QB365

Important Questions - Straight Lines

11th Standard CBSE

Mathematics Reg.No. :

Time : 01:00:00 Hrs

Total Marks : 50

Section-A

1) Show that the points A(4,-1), B(6,0),C(7,2) and D(5,1) are the vertices of a rhombus. **2**

2) If the points A(-2,-1),B(1,0),C(x,3) and D(1,y) are the verues of x and y(without using distance formula). **2**

3) Find the area of $\triangle$ABC, the mid-points of whose sides AB,BC and CA are D(3,-1),E(5,3) and F(1,-3), respectively. **2**

4) the length of the perpendicular from the origin to a line is 7 and the line makes an angle of 120^o with the positive direction of Y - axis. Find the equation of the line. **2**

5) Find the coordinates of the foot of perpendiculars from the point (2,3) on the line y=3x+4 **2**

6) In which quadrant, the following points lie? **2**
(6,-3)

Section-B

7) In which quadrant, the following points lie? **3**
(iv)(5,4)

8) Find the new coordinates of point (3,-4), if the origin is shifted to (1,2) by a translation. **3**

9) Find the equation of the lines parallel to the axes and passing through the point(-3,5) **3**

10) A point moves, so that the sum of its distances from (ae,0) and (-ae,0) is 2a , prove that the equation to its locus is $\frac{X^2}{a^2}+\frac{Y^2}{b^2}=1$, where $b^2=a^2(1-e^2)$. **3**

11) Find the distance of the point (2, -3) from the line 2x - 3y + 6 = 0. **3**

12) Check whether the points (1,-3),(5,2) and(9,5) are collinear or not **3**

Section-C

13) A variable line passes through a fixed point P. The algebraic sum of the perpendiculars drawn from the points (2, 0), (0, 2) and (1, 1) on the line is zero. Find the coordinates of the point P. **4**

14) Find the area of a square, if two sides of a square are x + 2y + 3 = 0 and x + 2y = 5. **4**

15) If four points A(6,3),B(3,5),C(4,-2) and D(x,3x) are given in such a way that $\frac{\Delta DBC}{\Delta ABC}=\frac{1}{2}$, then find x. **4**

16) Find the points on the line x + y = 4 which lie at a unit distance from the line 4x + 3y = 10. **4**

17) Prove that the following lines are concurrent. 5x-3y=1,2x+3y=23 and 42x+21y=257 **4**

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Section-A

1) Show that AB=CD=BC=DA **2**

2) Mid-point of AC=Mid-point of BD **2**

Ans x=4,y=2

3) Since,D,E and the F are the mid-points of sides AB,BC and CA, respectively of a $\triangle$ ABC. **2**

ar ($\triangle$ ABC) = 4 x ar($\triangle$DEF)

8 sq units

4) $x + \sqrt{3}y = 14$ **2**

5) $\left(\frac{-1}{10}, \frac{37}{10}\right)$ **2**

6) Let A=(6,-3) **2**

Since x-coordinate of A is positive and its y-coordinate is negative, therefore A lies in the fourth quadrant.

Section-B

7) **3**

Let D=(5,4)

Since,x-coordinate of D is positive and its y-coordinate is also positive, therefore D lies in the first quadrant.

8) The coordinates of the new origin are h=1, k=2 and the original coordinates are given point are x=3,y=-4. **3**

The transformation relation between the old coordinates (x,y) and the new coordinates (X,Y) are given by

x=X+h,i.e.X=x-h .....(i)

y=Y+k,i.e.Y=y-k ....(ii)

On substituting the values x=3, y=4,h=1 and k=2 ineqs (i) and (ii), we get

X=3=2 and Y=42=6

Hence the coordinates of point (3,-4) in the new system are (2,-6).

9) Clearly, the equation of a line parallel to the x-axis and passing through(-3,5) is y=5 **3**

The equation of a line parallel to the y-axis and passing through(-3,5) is x=-3.

10) Let, P(h,k) be the moving point such that the sum of its distances from A(ae,0) and B(-ae,0) is 2a. **3**

Then, PA+PB=2a

$\Rightarrow \sqrt{(h-ae)^2+(k-0)^2}+\sqrt{(h+ae)^2+(k-0)^2}=2a$ [by distance formula]

$\Rightarrow \sqrt{(h-ae)^2+k^2}+2a-\sqrt{(h+ae)^2+k^2}$

$\Rightarrow (h-ae)^2+k^2=4a^2+(h+ae)^2+k^2-4a\sqrt{(h+ae)^2+k^2}$

[squaring on both sides]

$h^2+a^2e^2-2hae+4a^2h^2+a^2e^2+2hae-4a\sqrt{(h+ae)^2+k^2}$

$\Rightarrow -4aeh-4a^2=-4a\sqrt{(h+ae)^2+k^2}$

$\Rightarrow (eh+a)=\sqrt{(h+ae)^2+k^2}$

$\Rightarrow (eh+a)^2=(h+ae)^2+k^2$[again squaring on both sides]

$\Rightarrow e^2h^2+2aeh+a^2=h^2+a^2e^2+2aeh+k^2$

$\Rightarrow h^2(1-e)^2+k^2=a^2(1-e^2)\Rightarrow \frac{h^2}{a^2}+\frac{k^2}{a^2(1-e^2)}=1$

Hence, locus of point P(h,k) is

$\frac{x^2}{a^2}+\frac{y^2}{a^2(1-e^2)}=1$ or $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ where b_2-=a_2(1-e_2)

11) Given equation of line is **3**

2x - 3y + 6 = 0

∴ Required distance of the point from the line = The perpendicular distance from point to the line

$=\frac{|2\times2-3(-3)+6|}{\sqrt{2^2+(-3)^2}}=\frac{|4+9+6|}{\sqrt{4+9}}=\frac{19}{\sqrt{13}}$

12) Let A=(1,-1),B(5,2)and C(9,5) **3**

Now,distance between A and B

$AB=\sqrt{(5-1)^2+(2+1)^2}$ [By distance formula] $=\sqrt{(4)^2+(3)^2}=\sqrt{16+9}=\sqrt{25}=5$

Distance between B and C,BC=

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

Distance between A and C

AC= $AC=\sqrt{(1-9)^2+(-1-5)^2}=\sqrt{(-8)^2+(-6)^2}=\sqrt{64+36}=10$

Clearly,AC=AB+BCHence,A,B and C are collinear points

Section-C

13) Let slope of the line be m and the coordinates of fixed point P be (x_1, y_1). **4**

Then, equation of line is $y - y_1 = m(x - x_1)$ ....(i)

Let the given points be A(2, 0), B(0, 2) and C(1,1).

Now, perpendicular distance from A

$$= \frac{0-y_1-m\left(2-x_1\right)}{\sqrt{1+m^2}}$$

Perpendicular distance from B $= \frac{2-y_1-m\left(0-x_1\right)}{\sqrt{1+m^2}}$

and perpendicular distance from C $= \frac{1-y_1-m\left(1-x_1\right)}{\sqrt{1+m^2}}$

Now, $\frac{\left[-y_1-2m+mx_1+2-y_1+mx_1+1-y_1-m+mx_1\right]}{\sqrt{1+m^2}} = 0$

$\Rightarrow$ $-3y_1 - 3m + 3mx_1 + 3 = 0$

$\Rightarrow$ $-y_1 - m + mx_1 + 1 = 0$

$\Rightarrow$ $y_1 = -m + mx_1 + 1$

On substituting this value in Eq. (i), we gwt

$y + m - mx_1 - 1 = mx - mx_1 \Rightarrow y - 1 = m(x - 1)$

Thus, $(x_1, y_1) = (1, 1)$

14) Given sides of a square are parallel lines. **4**

∴ The distance between two parallel lines $x + 2y + 3 = 0$ and $x + 2y - 5 = 0$ is

$$d = \frac{|-5-3|}{\sqrt{1^2+2^2}} \qquad \left[\because \quad d = \frac{\left|C_1-C_2\right|}{\sqrt{A^2+B^2}}\right] = \frac{8}{\sqrt{1+4}} = \frac{8}{\sqrt{5}}$$

∴ Length of side a square, $a = d = \frac{8}{\sqrt{5}}$

∴ Area of a square $= a^2 = \left(\frac{8}{\sqrt{5}}\right)^2 = \frac{64}{5}$ sq units

15) $\frac{11}{8}$ **4**

16) Let the required point be (h, k). **4**

Since, point (h, k) lies on the line $x + y = 4$,

therefore $h + k = 4$ ...(i)

Also, the distance of the point (h, k) from the line

$$4x + 3y = 10 \quad is \quad \left|\frac{4h+3k-10}{\sqrt{16+9}}\right| = 1 \Rightarrow \quad 4h + 3k - 10 = \pm 5$$

Ans. (3,1) and (-7,11)

17) Prove that point of intersection of any two lines lies on the third line. **4**