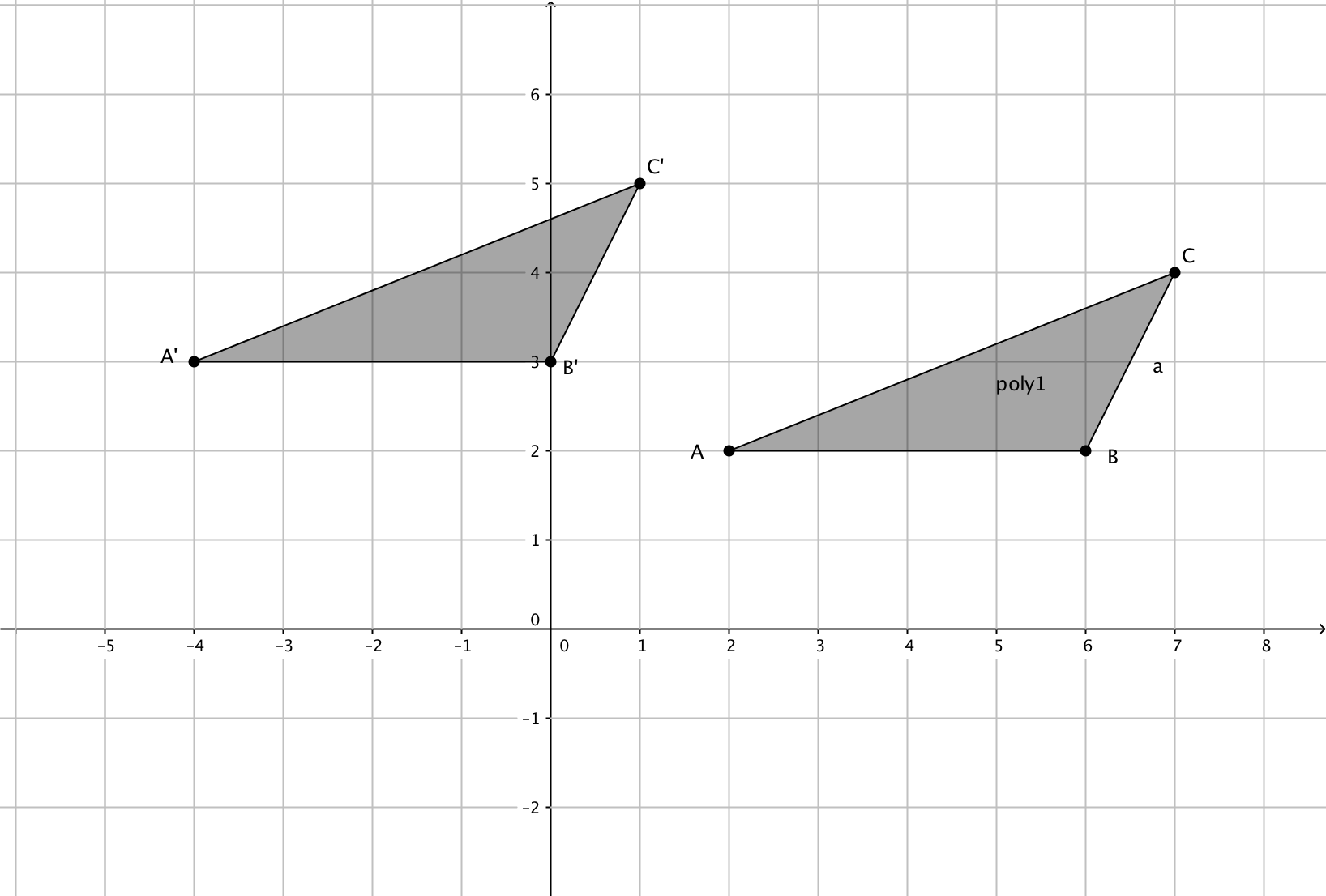
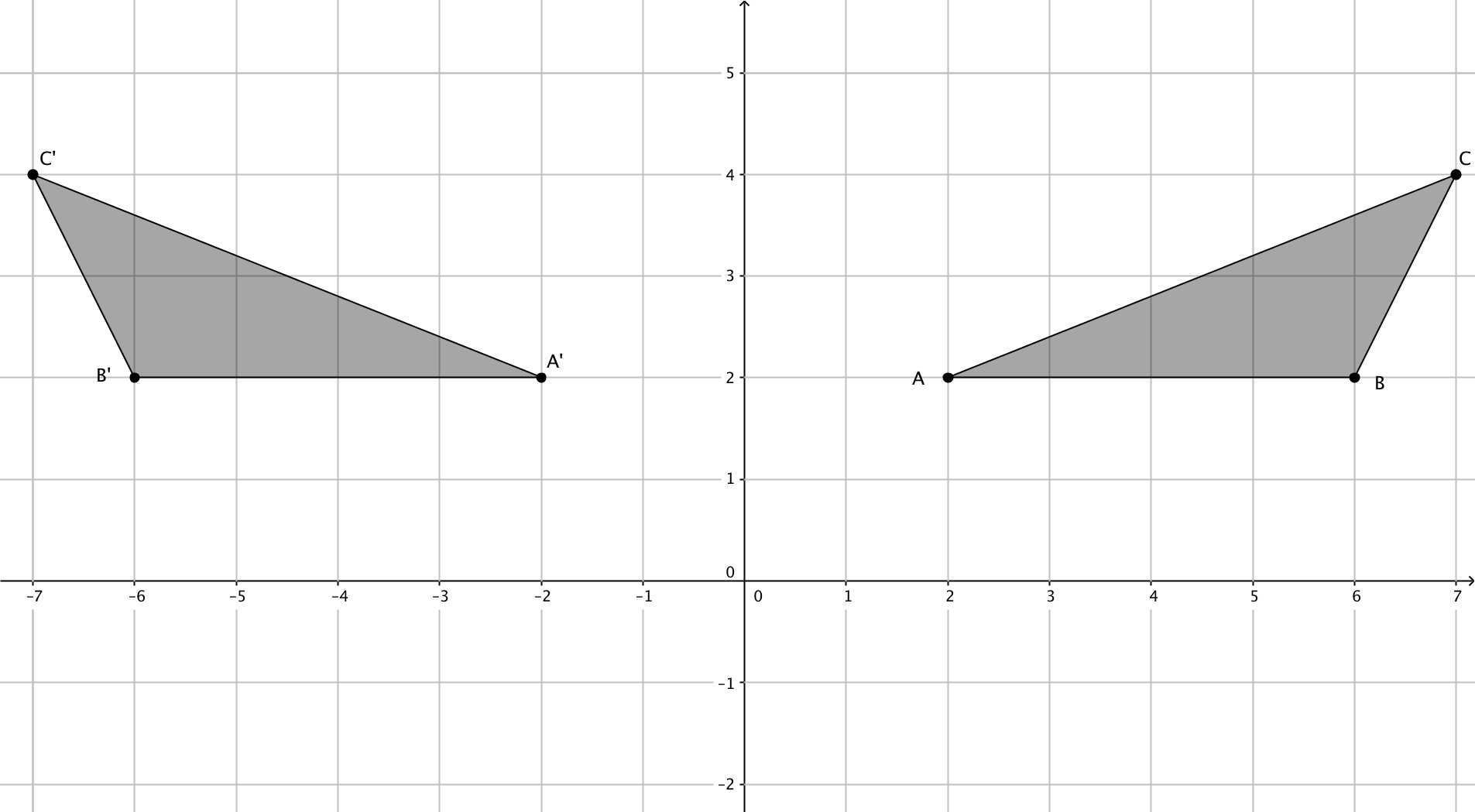
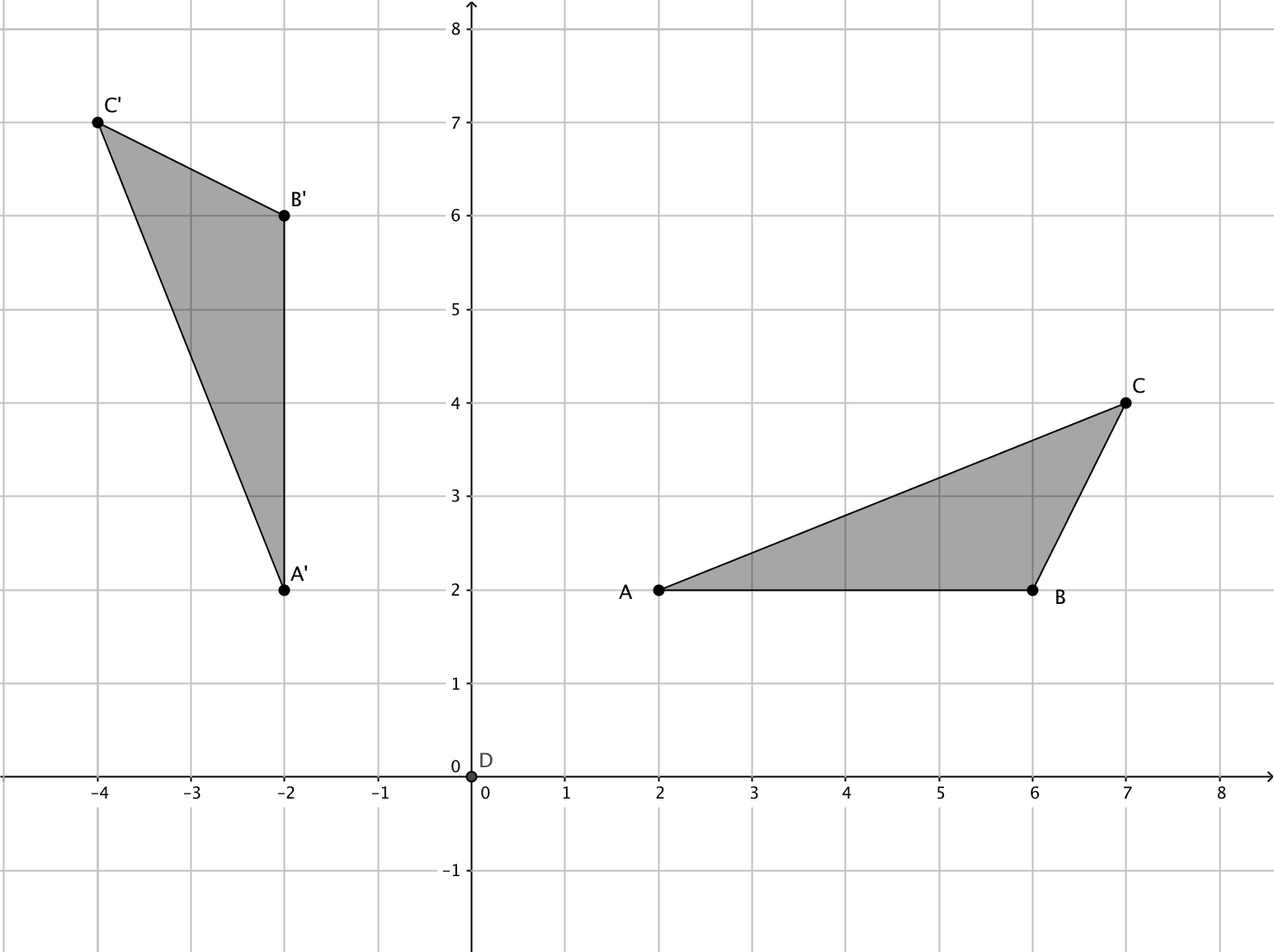
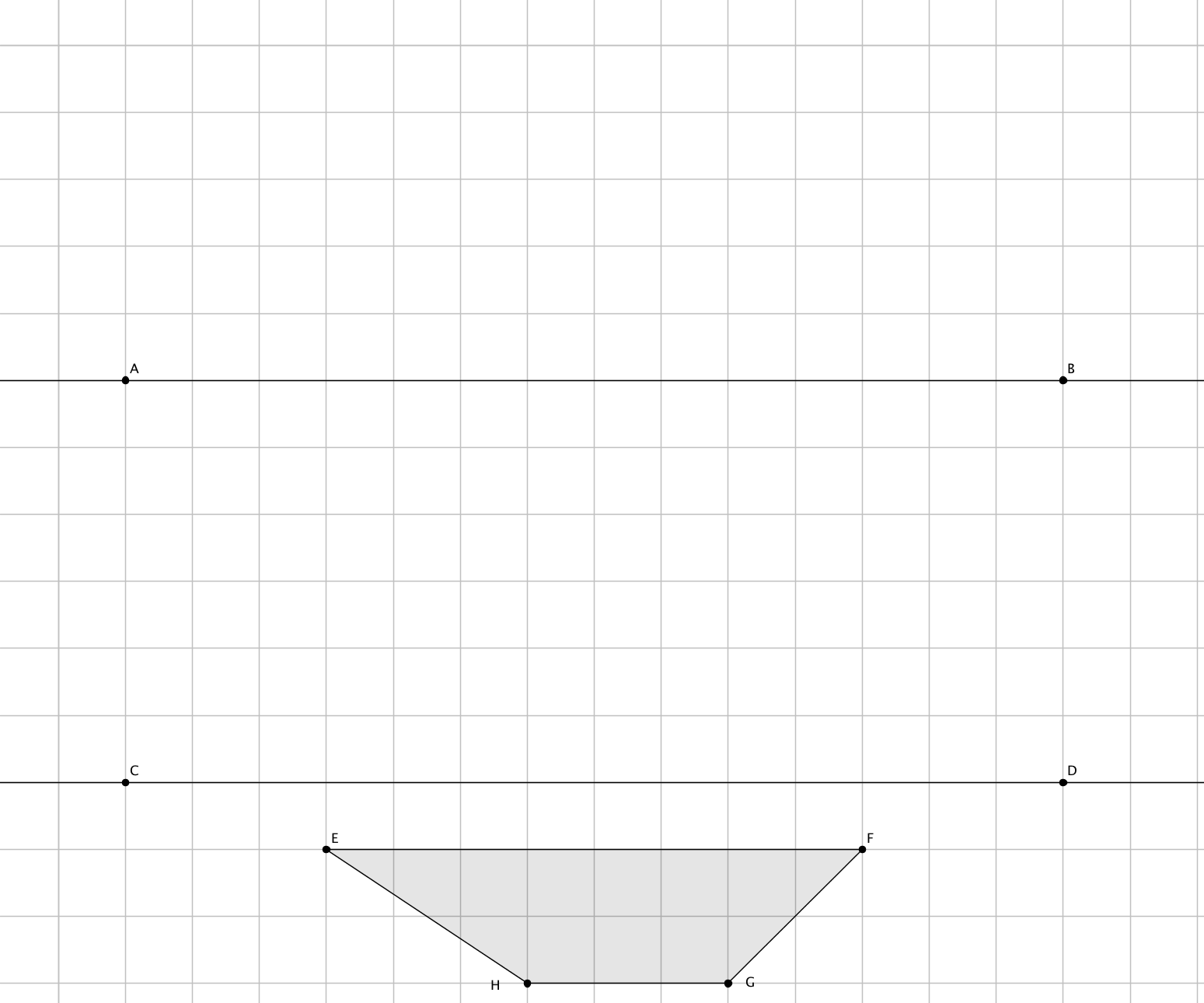
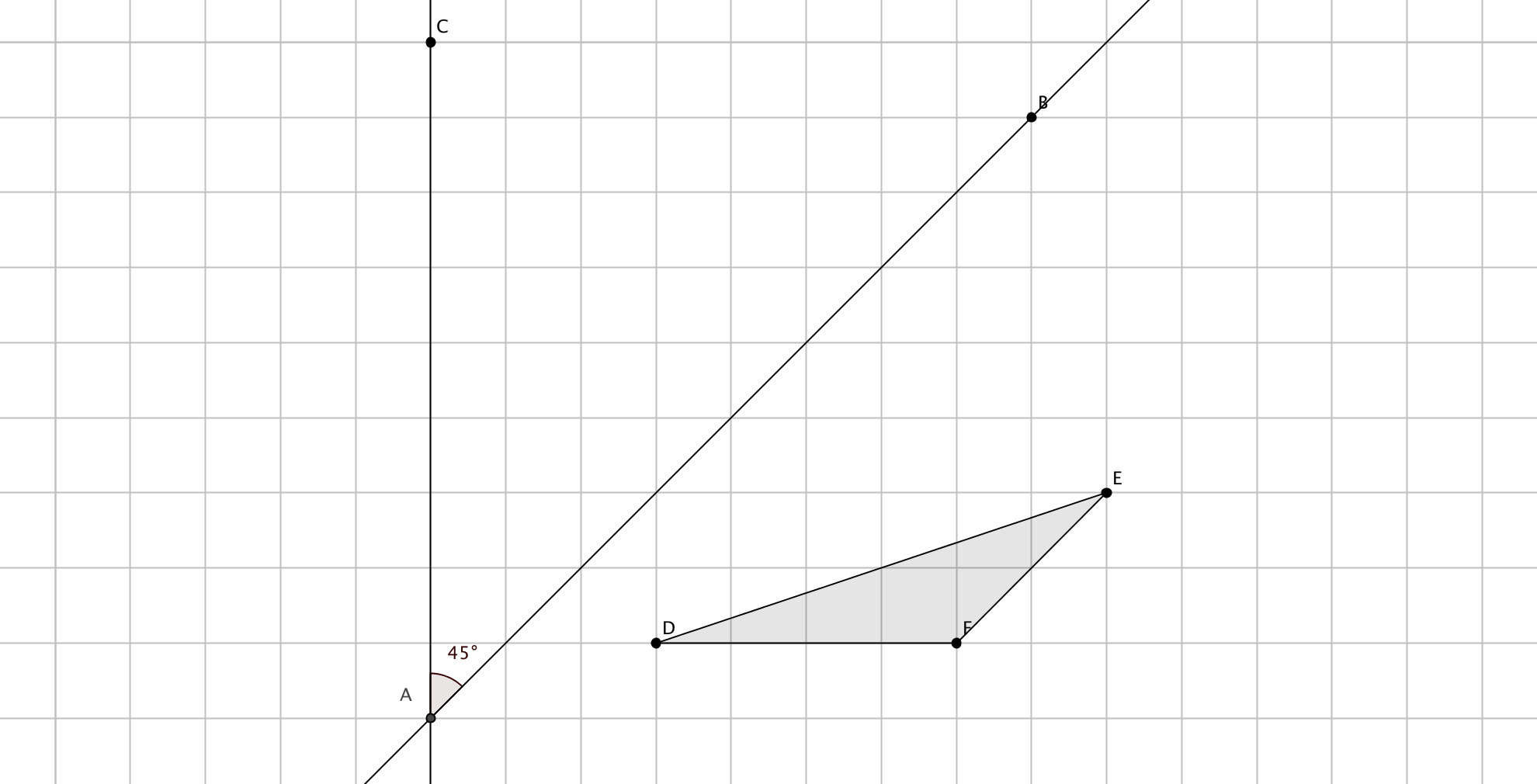
**Units 1–3 Questions for Midterm**

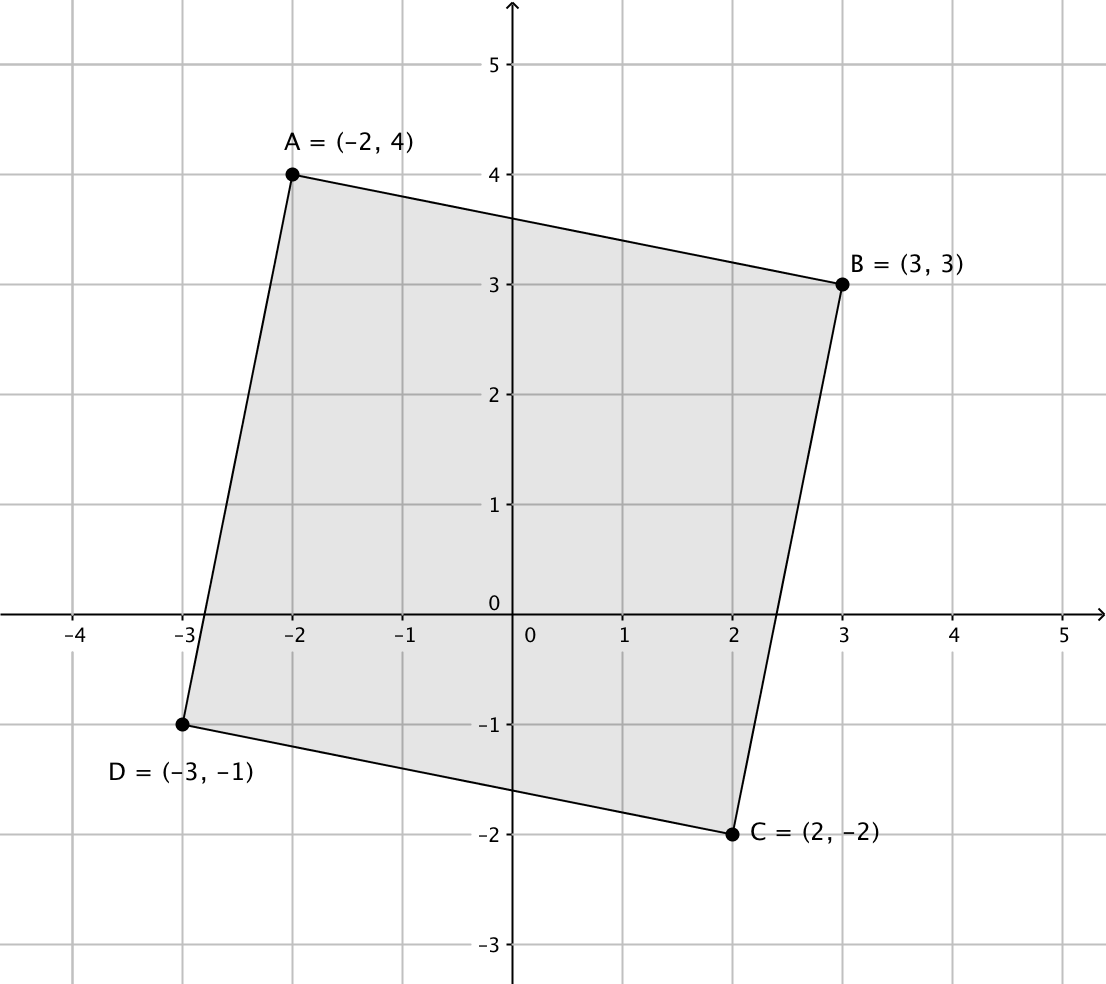
Teachers may choose from among these questions and/or add their own for the midyear examination. These questions are drawn from Units 1-3.

**Unit 1**

1. Sketch an example of a polygon with 60° rotational symmetry. Explain why it has rotational symmetry.
2. In each picture ∆*ABC* is mapped onto *A’B’C’.* Identify the type of transformation shown and give an mapping rule.  
     
   a. Type of transformation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
     
    Mapping rule: (*x*, *y*)🡪 (\_\_\_\_\_\_, \_\_\_\_\_\_\_)  
     
     
     
     
   b. Type of transformation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
     
    Mapping rule: (*x*, *y*)🡪 (\_\_\_\_\_\_, \_\_\_\_\_\_\_)  
     
     
     
     
     
     
   c. Type of transformation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
     
    Mapping rule: (*x*, *y*)🡪 (\_\_\_\_\_\_, \_\_\_\_\_\_\_)
3. Use the grid below.  
     
   a. Reflect quadrilateral *EFGH* over line . Label its image *E’F’G’H’.*  
   b. Reflect quadrilateral *E’F’G’H’* over line . Label its image *E”F”G”H”.*c. What single transformation would map *EFGH* onto *E”F”G”H”*?
4. Use the grid below. Note that m = 45°

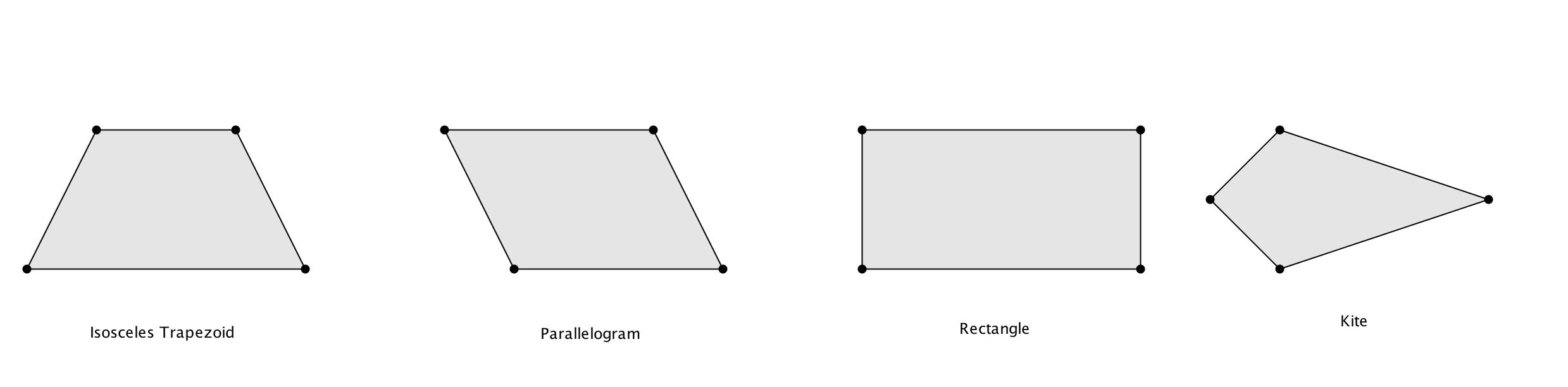
a. Reflect ∆*DEF* over line . Label its image ∆*D’E’F’.*  
b. Reflect ∆*D’E’F’* over line . Label its image ∆*D”E”F”.*c. What single transformation would map ∆*DEF* onto ∆*D”E”F”*?

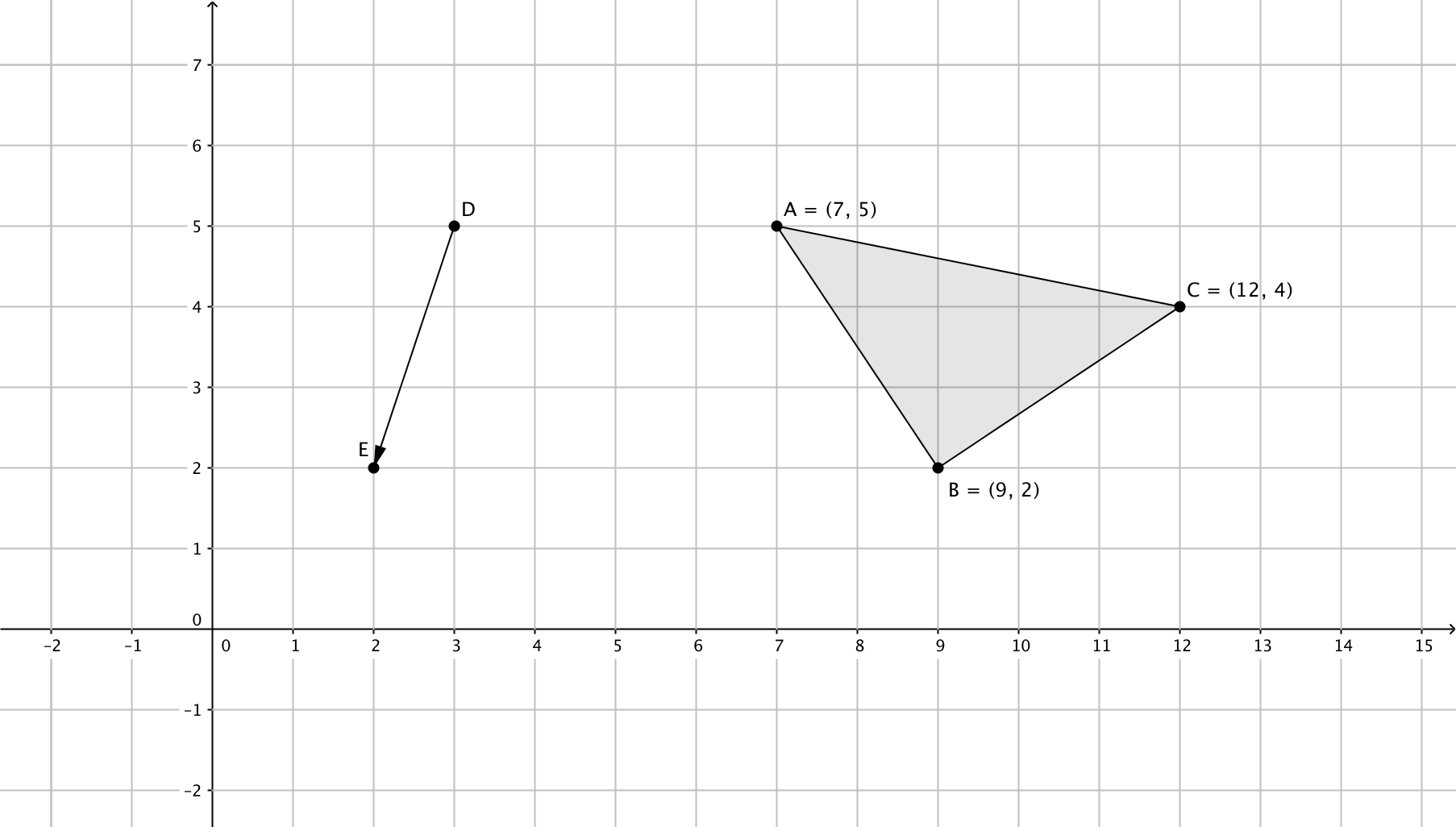


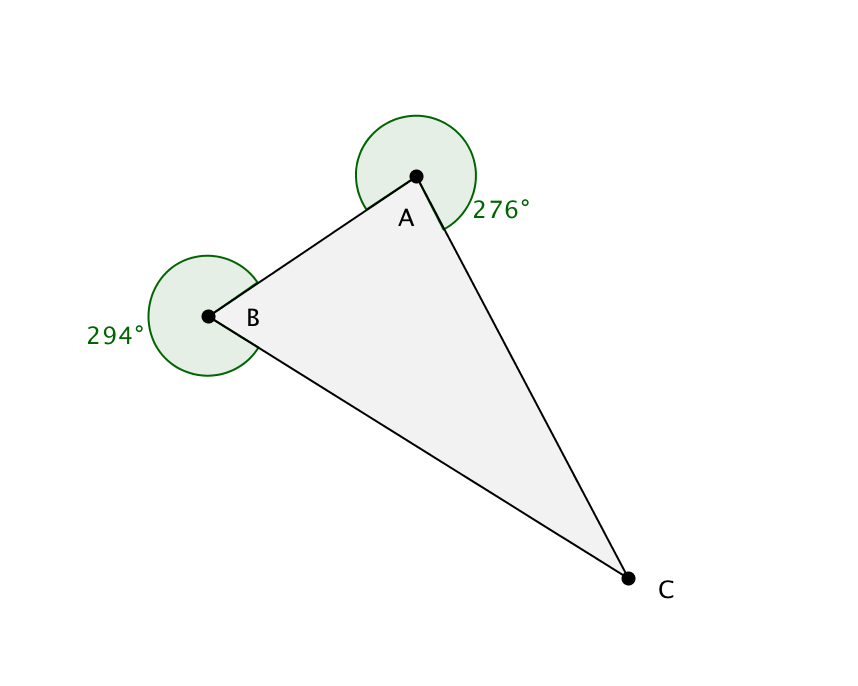
1. a. Find the perimeter of quadrilateral *ABCD* shown on the grid below.   
   (Answer to nearest 0.1 unit)  
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
     
    b. Show that *ABCD* is a square. (draws on Unit 3)
2. a. In this figure what type of transformation maps a left footprint onto a right footprint?   
     
   b. Is the transformation in part (a) an isometry? Explain.



1. For each of these quadrilaterals sketch any lines of symmetry or indicate that there are none.

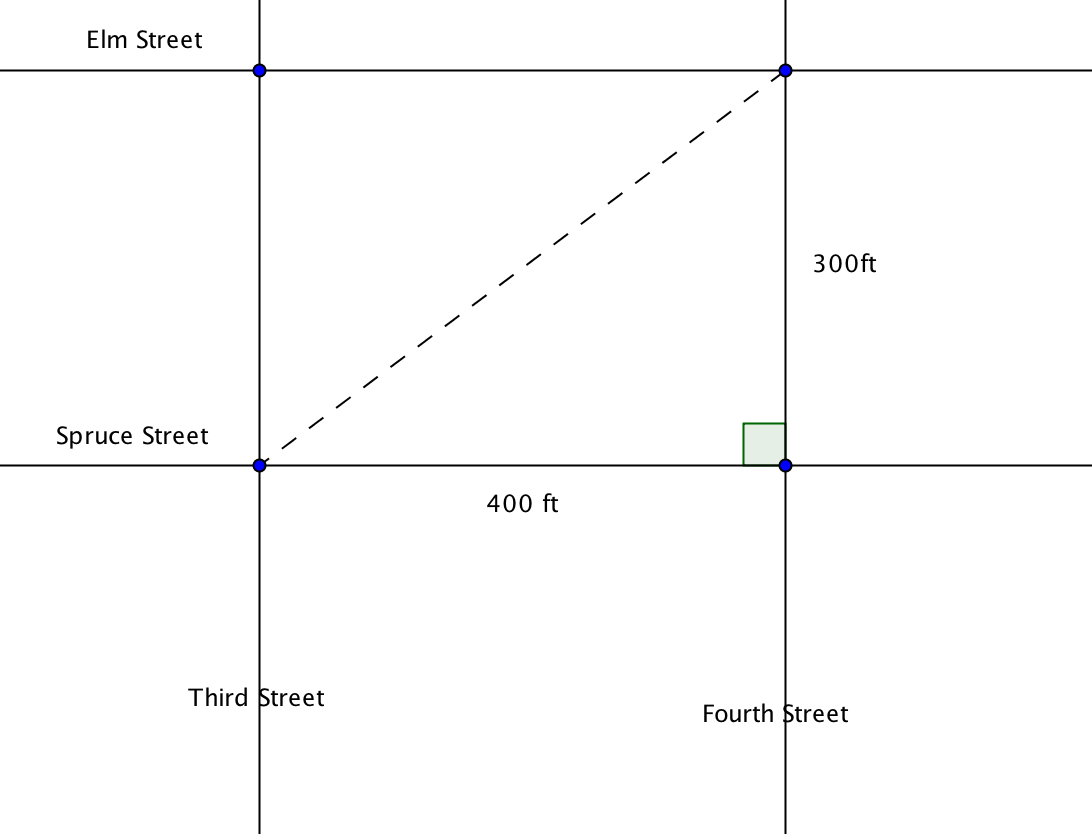
****

1. ****In the figure below ∆*ABC* is translated by the vector from *D* to *E.*  
     
   a. Sketch the image, ∆*A’B’C’*.  
     
   b. Show that || .  
     
     
     
     
     
   c. Show that .

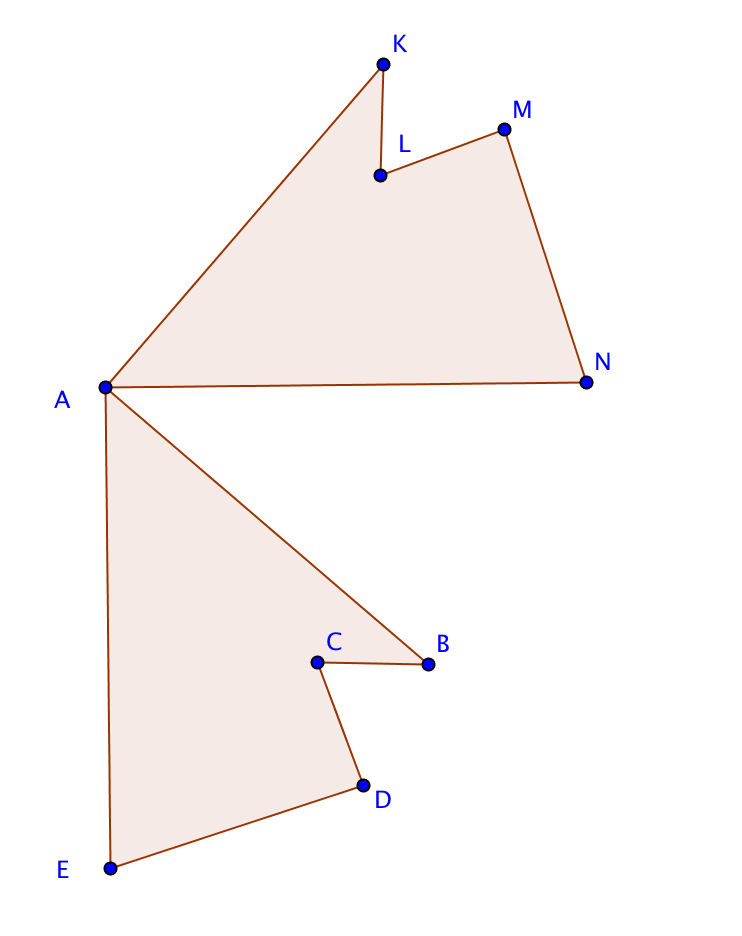
****9. Miguel drew a triangle in GeoGebra and measured two of its angles. However, he entered the points in clockwise order, rather than counter-clockwise, so this is what he got.  
  
Find the measures of each of the interior angles of ∆*ABC.*  
(draws on Unit 3)  
  
a. m *CAB* = \_\_\_\_\_\_\_\_\_\_

b. m *ABC* = \_\_\_\_\_\_\_\_\_\_

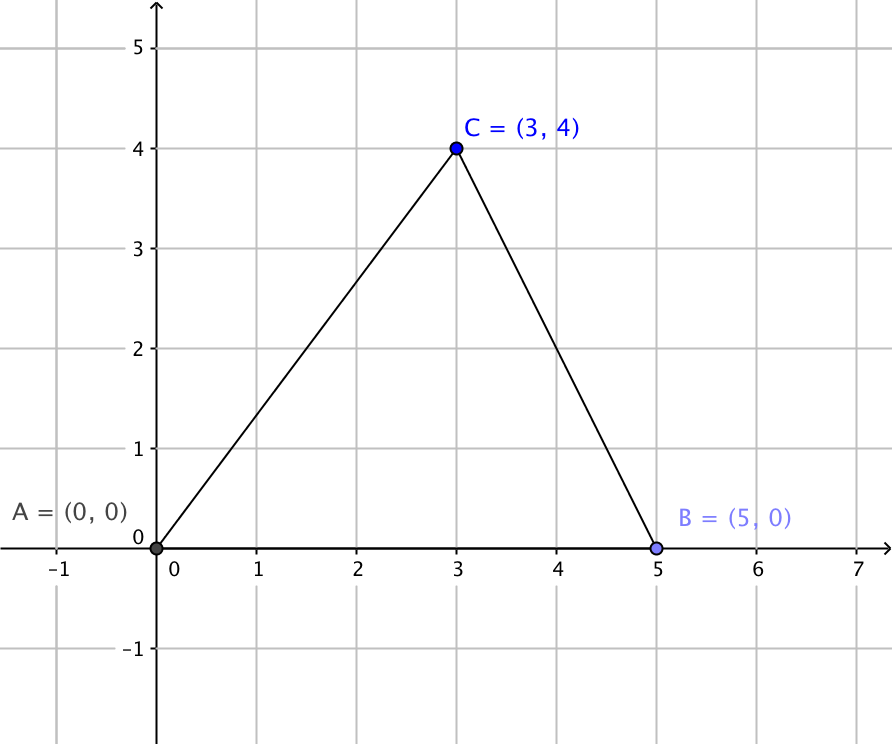
c. m *BCA* = \_\_\_\_\_\_\_\_\_\_

10. On her way to school Rhonda likes to cut across a vacant lot, from the corner of Third and Elm Streets to the corner of Fourth and Spruce. How much distance is saved by the shortcut compared to a path that would follow the streets. Use the measurements from the diagram and assume that at each intersection the streets are perpendicular to each other.

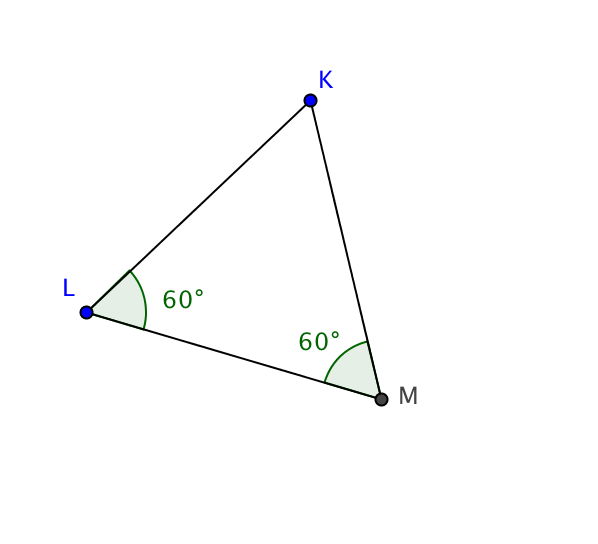
**Unit 2**

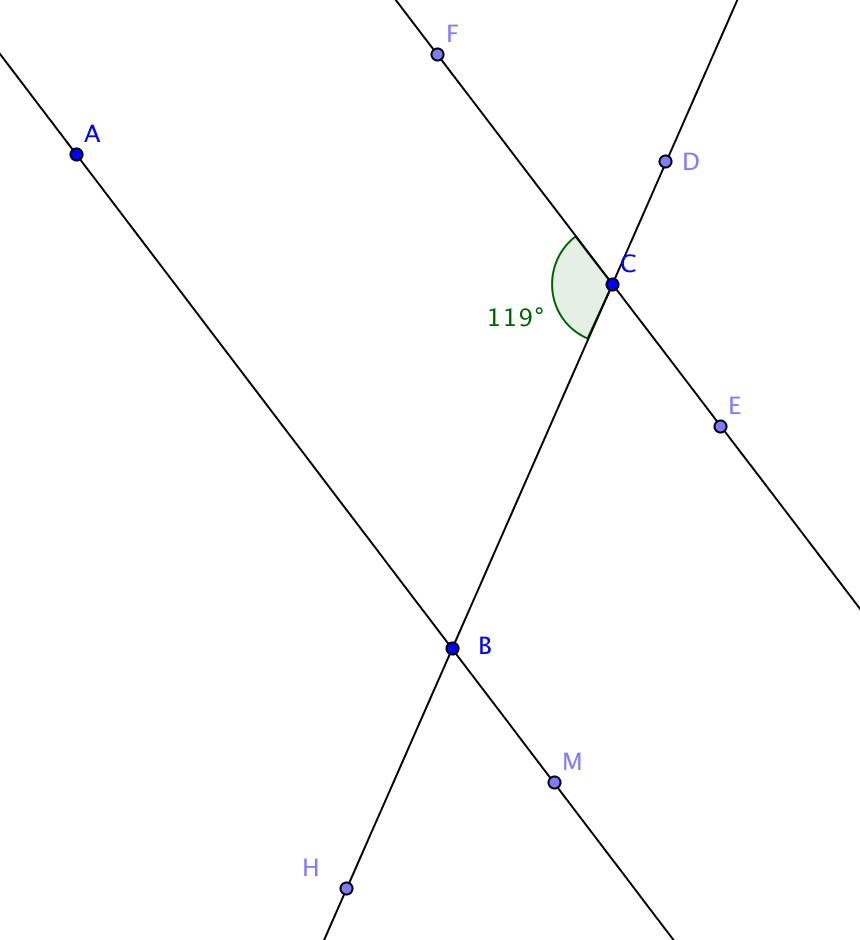
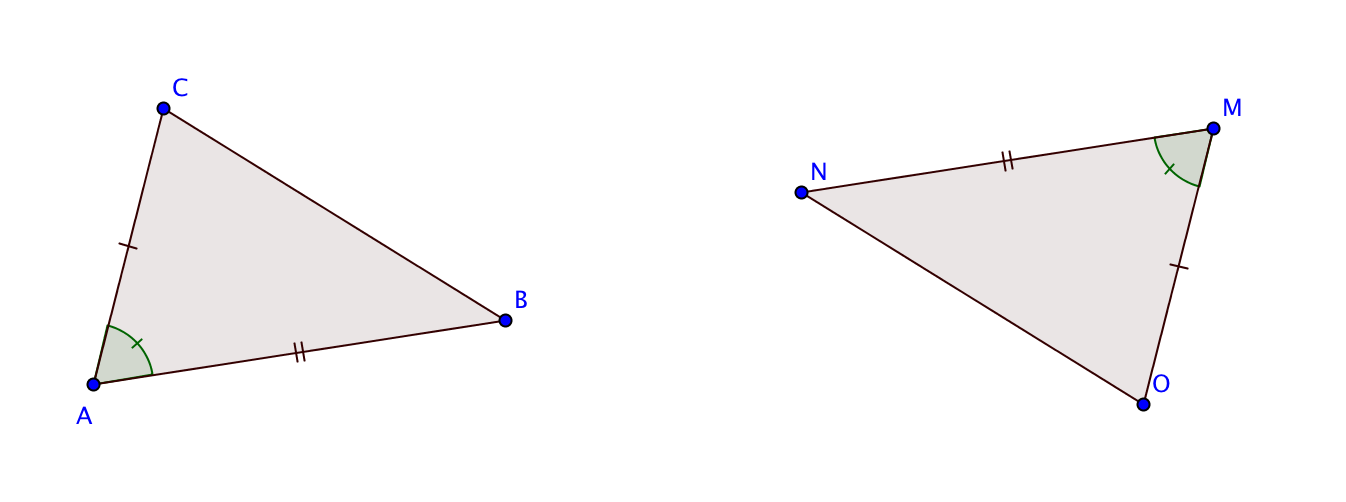
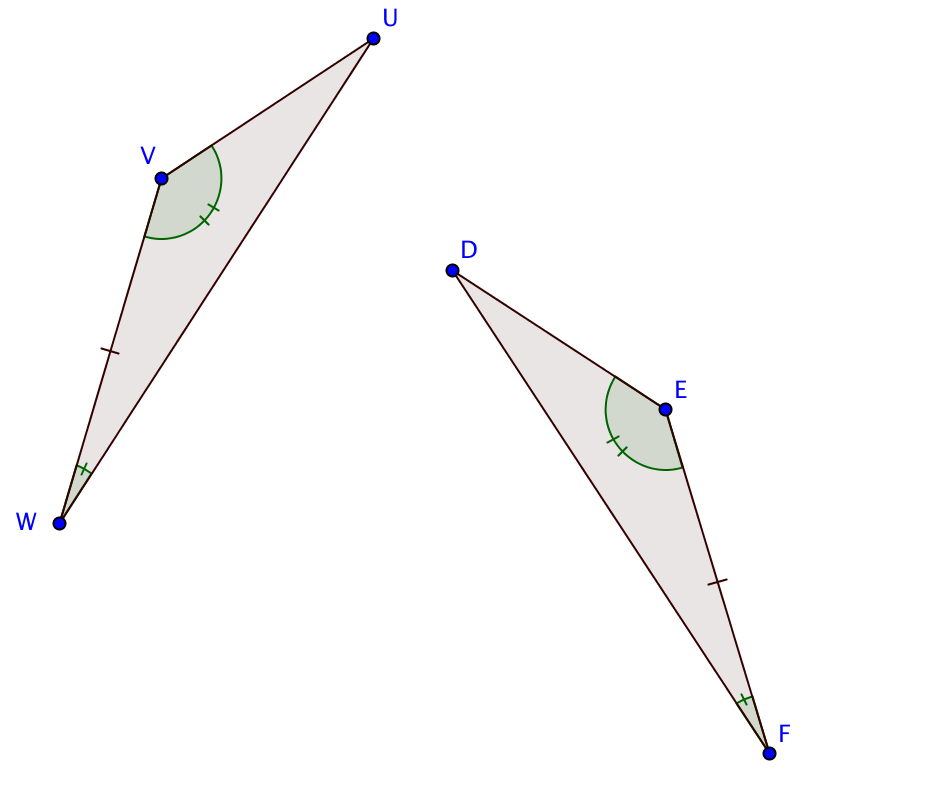
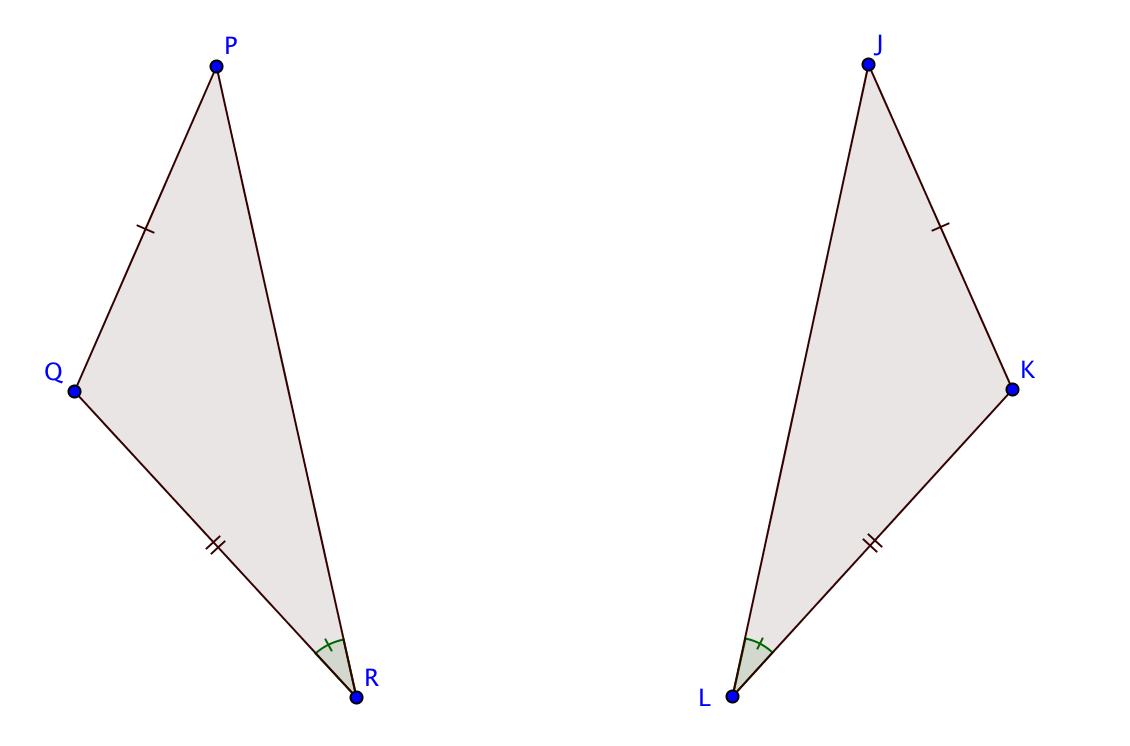
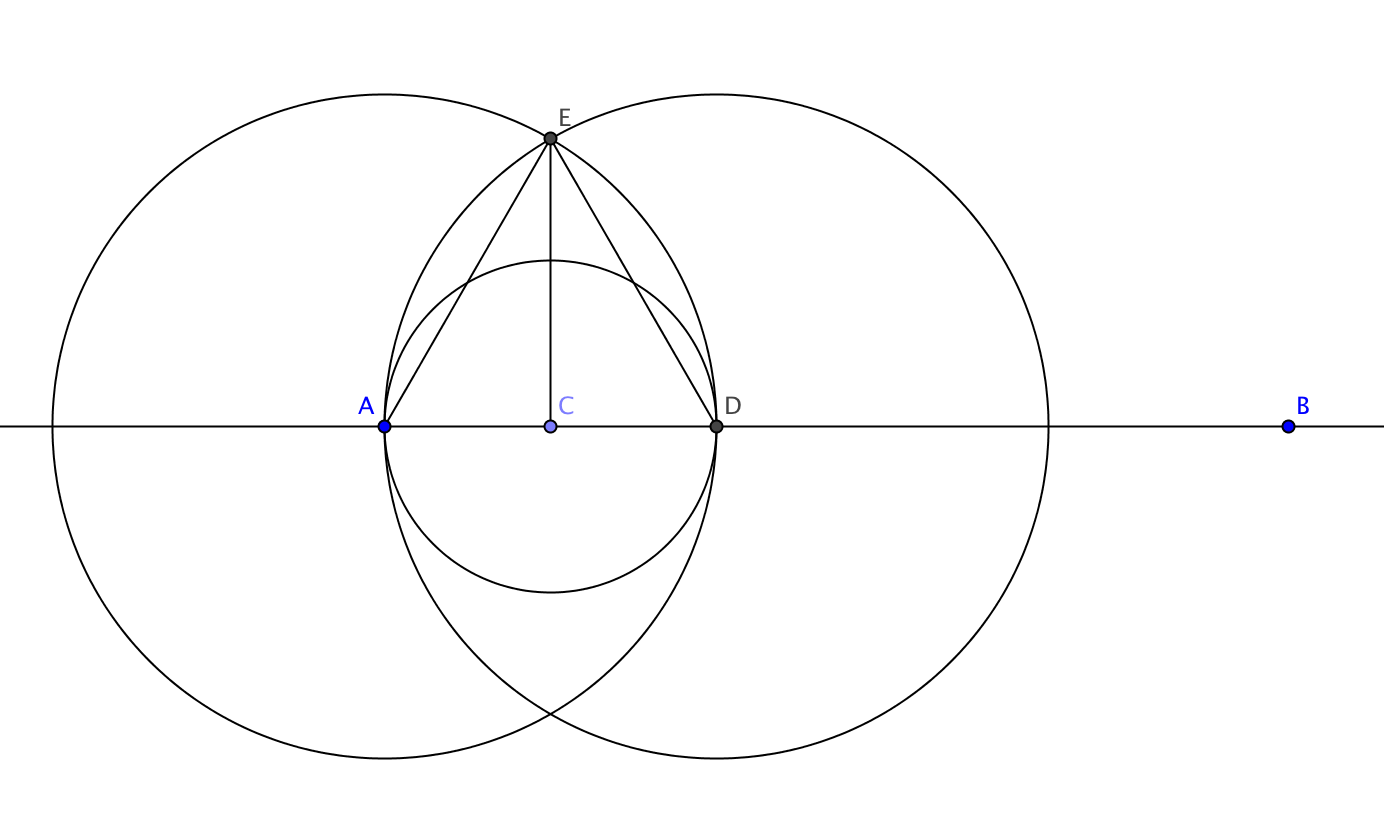
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1. One pentagon is the image of the other under a 90° rotation about point *A*. Fill in the blanks to show relations between the two figures.
2. *ABCDE* \_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_
5. m
6. *CD*  = \_\_\_\_\_\_\_\_\_\_\_

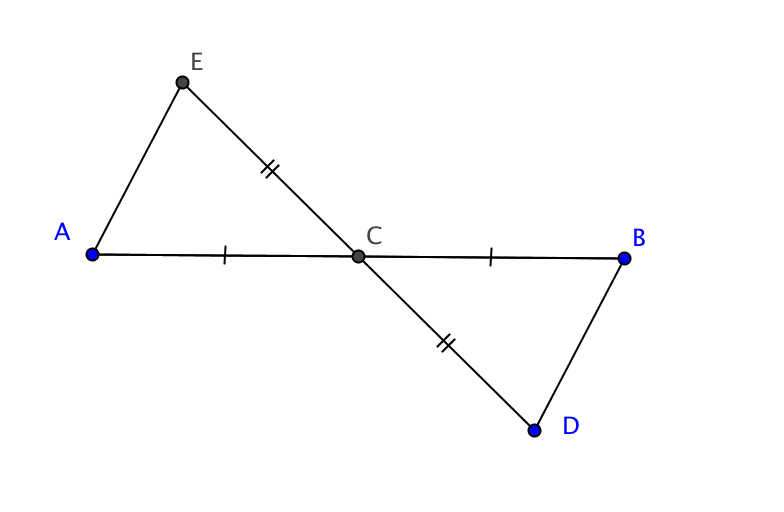
1. The coordinates of the vertices of ∆*ABC* are shown.

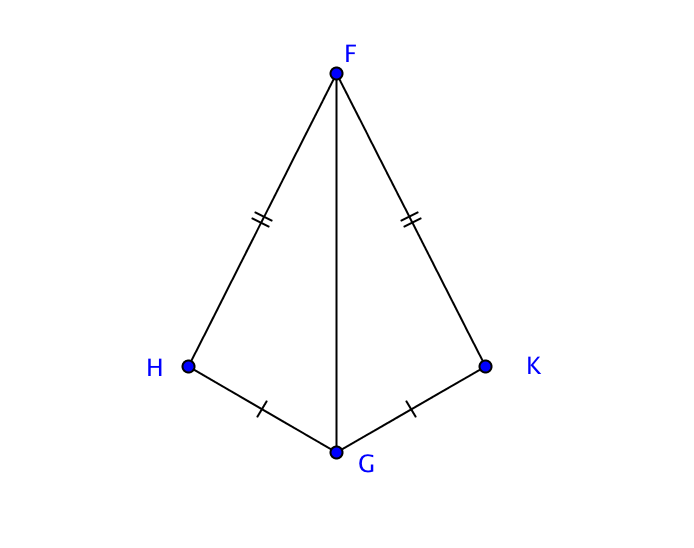
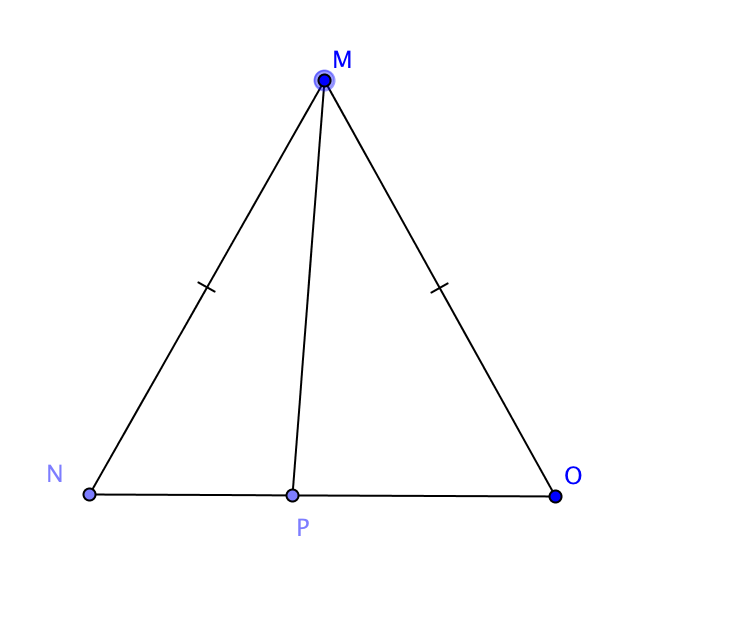
a. Show that ∆*ABC* is isosceles.  
  
  
  
b. Is ∆*ABC* equilateral? Explain.  
  
  
  
  
c.. Name a pair of congruent angles.  
  
  
  
d. Find an equation for a line of symmetry

**

1. We are given that in *KLM*, m = m = 60°. Is this enough information to prove that *KL* = *LM*? Explain your reasoning. (Draws on Unit 3)
2. Given: || and m = 119°.  
     
   a. Name a pair of alternate interior angles.  
     
     
     
   b. Name a pair of corresponding angles.  
     
     
     
   c. Name a pair of vertical angles.  
     
     
     
   d. Find m . Explain your reasoning.
3. Decide whether each pair of triangles may be proved congruent with the given information. If they can be proved congruent, identify the theorem you would use.  
     
   a. Can you prove that ∆*JKL* ∆*PQR*?  
     
   If so, which theorem?  
     
     
     
     
   b. Can you prove that ∆*DEF* ∆*UVW*?  
     
   If so, which theorem?  
     
     
     
     
   c . Can you prove that ∆*ABC* ∆*MNO*?  
     
   If so, which theorem?
4. A student was asked to construct a line through point *C* that is perpendicular to .She constructed a circle with center *C* passing through *A* and labeled the other point where the circle intersects as point *D*.   
     
   Then she constructed two more circles, one with center *A* passing through *D* and the other with center *D* passing through *A.* She labeled one of the points where those circles intersect as point *E.*Finally she drew segments , , and .
5. Prove that ∆*ACE* ∆*DCE.* (Optional Hint: Use the SSS Congruence Theorem.)

1. because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. is a straight angle since its sides lie on one line.   
   Use this fact to explain why ⃡
3. How would you find the midpoint of a segment if the only tools you had were a compass and straightedge? (No marked ruler!) You may use the segment below to demonstrate.



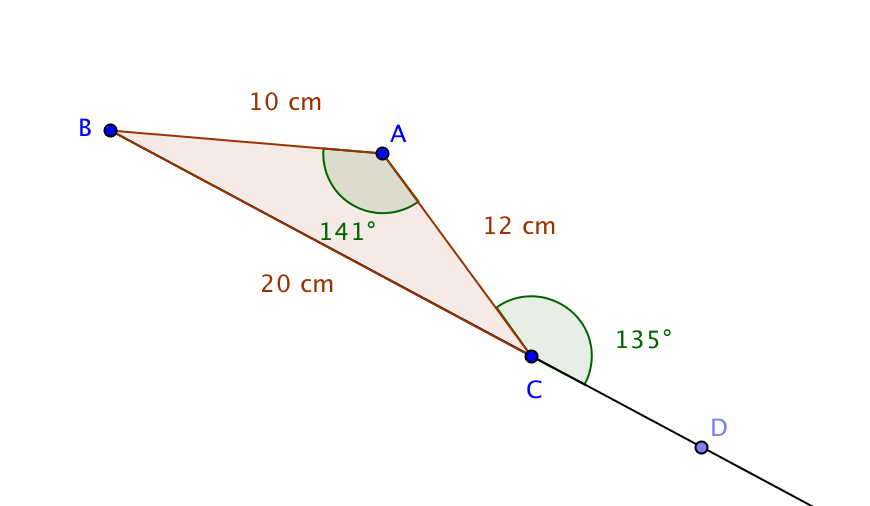
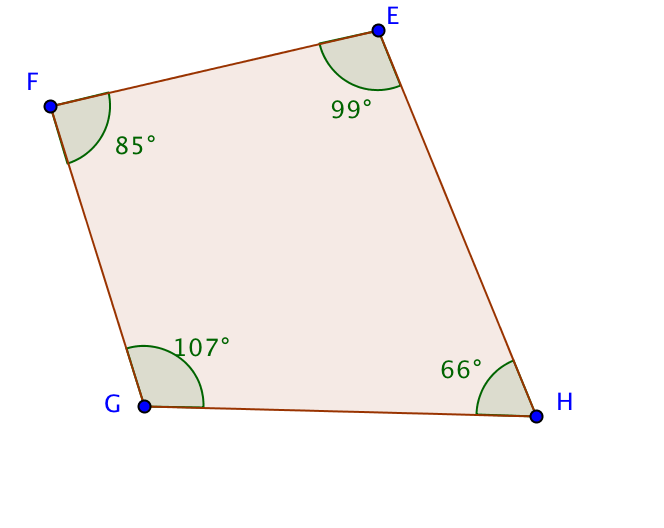
1.  Write proofs for each of these exercises:  
     
     
   a. Given: *C* is the midpoint of both and Prove: ∆*ACE* ∆*BCD*  
     
     
     
     
     
     
     
     
     
   b. With the same diagram and given in part (a), now prove that || .   
   (draws on Unit 3)  
     
     
     
     
     
     
     
     
     
     
     
   c. Given: *GH* = *GK* and *FH* = *FK.*  
    Prove: m = m .
2. Study this “proof”:  
     
   Given: ∆*NMO* is isosceles with *NM* = *OM*, and  
    *P* is a point on .   
   Prove: .  
     
   Proof:   
   *Step* 1. We are given that *NM* = *OM.*  
   *Step* 2. because if two sides of a triangle are congruent, then the angles opposite these sides are congruent.   
   *Step* 3. *MP* = *MP* by the reflexive property.   
   *Step* 4. Therefore ∆*NPM* ∆*OPM* by the SAS Congruence Theorem.  
   *Step* 5. because corresponding parts of congruent triangles are congruent.  
     
   There is a mistake in the “proof.” Identify in which step it occurs and explain why it is a mistake.

**Unit 3**1. Prove that in any right triangle, the sum of the two acute angles is 90°.

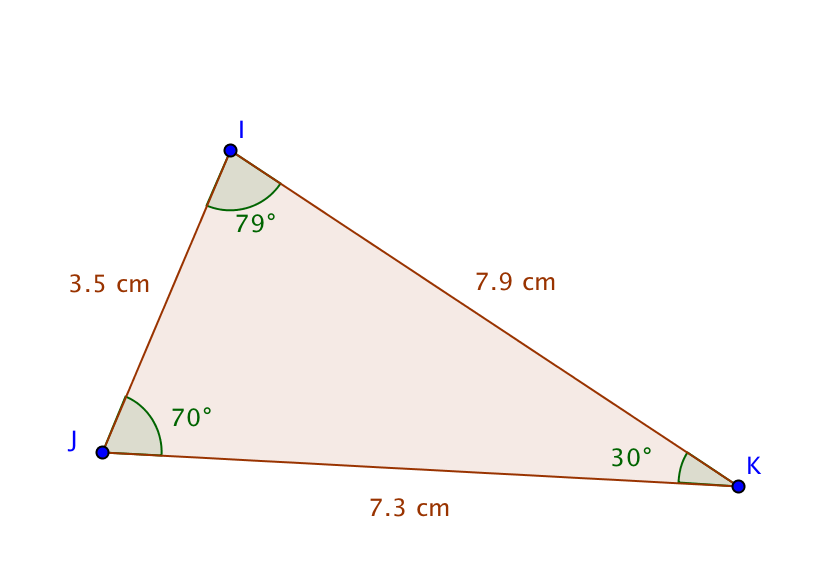
2. Explain why the hypotenuse of a right triangle is always the longest side.

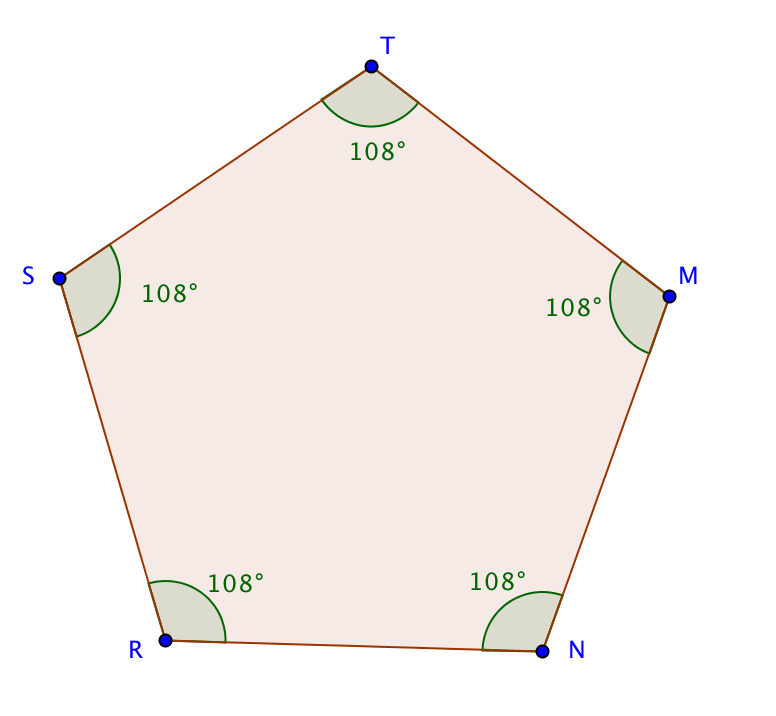
3. Find the measure of each interior angle of a regular polygon with 18 sides.

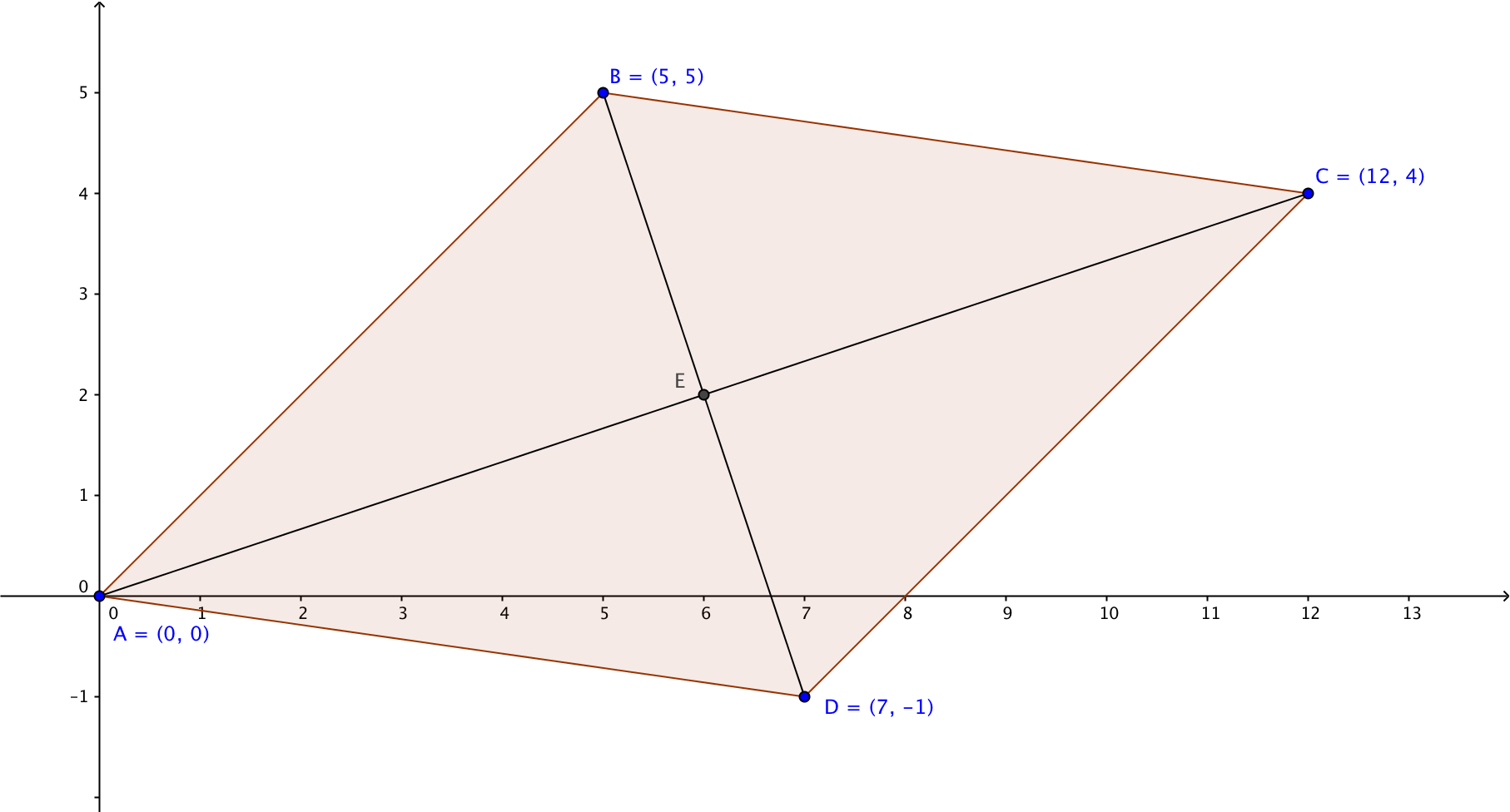
4. Some angle measures and side lengths are given on the polygons below. Which of the figures are possible and which are impossible? Explain why.



a. b.

****

****c. d.

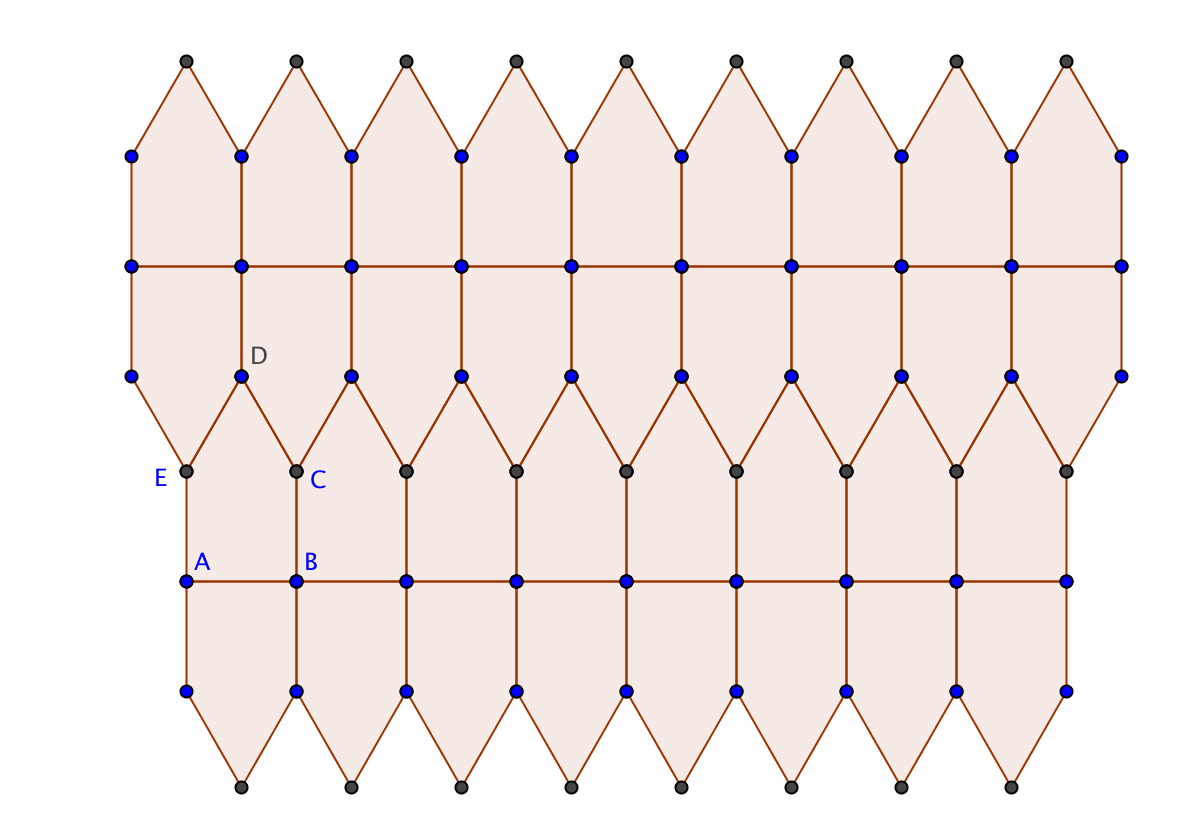
****5**.** The coordinates of quadrilateral *ABCD* are shown.  
  
a. Prove that *ABCD* is a rhombus.

b. Prove that *ABCD* is not a square.

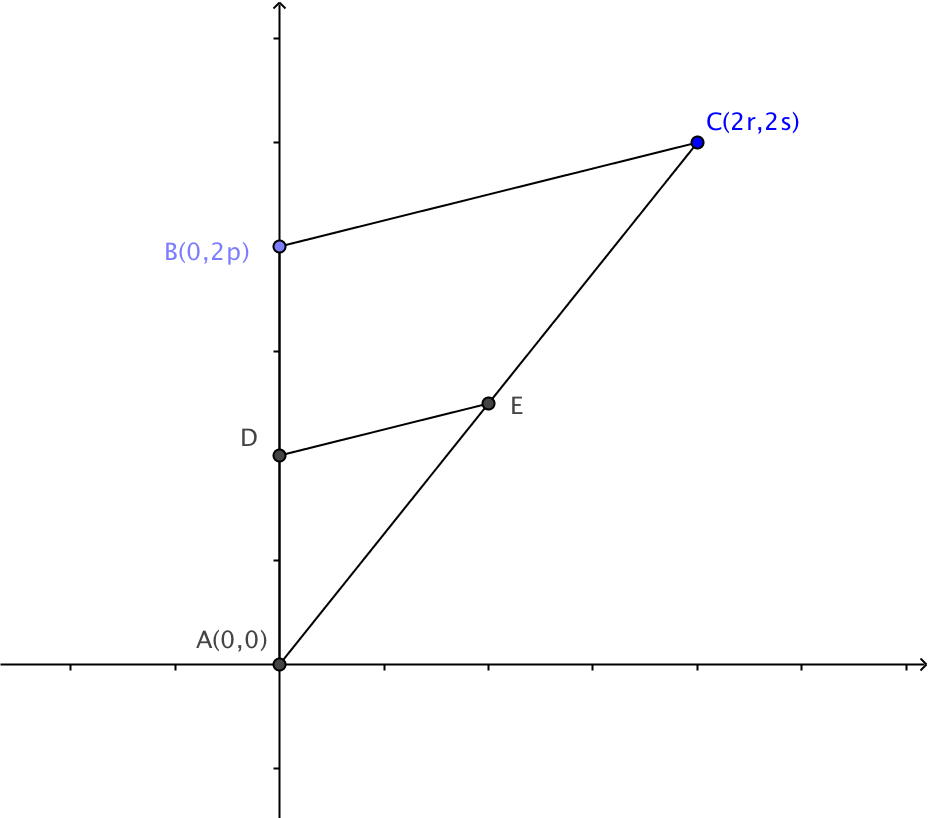
c. Show that the diagonals are perpendicular to each other.

d. Find the coordinates of point *E*, the intersection of and .

6. Pentagon *ABCDE* with *AB* = *BC* = *CD* = *DE* = *EA* tessellates the plane as shown.

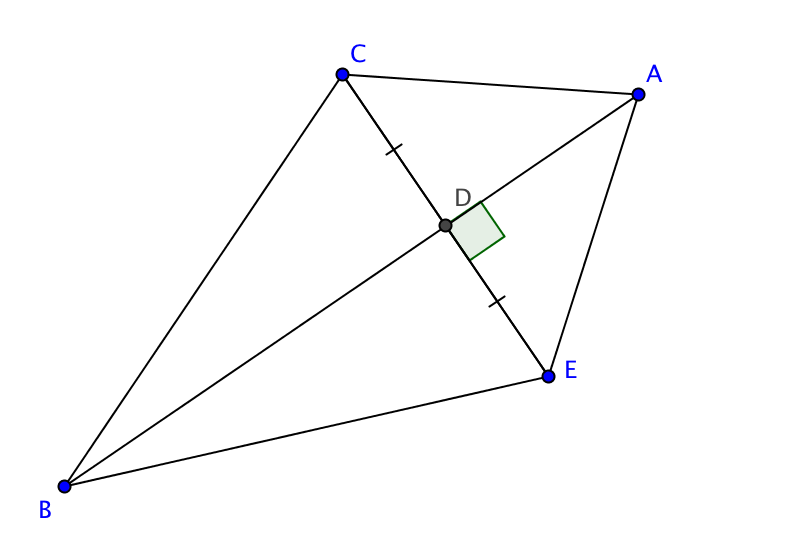


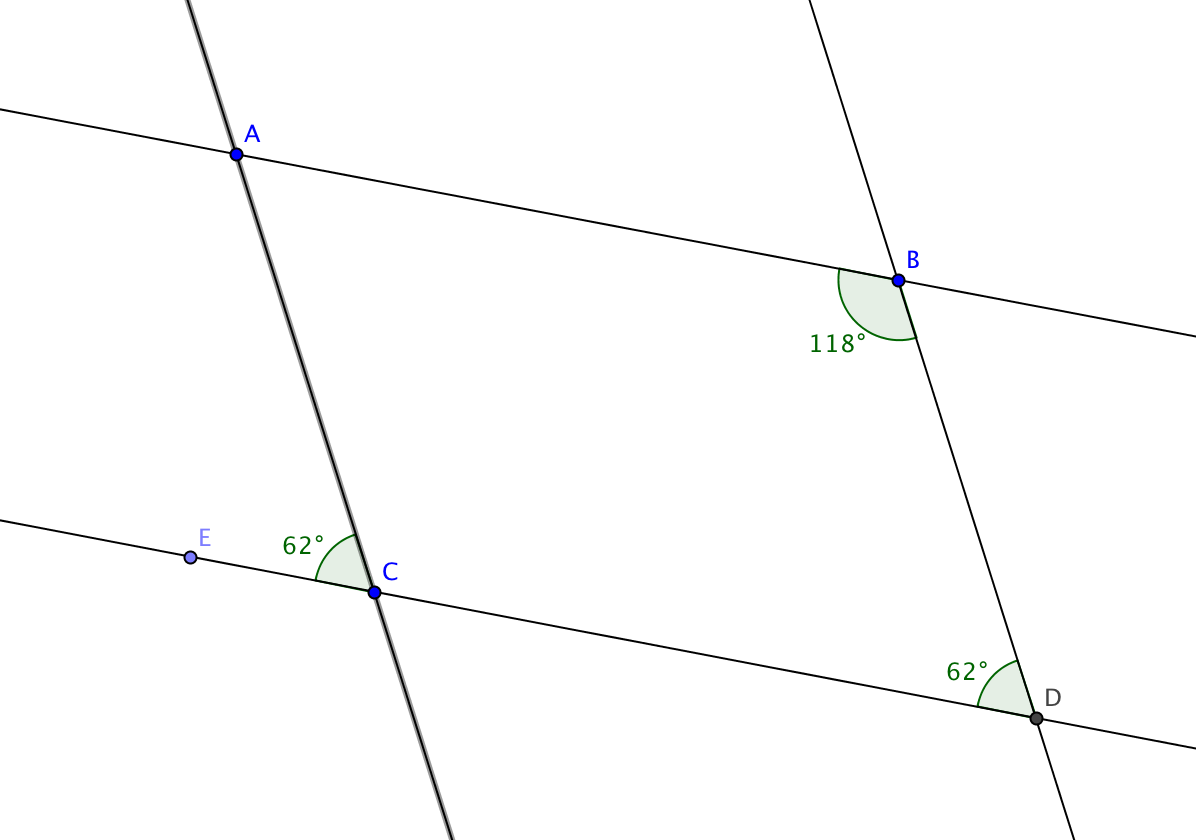
Does this example show that it is possible to tessellate the plane with regular pentagons? Explain.

7. ∆*ABC* lies in the plane with coordinates *A*(0,0), *B*(0,2*p*) and *C*(2*r*, 2*s*). *D* is the midpoint of and *E* is the midpoint of .  
  
a. Find the coordinates of *D* and *E.*

b. Show that ||

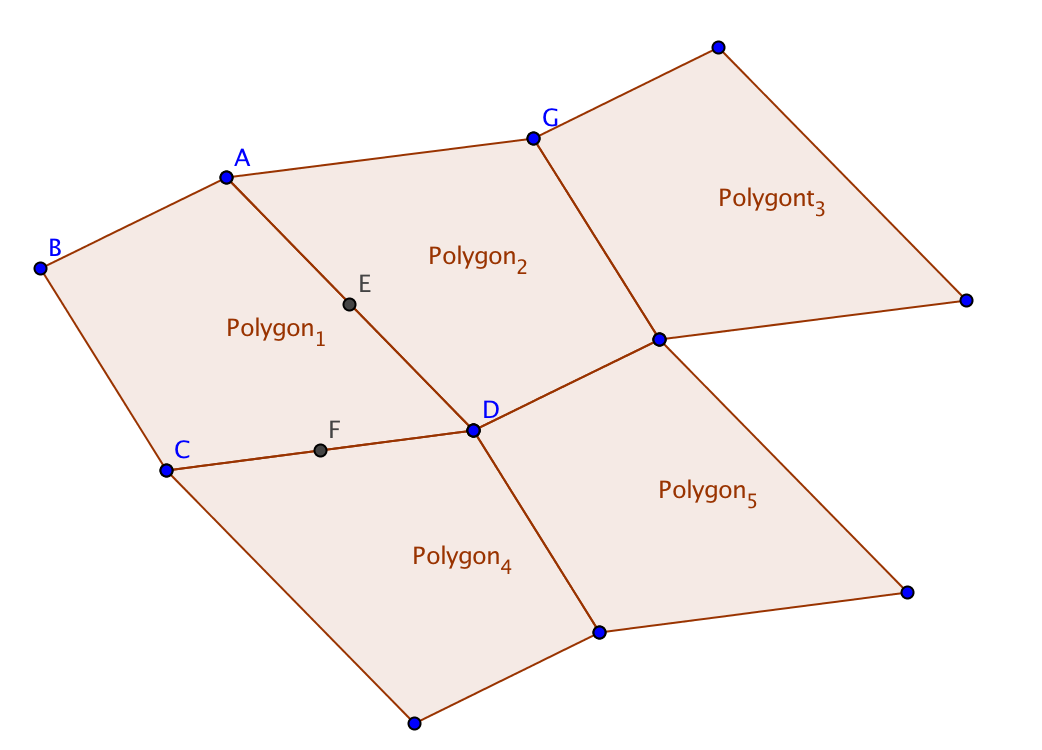
c. State the theorem that this proves: If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. Given: and *D* is the midpoint of   
 Prove: *ACBE* is a kite.

9. Given: m = 62°  
 m = 62°

m = 118°  
  
 Prove: *AB* = *CD*.

10. Quadrilateral ABCD, as labeled as “Polygon1” has been used to start a tessellation of the plane. Describe each of these transformations in as much detail as you can.



1. What transformation maps Polygon1 onto Polygon2?
2. What transformation maps Polygon1 onto Polygon3?
3. What transformation maps Polygon1 onto Polygon4?
4. What transformation maps Polygon1 onto Polygon5?