STUDENT WORKSHEET

ANAMORHPIC ART

Part 1

The Ambassadors by Hans Holbein the Younger

Look carefully at the painting. Then discuss the points below.

- What can you see in the painting?
- Who do you think the people in the portrait might be?
- When do you think the picture was painted? Explain why you think this.
- Write a list of the objects in the picture. Why do you think the artist included them?
- Look carefully at the strange object in the very front of the picture.
- What do you think it is? Why do you think the artist included it?
- What title would you give the painting?

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Part 2

Drawing an anamorphic picture

Before you start

The thick lines in Figure 1 show the edge of a picture. You have to imagine the picture! The first step is to draw a grid of squares over the picture. This has been done for you. The grid has axes x and y.

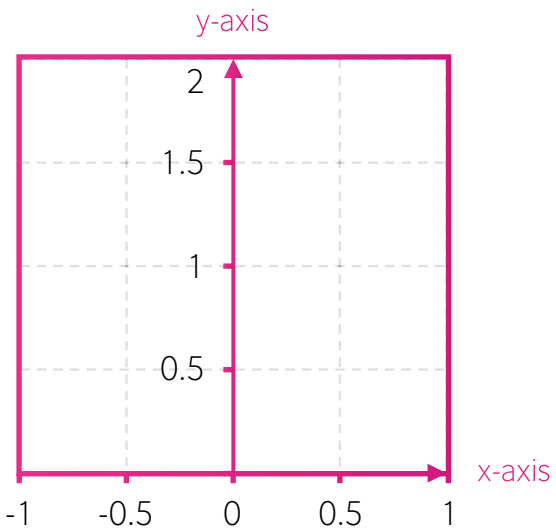

Figure 1

Before you draw your own anamorphic grid, you need to know three things:

- The viewer will look at the picture from a distance d and height h (Figure 2).

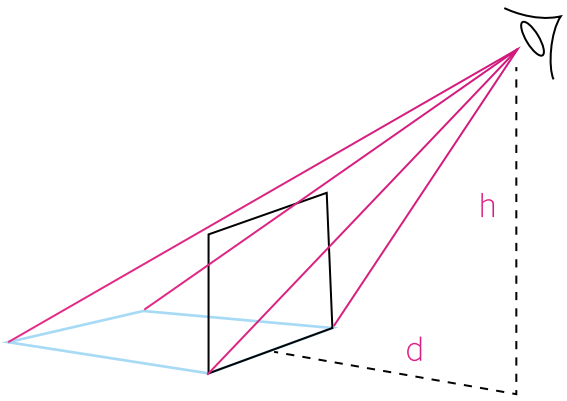

Figure 2

- In this view, point A on the original picture is transformed to point B on the new anamorphic picture (Figure 3).

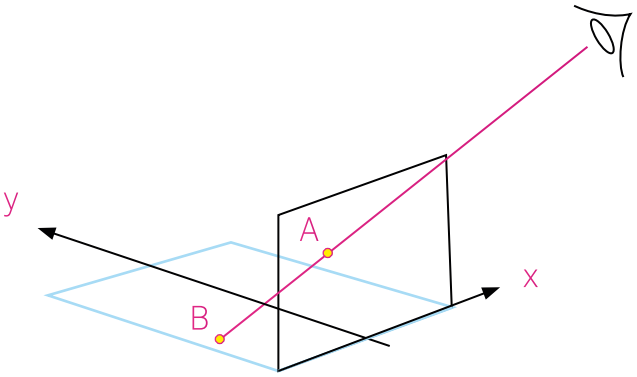

Figure 3

- An anamorphic grid has new axes, X and Y (Figure 4).

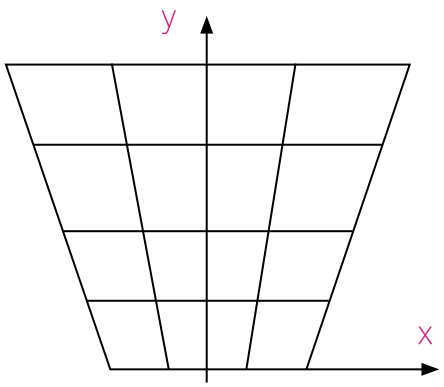

Figure 4

Transforming a picture of a square

Now you will transform Figure 1 to make an anamorphic picture. Here is Figure 1 again.

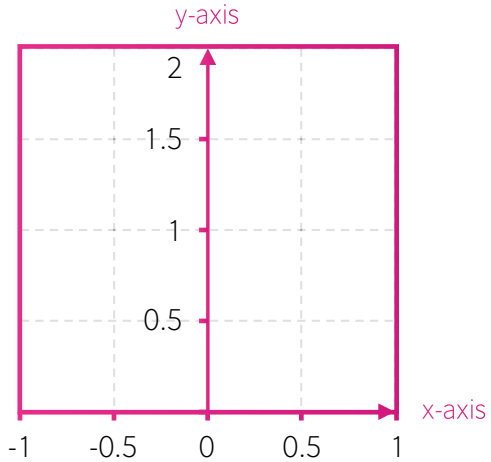

Figure 1

1. The viewer will look from a distance of 15 cm and height of 5 cm. So d =15 and h =5.

2. The co-ordinates of two of the corners of the picture in Figure 1 are (−1, 0) (1,0).
   - Write down the coordinates of the other two corners.
     (__, __) and (__, __)

3. The co-ordinates of all four corners of the picture in Figure 1 are shown in Table 1.
   They are shown in a different format.

x	-1	1	1	-1
y	0	0	2	2

Table 1

4. You can use the equations below to calculate the coordinates of the corners of the transformed (anamorphic) picture.
   In the equations, X and Y represent the values of the coordinates in the anamorphic picture.

equation 1 $Y = \frac{yd}{h-y}$

equation 2 $X = \frac{x(d+Y)}{d}$

   - Use equation 1 to calculate the Y coordinates. Remember, d =15 and h =5.
     The values of y are in Table 1 and Table 2.
     Write the values of Y in Table 2. Some have been done for you.

x	-1	1	1	-1
y	0	0	2	2
x	-1			
y	0	0		

Table 2

   - Use equation 2 to calculate the X coordinates. The values of X and Y are in Table 2.
     Write the values of X in Table 2. One has been done for you.

5. You can now transform the picture of the square.
   - Use the values of the X and Y coordinates in Table 2 to plot the corners of the transformed (anamorphic) picture in the grid below (Figure 5).
   - Join up the points in Figure 5. The shape of the picture should be similar to the shape of Figure 4.

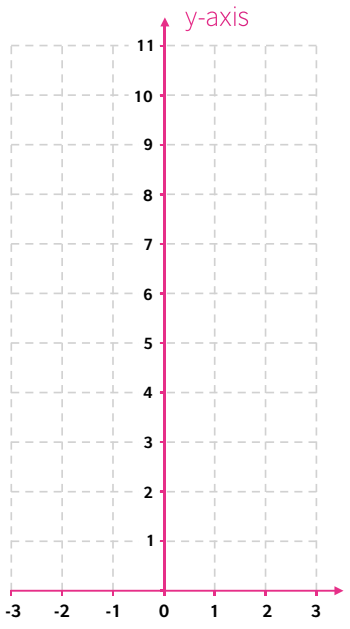

Figure 5

Transforming a picture of a diamond

The coordinates of the diamond in Figure 6 are shown in the top two rows of Table 3, as values of x and y.

Table 3

x	-1	0	1	0
y	1	0	1	2
x	−1.25	0		
y	3.75	0	3.75	

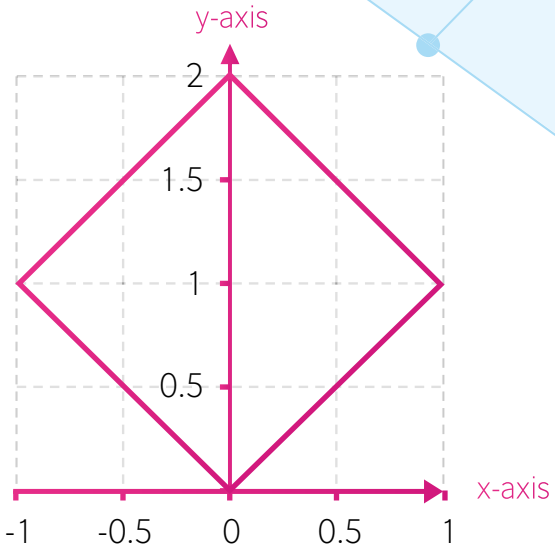

Figure 6

- Use equation 1 and equation 2 to calculate the X and Y coordinates of a transformed anamorphic drawing of Figure 6. Write the X and Y coordinates in Table 3. Some have been done for you.

equation 1 $Y = \frac{yd}{h-y}$

equation 2 $X = \frac{x(d+Y)}{d}$

- Use the values of the X and Y coordinates in Table 3 to plot the corners of the transformed diamond in the grid on Figure 5.
- View your transformed diamond on Figure 5 from a distance of 15 cm and a height of 5 cm.
  Describe what you see.

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Group discussion task

Mathematical task