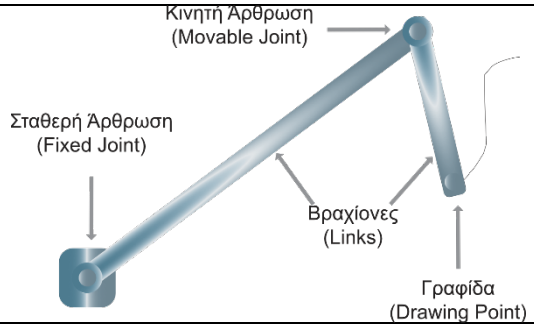
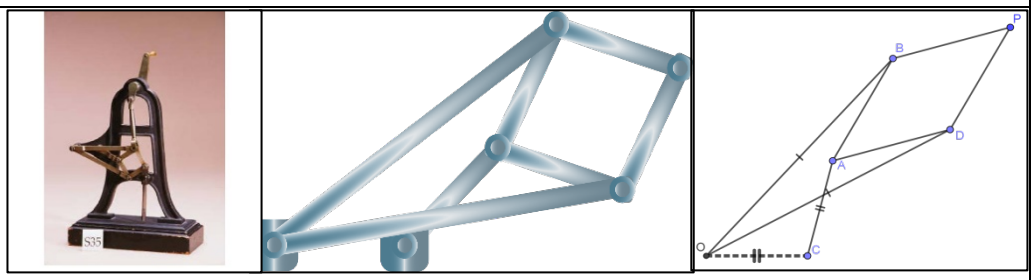
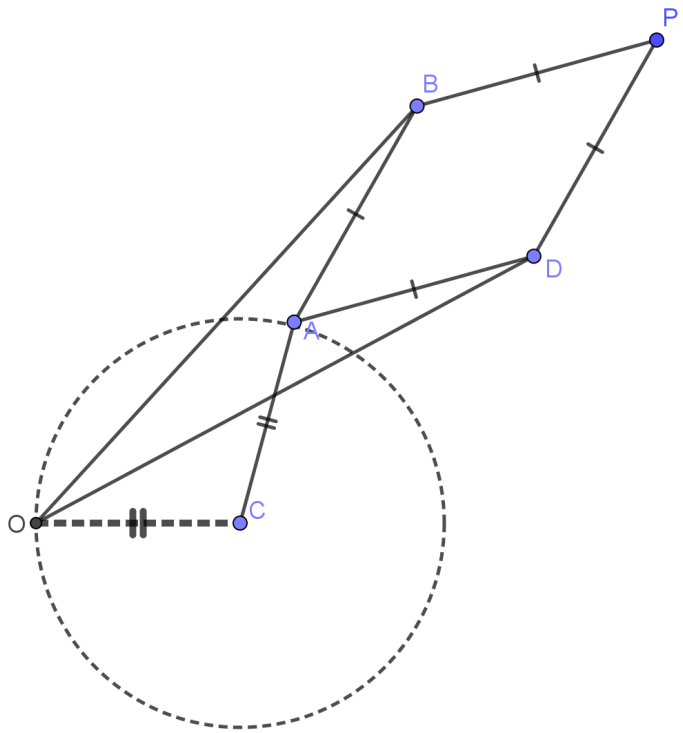
WORKSHEET	GEOMETRY OF PEAUCELLIER LINKAGE
LINKAGES' DEFINITION	Linkages are mechanisms that used as parts of machines for specific purposes like converting motion. More specific, a form of motion is applied to a linkage - it is considered "driver" or "master" or "input" - and a desired or usable motion is produced that called "follower" or "output" or "slave".
LINKAGES' DESCRIPTION	 A linkage is a collection of links. Links are connected either to each other or to fixed points by joints. Each joint connects two or more links.
ACTIVITY No1	In the above figure you can see a linkage. 1. Describe the motion of the links …… …… 2. Describe the motion of the drawing point …… ……
PEAUCELLIER LINKAGE	 The first figure shows a replica of Peaucellier's Linkage, the second is its schematic representation and the third one is its geometric representation. How many links, joints and fixed joints are in the linkage? …… Two large-sized OA and OB arms, of equal length, rotate at the same fixed point O while their free ends B and D are attached to the opposite vertices of a ABPD modular linkage composed of four equal sized links, with movable joints. Next, the part of the device described so far is connected by the joint A of the modular linkage with a fixed point C via an additional AC link, the length of which is just as the distance OC. Suppose that a mechanism attached to joint A, could produce movement to it. Try to figure out the motion of the links of the linkage. …… …… …… ……

PEAUCELLIER'S LINKAGE GEOMETRIC REPRESENTATION



This figure shows Peaucellier's Linkage geometric representation. The joint on point A performs circular motion with its center on fixed point C and radius CA. Meanwhile point O is a fixed point positioned on the same circle.

Describe the motion of points B and D.

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Describe all geometric shapes of the figure and their properties. You can draw any line that you think will be convenient.

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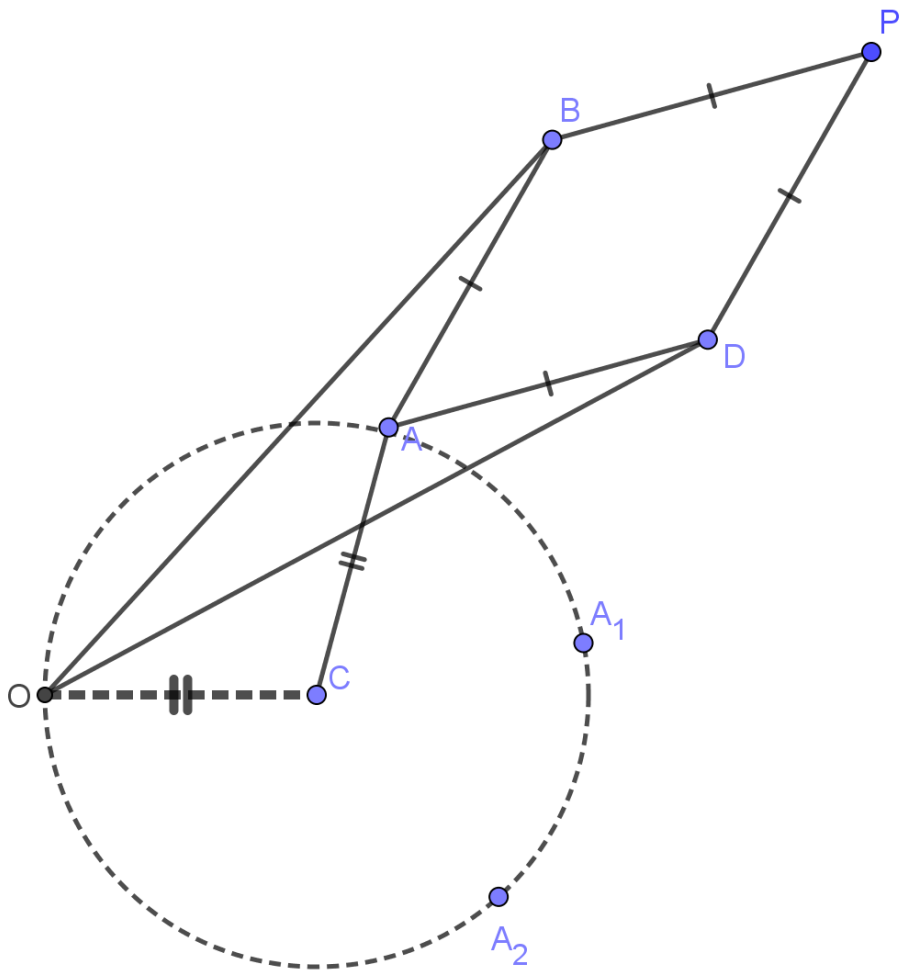
LOCATE POSSIBLE POSITIONS OF POINT P



Suppose that A_1 is another position of point A. Bearing in mind previous questions design the new position of the mechanism and locate point P. Describe the procedure you followed step by step. Repeat for point A_2.

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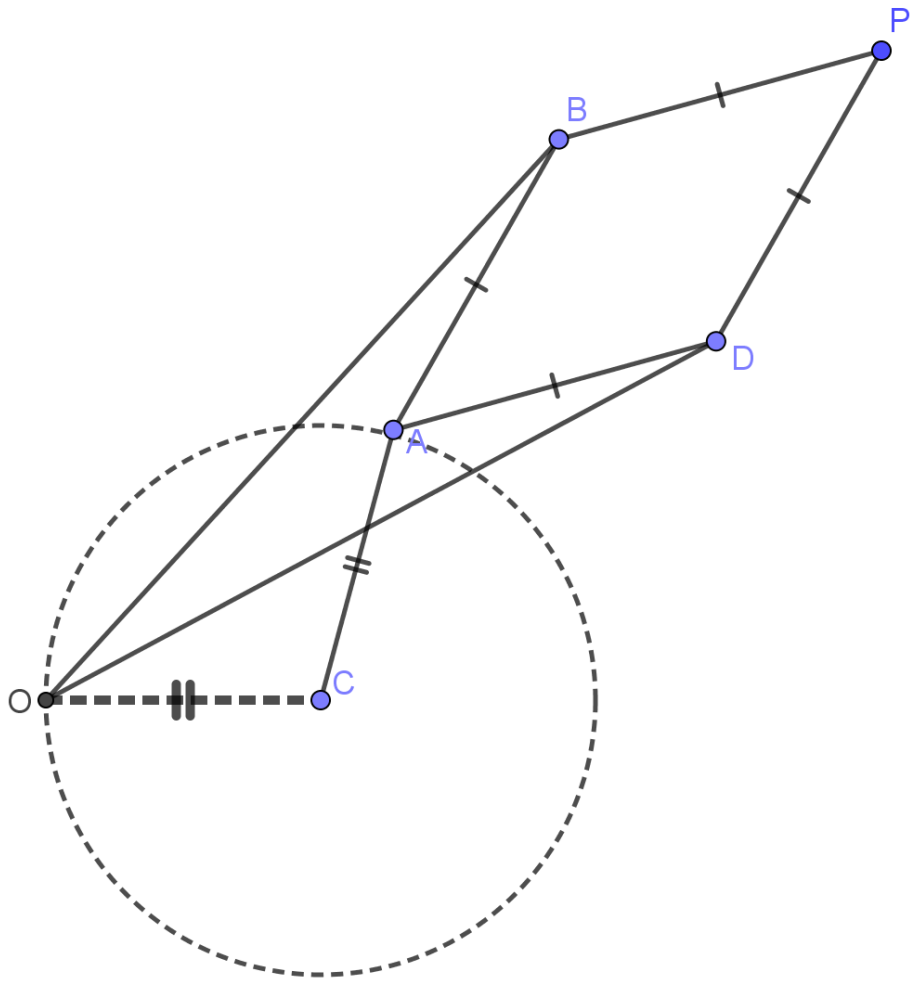
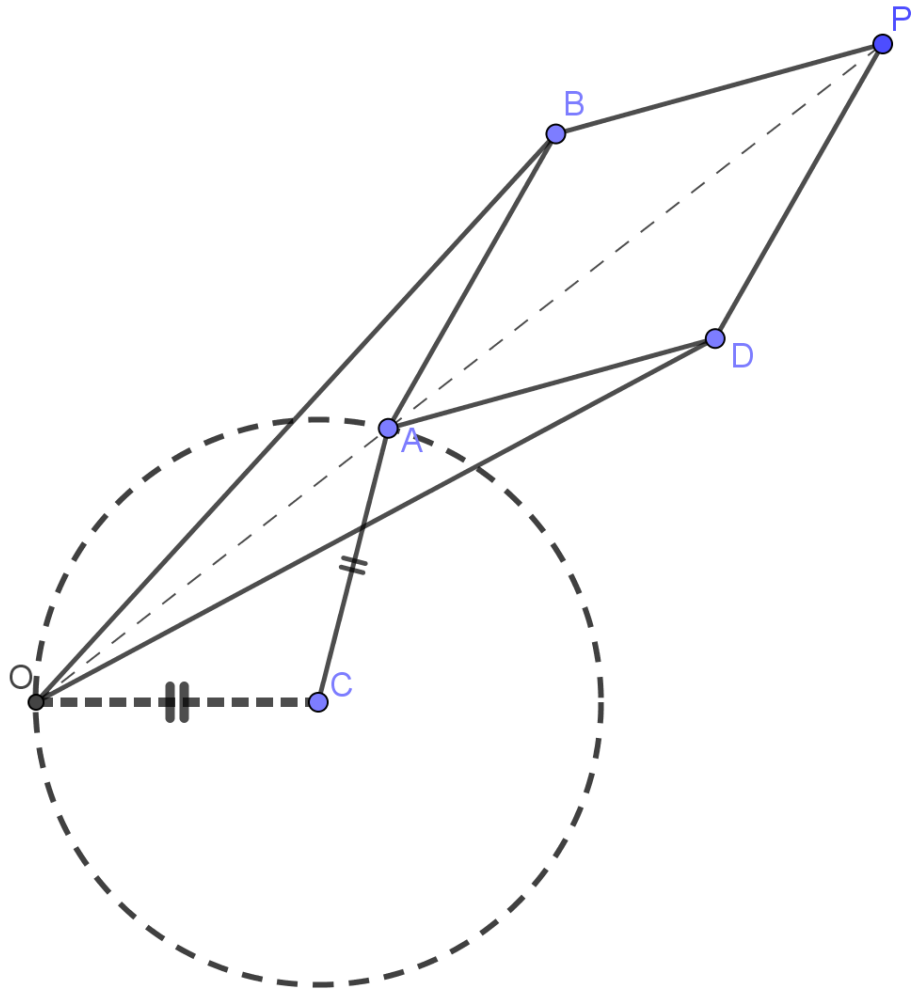
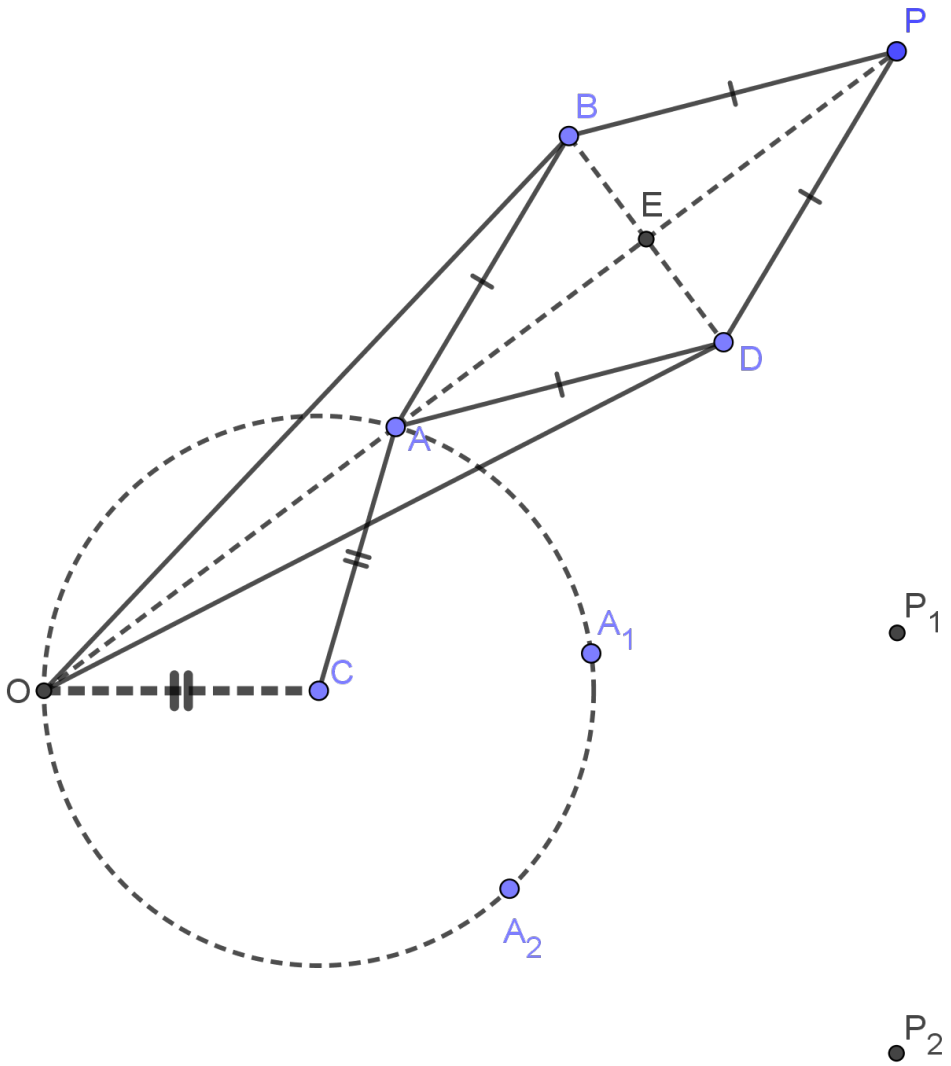
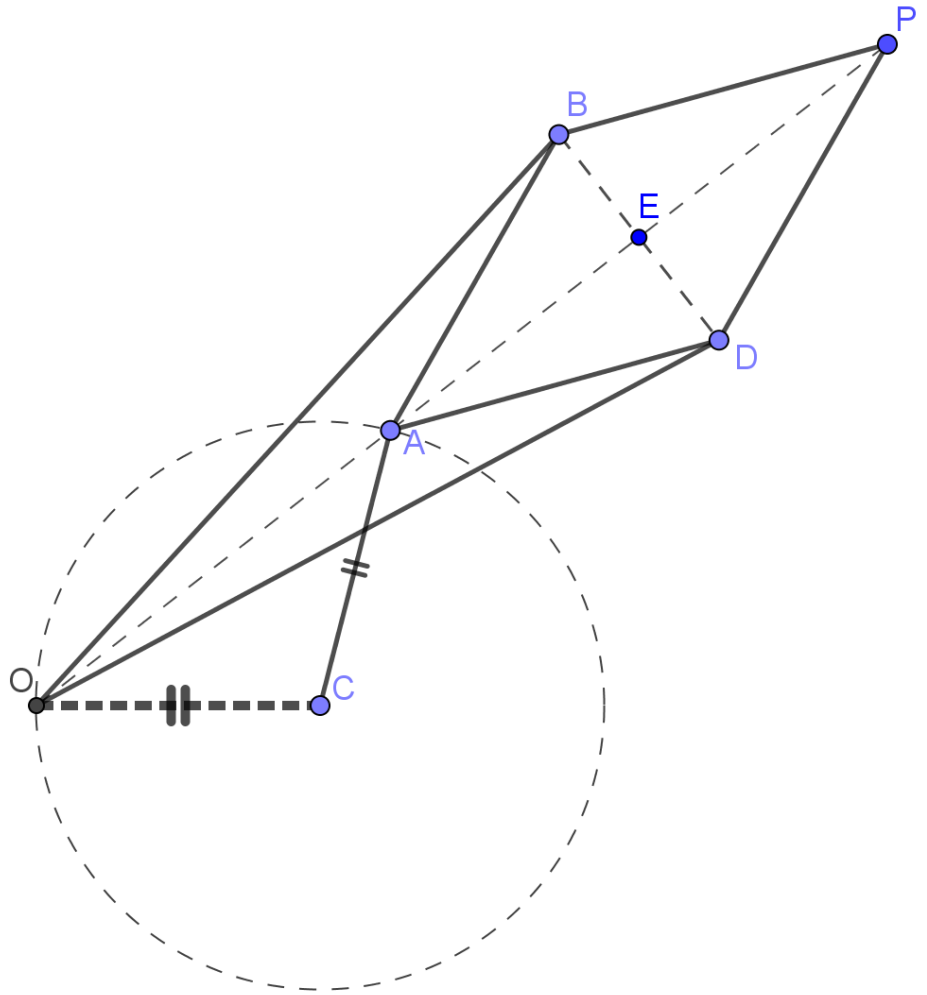
POINT'S P POSSIBLE POSITIONS	Suppose that there is a pen attached at point P position while point A moves along the circle. Can you guess what kind of drawing will be produced? …… ……
FINDING POINTS MAINTAINING THE SAME RELATIVE POSITION	Study carefully the figure with the possible positions of point P. Try to find three or more points that they maintain constant the relative positions between them. Perform all possible controls. ……
PROVING	Connect with straight line segments the points O, A and P (if you haven't done so yet). Prove that they are collinear no matter the position of point A.  …… …… …… …… …… ……

CALCULATIONS	Draw the line segment BD (unless you haven't done so yet) in the following figure. Let E be the point of intersection of AP and BD line segments. Calculate the length of line segment OAP. (Tip. An easy way to calculate right triangles' sides lengths is the use of Pythagorean Theorem)  ....

DETERMINATION OF FIXED SIZE'S SEGMENT	Considering that P_1 and P_2 are possible positions of point P (found during previous activities) determine a geometric shape that has a relationship with the line connecting points P, P_1, P_2. (Tip: Connect all the possible positions of point P while point A is moving along the circle). ……  Apart from the segments PB, PD is there any other points or lines which have fixed distance from point P? Please justify your opinion. …… ……
IDENTIFICATION OF THE GEOMETRIC SHAPE WITH THE FIXED DISTANCE FROM POINT P	Locate the geometric shape that has fixed distance from point P. You can draw any line that will assist you. (Tip: Connect all the possible positions of point P while point A is moving along the circle) …… …… ……

PROVING	Draw any useful line, according to your opinion, in order to prove your assertion. (Tip1: Right triangles are very useful when comes to calculations not only because it is easier to prove the similarity but you can apply Pythagoras theorem as well. Tip2: Modify appropriately the mathematical relationship of OP line segment)  …… …… …… …… …… …… …… …… …… …… ……

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REALITY	Place a sheet of paper under the pen in model of the Peaucellier's Linkage. Locate the position of point A (of the geometric representation) on the model and slide it so it moves along a (fantastic) circle. Now find out the shape of the line that the pen draws. …… …… …… …… …… ……

Thank You for your attention