# Perspective drawing

*In the senior workshop, **Experiments in projective geometry**, we think about the intersection of lines with planes, and planes with planes. In this one we are only concerned with the former. In the senior masterclass perspective drawing forms Part 1. We expand this here.*

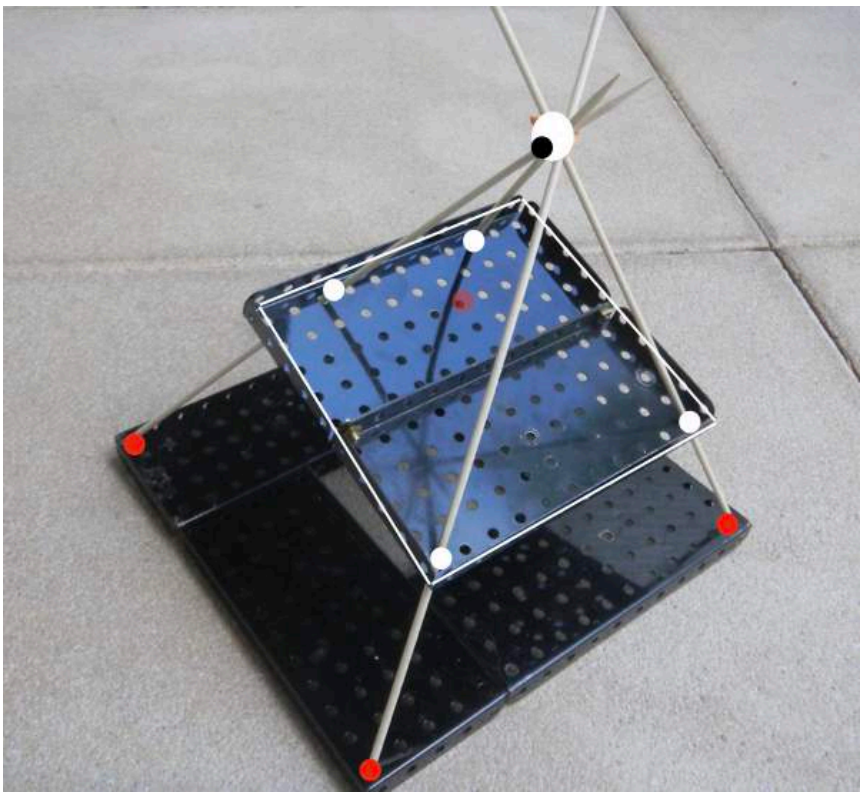
**E1** *Class experiment*

*Look at that table over there* [indicates]. *Your brain tells you the top is a rectangle. Make a picture frame with your fingers* [demonstrates] *and imagine drawing the table. The light rays from a corner of the table to your eye pass through this picture frame and make a shape. For each of you the shape will be a quadrilateral but you'll all be seeing different quadrilaterals because your eyes are in different places.*

We're going to pretend you've just got one eye till the end of the workshop, when we'll experiment with two-eyed vision.

Meccano model

*This model* [exhibit and project powerpoint] *is me looking down at a square but from an angle. The barbecue sticks are the rays of light from the corners. Mathematicians call a flat surface a **plane**. What can you tell me about the planes in the model and about the shapes made by the red dots and the white dots?* [The planes are not parallel. The red shape is a square but the white shape is not.]



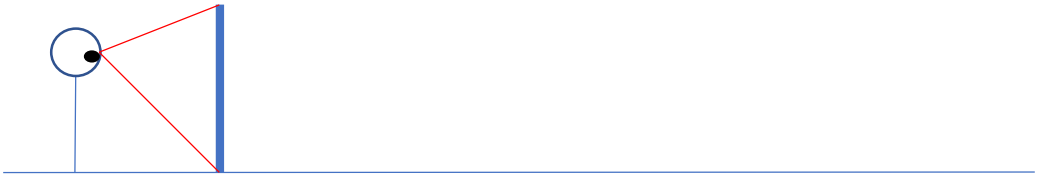
*We can do better than our Meccano model. We shall use a piece of apparatus designed five hundred years ago by one of the early people to study the geometry of how we see the world, so called* ***perspective*** *drawing, the artist Albrecht Dürer.*

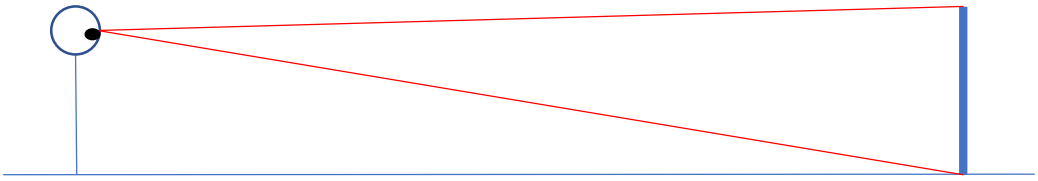
**E2** *Class experiment*

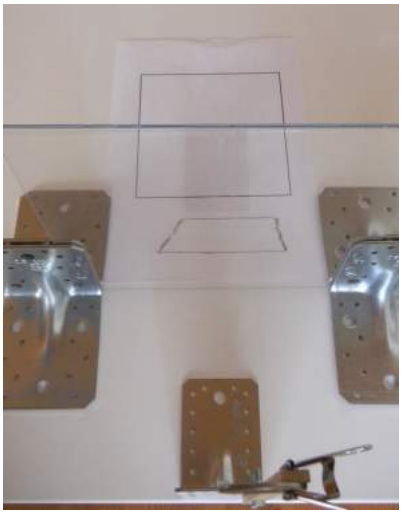
Dürer screen, x 15
Square, x 15
Black pen, duster

*This is how to assemble your Dürer screen* [describes, demonstrates].

*Lay the paper so that an edge of the square is parallel to the screen. How will it turn out when you trace it?* [Give the name **trapezium** when the children have made the experiment].
*Why has the top edge of the square turned out shorter than The bottom edge?* [It's further away. Project and discuss explanatory diagram.] *If you look across the street and hold up a finger, you can make the little people walk along it.*

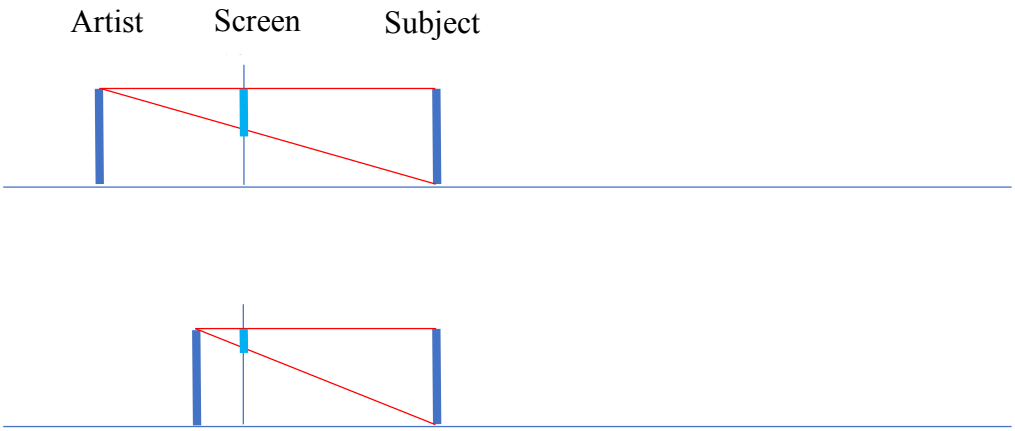






*Now turn it at 45° and guess again.*
[Give the name **kite** when the children have made the experiment.]

*What will happen to the size of your picture if you move the sight closer to the screen?* [It will become smaller. Project and discuss explanatory figure.]




**E3** *Demonstration by 2 pupils*

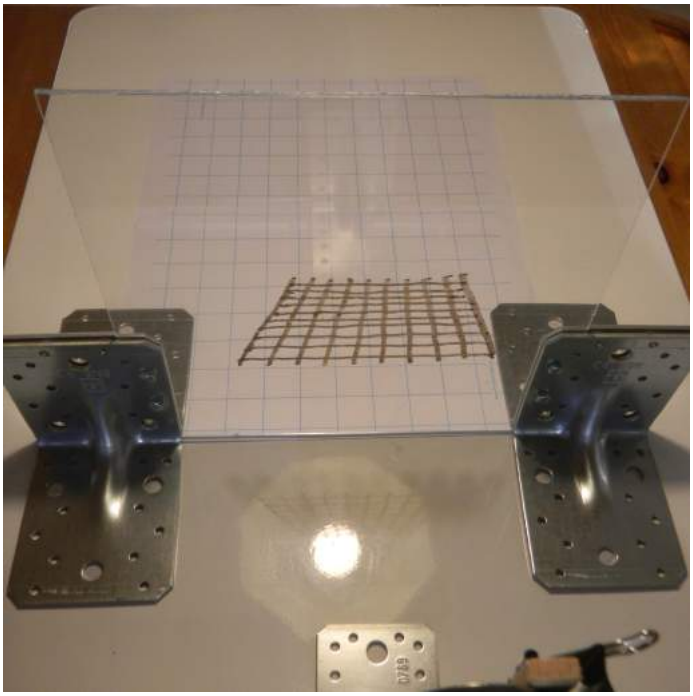
Stick models of trapezium and kite,
OHP on trolley

*If you swapped a strong torch for your eye, it would cast a shadow over your square. All we would be doing is reversing the direction of the light rays. Let's make that experiment with this projector and these two shapes. Could I have a volunteer to move the trolley (if needed) and another to hold one of these shapes in the beam so that you get a square on the screen?*

**E4** *Class experiment*

Square grid, x 15

*Instead of the square as you first had it, put this square tiling and draw it. Try it at an angle as well.*



*What features do you notice?* [Converging lines, 'squares' further away smaller]

**E5** *Class experiment*

Paper, pencils in 3 colours, x 45

*How can we draw a tiled floor* ***without*** *the help of our Dürer window?*

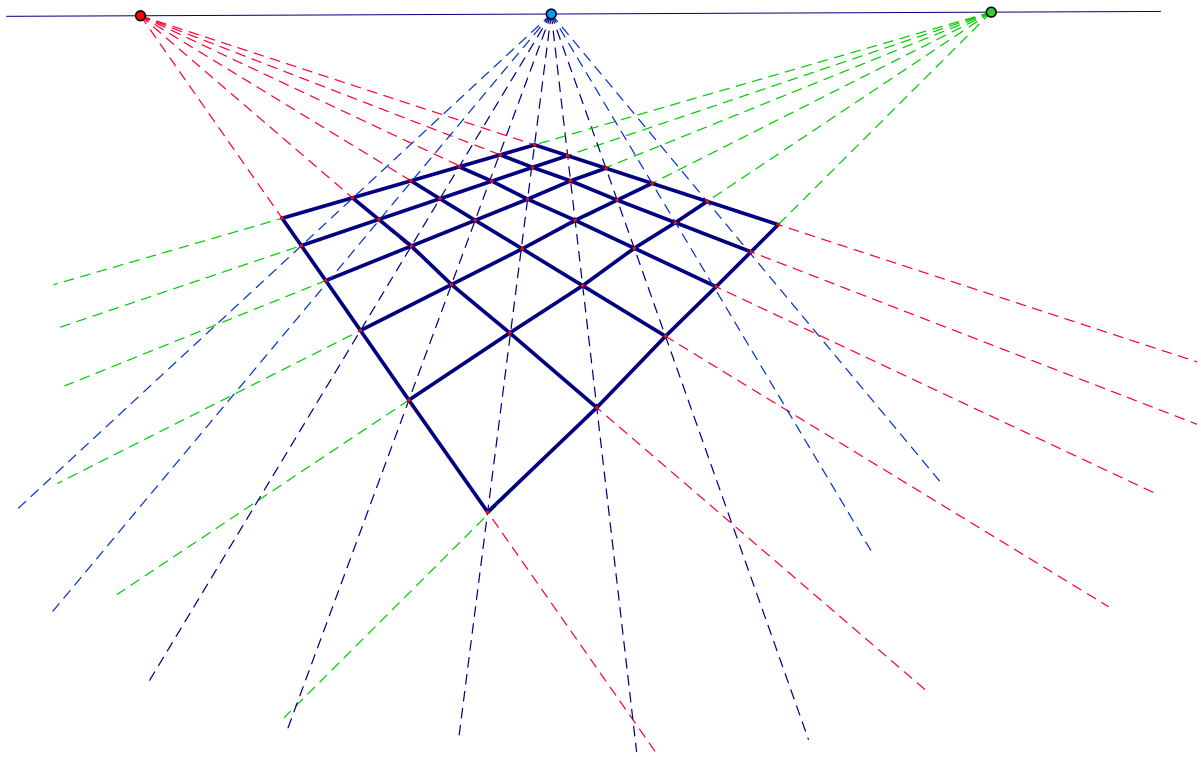
*We're going to draw the tiled floor at an angle. What you've noticed is that sets of lines which are really parallel seem to come together to a point. Such a point is called a 'vanishing' point.*

*Rule a line across the top of the paper.*

*Mark a red point top left, a blue point 10 cm away, and a green point 10 cm away again, so that the blue point is in the middle.*

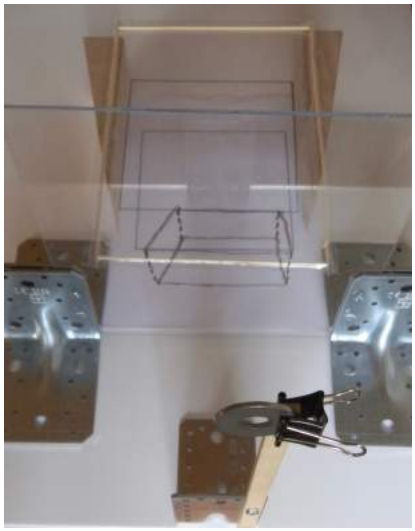
*Draw a red line from the red point and a green line from the green point so that they cross somewhere near the middle of the bottom of the page. Draw a blue line from the blue point through the crossing.*

*The rule now on is:* ***Every point must have a red, a blue and a green line going through it.***



**E6** *Class experiment* *Now we move to 3-D shapes. Try the cube.*

Skeleton cube, x 15



*Let's see what features we notice here.* [Indicate on the apparatus those you're referring to.]

*What about the face at the back and the face at the front?* [The face at the back comes out smaller?]
*Why d'you think that is?* [It's further away.]

*What about the face at the top and the face at the bottom?*

[The face at the top is more squashed.]
*This squashing-up of features which are near eye level artists call* ***foreshortening****.*

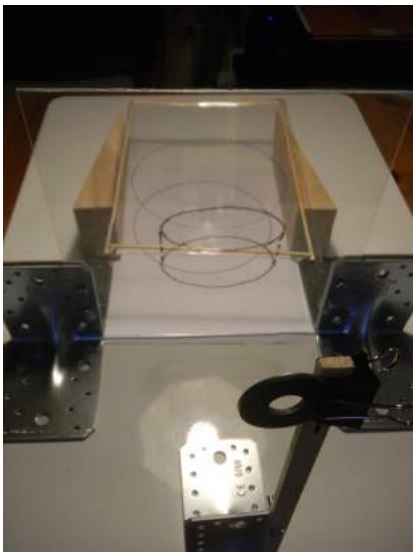
*Imagine a stack of cubes going up to the ceiling.*
*Not only do horizontal parallels appear to come together, but vertical ones do too – or would if the brain didn't correct for it.*
*But you see it in photographs* [Project].

**E7** *Class experiment*

Cylinder, x 15

*We haven't seen what happens to circles so we're going to draw a cylinder.*

*First, what shape d'you think the top and bottom will be?* [Ovals. Give the children the name **ellipse**.]



*What happened which was the same as what happened with the cube?* [The foreshortening]

**E8** *Teacher demonstration*

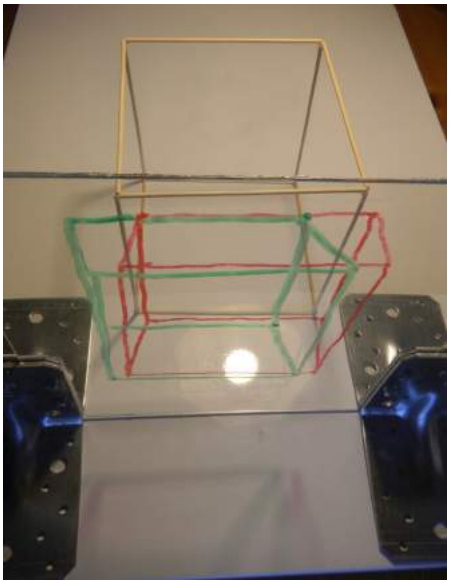
Circles, squares on acetate, OHP on trolley

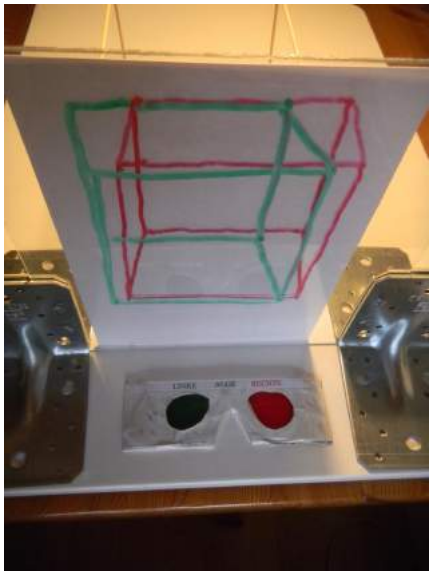
*We haven't finished with the Dürer window yet but Let's see what you think will happen in this experiment. I'm projecting this picture of squares and circles on the screen* [the squares respectively square-on and at 45°]. *What will happen to each shape as I swing the trolley round to here* [indicate]*, pointing in this direction* [indicate]? [Discuss links with the Dürer window experiments.]

**E9** *Class experiment*

Red, green pens, Anaglyptic spectacles, x 15

*Put the cube back its original way.*
*Remove the sight.*
*Shut your left eye.*
*Draw the cube with the green pen.*
*Don't move.*
*Shut your right eye.*
*Draw the cube with the red pen.*
*Get a partner to hold a sheet of white paper behind the screen and put on the special glasses.*
[Discuss binocular vision.]





**E10** *Class experiment* *In the time we have left, do what a real artist like Dürer would do. Draw a person!*