**2- Reflection**

Reflection along a line passing through origin making an angle with x-axis in anticlockwise direction is a transformation T: R2R2 defined as

**T () =A + , ∈ R2**

Where,

A

**Reflection over/along the y-axis**

Y

X

(x, y)

(-x, y)

Along y-axis with =

A =

=

Y

X

(x, y)

(x, -y)

= A = =

**Reflection over/along the x-axis**

Along y = 0,

A = =

=

**Reflection along the line y = *x* with**

A = =

Y

X

(x, y)

(y, x)

y = x

=

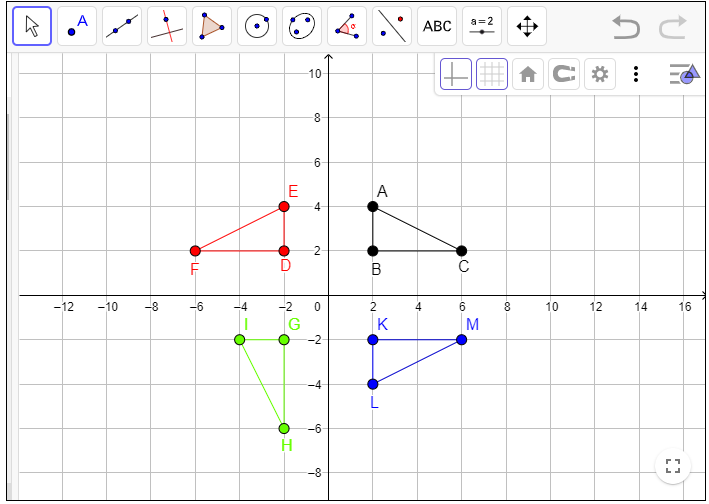
**Reflection along the line y = -x**

with

=

**Example 1. (Reflection of Triangle)**

Reflect the triangle with vertices A= (2, 4), B = (2, 2), C = (6, 2) along x-axis, y-axis and y = -x.



**Example 2. (Reflection of a line)**

Let y = 2x +1 be a line. Find the reflection of that line along the line y = x.

Solution. First of all we will find the angle of the line y = x with the x-axis about the origin.

y = x (General form of line is y = mx + c)

So, m =1, tan = 1  = 45

Here, A = =

Therefore, **T () = A**

= =

So, =, =

Y

X

y = 2x+1

= ½ -1/2

Put x and y in original line y = 2x + 1

= 2 + 1

Or 2 = - 1

So = 1/2 - 1/2 is the reflected line.

To draw original line y = 2x + 1 take two points on it, let A = (1, 3) and B = (2, 5).

And to draw the Reflected line = 1/2 - ½, = (2, 1/2) and = (4, 3/2).

**Reflection of circle**

Let (x-2)2 + (y-3)2 = 4 be a circle. Find its reflection along the line y = -x

Solution.

First of all we will find the angle of line y = -x with x-axis at origin line.

That is for m = -1, = 135.

The transformation of reflection is

**T () =A, ∈R2**

Where

A = =

As, **T () =A**

= =

Putting = = in the original circle (x - 2)2 + (y - 3)2 = 4, we get

2 + 2 = 4, reflected circle.

As original circle (x - 2)2 + (y - 3)2 = 4 is with Centre = (2, 3) and Radius = 2

While Reflected circle 2 + 2 = 4 has Centre = (-3, -2), Radius = 2. We can draw both circles easily.

**Example.** Reflection of a line along a line which is not passing through origin.

Let y = x+2 be a line. Find its reflection along the line x =1.

Solution: Now first we will shift our line x =1 at origin. For this purpose we have to subtract vector. Our line become x = 0. So our vector can be written as:

**=**  - =

Now we will find

x = 0, m = tan = tan-1 = 90

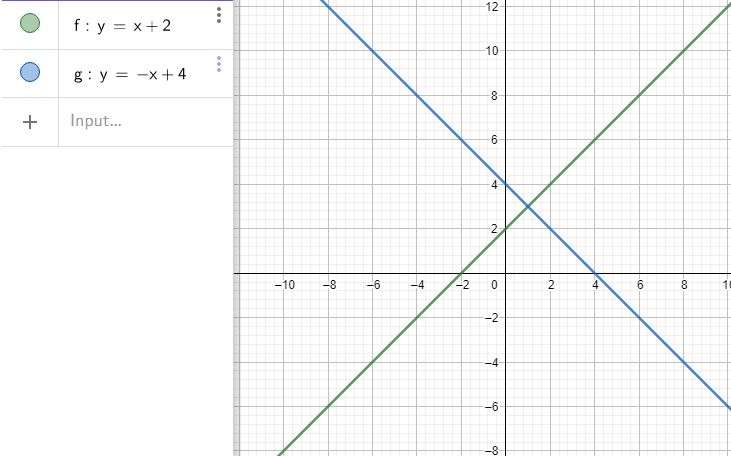
The transformation of reflection becomes

**T () =A**

=

=

Now we will add vector



Or

Now substitute in

**Original line** y = x+2

having points, A= (0, 2)

and B= (-1, 1) getting

**Reflected line**  having and

Work to do:

**Q. Let y=x+3 be a line. Find its reflection along the line x= -1**