $x_1^2 + y_1^2 - x_2^2 - y_2^2$

B.  $x_1x_2 + y_1y_2$

C.  $x_1y_2 + x_2y_1$

D.  $|x_1y_2 - x_2y_1|$

**Answer: D**



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## Exercise 26

1. If  $A = (1, 1)$ ,  $B(4, 5)$  and  $C(6, 13)$  then  $\cos A =$

A.  $64/63$

B.  $63/65$

C.  $56/36$

D.  $36/56$

**Answer: B**



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## Exercise 27

1. If the vertices of a triangle A, B, C are  $A(0, 0)$ ,  $B(2, 1)$ ,  $C(9, -2)$  then  $\cos B =$

A.  $\frac{16}{5\sqrt{17}}$

B.  $\frac{11}{\sqrt{290}}$

C.  $\frac{16}{5\sqrt{7}}$

D.  $\frac{-11}{\sqrt{290}}$

**Answer: D**



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## Exercise 28

1. The points  $(2, 5)$ ,  $(0, 3)$ ,  $(2, 1)$ ,  $(4, 3)$  taken in order, form

A. parallelogram

B. rectangle

C. rhombus

D. square

**Answer: D**



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## Exercise 29

1. The points  $(7, 1)$ ,  $(4, 4)$ ,  $(-2, -2)$ ,  $(1, -5)$  taken in order, form

A. parallelogram

B. rectangle

C. rhombus

D. square

**Answer: B**



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## Exercise 30

1. The points  $(7, 8)$ ,  $(1, 6)$ ,  $(-1, 0)$ ,  $(5, 2)$  taken in order, form



A. parallelogram

B. rectangle

C. rhombus

D. square

**Answer: C**



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### Exercise 31

1. The points  $(-5, 12)$ ,  $(-2, -3)$ ,  $(9, -10)$ ,  $(6, 5)$  taken in order, form

A. parallelogram

B. rectangle

C. rhombus

D. square

**Answer: A**



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### Exercise 32

1. find the centroid of the triangle  $(-a, -b), (a, b), (a^3, ab)$

A.  $\frac{a^3}{3}, \frac{ab}{3}$

B.  $\frac{a + a^2}{3}, \frac{ab}{3}$

C. 0

D.  $-\frac{a^3}{3}, \frac{-ab}{3}$

**Answer: A**



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### Exercise 33

1. If the distance of  $(4, 0)$  from  $(a, b)$  is double the distance between point  $(0,0)$  and  $(a, b)$ , then the relation between  $a$  and  $b$  is



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### Exercise 34

1. The midpoint of a line segment is  $(-4, -2)$ . If  $(-6, 4)$  is one end then the other end is

- A.  $(2, 8)$
- B.  $(-2, 8)$
- C.  $(2, -8)$
- D.  $(-2, -8)$

**Answer: D**



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## Exercise 35

1. If  $A(3, -4)$ ,  $B(7, 2)$  are the ends of a diameter of a circle and  $C(3, 2)$  is a point on the circle, then the orthocentre of the  $\triangle ABC$  is

A.  $(3, -4)$

B.  $(7, 2)$

C.  $(5, -1)$

D.  $(0, 0)$

**Answer: C**



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## Exercise 36

1. If the midpoint of the line joining  $(x, y + 1)$  and  $(x + 1, y + 2)$  is  $(3/2, 5/2)$  then the midpoint of the line joining

$(x - 1, y + 1), (x + 1, y - 1)$  is

A.  $(-1, -1)$

B.  $(-1, 1)$

C.  $(1, -1)$

D.  $(1, 1)$

**Answer: D**



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### Exercise 37

1. The points which divide internally and externally the line segment joining the points  $(1, 7), (6, -3)$  in the ratio  $2 : 3$  are

A.  $(3, 3) (15, 15)$

B.  $(3, 3), (-15, -15)$

C.  $(3, 3), (-9, 27)$

D.  $(-3, -3), (9, 27)$

**Answer: C**



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### Exercise 38

1. The points of trisection of the line segment joining  $(-5, 2), (3, 6)$  are

A.  $(27/5, 7/5), (15, 23)$

B.  $(-7/3, 10/3), (1/3, 14/3)$

C.  $(-1, 24/7), (-23/3, -4/3)$

D.  $(3, 1), (0, 5)$

**Answer: B**



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## Exercise 39

1. The coordinates of the point that is two thirds away from  $(-4, 3)$  to  $(5, 7)$  is

A.  $(-2, 29/5)$

B.  $(7/5, 27/5)$

C.  $(2, 17/3)$

D. none

**Answer: C**



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## Exercise 40

1. If A, B, C are collinear points such that  $A = (3, 4)$ ,  $B = (7, 7)$  and  $AC = 10$  then C =

A. (5, 2)

B. (5, -2)

C. (-5, 2)

D. (-5, -2)

**Answer: D**



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## Exercise 41

1. If  $(2, -3)$ ,  $(-2, 1)$  are the points of trisection of A, B then A and B are

A.  $(6, -7)$ ,  $(-6, 5)$

B.  $(6, -7)$ ,  $(-6, 4)$



C. (5, -7), (-6, 4)

D. (5, -7), (-6, 5)

**Answer: A**



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## Exercise 42

1. The point which divides the line segment joining  $(a + b, a - b)$ ,  $(a - b, a + b)$  in the ratio  $a : b$  externally is

A.  $\left( \frac{a^2 - 2ab - b^2}{a - b}, \frac{a^2 + b^2}{a - b} \right)$

B.  $\left( \frac{a^2 + 2ab - b^2}{a - b}, \frac{a^2 + b^2}{a - b} \right)$

C.  $\left( \frac{a^2 + 2ab + b^2}{a - b}, \frac{(a + b)^2}{a - b} \right)$

D. none

**Answer: A**



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### Exercise 43

1. The fourth vertex of the rectangle whose other vertices are  $(4, 1)$ ,  $(7, 4)$   $(13, -2)$  is

- A.  $(10, -5)$
- B.  $(10, 5)$
- C.  $(-10, 5)$
- D.  $(-10, -5)$

**Answer: A**



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### Exercise 44

1. The fourth vertex of the square whose consecutive vertices are  $(2, 1)$ ,  $(4, 3)$ ,  $(-2, 5)$  is

A.  $(2, -2)$

B.  $(17, 13)$

C.  $(-4, 3)$

D.  $(6, 9)$

**Answer: C**



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## Exercise 45

1. The extremities of a diagonal of a parallelogram are the points  $(3, -4)$  and  $(-6, 5)$ . If the third vertex is  $(-2, 1)$  then the fourth vertex is

A.  $(1, 0)$

B.  $(-1, 0)$

C.  $(1, 1)$

D.  $(-1, -1)$

**Answer: B**



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## Exercise 46

1. Taking AB, AD as axes, the coordinates of the point C when ABCD is a square of side  $a$  is

A.  $(a, a)$

B.  $(1, 2a)$

C.  $(2a, 2a)$

D. none

**Answer: A**



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## Exercise 47

1. Taking AB, AD as axes, the coordinates of the point C when ABCD is a rectangle of sides a and b is

- A.  $(a, b)$
- B.  $(a, 2b)$
- C.  $(2a, b)$
- D. none

**Answer: A**



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## Exercise 48

1. ABCD is a square of side  $2a$ . Taking the centre of the square as origin and axes parallel to the sides AB and AD. The coordinates of the vertices of the square are

- A.  $(a, a), (a, 0), (-a, a), (a, -a)$
- B.  $(a, a), (a, -a), (-a, -a), (-a, a)$
- C.  $(a, 0), (a, a), (-a, -a), (-a, a)$
- D. none

**Answer: B**



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## Exercise 49

1. Two opposite vertices of a square are  $(1, -2)$  and  $(-5, 6)$  then the length of the side is



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### Exercise 50

1. A square has two opposite vertices at the points  $(2, 3)$  and  $(4, 1)$ . The length of the side is

A. 0

B. 1

C. 3

D. 2

**Answer: D**



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## Exercise 51

1. If  $(2,1)$ ,  $(-2, 5)$  are two opposite vertices of square then the area of the square is

- A. 4
- B. 12
- C. 16
- D. 36

**Answer: C**



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## Exercise 52

1. ABCD is a rectangle. If  $A = (2, 3)$ ,  $C = (8, 11)$  and BD is parallel to y-axis then B and D are



A.  $(5, 12), (5, 2)$

B.  $(3, 9), (3, 2)$

C.  $(7, 5), (7, 15)$

D.  $(12, 5), (2, 5)$

**Answer: A**



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## Exercise 53

1. The centre of the circle passing through  $(2, 3), (5, 3), (5, -1), (2, -1)$  is

A.  $(2, -1)$

B.  $(5, -1)$

C.  $(2, 3)$

D.  $(7/2, 1)$

**Answer: D**



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## Exercise 54

1. x-axis divides the line segment joining  $(2, -3)$ ,  $(5, 7)$  in the ratio

A. 1 : 2

B. 3 : 7

C. 4 : 5

D. 3 : 4

**Answer: B**



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## Exercise 55

1. y-axis divides the line segment joining  $(3, 5)$ ,  $(-4, 7)$  in the ratio

A. 1 : 2

B. 3 : 7

C. 4 : 5

D. 3 : 4

**Answer: D**



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## Exercise 56

1. The ratio in which  $(2, 3)$  divides the line segment joining  $(4, 8)$ ,  $(-2, -7)$  is

A. 2 : 1 externally

B. 2 : 3

C. 4 : 3 externally

D. 1:2

**Answer: D**



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## Exercise 57

1. The harmonic conjugate of  $(7, 5)$  w.r.t  $(4, 2), (9, 7)$  is

A.  $(2, 5)$

B.  $(-3, 2)$

C.  $(-8, -14)$

D.  $(19, 17)$

**Answer: D**



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## Exercise 58

1. If  $Q$  is the harmonic conjugate of  $P$  w.r.t.  $A, B$  and  $AP = 2$ ,  $AQ = 6$  then  $AB =$

A. 5

B. 1

C. 3

D. 2

**Answer: C**



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## Exercise 59

1. If  $A$  and  $B$  are the points  $(-3, 4)$ ,  $(2, 1)$  then the coordinates of point  $C$  on  $AB$  produced such that  $AC = 2BC$  are

A. (2, 4)

B. (3, 7)

C. (7, -2)

D.  $(-1/2, 5/2)$

**Answer: C**



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## Exercise 60

1.  $P = (-5, 4)$  and  $Q = (-2, -3)$ . If  $\overline{PQ}$  is produced to R such that P divides  $\overline{QR}$  externally in the ratio 1 : 2, then R is

A. (1, 10)

B. (1, -10)

C. (10, 1)

D. (2, -10)

**Answer: B**



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## Exercise 61

1. P and Q are points on the line joining A(-2, 5), B(3, -1) such that  $AP = PQ = QB$ . Then the mid point of PQ is

A.  $(1/2, 2)$

B.  $(-1/2, 4)$

C.  $(2, 3)$

D.  $(1, 4)$

**Answer: A**



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## Exercise 62

1. If P, Q are the points of trisection of A(1, -2), B(-5, 6) then PQ =

A. 10

B. 5

C.  $10/3$

D.  $5/2$

**Answer: C**



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## Exercise 63

1. If P(-1, 4), Q(11, -8) divide AB harmonically in the ratio 3:2 then A, B in order are



A.  $(-4, 7), (1, 2)$

B.  $(1, 2), (-4, 7)$

C.  $(7, -4), (2, 1)$

D.  $(2, 1), (7, -4)$

**Answer: A**



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## Exercise 64

1. If  $A = (1, -1), B = (-1, 3), C = (5, 1)$  then the length of the median through A is

A.  $3\sqrt{2}$

B.  $2\sqrt{3}$

C.  $\sqrt{10}$

D. 2

Answer: C



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### Exercise 65

1.  $A(a, b)$  and  $B(0, 0)$  are two fixed points.  $M_1$  is the mid point of  $AB$ .  $M_2$  is the midpoint of  $\overline{AM_1}$ ,  $M_3$  is the midpoint of  $\overline{AM_2}$  and so on. Then  $M_5$  is

A.  $\left(\frac{7a}{8}, \frac{7b}{8}\right)$

B.  $\left(\frac{15a}{16}, \frac{15b}{16}\right)$

C.  $\left(\frac{31b}{32}, \frac{31b}{32}\right)$

D.  $\left(\frac{63a}{64}, \frac{63b}{64}\right)$

Answer: C



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## Exercise 66

1. The point whose coordinates are  $x = x_1 + t(x_2 - x_1)$ ,  $y = y_1 + t(y_2 - y_1)$  divides the join of  $(x, y)$  and  $(x_2, y_2)$  in the ratio

A.  $\frac{t}{1+t}$

B.  $\frac{1+t}{t}$

C.  $\frac{t}{1-t}$

D.  $\frac{1-t}{t}$

**Answer: C**



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## Exercise 67

1. If the point  $(x_1 + t[x_2 - x_1], y_1 + t[y_2 - y_1])$  divides the join of  $(x_1, y_1)$  and  $(x_2, y_2)$  internally, then

A.  $t < 0$

B.  $0 < t < 1$

C.  $t > 1$

D.  $t = 1$

**Answer: B**



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## Exercise 68

1. Midpoints of the sides AB and AC of  $\triangle ABC$  are  $(-3, 5)$  and  $(-3, -3)$  respectively, then the length of BC =

A. 10

B. 15

C. 16

D. 30

**Answer: C**



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## Exercise 69

1.  $A = (2, 2)$ ,  $B = (6, 3)$ ,  $C(4, 1)$  are the vertices of a triangle. If  $D$ ,  $E$  are the midpoints of  $BC$ ,  $CA$  then  $DE =$

A.  $\sqrt{17}$

B.  $\frac{1}{2}\sqrt{17}$

C.  $2\sqrt{17}$

D. none

**Answer: B**



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## Exercise 70

1. If the midpoint of the sides  $\overline{BC}$ ,  $\overline{CA}$ ,  $\overline{AB}$  of  $\triangle ABC$  are  $(3, -3)$ ,  $(3, -1)$ ,  $(1, 1)$  respectively then the vertices A, B, C are

A.  $A(1, 3)$ ,  $B(1, -1)$ ,  $C(5, -5)$

B.  $A(1, -3)$ ,  $B(1, -1)$ ,  $C(5, -5)$

C.  $A(1, 3)$ ,  $B(1, -1)$ ,  $C(5, 5)$

D.  $A(1, 3)$ ,  $B(1, 1)$ ,  $C(5, -5)$

**Answer: A**



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## Exercise 71

1. The points D, E, F are the midpoints of the sides  $\overline{BC}$ ,  $\overline{CA}$ ,  $\overline{AB}$  of  $\triangle ABC$  respectively. If  $A = (-2, 3)$ ,  $D = (1, -4)$ ,  $E = (-5, 2)$ , then  $F =$

- A. (4, 3)
- B. (4, -3)
- C. (-4, 3)
- D. (-4, -3)

**Answer: B**



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## Exercise 72

1. If  $A = (3, -4)$  and the midpoints of  $AB$ ,  $AC$  are  $(2, -1)$ ,  $(4, -5)$  respectively then the midpoint of  $BC$  is

A. (1, 2)

B. (3, -2)

C. (-1, 2)

D. (0, -3)

**Answer: B**



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## Exercise 73

1. The centroid of the triangle formed by (7, 4), (4, -6), (-5, 2) is

A. (2, 3)

B. (2, -3)

C. (2, -1)

D. (2, 0)



**Answer: D**



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## Exercise 74

1. If the centroid of the triangle whose vertices are  $(2, 4)$ ,  $(3, k)$  and  $(4, 2)$  is  $(k, 3)$  then  $k =$

A. 1

B. 2

C. 3

D. 4

**Answer: C**



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## Exercise 75

1. The centroid of a triangle is  $(2, 3)$  and two of its vertices are  $(5, 6)$  and  $(-1, 4)$ . The third vertex of the triangle is

A.  $(2, 1)$

B.  $(2, -1)$

C.  $(1, 2)$

D.  $(1, -2)$

**Answer: B**



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## Exercise 76

1. If  $G$  is the centroid of  $\triangle ABC$ , then  $\frac{AG^2 + BG^2 + CG^2}{AB^2 + BC^2 + CA^2} =$

A. 1

B. 3

C.  $\frac{1}{3}$

D. -1

**Answer: C**



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## Exercise 77

1. If a vertex of a triangle is  $(1, 1)$  and the midpoints of two sides through this vertex are  $(-1, 2)$  and  $(3, 2)$ , then the centroid of the triangle is

A.  $\left(-1, \frac{7}{3}\right)$

B.  $\left(\frac{-1}{3}, \frac{7}{3}\right)$

C.  $\left(1, \frac{7}{3}\right)$

D.  $\left(\frac{1}{3}, \frac{7}{3}\right)$

**Answer: C**



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## Exercise 78

1. The sum of the squares of the sides of a triangle is 32 then the sum of the squares of the medians of the triangle is

A. 20

B. 24

C. 16

D. 26

**Answer: B**



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## Exercise 79

1. If  $(1, 2)$ ,  $(4, -3)$ ,  $(-2, 4)$  are midpoints of the sides of a triangle, then its centroid is

A.  $(1, 0)$

B.  $(1, 1)$

C.  $(1, 2)$

D.  $(2, 2)$

**Answer: B**



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## Exercise 80

1. The centroid of  $\triangle ABC$  is  $(2, 7)$ . If the points B, C lie on x, y axes respectively and  $A = (4, 8)$  then B and C are

A.  $B = (2, 0), C = (0, 13)$

B.  $B = (0, 2), C = (0, 13)$

C.  $B = (2, 0), C = (10, 0)$

D.  $B = (0, 0), C = (0, 13)$

**Answer: A**

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## Exercise 81

1. In  $\triangle ABC$ , centroid =  $(2, 0)$ . If  $(1, 3)$  is the midpoint of  $BC$ , then  $A =$

A.  $(7, 4)$

B.  $(-5, 2)$

C.  $(4, -6)$

D.  $(-3, -2)$

**Answer: C**



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## Exercise 82

1. In triangle ABC,  $\overline{AD}$  is median. If  $A = (1, 1)$  and  $D = (1, -5)$ , then the centroid of the triangle is

A. (1, -3)

B. (-1, -3)

C. (-1, 3)

D. (1, 3)

**Answer: A**



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## Exercise 83

1. If the centroid of the triangle formed with  $(a, b)$ ,  $(b, c)$  and  $(c, a)$  is  $O(0, 0)$  then  $a^3 + b^3 + c^3 = \dots$

A. 0

B.  $abc$

C.  $a + b + c$

D.  $3abc$

**Answer: D**



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## Exercise 84

1.  $A(4, 1)$ ,  $B(7, 4)$ ,  $C, D$  are the vertices of a rectangle. If  $(8, 1)$  is the centroid of  $\triangle ABC$ , then  $D =$



A. (13, -2)

B. (10, -5)

C. (-8, 3)

D. (2, 17)

**Answer: B**



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## Exercise 85

1. If the lengths of two medians of a triangle are equal, then the triangle is

A. right angled

B. equilateral

C. isosceles

D. scalane

**Answer: C**



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## Exercise 86

1. The centroid of the triangle formed by  $(2, -5)$ ,  $(2, 7)$ ,  $(4, 7)$  is

A.  $(2, -9)$

B.  $(3, 1)$

C.  $(4, -1)$

D.  $(8/3, 3)$

**Answer: D**



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## Exercise 87

1. The circumradius of the triangle formed by  $(3, 7)$ ,  $(3, -2)$ ,  $(5, 7)$  is

A.  $\sqrt{85}$

B.  $2\sqrt{85}$

C.  $\sqrt{85}/2$

D.  $\sqrt{85/2}$

**Answer: C**



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## Exercise 88

1. The point of intersection of the perpendicular bisectors of the sides of the triangle formed by the points  $(2, 1)$ ,  $(5, 2)$  and  $(3, 4)$  is

A.  $\left(\frac{13}{2}, \frac{9}{2}\right)$

B.  $\left(\frac{13}{4}, \frac{9}{4}\right)$

C.  $\left(\frac{13}{2}, 3\right)$

D.  $\left(\frac{13}{5}, \frac{9}{5}\right)$

**Answer: B**



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### Exercise 89

1. The point  $P$  is equidistant from  $A(1, 3)$ ,  $B(-3, 5)$  and  $C(5, -1)$ , then  $PA$  is equal to

A. 5

B.  $5\sqrt{5}$

C. 25

D.  $5\sqrt{10}$

**Answer: D**

Exercise 90

1. The circumcentre of a triangle lies within the triangle only when the triangle is

- A. acute angled triangle
- B. right angled triangle
- C. obtuse angled triangle
- D. none

**Answer: A**

Exercise 91

1. The vertices of a triangle are  $(6, 6)$ ,  $(0, 6)$  and  $(6, 0)$ . The distance between its circumcentre and centroid is

A.  $2\sqrt{2}$

B. 2

C.  $\sqrt{2}$

D. 1

**Answer: C**



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## Exercise 92

1. The orthocentre of the triangle formed by  $(-1, -3)$ ,  $(-1, 4)$ ,  $(5, -3)$  is

A.  $(2, 7)$

B.  $(-3, -4/3)$

C. (4, 3)

D. (-1, -3)

**Answer: D**



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### Exercise 93

1. The orthocentre of the triangle formed by  $(2, -1/2)$ ,  $(1/2, -1/2)$  and  $(2, (\sqrt{3} - 1)/2)$  is

A.  $(3/2, (9\sqrt{3} - 3)/6)$

B.  $(2, -1/2)$

C.  $(5/4, (\sqrt{3} - 2)/4)$

D.  $(1/2, -1/2)$

**Answer: B**



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## Exercise 94

1. Origin is the orthocentre of  $\triangle ABC$  where  $A = (5, -1)$ ,  $B = (-2, 3)$  then the orthocentre of  $\triangle OAC$  is

A.  $(-4, -7)$

B.  $(3, -2)$

C.  $(-2, 3)$

D.  $(5, -1)$

**Answer: C**



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## Exercise 95



1. If O is the orthocentre of the triangle formed by A(1, -3), B(7, 2), C(2, 5) then the distance between the orthocentres of  $\Delta BOC$ ,  $\Delta AOB$  is

A.  $\sqrt{65}$

B.  $2\sqrt{65}$

C.  $\frac{1}{2}\sqrt{65}$

D. none

**Answer: A**



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### Exercise 96

1. If origin is the orthocentre of a triangle formed by the points  $(\cos \alpha, \sin \alpha, 0)$ ,  $(\cos \beta, \sin \beta, 0)$ ,  $(\cos \gamma, \sin \gamma, 0)$  then

$$\sum \cos(2\alpha - \beta - \gamma) = -$$

A. 0

B. 1

C. 2

D. 3

**Answer: D**



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### Exercise 97

1. If  $A(3, -4)$ ,  $B(7, 2)$  are the ends of a diameter of a circle and  $C(3, 2)$  is a point on the circle, then the orthocentre of the  $\triangle ABC$  is

A.  $(0, 0)$

B.  $(3, 4)$

C.  $(3, 2)$

D.  $(7, 2)$

**Answer: C**



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## Exercise 98

1. The incentre of the triangle formed by the points  $(0, 0)$ ,  $(5, 12)$ ,  $(16, 12)$  is

A.  $(6, 9)$

B.  $(7, 9)$

C.  $(6, 7)$

D.  $(9, 7)$

**Answer: B**



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## Exercise 99

1. The excentre of the triangle formed by the points  $(0, 3)$ ,  $(4, 0)$ ,  $(0, 0)$  which is opposite to  $(0, 0)$  is

A.  $(3, 1)$

B.  $(6, 6)$

C.  $(1, -1)$

D.  $(3/2, 5/2)$

**Answer: C**



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## Exercise 100

1. If  $(0, 1/2)$ ,  $(1/2, 1/2)$ ,  $(1/2, 0)$  are the midpoints of the sides of a triangle, then incentre of the triangle is

A.  $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

B.  $\left(1 + \frac{1}{\sqrt{2}}, 1 + \frac{1}{\sqrt{2}}\right)$

C.  $\left(1 - \frac{1}{\sqrt{2}}, 1 - \frac{1}{\sqrt{2}}\right)$

D.  $\left(1 + \frac{1}{\sqrt{2}}, 1 - \frac{1}{\sqrt{2}}\right)$

**Answer: C**



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## Exercise 101

1. The x-coordinate of the incentre of the triangle that has the coordinates of mid points of its sides as  $(0, 1)$ ,  $(1, 1)$  and  $(1, 0)$  is

A.  $1 + \sqrt{2}$

B.  $1 - \sqrt{2}$

C.  $2 + \sqrt{2}$

D.  $2 - \sqrt{2}$

**Answer: D**



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## Exercise 102

1. The vertices of a triangle are  $A(0, 0)$ ,  $B(1, 0)$  and  $C(0, 2)$ . The point of intersection of bisectors of internal angles is

A.  $\left( \frac{1}{3 + \sqrt{5}}, \frac{1}{3 + \sqrt{5}} \right)$

B.  $\left( \frac{2}{3 + \sqrt{5}}, \frac{2}{3 + \sqrt{5}} \right)$

C.  $\left( \frac{1}{3 + \sqrt{5}}, \frac{2}{3 + \sqrt{5}} \right)$

D.  $\left( \frac{2}{3 + \sqrt{5}}, \frac{1}{3 + \sqrt{5}} \right)$

**Answer: B**



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## Exercise 103

1. If  $I_1, I_2, I_3$  are excentres of the triangle with vertices  $(0, 0), (5, 12), (16, 12)$  then the orthocentre of  $\Delta I_1 I_2 I_3$  is

A.  $(7, 9)$

B.  $(6, 7)$

C.  $(9, 7)$

D.  $(6, 9)$

**Answer: A**



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## Exercise 104

1. If  $A = (2, 3), B = (-2, -5), C = (-4, 6)$  and if  $P$  is a point on  $BC$  such that  $AP$  bisects the angle  $A$ , then  $P =$

A.  $\left(-\frac{22}{7}, \frac{9}{7}\right)$

B.  $\left(\frac{22}{7}, \frac{9}{7}\right)$

C.  $\left(\frac{22}{7}, -\frac{9}{7}\right)$

D.  $\left(-\frac{22}{7}, -\frac{9}{7}\right)$

**Answer: A**



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## Exercise 105

1. In  $\triangle ABC$ , the sides  $BC = 5$ ,  $CA = 4$ ,  $AB = 3$ . If  $A(0, 0)$  and the internal bisector of angle  $A$  meets  $BC$  in  $D(12/7, 12/7)$  then incentre of  $\triangle ABC$  is

A.  $(2, 2)$

B.  $(3, 2)$

C.  $(2, 3)$



D. (1, 1)

**Answer: D**



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## Exercise 106

1. The perpendicular from the origin to the line joining the points  $A(a \cos \alpha, a \sin \alpha)$  and  $B(a \sin \beta, a \cos \beta)$  divides AB in the ratio

A. 1:2

B. 2:1

C. 2:3

D. 1:1

**Answer: D**



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## Exercise 107

1. The foot of the perpendicular from origin on the line joining  $(3, -4)$ ,  $(-4, 3)$  is

A.  $(1, 1)$

B.  $(-1, -1)$

C.  $(1/2, 1/2)$

D.  $(-1/2, -1/2)$

**Answer: D**



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## Exercise 108

1. The angles A, B and C are in A.P. in a  $\triangle ABC$ . If  $AB = 6$ ,  $BC = 7$  then  $AC =$

A. 5

B. 7

C. 8

D. none

**Answer: D**



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## Exercise 109

1. In a  $\triangle ABC$ ,  $AB = 6$ ,  $BC = 5$  and  $CA = 4$  and  $AP$  bisects the angle  $A$ . If  $P$  lies on  $BC$  then  $BP =$

A. 3

B.  $31/10$

C.  $29/10$

D.  $9/2$

**Answer: A**



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## Exercise 110

1. If the orthocentre and circumcentre of a triangle are  $(2, -3)$ ,  $(5, 6)$  then the centroid is

A.  $(2, 7)$

B.  $(-3, -4/3)$

C.  $(4, 3)$

D.  $(-1, -3)$

**Answer: C**



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## Exercise 111

1. If  $(0, 1)$  is the orthocentre and  $(2, 3)$  is the centroid of a triangle. Then its circumcentre is

A.  $(3, 2)$

B.  $(1, 0)$

C.  $(4, 3)$

D.  $(3, 4)$

**Answer: D**



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## Exercise 112

1. If the centroid and circumcentre of a triangle are  $(3, 3)$ ,  $(6, 2)$  then the orthocentre is

A. (9, 5)

B. (3, -1)

C. (-3, 5)

D. (-3, 1)

**Answer: C**



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### Exercise 113

1. Origin is the orthocentre of the triangle formed by the points (5, -1), (-2, 3) and (-4, -7) then its ninepoint centre is

A.  $(-1/3, -5/3)$

B. (5, 3)

C. (1, 1)

D.  $(-1/4, -5/4)$

**Answer: D**



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### Exercise 114

1. If  $(3, -2)$  is the orthocentre and  $(-1, 4)$  is the circumcentre of  $\triangle ABC$  then centroid of  $\triangle ABC$  is



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### Exercise 115

1. The radius of nine point circle of the triangle formed by  $(6, 2), (4, 6), (0, 4)$  is

A.  $\frac{\sqrt{7}}{2}$

B.  $\sqrt{2}$

C.  $\sqrt{5}/\sqrt{2}$

D.  $\frac{5}{\sqrt{2}}$

**Answer: C**



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## Exercise 116

1. The area of the triangle with vertices at  $(-4, -1)$ ,  $(1, 2)$ ,  $(4, -3)$  is

A. 12

B. 18

C. 17

D. 30

**Answer: C**



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## Exercise 117

1. The area of the triangle formed by the points  $(a, b + c)$ ,  $(b, c + a)$ ,  $(c, a + b)$  is

- A.  $abc$
- B.  $2ab$
- C.  $3abc$
- D.  $0$

**Answer: D**

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## Exercise 118

1. The area of the triangle formed by  $(a + 3, a - 2)$ ,  $(a - 4, a + 5)$  and  $(a, a)$  is

A. 0

B.  $a$

C.  $7/2$

D.  $a^2$

**Answer: C**



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### Exercise 119

1. The area of the triangle formed by the points  $(a, 1/a)$ ,  $(b, 1/b)$ ,  $(c, 1/c)$  is

A.  $\left| \frac{(a + b)(b + c)(c + a)}{2abc} \right|$

- B.  $\left| \frac{(a-b)(b-c)(c-a)}{2abc} \right|$
- C.  $\left| \frac{(a+b)(b-c)(c-a)}{2abc} \right|$
- D.  $\left| \frac{(a+b)(b-c)(c+a)}{2abc} \right|$

**Answer: B**



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## Exercise 120

1. The area of the triangle with vertices  $(a, 0)$ ,  $(a \cos \theta, b \sin \theta)$ ,  $(a \cos \theta, -b \sin \theta)$  is

- A.  $\sqrt{3} \frac{ab}{a}$
- B.  $2\sqrt{3} \frac{ab}{4}$
- C.  $|ab(1 - \cos \theta) \sin \theta|$
- D.  $\sqrt{3}ab$

**Answer: C**



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## Exercise 121

1. The area of the triangle with vertices  $(a, b)$ ,  $(ar, bs)$ ,  $(ar^2, bs^2)$  is

A.  $ab(r - 1)(s - 1)|$

B.  $|ab(r - 1)(s - 1)(s - r)|$

C.  $\frac{1}{2}|ab(r + 1) + (s + 1) + (s - r)|$

D.  $\frac{1}{2}|ab(s^2(r - 1) - r^2(s - 1) + (s - r))|$

**Answer: D**



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## Exercise 122

1. If the area of the triangle whose vertices are  $(b, c)$ ,  $(c, a)$ ,  $(a, b)$  is  $p$  then the area of the triangle whose vertices are  $(ac - b^2, ab - c^2)$ ,  $(ab - c^2, bc - a^2)$  and  $(bc - a^2, ac - b^2)$  is

A.  $(a + b + c)^2$

B.  $p(a + b + c)$

C.  $p(a + b + c)^2$

D. none

**Answer: C**



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### Exercise 123

1. If  $G$  is the centroid of  $\triangle ABC$  and if area of  $\triangle AGB$  is 5 sq.unit. then the area of  $\triangle ABC$  is

A. 20 sq.unit

B. 10 sq.unit

C. 15 sq.unit

D. 25 sq.unit

**Answer: C**

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## Exercise 124

1. If the centroid of a triangle is  $(1, 4)$  and two of its vertices are  $(4, -3)$ ,  $(-9, 7)$ , then the area of the triangle is

A.  $180/3$  sq.unit

B.  $183/2$  sq.unit

C.  $174/3$  sq.unit

D.  $197/2$  sq.unit

**Answer: B**



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### Exercise 125

1. If  $G$  is the centroid of the triangle formed by  $A(6, 1)$ ,  $B(3, 5)$ ,  $C(-1, -1)$ , then the area of  $\triangle GAB$  is

A.  $19/3$  sq.unit

B.  $13/2$  sq.unit

C.  $17/3$  sq.unit

D.  $17/2$  sq.unit

**Answer: C**



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## Exercise 126

1.  $P(3, 1)$ ,  $Q(6, 5)$  and  $R(x, y)$  form a triangle where  $\angle PQR = 90^\circ$  and area of  $\triangle RPQ = 7$ . Then the number of such points  $R$  is

A. 0

B. 1

C. 2

D. 3

**Answer: C**



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## Exercise 127

1.  $P$ ,  $Q$ ,  $R$  are the midpoints of  $AB$ ,  $BC$ ,  $CA$  of  $\triangle ABC$  and the area of  $\triangle ABC$  is 20. The area of  $\triangle PQR$  is



A. 4

B. 5

C. 6

D. 8

**Answer: B**



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## Exercise 128

1. If the area of the triangle formed by joining the midpoints of the sides of  $\triangle ABC$  is 5 sq.unit, then the area of  $\triangle ABC$  is

A. 40 sq.unit

B. 20 sq.unit

C. 10sq.unit

D. 50 sq.unit

**Answer: B**



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### Exercise 129

1. If D, E, F are the midpoints of the sides  $\overline{BC}$ ,  $\overline{CA}$ ,  $\overline{AB}$  of  $\triangle ABC$  where  $A = (-3, 4)$ ,  $B = (-1, -2)$ ,  $C = (5, 6)$  then the area of  $\triangle DEF =$

A.  $19/3$  sq.unit

B.  $13/2$  sq.unit

C.  $17/3$  sq.unit

D.  $17/2$  sq.unit

**Answer: B**



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## Exercise 130

1. If  $\Delta_1$  is the area of the triangle formed by the centroid and two vertices of a triangle,  $\Delta_2$  is the area of the triangle formed by the midpoints of the sides of the given triangle then  $\Delta_1 : \Delta_2 =$

A. 3 : 4

B. 4 : 1

C. 4 : 3

D. 2 : 1

**Answer: C**

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## Exercise 131

1. If  $A(6, 3)$ ,  $B(3, 5)$ ,  $C(4, 2)$ ,  $P(\alpha, \beta)$ , then the ratio of the areas of the triangles  $PBC$ ,  $ABC$  is

A.  $|\alpha + \beta| : 7$

B.  $|\alpha - \beta| : 7$

C.  $|\alpha + \beta + 2| : 7$

D.  $|3\alpha + \beta - 14| : 7$

**Answer: D**



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### Exercise 132

1. If  $A(6, 3)$ ,  $B(-3, 5)$ ,  $C(4, -2)$ ,  $D(x, 3x)$  are four points and the magnitude of the area of  $\triangle ABC$  is twice the area of  $\triangle DCB$  then  $x =$

A.  $3/8$

B.  $-3/8$

C.  $11/8$

D. none

**Answer: B**



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### Exercise 133

1. If  $A = (-3, 4)$ ,  $B(-1, -2)$ ,  $C(5, 6)$ ,  $D(x, -4)$  are the vertices of a quadrilateral such that area of  $\triangle ABD = 2[\text{Area of } \triangle ACD]$  then

$x =$

A. 6

B. 9

C. 69

D. 96

**Answer: C**



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### Exercise 134

1. The point A divides the join of  $P(-5, 1)$  and  $Q(3, 5)$  in the ratio  $k : 1$ . The values of  $k$  for which the area of  $\triangle ABC$  where  $B(1, 5)$ ,  $C(7, -2)$  is 2 sq.units is

A.  $7, 31/9$

B.  $-7, 31/9$

C.  $7, -31/9$

D.  $-7, -31/9$

**Answer: A**



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## Exercise 135

1. Let  $A(h, k)$ ,  $B(1, 1)$  and  $C(2, 1)$  be the vertices of a right angled triangle with  $AC$  as its hypotenuse. If the area of the triangle is 1, then the set of values which  $k$  can take is given by

- A.  $\{1, 3\}$
- B.  $\{0, 2\}$
- C.  $\{-1, 3\}$
- D.  $\{-3, -2\}$

**Answer: C**



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## Exercise 136

1. If  $A(x_1, y_1)$ ,  $B(x_2, y_2)$  then the circumradius of  $\triangle OAB$  is

A.  $\frac{OA \cdot OB \cdot AB}{|x_1y_2 - x_2y_1|}$

B.  $\frac{OA \cdot OB \cdot AB}{2|x_1y_2 - x_2y_1|}$

C.  $\frac{OA \cdot OB \cdot AB}{4|x_1x_2 - x_2y_1|}$

D. none

**Answer: B**



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### Exercise 137

1. If  $A = (1, 2)$ ,  $B = (2, 3)$  then the circum radius of  $\triangle OAB$  is

A.  $\sqrt{130}$

B.  $\frac{1}{2}\sqrt{130}$

C.  $2\sqrt{130}$

D.  $\sqrt{65}$



**Answer: B**



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### Exercise 138

1. If  $O(0, 0)$ ,  $A(3, 4)$ ,  $B(4, 3)$  are the vertices of a triangle then the length of the altitude from  $O$  is

A.  $4\sqrt{2}$

B.  $7\sqrt{2}$

C.  $7/\sqrt{2}$

D.  $7/2\sqrt{2}$

**Answer: C**



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## Exercise 139

1.  $a, b, c$  are in A.P. and  $x, y, z$  are in G.P. The points  $(a, x), (b, y), (c, z)$  are collinear if

A.  $x^2 = y$

B.  $x = z^2$

C.  $y^2 = z$

D.  $x = y = z$

**Answer: D**



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## Exercise 140

1. If  $(k, 2 - 2k), (-k + 1, 2k), (-4 - k, 6 - 2k)$ , are collinear, then  $k =$

A. 2

B. 5

C.  $1/2, -1$

D.  $-1/2, 2$

**Answer: C**



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## Exercise 141

1. If the area of the triangle formed by the points  $(t, 2t)$ ,  $(-2, 6)$ ,  $(3, 1)$  is 5 sq.unit, then t is

A.  $1/2, 2$

B.  $2, 2/3$

C.  $-77, 83$

D.  $1/2, -1$

**Answer: B**



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## Exercise 142

1. If the area of the triangle formed by the points  $(1, 2)$ ,  $(2, 3)$ ,  $(x, 4)$  is 40 sq.unit, then  $x$  is

A.  $1/2, 2$

B.  $2, 2/3$

C.  $-77, 83$

D.  $1/2, -1$

**Answer: C**



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## Exercise 143

1. The area of the triangle formed by  $(0, 0)$ ,  $(a^{x^2}, 0)$ ,  $(0, a^{6x})$  is  $1/2a^5$  sq.unit then  $x =$

- A. 1 or 5
- B.  $-1$  or 5
- C. 1 or  $-5$
- D.  $-1$  or  $-5$

**Answer: D**



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## Exercise 144

1. If the area of the triangle with vertices  $(2a, a)$ ,  $(a, a)$ ,  $(a, 2a)$  is 18 sq.units then the circumcentre of the triangle is

A. (3, 3)

B. (6, 6)

C. (9, 9)

D. (0, 0)

**Answer: C**



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## Exercise 145

1. The area of the quadrilateral formed by the points (1, 2), (2, -3), (-2, 4), (0, 5) is

A. 10 sq.unit

B. 15 sq.unit

C. 18 sq.unit

D. 20 sq.unit

**Answer: A**



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### Exercise 146

1. If  $(-1, 2)$ ,  $(4, 1)$ ,  $(7, 16)$  are the three vertices of a parallelogram taken in order, then the fourth vertex and also the area of the parallelogram are

- A.  $(-4, 3)$ , 16 sq.unit
- B.  $(2, 17)$ , 78 sq.unit
- C.  $(-8, 3)$ , 24 sq.unit
- D.  $(10, -5)$ , 36 sq.unit.

**Answer: B**



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## Exercise 2 Special Type Questions

1. I : The points (2, -2), (-1, 2), (3, 5) are the vertices of a right angled isosceles triangle.

II : The points (2, -4), (4, -2), (7, 1) form an isosceles triangle.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

**Answer: A**

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2. I : If O is the origin and if  $A(x_1, y_1)$ ,  $B(x_2, y_2)$  are two points then

$$OA \cdot OB \cdot \cos \angle AOB = x_1 x_2 + y_1 y_2$$



II. If  $O$  is the origin and if  $A(x_1, y_1), B(x_2, y_2)$  are two points then

$$OA \cdot OB \cdot \sin \angle AOB = x_1 x_2 + y_1 y_2$$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

**Answer: A**



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3. I : The points  $(2, 5), (0, 3), (2, 1), (4, 3)$  taken in order form a square.

II : The points  $(-a, -b), (0, 0), (a, b), (a^2, ab)$  are collinear.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

**Answer: C**



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4. The arrangement of the following distances between the points in ascending order is

(A)  $P(0, 0), Q(1, 1)$     (B)  $P(0, 1), Q(0, 5)$     (C)  $P(3, 0), Q(8, 0)$     (D)  $P(0, 0), Q(0, 5)$

A. A, D, B, C

B. A, B, C, D

C. B, A, C, D

D. D, C, B, A

**Answer: A**



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5. The arrangement of the areas of triangles formed by the following points in ascending order is

(A)  $P(0, 0), Q(4, 0), R(0, 3)$       (B)  $P(0, 0), Q(5, 0), R(0, 2)$

(C)  $P(0, 0), Q(0, 5), R(6, 0)$       (D)  $P(3, 0), Q(0, 6), R(0, 0)$

A. A, B, C, D

B. B, A, C, D

C. B, A, D, C

D. D, C, B, A

**Answer: C**



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6. Arrangement of the areas of the quadrilaterals formed by the following points in ascending order is

(A)  $P(0, 0), Q(3, 5), R(1, 1), S(4, 5)$       (B)  $P(0, 0), Q(4, 0), R(0, 6), S(1, 1)$

(C)  $P(0, 0), Q(7, 6), R(5, 3), S(5, 7)$

A. A, C, B

B. B, A, C

C. C, A, B

D. B, C, A

**Answer: A**



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7. If  $A = (0, 0)$ ,  $B = (3, 0)$ ,  $C = (0, 4)$  are the vertices of a triangle then match the following

- |                   |                |
|-------------------|----------------|
| I. Centroid       | (a) $(1, 1)$   |
| II. Orthocentre   | (b) $(1, 4/3)$ |
| III. Circumcentre | (c) $(0, 0)$   |
| IV. Incentre      | (d) $(4, 5)$   |
|                   | (e) $(3/2, 2)$ |

A. a, b, c, d

B. a, b, d, e

C. b, c, e, a

D. c, d, e, b

**Answer: C**



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**8. Match the following**

Vertices of the triangle	Nature of the triangle
I. $(0, 0), (1, 3), (-1, -3)$	(a) Right angled triangle
II. $(3, 4), (3, 5), (6, 5)$	(b) Isosceles triangle
III. $(4, 3), (-2, 3), (1, -2)$	(c) Collinear

A. c, b, a

B. c, a, b

C. a, b, c

D. a, c, b

**Answer: B**



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9. In the triangle which vertices at  $A(6, 3)$ ,  $B(-6, 3)$  and  $C(-6, -3)$ , the median through  $A$  meets  $BC$  at  $P$ , the line  $AC$  meets the  $x$ -axis at  $Q$ , while  $R$  and  $S$  respectively denote the orthocentre and centroid of the triangle. Then the correct matching of the coordinates of points in List-I to List-II is

List-I    List-II

(i)  $P$     (A)  $(0, 0)$

(ii)  $Q$     (B)  $(6, 0)$

(iii)  $R$     (C)  $(-2, 1)$

(iv)  $S$     (D)  $(-6, 0)$

(E)  $(-6, -3)$

(F)  $(-6, 3)$

A. (i) (ii) (iii) (iv)

$D$      $A$      $E$      $C$

B. (i) (ii) (iii) (iv)

$D$      $B$      $E$      $C$

C. (i) (ii) (iii) (iv)

$D$      $A$      $F$      $C$

D. (i) (ii) (iii) (iv)

$B$      $A$      $F$      $C$

**Answer: C**



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10. A : The orthocentre of the triangle having vertices as  $(2, 3)$ ,  $(2, 5)$ ,  $(4, 3)$  is  $(2, 3)$

R : Orthocentre of a right angled triangle is midpoint of a hypotenuse.

- A. A true, R true and R is correct explanation of A
- B. A true, R true but R is not the correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

**Answer: C**



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11. A : If the midpoints of the sides of a triangle are  $(1, 0)$ ,  $(0, 1)$ ,  $(1, 1)$  then the centroid is  $(\frac{2}{3}, 1)$ .

R : Centroid of the triangle is same as centroid of triangle formed by their midpoints.

A. both A and R are true and R is the correct explanation of A

B. both A and R are true and R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

**Answer: D**



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**12.** A : The maximum area of the triangle formed by the points  $(0, 0)$ ,

$(a \cos \theta, b \sin \theta)$ ,  $(a \cos \theta, -b \sin \theta)$  is  $\frac{1}{2}|ab|$ .

R : Maximum value of  $\sin \theta$  is 1.

A. A is false but R is false

B. A is true but R is false

C. both A and R are true and R is the correct explanation of A

D. both A and R are true and R is not the correct explanation of A



**Answer: D**



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