Prace Naukowe Wyższej Szkoły Pedagogicznej w Częstochowie
Matematyka IV, Częstochowa 1998

The shadows

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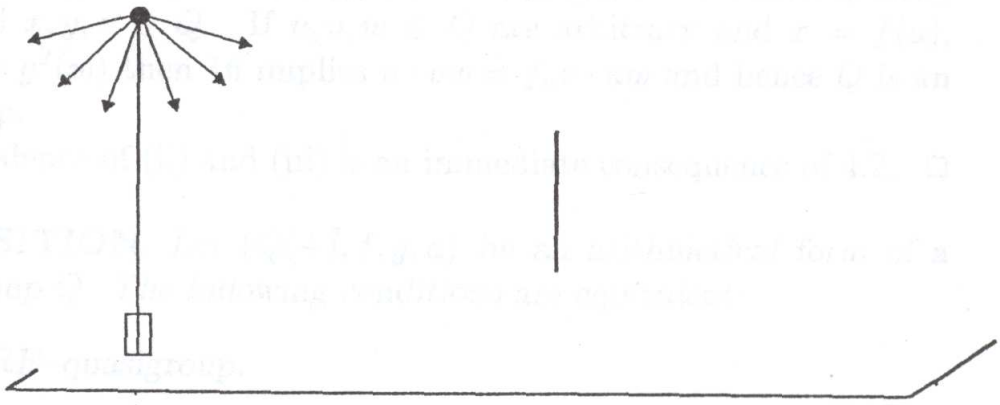
In my short lecture I would like so sell you a few words about my experiences from experiments, in which I and my colleagues were interested in possibilities of the progress of lower secondary school pupils space–vision.

Especially I would like to point out the method, were we use the theme of shadows. This theme was ordered into the didactical sequence of problems, some of them I will present there.

We have started with this primer problem:

There are both a lamp and pole in the plane.
Find the shadow of the pole.

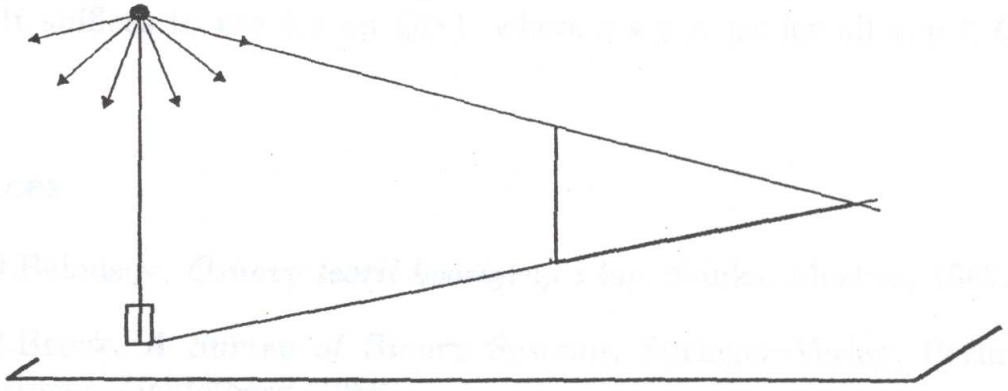


I asked my students:

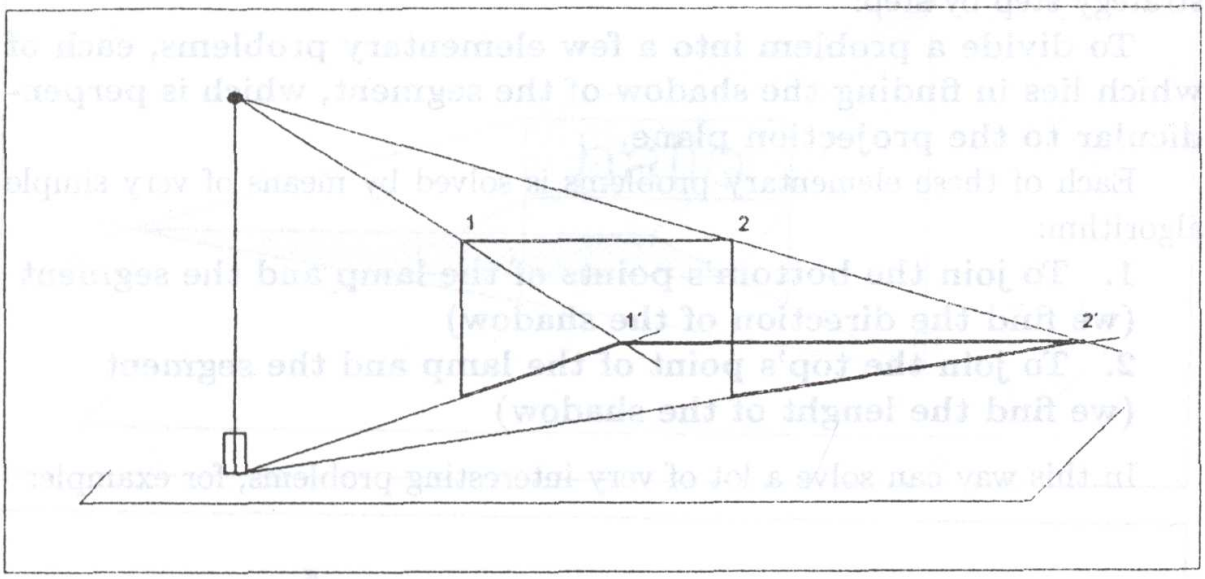
– In which direction will be the shadow laid ?

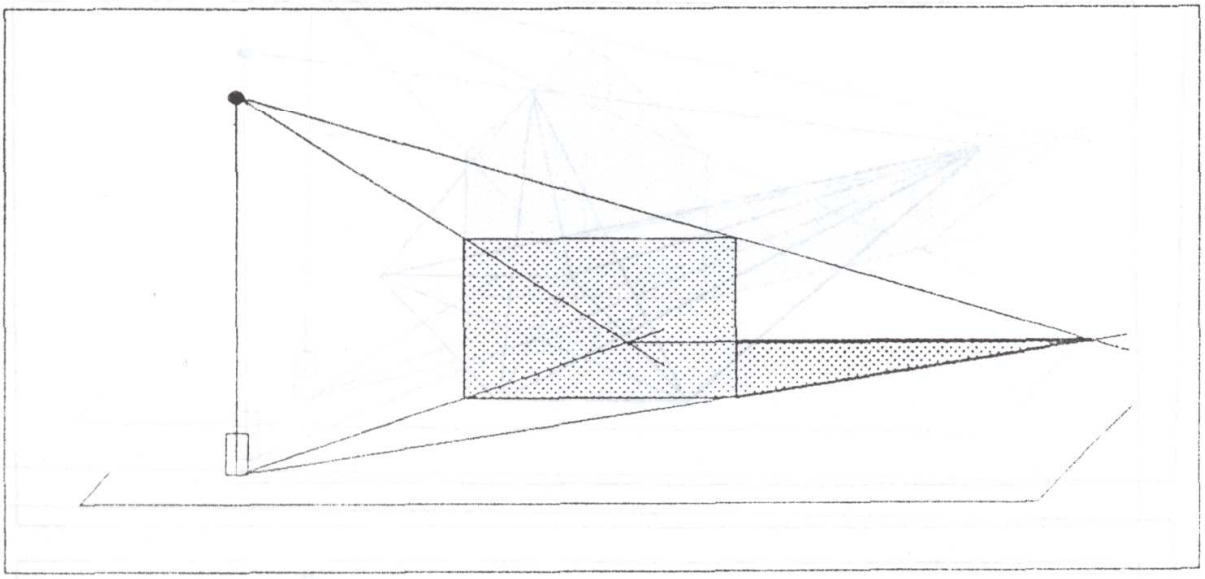
– How long the shadow will be ?

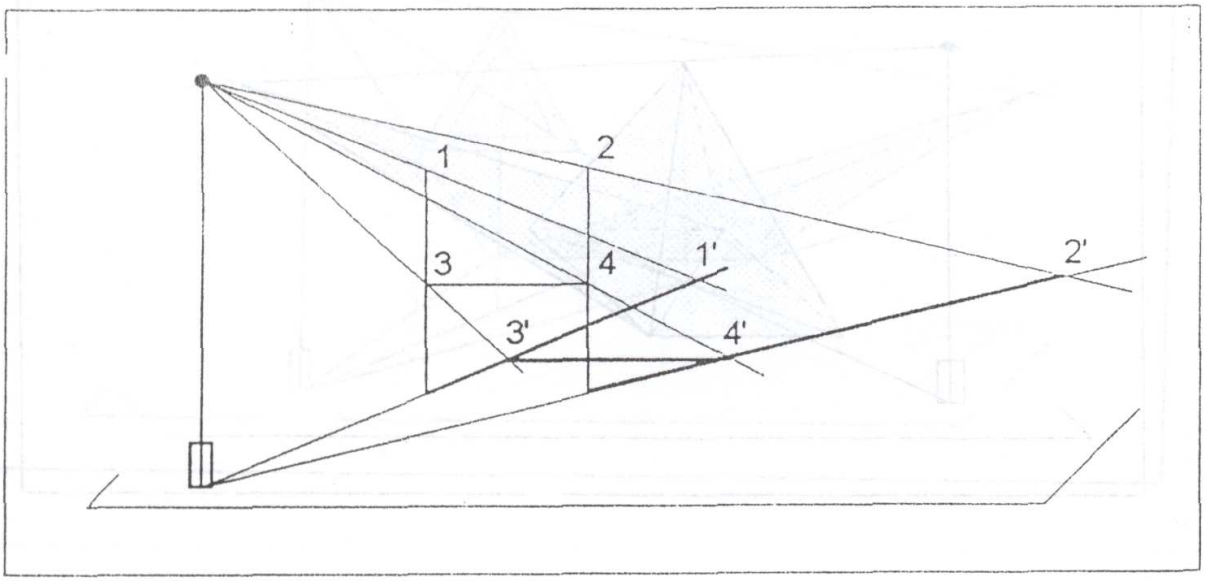
They found answers very easily and drew immediately this solution:



And now I continued with following sequence of problems:







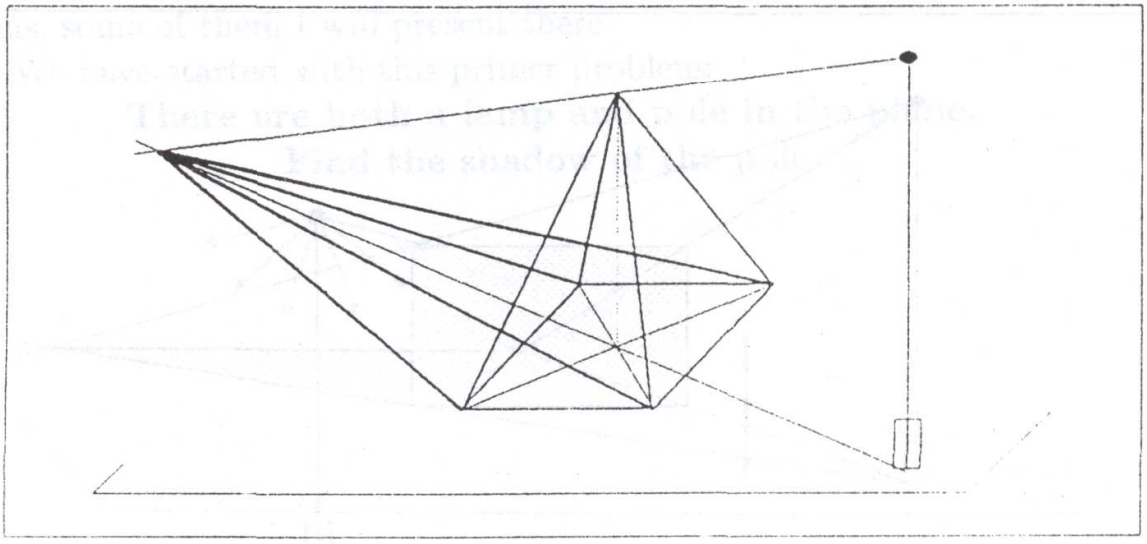
The solution of these problems led my pupils to understand of this strategy step by step:

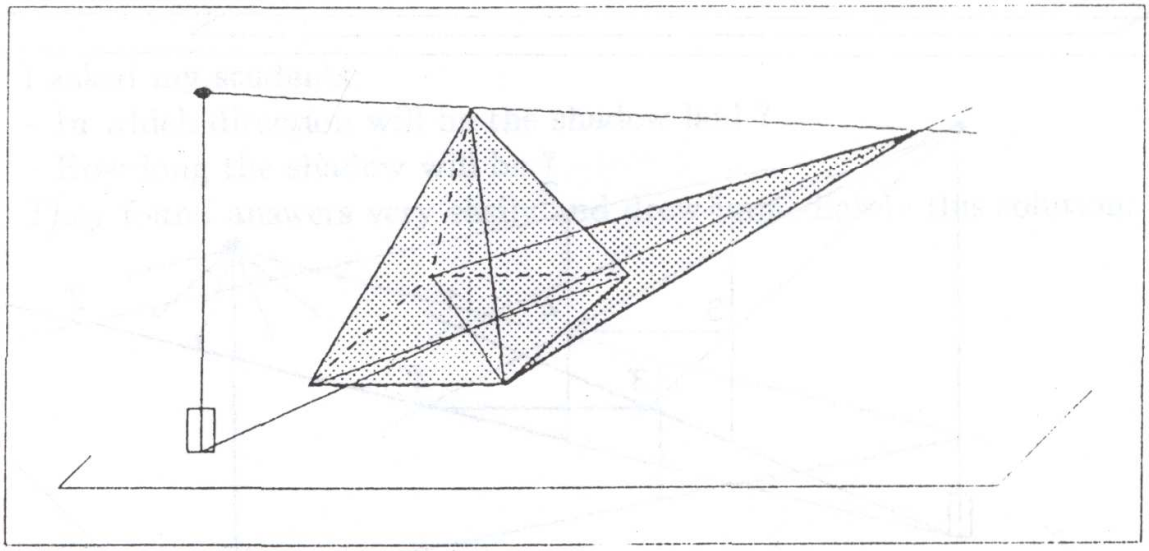
To divide a problem into a few elementary problems, each of which lies in finding the shadow of the segment, which is perpendicular to the projection plane.

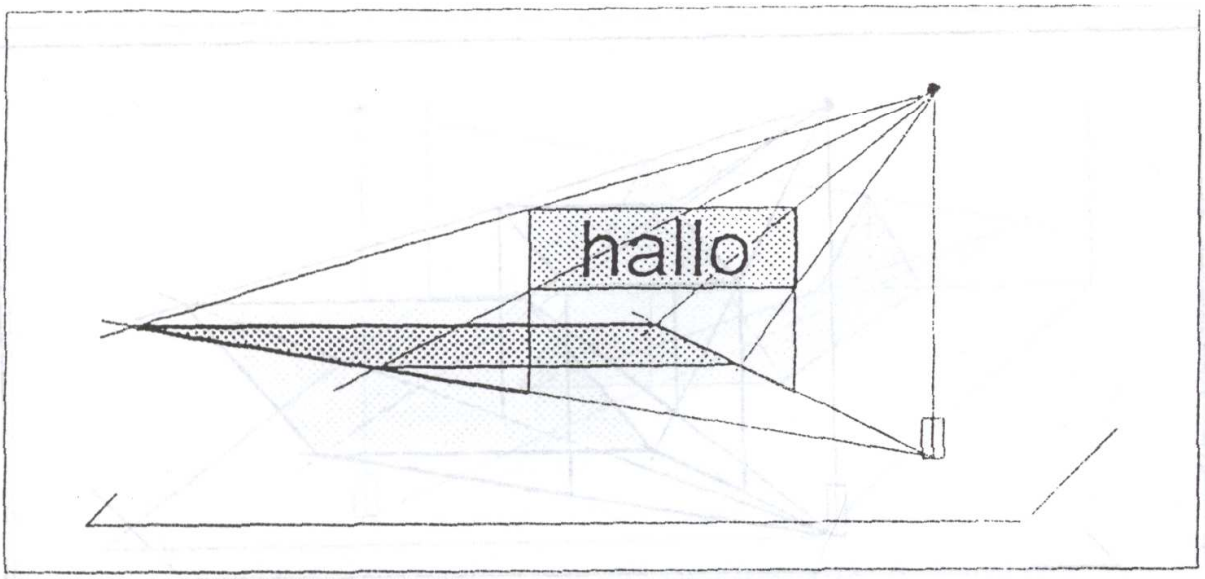
Each of these elementary problems is solved by means of very simple algorithm:

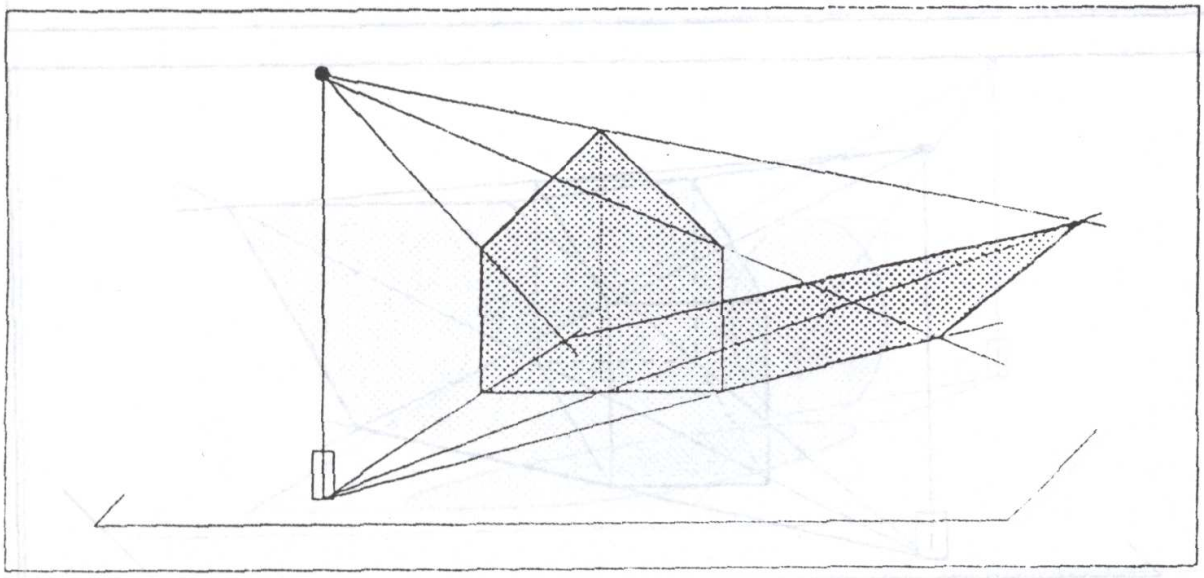
1. **To join the bottom's points of the lamp and the segment (we find the direction of the shadow)**
2. **To join the top's point of the lamp and the segment (we find the lenght of the shadow)**

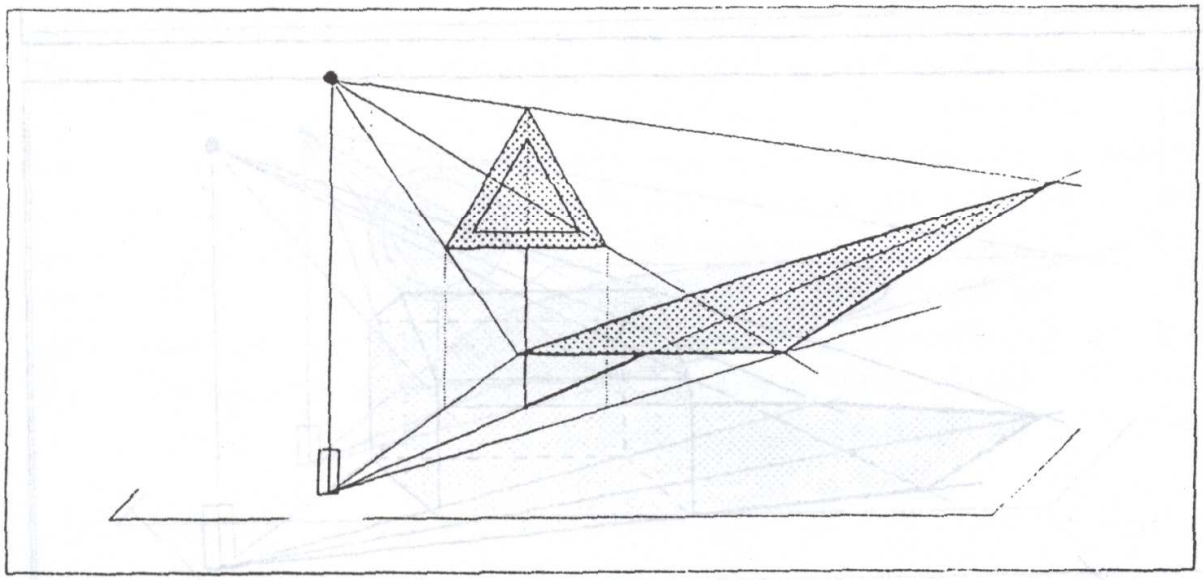
In this way can solve a lot of very interesting problems, for example:

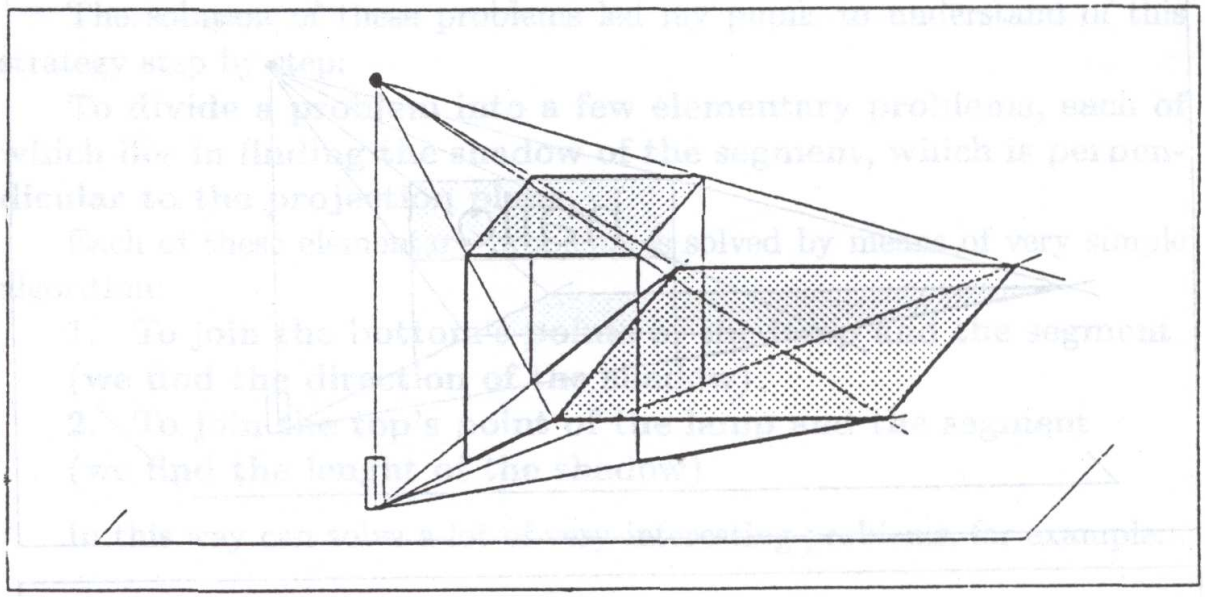


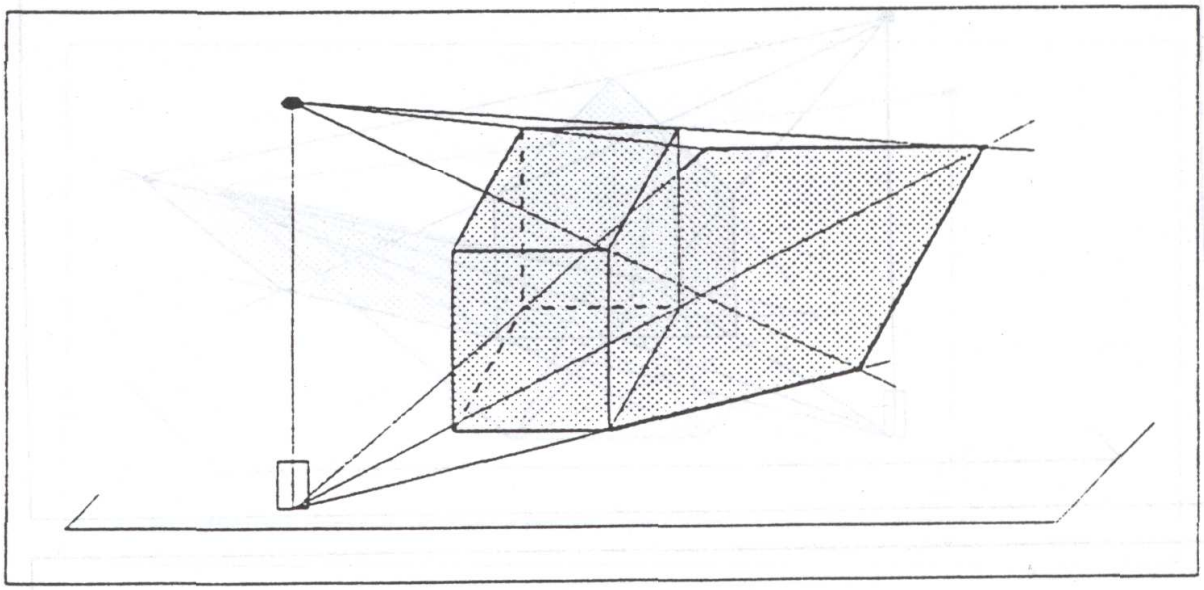


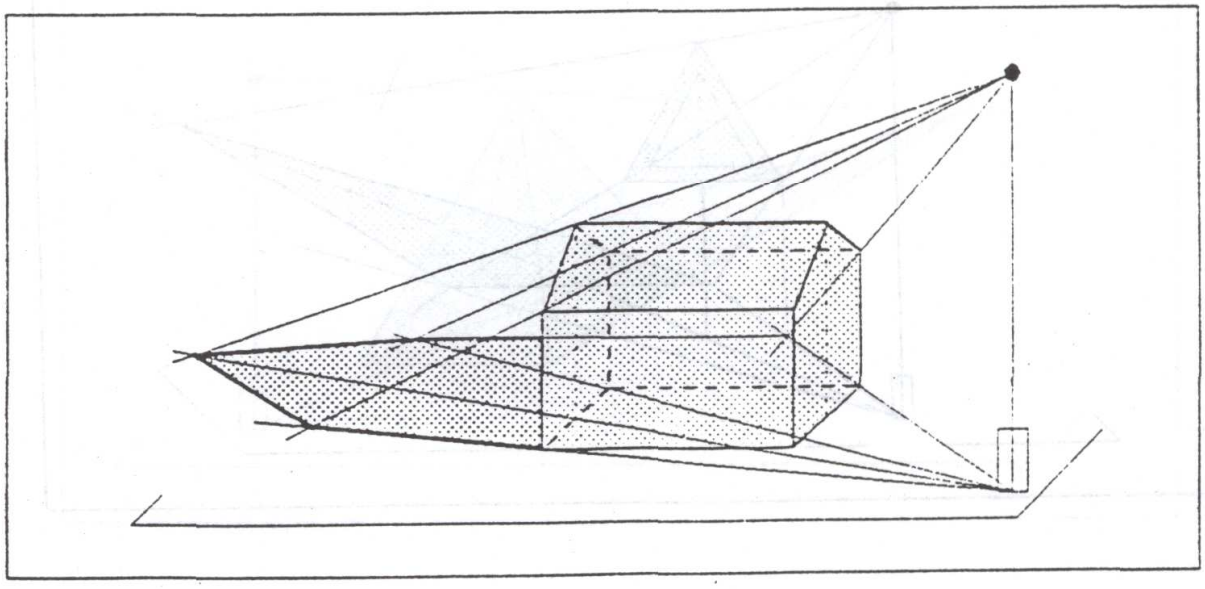

halo

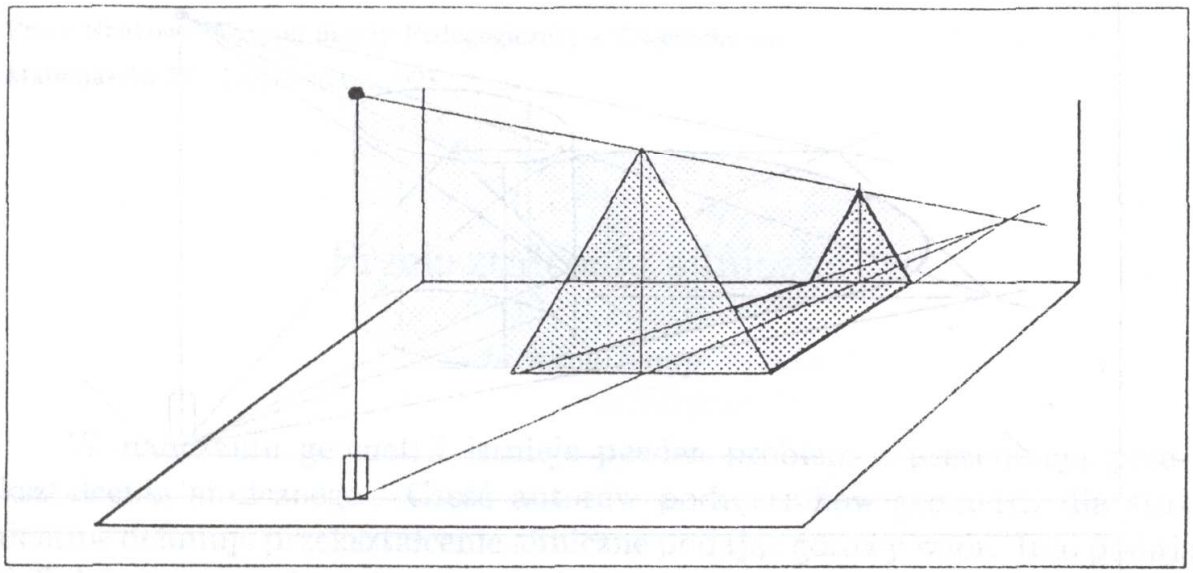


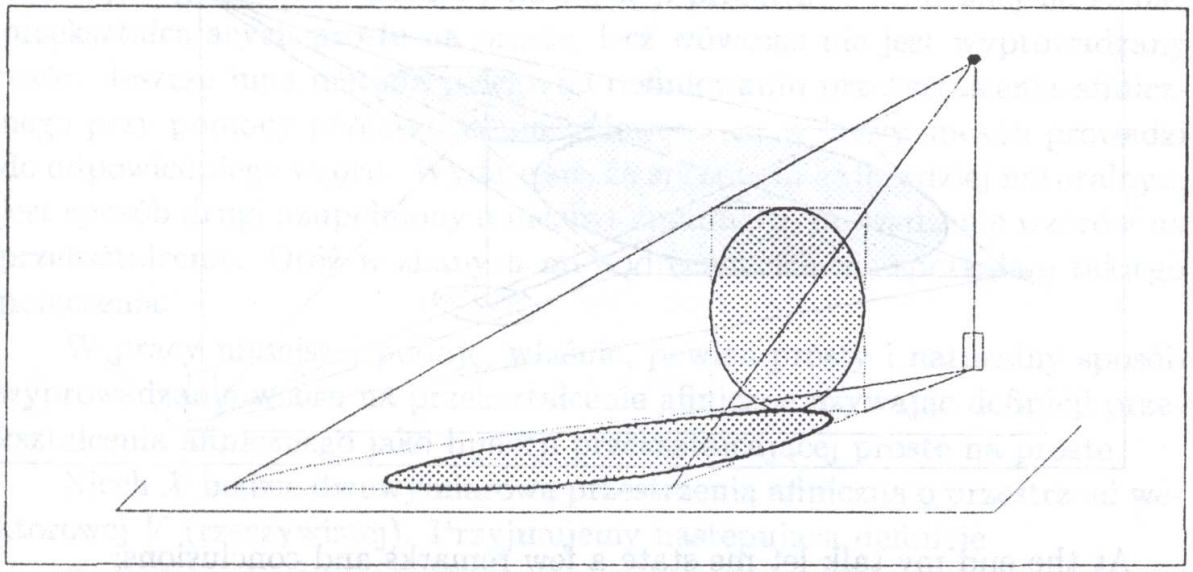


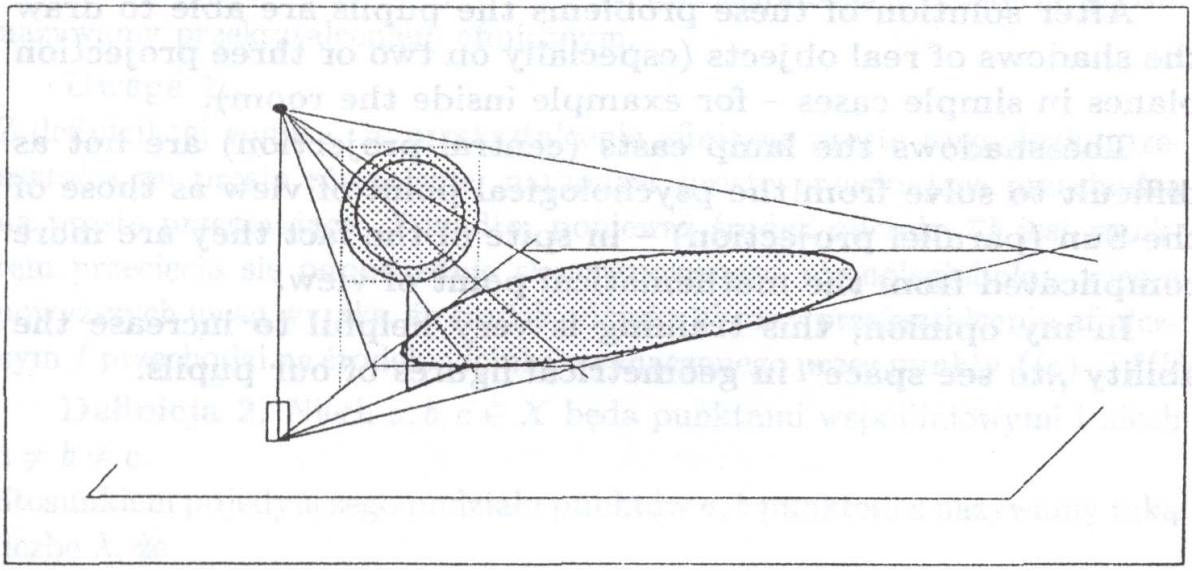


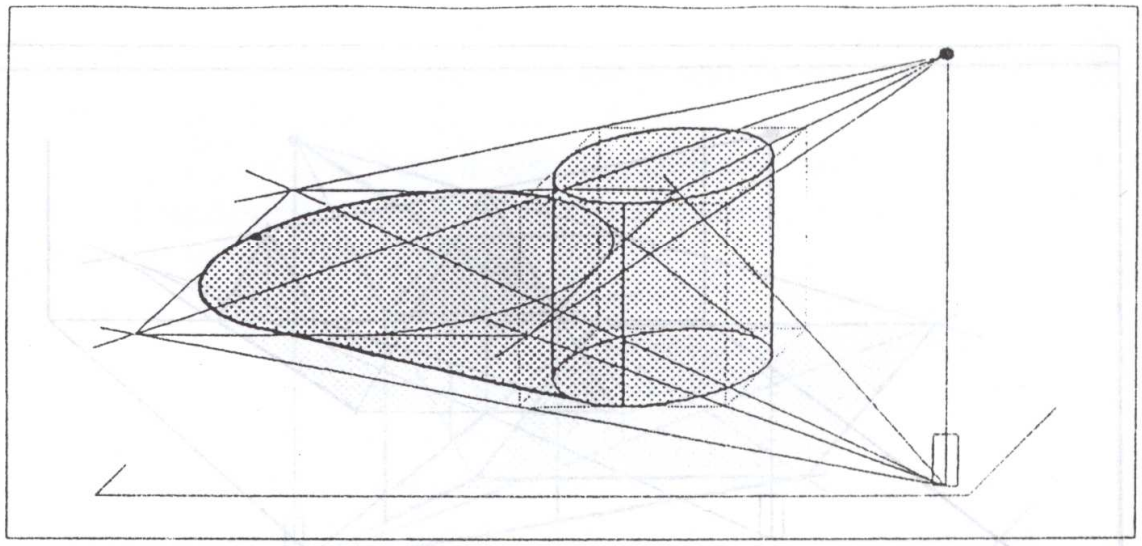


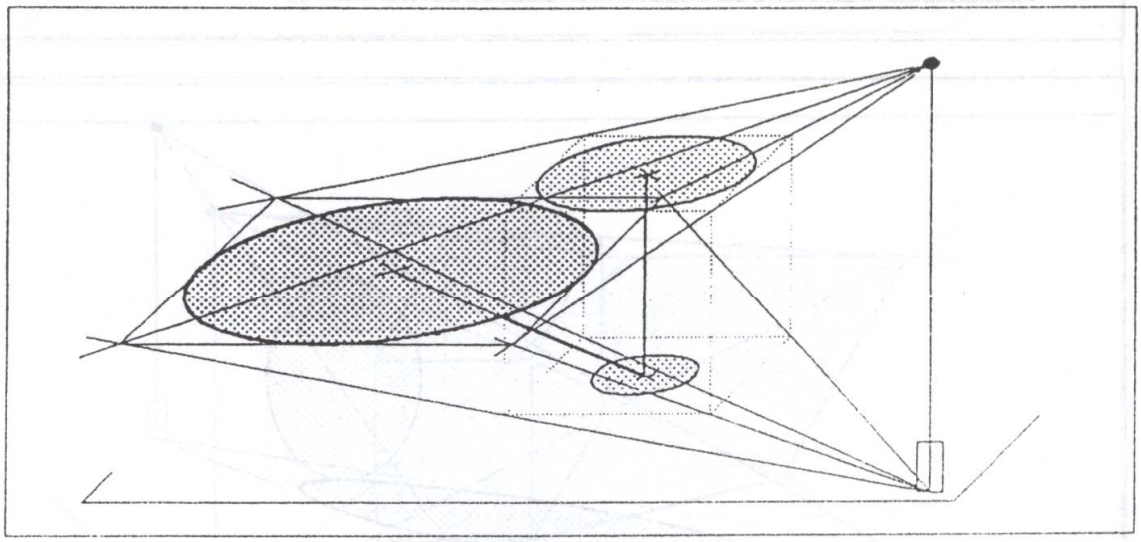












At the end my talk let me state a few remarks and conclusions:

After solution of these problems the pupils are able to draw the shadows of real objects (especially on two or three projection planes in simple cases – for example inside the room).

The shadows the lamp casts (central projection) are not as difficult to solve from the psychological point of view as those of the Sun (parallel projection) – in spite of the fact they are more complicated from the mathematical point of view.

In my opinion, this training is very helpful to increase the ability ,,to see space" in geometrical figures of our pupils.