MATHEMATICS

WORKSHEET-9

STEP
A PROJECT BY PUNJAB GROUP

Worksheet-9

USE THIS SPACE FOR SCRATCH WORK

1. The reflection of the point $(2,-4)$ about $x-axis$ is:

A. $(2,4)$ B. $(-2,-4)$

C. $(-2,4)$ D. $(-4,2)$

2. The point on the join of $A(1,4)$ and $B(5,6)$ that is twice as far from A as B is from A and lie on the opposite side of A as B does:

A. $(5,6)$ B. $(0,-7)$

C. $(-7,0)$ D. $(6,5)$

3. The $xy-$axes are translated, and origin is shifted to the point $O'(-4,-6)$, the coordinates of $P(-6,-8)$ in new system:

A. $\left(\frac{1}{2},\frac{3}{4}\right)$ B. $(-2,-2)$

C. $(5,6)$ D. $(-6,-5)$

4. $A(1,-2), B(6,-1), C(6,3)$ and $D(1, 2)$ are the vertices of a parallelogram, then mid of AC is same as that of:

A. Mid-point of BC B. Mid-point of BD

C. Mid-point of AB D. Mid-point of CD

5. If $P(x,y)$ in $xy-$plane lies in $IVth$ quadrant, then:

A. $x<0,\ y<0$ B. $x>0,\ y<0$

C. $x>0,\ y>0$ D. $x<0,\ y>0$

6. Coordinates of the point that divides the join of $A(-6,3)$ and $B(5,-2)$ in the ratio $2:3$ internally:

A. $\left(\frac{-1}{2},\frac{-1}{2}\right)$ B. $(-28,13)$

C. $\left(\frac{8}{3},-1\right)$ D. $\left(\frac{-8}{5},1\right)$

7. The point P lies on the line joining $A(-1,-5)$ and $B(11,13)$ such that $|AP|=\frac{1}{3}|AB|$. The coordinates of P are:

A. $(2,-\frac{1}{2})$ B. $(-3,-1)$

C. $(5,4)$ D. $(3,1)$

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8. **Find k so that points $(2,2),(8,-1)$ and $(0,k)$ lie on a line:**

A. 4 B. -2
C. 3 D. 1

9. **Point dividing join of $(6,0)$ and $(0,8)$ in ratio $2:1$ externally:**

A. $\left(2,\dfrac{16}{3}\right)$ B. $(2.2,3.4)$
C. $(-6,16)$ D. $(7.2,8.2)$

10. **The ratio in which $x-axis$ divides the join of $A(6,7)$ and $B(-7,-6)$ is:**

A. $5:6$ B. $6:7$
C. $7:6$ D. $6:5$

11. **If ABC is a triangle with usual notations, the bisector of $\angle A$ divides the side BC in ratio:**

A. $a:b$ B. $b:c+a$
C. $c:b$ D. $c:a$

12. **The figure formed by joining the mid-points consecutively of the sides of a quadrilateral $ABCD$ with $A(9,3)$, $B(-7,7)$, $C(-3,-7)$ and $D(5,-5)$ is:**

A. Square B. Rectangle
C. Parallelogram D. Rhombus

13. **The point of concurrency of the medians of the ΔABC is called its:**

A. Orthocenter B. Circumcentre
C. Centriod D. Incentre

14. **The points $A(-5,-2)$ and $B(5,-4)$ are ends of a diameter of a circle. Find the center and radius of the circle:**

A. $(0,-3)$; 26 B. $(0,3)$; $\sqrt{26}$
C. $(0,-3)$; $\sqrt{26}$ D. $(5,-3)$, $\sqrt{26}$

15. **The points $A(3,1),B(-2,-3),C(2,2)$ are vertices of a (an):**

A. Right triangle B. Isosceles triangle
C. Equilateral triangle D. Scalene triangle

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16. The centroid of the triangle whose vertices are $(4,-2),\ (-2,4),\ (5,5)$ is:

A. $\left(\frac{11}{3},\frac{11}{3}\right)$ B. $\left(\frac{11}{3},\frac{7}{3}\right)$

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

17. The points $A(+1,-1), B(3,0), C(3,7), D(1,8)$ are vertices of:

A. Square B. Rectangle

C. Parallelogram D. All are incorrect

18. If the axes are rotated through an angle of $-30°$ in the clockwise direction, the point $\left(4,-2\sqrt{3}\right)$ in the new system is:

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

C. $\left(3\sqrt{3},-1\right)$ D. $\left(3\sqrt{3},5\right)$

19. When axes are translated, the coordinates of the point (-6,9) are changed into (-3,7), find the point through which axes are translated:

A. (7,-3) B. $(-3,+2)$

C. (-9,16) D. $(+3,-2)$

20. Which of the following in a triangle are not concurrent:

A. Medians B. Angle bisectors

C. Right bisectors D. Sides

21. The ordinate of the point where joining of $A(-3,2)$ and $B(2,4)$ cuts $y-axis$:

A. $\frac{4}{5}$ B. $\frac{12}{5}$

C. $\frac{8}{5}$ D. $\frac{16}{5}$

22. The point dividing $(1,6)$ and $(-1,-6)$ in ratio $1:1$ externally is:

A. $(0,0)$ B. $(0,12)$

C. $(2,12)$ D. Does not exist

23. After rotation of axes through an angle of 90° in anticlockwise direction point $(5,6)$ reaches the position:

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

C. $(-6,5)$ D. $(6,-5)$

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24. **The incentre of the triangle with vertices $\left(1,\sqrt{3}\right),\left(0,0\right)$ and $\left(2,0\right)$ is:**

A. $\left(1,\frac{\sqrt{3}}{2}\right)$ B. $\left(\frac{2}{3},\frac{1}{\sqrt{3}}\right)$

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

25. **If $P\left(1,2\right),Q\left(4,6\right),R\left(5,7\right)$ and $S\left(a,b\right)$ are the vertices of a parallelogram $PQRS$, then:**

A. $a=2,\ b=4$ B. $a=3,\ b=4$

C. $a=2,\ b=3$ D. $a=3, b=5$

26. **The points $\left(0,\frac{8}{3}\right),\left(1,3\right)$ and $\left(8,3\right)$ are the vertices of:**

A. An acute angle triangle B. An isosceles triangle

C. An obtuse angle triangle D. Points are collinear

27. $\frac{1}{2}$ **(sum of || sides)(distance between || sides) is equal to the area of the:**

A. Triangular region B. Circular region

C. Trapezoidal region D. Quadrilateral region

28. **The circumcentre of a triangle whose vertices are $A\left(-2,3\right),B\left(-4,1\right),\ C\left(3,5\right)$ is:**

A. $\left(\frac{25}{6},\frac{-31}{6}\right)$ B. $\left(25,-31\right)$

C. $\left(1,\ 1\right)$ D. $\left(-1,3\right)$

29. **The line $4y=x+11$ intersects the curve $y^2=2x+7$ at the points A and B. Find the coordinates of the midpoint of the line AB:**

A. $(4,5)$ B. $(5,4)$

C. $(1,3)$ D. $(9,5)$

30. **If axes are rotated about an angle 45° then a point $\left(x,y\right)$ will shift to a new position $\left(2,5\right)$ then the original position is:**

A. $\left(0,-15\right)$ B. $\left(3,8\right)$

C. $\left(-2\sqrt{2},4\sqrt{2}\right)$ D. $\left(\frac{2}{\sqrt{2}},\frac{5}{\sqrt{2}}\right)$

31. **To remove the term involving xy, from $xy-4x-2y=0$ the angle of rotation is:**

A. $\theta=30^\circ$ B. $\theta=45^\circ$
C. $\theta=60^\circ$ D. $\theta=75^\circ$

32. **If $f(x,y)=0$ is the equation of the curve, then its transformed equation $f(X,Y)=0$ through rotation of an angle θ, where (x,y) and (X,Y) are related by:**

A. $X=x\cos\theta-y\sin\theta, Y=x\sin\theta+y\cos\theta$
B. $X=x\cos\theta+y\sin\theta, Y=-x\sin\theta+y\cos\theta$
C. $X=y\cos\theta+x\sin\theta, Y=-x\sin\theta+y\cos\theta$
D. $X=x-h, Y=y-k$

33. **Translation of the equation $2x-y+2=0$ through the point $(-1,0)$ axes remains parallel:**

A. $-2x+2=0$ B. $2x+y-3=0$
C. $2x-y=0$ D. $2x+2=0$

34. **If original axes are rotated about an angle of 45°, origin remains the same in the new system then the equation $x^2-y^2=a^2$ will transform into:**

A. $2xy+a^2=0$ B. $xy=a^2$
C. $4xy=a^2$ D. $x^2-y^2=0$

35. **Transform to axes inclined at an angle 90° to the original axes of the conic $y^2=4px$:**

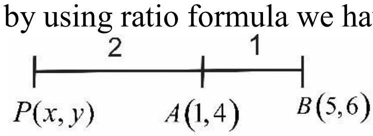
A. $y^2=4px$ B. $y^2=-4px$
C. $x^2=4py$ D. $x^2=-4py$

ANSWER KEY (Worksheet-9)							
1	A	11	C	21	D	31	B
2	C	12	C	22	D	32	B
3	B	13	C	23	C	33	C
4	B	14	C	24	D	34	A
5	B	15	B	25	C	35	D
6	D	16	C	26	C		
7	D	17	D	27	C		
8	C	18	C	28	A		
9	C	19	B	29	B		
10	C	20	D	30	C		

ANSWERS EXPLAINED

1. (A) Reflection about $x-axis$ of a point will change the sign of y-coordinate of the point so $(2,-4)$ will reflect as $(2,4)$.

2. (C) If $p(x,y)$ is required point then according to given condition $PA:AB=2:1$
so by using ratio formula we have



$\frac{2(5)+1\times x}{2+1}=1$; $\frac{2(6)+1\times y}{2+1}=4$

$\Rightarrow 10+x=3$; $12+y=12$

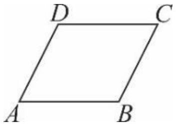
$\Rightarrow x=-7$, $y=0$

Hence $p(x,y)=(-7,0)$

3. (B) If (X,Y) are coordinates in new system and (h,k) is new origin then transform equations are

$\Rightarrow x=X+h$	$y=Y+k$
$X=x-h$	$Y=y-k$
$\Rightarrow X=-6+4$	$Y=-8+6$
$\Rightarrow X=-2$	$Y=-2$
$\Rightarrow (X,Y)=(-2,-2)$	

4. (B) Parallelogram is of the form which has AC and BD as diagonals,
$\because$ Diagonals of ||gram bisect each other
So mid point of diagonal AC
= mid point of diagonal BD



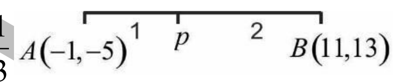
5. (B) All the points in fourth quadrant have abscissa positive and negative ordinate.

6. (D) By ratio formula coordinates of required point are

$$\left(\frac{3(-6)+2(5)}{2+3},\frac{3(3)+2(-2)}{2+3}\right)=\left(\frac{-8}{5},1\right)$$

7. (D) Given points are $A(-1,-5)$ and $B(11,13)$ also $|AP|=\frac{1}{3}|AB|$

$\Rightarrow \frac{|AP|}{|AB|}=\frac{1}{3}$



$\Rightarrow AP:PB=1:2$

So by ratio formula

$$p=\left(\frac{(-1)(2)+(1)(11)}{1+2},\frac{2(-5)+1(13)}{1+2}\right)$$

$$=\left(\frac{-2+11}{3},\frac{-10+13}{3}\right)=(3,1)$$

8. (C) If points $A(2,2), B(8,-1)$ and $C(0,k)$ lie on a line then

$$\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}=0 \Rightarrow \begin{vmatrix} 2 & 2 & 1 \\ 8 & -1 & 1 \\ 0 & k & 1 \end{vmatrix}=0$$

$\Rightarrow 2(-1-k)-2(8-0)+1(8k-0)=0$

$\Rightarrow -2-2k-16+8k=0$

$\Rightarrow 6k-18=0 \Rightarrow k=3$

9. (C) Given points are $(6,0)$ and $(0,8)$ given ratio is $2:1$. Ratio formula for the external division is

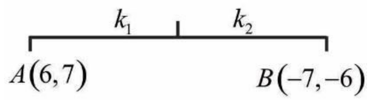
$$p(x,y)=\left(\frac{k_1x_2-k_2x_1}{k_1-k_2},\frac{k_1y_2-k_2y_1}{k_1-k_2}\right)$$

$$=\left(\frac{2(0)-1(6)}{2-1},\frac{2(8)-1(0)}{2-1}\right)=(-6,16)$$

10. (C) Note that the ratio in which $y-axis$ divides the join of $A(x_1,y_1)$ and $B(x_2,y_2)$ is $|x_1|:|x_2|$ and for $x-axis$ $|y_1|:|y_2|$
So required ratio is $|y_1|:|y_2|=7:6$

OR

By ratio formula $y-$coordinate of point of division is



$\dfrac{-6k_1+7k_2}{k_1+k_2}=0$

$\Rightarrow -6k_1=-7k_2$

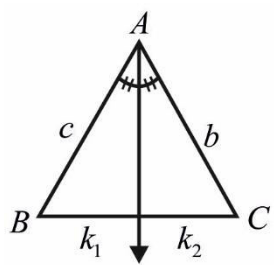
$\Rightarrow \dfrac{k_1}{k_2}=\dfrac{7}{6}\Rightarrow k_1:k_2=7:6$

11. (C) If ABC is a triangle with usual notations

i.e. $|AB|=c$

$|BC|=a$

$|AC|=b$



then angle bisector of $m\angle A$ divides BC in a ratio $k_1:k_2$ where $k_1:k_2=c:b$

12. (C) By property of quadrilateral. The figure formed by joining the mid points of sides of a quadrilateral is a parallelogram.

13. (C) Orthocentre: is the point of concurrency of altitudes

Circumcentre: is the point of concurrency of right bisectors

Centroid: is the point of concurrency of medians

In-centre: is the point of concurrency of internal angle bisectors

14. (C) Ends of the diameter of a circle are $A(-5,-2)$ and $B(5.-4)$

Radius $=\dfrac{1}{2}|AB|=\dfrac{1}{2}\sqrt{(5+5)^2+(-4+2)^2}$

$=\dfrac{1}{2}\sqrt{100+4}=\dfrac{1}{2}\sqrt{104}=\sqrt{26}$

Centre $=$ midpoint of AB

$=\left(\dfrac{-5+5}{2},\dfrac{-2-4}{2}\right)=(0,-3)$

15. (B) Given points are $A(3,1),B(-2,-3)$ and $C(2,2)$

$|AB|=\sqrt{(3+2)^2+(1+3)^2}$

$=\sqrt{25+16}=\sqrt{41}$

$|BC|=\sqrt{(2+2)^2+(2+3)^2}$

$=\sqrt{16+25}=\sqrt{41}$

$|AC|=\sqrt{(3-2)^2+(1-2)^2}=\sqrt{1+1}=\sqrt{2}$

Since $|AB|=|BC|$

so the triangle is isosceles

16. (C) Given vertices of a triangle are $(4,-2),(-2,4)$ and $(5,5)$, the centroid is

$\left(\dfrac{x_1+x_2+x_3}{3},\dfrac{y_1+y_2+y_3}{3}\right)$

$\Rightarrow\left(\dfrac{4-2+5}{3},\dfrac{-2+4+5}{3}\right)=\left(\dfrac{7}{3},\dfrac{7}{3}\right)$

17. (D) Given points are

$A(1,-1),\ B(3,0),C(3,7),\ D(1,8)$

mid point of diagonal $AC=\left(\dfrac{3+1}{2},\dfrac{7-1}{2}\right)$

$=(2,3)$

mid point of diagonal $BD=\left(\dfrac{3+1}{2},\dfrac{0+8}{2}\right)$

$=(2,4)$

$\Rightarrow$ Diagonals do not bisect each other.

But in each square, rectangle and parallelogram diagonals bisect each other.

18. (C) Angle of rotation $\theta=-30^\circ$ and the original point is $\left(4,-2\sqrt{3}\right)$

transform equation are

$X=x\cos\theta+y\sin\theta,\ Y=-x\sin\theta+y\cos\theta$

$\Rightarrow X=4\left(+\dfrac{\sqrt{3}}{2}\right)+\left(-2\sqrt{3}\right)\left(\dfrac{-1}{2}\right);\quad and$

$Y=-4\left(\dfrac{-1}{2}\right)+\left(-2\sqrt{3}\right)\left(\dfrac{+\sqrt{3}}{2}\right)$

$\Rightarrow X=+2\sqrt{3}+\sqrt{3}\qquad Y=2-3$

$\Rightarrow X=3\sqrt{3}\qquad Y=-1$

$\Rightarrow (X,Y)=\left(3\sqrt{3},-1\right)$

19. (B) Coordinates in $XY-$coordinates system

$(\mathrm{X},\mathrm{Y})=(-3,7)$

coordinates in $xy-$coordinates system

$\left(x,y\right)=\left(-6,9\right)$

If $\left(h,k\right)$ is new origin then

$x=X+h$; $\quad y=Y+k$

$\Rightarrow h=x-X,\quad k=y-Y$

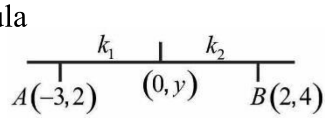
$\Rightarrow h=-6+3\quad k=9-7$

$\Rightarrow h=-3\quad k=2$

$\Rightarrow\left(h,k\right)=\left(-3,+2\right)$

20. (D) Medians, angle bisectors and right bisectors of a triangle are always concurrent and sides can never concurrent.

21. (D) Let $y-axis$ divides AB in ratio $k_1:k_2$ then by ratio formula



$$\frac{2k_1+\left(-3\right)k_2}{k_1+k_2}=0$$

$\Rightarrow 2k_1-3k_2=0\Rightarrow 2k_1=3k_2$

$\Rightarrow\frac{k_1}{k_2}=\frac{3}{2}\Rightarrow k_1:k_2=3:2$

Now y-coordinate of this point is

$$y=\frac{3\left(4\right)+2\left(2\right)}{3+2}=\frac{12+4}{5}=\frac{16}{5}$$

22. (D) External division is only possible when $k_1\neq k_2$

23. (C) Rotation of 90° anticlockwise changes $\left(x,y\right)$ to $\left(-y,x\right)$

$\Rightarrow\left(5,6\right)$ to $\left(-6,5\right)$

24. (D) Given vertices are $A\left(1,\sqrt{3}\right),B\left(0,0\right),C\left(2,0\right)$ by using distance formula first find the length of sides

$a=\left|BC\right|=2$

$b=\left|AC\right|=2$

$c=\left|AB\right|=2$

Now in-centre is

$$\left(\frac{ax_1+bx_2+cx_3}{a+b+c},\frac{ay_1+by_2+cy_3}{a+b+c}\right)$$

$$=\left(\frac{2(1)+2(0)+2(2)}{6},\frac{2\left(\sqrt{3}\right)+2(0)+2(0)}{6}\right)$$

$$=\left(\frac{6}{6},\frac{2\sqrt{3}}{6}\right)=\left(1,\frac{1}{\sqrt{3}}\right)$$

Note that in an equilateral triangle all the centers are coincident.

So $\left(\frac{x_1+x_2+x_3}{3},\frac{y_1+y_2+y_3}{3}\right)$

is valid in this case.

25. (C) Given vertices of a parallelogram are $P\left(1,2\right),Q\left(4,6\right),R\left(5,7\right)$ and $S\left(a,b\right)$.

Using property of parallelogram midpoint of $PR=$ midpoint of QS

$$\Rightarrow\left(\frac{1+5}{2},\frac{2+7}{2}\right)=\left(\frac{4+a}{2},\frac{6+b}{2}\right)$$

$\Rightarrow\frac{4+a}{2}=\frac{6}{2},\quad \frac{6+b}{2}=\frac{9}{2}$

$\Rightarrow a=2,\quad b=3$

26. (C) Given points are

$A\left(0,\frac{8}{3}\right),B\left(1,3\right),C\left(8,3\right)$ first we find lengths of sides.

$$c=\left|AB\right|=\sqrt{\left(0-1\right)^2+\left(\frac{8}{3}-3\right)^2}=\sqrt{1+\frac{1}{9}}=\frac{\sqrt{10}}{3}$$

$$a=\left|BC\right|=\sqrt{\left(1-8\right)^2+\left(3-3\right)^2}=7$$

$$b=\left|AC\right|=\sqrt{\left(0-8\right)^2+\left(\frac{8}{3}-3\right)^2}=\sqrt{64+\frac{1}{9}}$$

$$=\sqrt{\frac{576}{9}}=\frac{\sqrt{577}}{3}$$

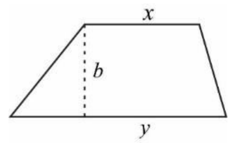
Now $c^2=\frac{10}{9}=1.1$, $a^2=49$, $b^2=\frac{577}{9}$

Since $a^2+c^2<b^2$

Hence triangle is obtuse.

27. (C) If x and y are lengths of parallel sides and b is distance between parallel sides then the formula of area of a trapezium is

$$=\frac{1}{2}(x+y)b$$



28. (A) Given vertices are

$A(-2,3), B(-4,1), C(3,5)$

Let $P(x,y)$ in circumcentre

then $|AP|=|BP|$

$$\Rightarrow \sqrt{(x+2)^2+(y-3)^2}=\sqrt{(x+4)^2+(y-1)^2}$$

$\Rightarrow x+y=-1$ ……… (i)

also $|AP|=|PC|$

$$\sqrt{(x+2)^2+(y-3)^2}=\sqrt{(x-3)^2+(y-5)^2}$$

$\Rightarrow\ 10x+4y=21$ ……. (ii)

Only (A) option satisfy equations (i) and (ii)

29. (B) Given equation are

$4y=x+11$ _______(i)

$y^2=2x+7$ _______(ii)

From (i) $x=4y-11$

Put in (ii)

$y^2=2(4y-11)+7$

$y^2=8y-22+7$

$y^2-8y+15=0$

$y^2-5y-3y+15=0$

$y(y-5)-3(y-5)=0$

$\Rightarrow y=3$	$y=5$
Put in (i)	put in (i)
$4(3)=x+11$	$4(5)=x+11$
$\Rightarrow x=1$	$\Rightarrow x=9$

Points of intersection are $(1,3)$ and $(9,5)$

required mid point is

$$\left(\frac{1+9}{2},\frac{3+5}{2}\right)=(5,4)$$

30. (C) If θ is angle of rotation and point (x,y) will shift to (X,Y) then

$X=x\cos\theta+y\sin\theta \qquad Y=-x\sin\theta+y\cos\theta$

$\Rightarrow 2=x\cos 45^\circ+y\sin 45^\circ \qquad 5=-x\sin 45^\circ+y\cos 45^\circ$

$\Rightarrow 2=\frac{1}{\sqrt{2}}(x+y) \qquad 5=\frac{1}{\sqrt{2}}(-x+y)$

$\Rightarrow x+y=2\sqrt{2}$ _____ (i)

$-x+y=5\sqrt{2}$ _____ (ii)

By adding

$$\begin{array}{r} x+y=2\sqrt{2} \\ -x+y=5\sqrt{2} \\ \hline 2y=8\sqrt{2} \end{array}$$

$\Rightarrow y=4\sqrt{2}$ put in (i)

$x+4\sqrt{2}=2\sqrt{2}\Rightarrow x=-2\sqrt{2}$

$\Rightarrow (x,y)=\left(-2\sqrt{2},4\sqrt{2}\right)$

31. (B) Given second degree equation is

$xy-4x-2y=0$, comparing with

$ax^2+2hxy+by^2+2gx+2fy+c=0$

$\Rightarrow a=0 \qquad 2h=1 \qquad b=0$

If θ is required angle

Then $\tan 2\theta=\frac{2h}{a-b}=\frac{1}{0-0}=\infty$

$\Rightarrow 2\theta=\tan^{-1}(\infty)$

$\Rightarrow 2\theta=90^\circ \Rightarrow \theta=45^\circ$

Note:

$\therefore \tan 2\theta=\frac{2h}{a-b}$

When $a=b$

$\theta=45^\circ$

32. (B) If axes are rotated through an angle θ and point $P(x,y)$ has coordinates $P(X,Y)$ in new system of coordinate then

$$X=x\cos\theta+y\sin\theta$$
$$Y=-x\sin\theta+y\cos\theta$$

33. (C) New origin is $(h,k)=(-1,0)$

Transform equations are

$x=X+h \qquad y=Y+k$

$\Rightarrow x=X-1, \quad y=Y+0$

Put in $2x-y+2=0$

$\Rightarrow 2(X-1)-Y+2=0$

$\Rightarrow 2X-2-Y+2=0$

$\Rightarrow 2X - Y = 0$

34. (A) $\because x = X\cos\theta - Y\sin\theta$

$y = X\sin\theta + y\cos\theta$

Put $\theta = 45^\circ$

$\Rightarrow x = \frac{1}{\sqrt{2}}(X - Y), y = \frac{1}{\sqrt{2}}(X + Y)$

Put is $x^2 - y^2 = a^2$

$\left(\frac{1}{\sqrt{2}}(X-Y)\right)^2 - \left(\frac{1}{\sqrt{2}}(X+Y)\right)^2 = a^2$

$\Rightarrow \frac{1}{2}\left(X^2 + Y^2 - 2XY - X^2 - Y^2 - 2XY\right) = a^2$

$\Rightarrow -4XY = 2a^2 \Rightarrow -2XY = a^2$

35. (D) $x = X\cos\theta - Y\sin\theta$

$y = X\sin\theta + Y\sin\theta$

Put $\theta = 90^\circ$

$\Rightarrow x = -Y, y = X$

Put in $y^2 = 4px$

$\Rightarrow X^2 = 4p(-Y)$

$\Rightarrow X^2 = -4py$

STEP

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