

DISCOVERING THE DEFINITION OF ROTATION

A Guided Investigation

Part 2. Make Conclusions

Group members will need to work together in order to answer the questions that will inform a precise definition of Rotation.

Make Conclusions Based Upon Your Work.

For definiteness, we first deal with the case where $0 \leq t \leq 180$.

P is any point of the pre-image.

Look specifically at exercises A and C.3. What is the location of points A and U , respectively, relative to the origin?

What is the location of A' and U' , respectively, again relative to the origin?

What is the observed effect of rotating such a point, for any value of t° , around the origin?

Based upon these two observations, complete the general rule.

If $P = O$, then by definition, $Ro(O) = \underline{\hspace{1cm}}$.

Look at any points in any of the exercises other than points A and U just considered, are the points distinct or non-distinct from the origin? Why?

When rotated, where are the images in relation to their respective pre-images?

In contrast to the preceding rule,

MULTI FILL-IN-THE-BLANK

If P is distinct from O , then by definition, $Ro(P)$ is the point Q on the

(1) _____ with (2) _____ O and (3) _____ $|OP|$ such

that $|m\angle QOP| = t^\circ$ and such that Q is in the

(4) _____ direction of the point P .

circle / radius / diameter / angle / degree / clockwise / counterclockwise / center

Looking at any point of any geometric image rotated in this investigation, does the mapping result in a single image or multiple images?

MULTIPLE CHOICE

Thus, one may claim that the mapping is _____ (i.e., there cannot be more than one such image Q).

unique / ambiguous / congruent / unambiguous

Look at exercises B.2 and C.2, where geometric figures are rotated 180° around the origin, if each pair of pre-image/image points (e.g., H and H') are treated as endpoints of a segment, what special chord of a circle does each pre-image/image pair create?

MULTIPLE CHOICE

If $t = 180$, then Q is the point on the circle so that \overline{PQ} is a _____ of the circle.

secant / diameter /

Look at exercises C.4 and C.6, where geometric figures are rotated 0° around the origin, describe the result of the mapping.

MULTIPLE CHOICE

If $t = 0$, then $Q = P$; and R_0 is the _____ transformation of the plane.

reciprocal / identity / non-rigid / inverse

MULTIPLE CHOICE

Hence, if $0 < t < 180$, then all the Q 's in the

_____ direction of the point P with the

property $0 < |m\angle QOP| < 180^\circ$ lie in the fixed half-plane of \overrightarrow{OP} that contains Q .

clockwise / counterclockwise / circumference

Thus, Ro is well-defined, in the sense that the mapping is ***unambiguous***.

Now, consider the case when $t < 0$.

MULTIPLE FILL-IN-THE-BLANK

By definition, we rotate the given point P _____ on the circle

that is _____ at O with _____ $|OP|$. Everything

remains the same except that the point Q is now the point on the circle so that

$|m\angle QOP| = |t|^\circ$ and Q is in the _____ direction of P .

circle / radius / diameter / angle / degrees / clockwise / counterclockwise / center

Thus, we define $Ro(P) = Q$.