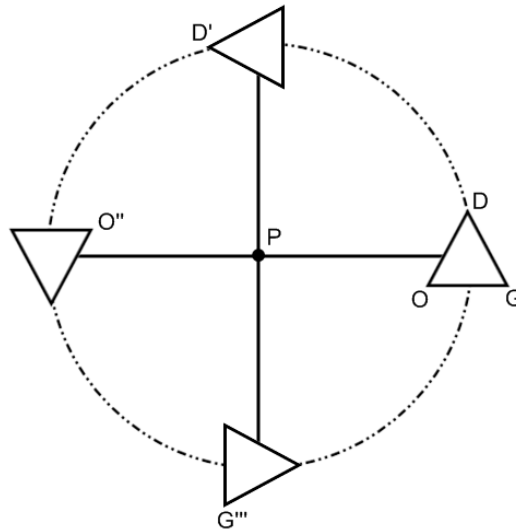# Lesson 2.4 – Moving Shapes Around - Rotations

Let us pretend we have a pet dog to help us understand the third basic rigid motion. Our dog is not your ordinary dog. Our dog is a triangle labeled DOG. DOG is tied up to point P and DOG runs in circles all day in a counter-clockwise direction. Use the diagram below to complete Set 1.



**Set 1 –** Use the diagram to answer all questions and complete all tasks.

| | |
|---|---|
| **A.** Triangle DOG is already labeled. The other three triangles are not completely labeled. Label them appropriately. | **B.** State the degree measure of the angle the dog travels when it travels from:<br><br>  I.    Triangle DOG to triangle D'O'G'<br><br><br>  II.   Triangle DOG to triangle D''O''G''<br><br><br>  III.  Triangle DOG to triangle D'''O'''G''' |

| **C.** Name two pairs of triangles that are pointing in opposite directions. | **D.** What degree measure does a triangle turn about point P so that it will point in an opposite direction? | **E.** What is the measure of the minor angle formed by the leashes of triangle DOG and triangle D'''O'''G'''? |
|---|---|---|
| | | |

In order to rotate an object we need a point to rotate the object around and a degree measures.

## **The difference between negative and positive degree measures.**
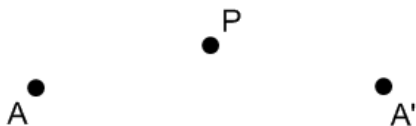Recall that the quadrants in the coordinate plane are labeled in a counter-clockwise direction from I to IV. Positive angle measures also turn in a counter-clockwise direction. Negative angle measures turn in a clockwise direction.

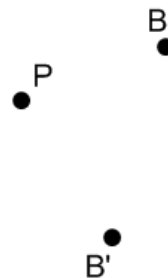In the next activity we will learn how to rotate a point in a positive and negative direction.
_____

**Class Activity –** Rotate point A 60 degrees using point P as the center of rotation. Rotate point B -45 degrees about point P. Label the resulting points appropriately.
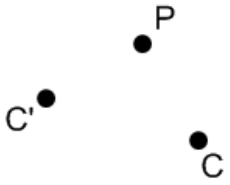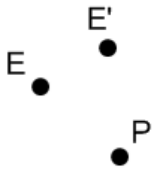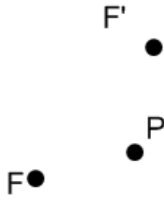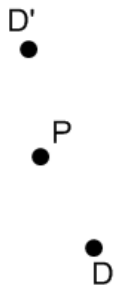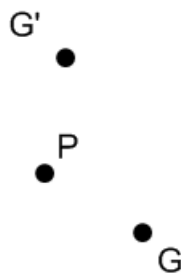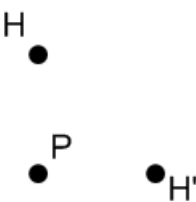
A
●

B
●

P ●

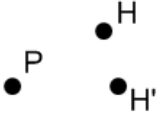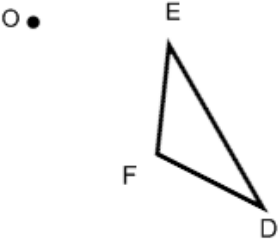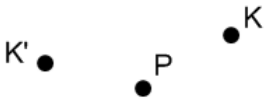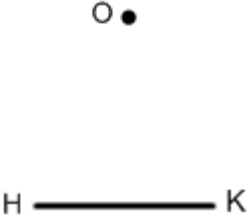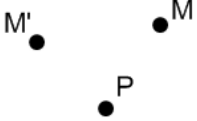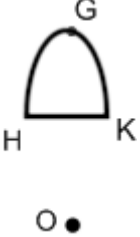| Point A is rotated to A' about point P using a positive angle measure. Use a protractor to determine the angle of rotation. | Point B is rotated about point P using a negative angle measure. Use a protractor to determine the angle measure. |
|---|---|
| P ● <br><br> A ●      ● A' | B ● <br> P ● <br><br> ● B' |

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**Set 2** – Each point below is rotated about point P. Determine the angle of rotation for the minor angle that translates the original point to its prime. State whether the angle is acute, obtuse, or right.

| A) | B) |
|---|---|
| P · <br><br> C' · <br><br> · C | E' · <br> E · <br><br> · P |

| C) | D) |
|---|---|
| F' · <br><br> · P <br> F · | D' · <br><br> · P <br><br> · D |

| E) | F) |
|---|---|
| G' · <br><br> · P <br><br> · G | H · <br><br> · P <br> · H' |

**G)** Rotate rectangle ABCD about point O at an angle measure of 45⁰ and label its image A'B'C'D'.
 Rotate rectangle ABCD about point O at an angle measure of –60⁰ and label its image A"B"C"D".

D   C

A   B

· O

Lesson 2.4

REVIEW – On the left-side a point has been rotate about point P to its prime. Determine the angle of rotation and state whether the angle is acute, obtuse, or right. On the right-side, rotate the object about point O using the given instructions.

| R#1 | Rotate triangle DEF 55⁰ and label it D'E'F' |
| | |
| R#2 | Rotate line segment HK –45⁰ and label it H'K'.<br>Rotate line segment HK 90⁰ and label it H"K". |
| R#3 | Rotate object GHK –120⁰ and label it G'H'K'. |

Lesson 2.4