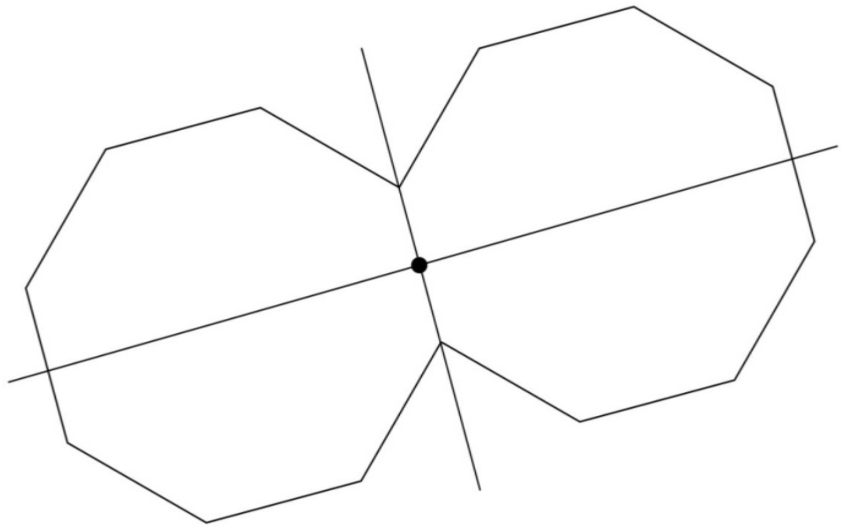
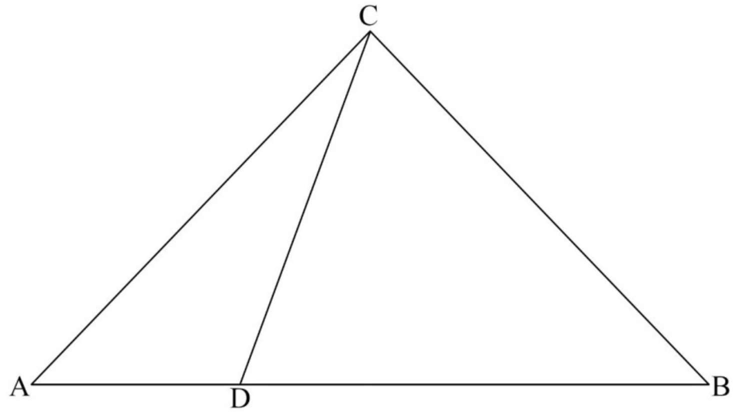
Geometry Homework #17 – Answer Key

1) 165°
2) Line Symmetry
   Point Symmetry



3) $(0,2), (-10,-2)$ and $(-4,8)$
4) $(5.5, -.8)$
5) $x = \dfrac{-9}{8}$
6) Triangle ABC is congruent to triangle EDF by the AAS Theorem.
7) Triangle ABE is congruent to triangle DCE by the ASA Theorem because angles B and C are congruent, alternate interior angles and angles A and D are also congruent, alternate interior angles.
8) Segment BA is congruent to segment CB because ABCD is a square. Angle ABC and angle A are congruent because they are both right angles since ABCD is a square. Angle CBF and angle AFB are congruent since segments BC and AD are parallel. Angle ABF is congruent to angle BCE because the sum of the angles in any triangle is equal to the sum of the angles in any other, coupled with the fact that two of the angles in triangle ABF are already congruent to two of the angles in triangle BCE so each remaining angle must be congruent. Therefore, triangles CBE and BAF are congruent by the ASA Theorem.
9) Both triangles share segment BD so those two sides are congruent. Segments AD and DC are congruent because BD is a median. Angles BDA and BDC are congruent because BD is an altitude and an altitude forms two right angles when it meets the opposite side. Therefore, triangles ADB and CDB are congruent by the SAS Theorem.
10) Segments CG, DG, AG, and BG are all radii since segments CD and AB are both diameters of circle G and intersect at the center, G. Since all radii of a circle are congruent, segments CG and DG are congruent and segments AG and BG are congruent. Angles CGA and DGB are congruent because they are vertical angles. Therefore, triangles CGA and DGB are congruent by the SAS Theorem.

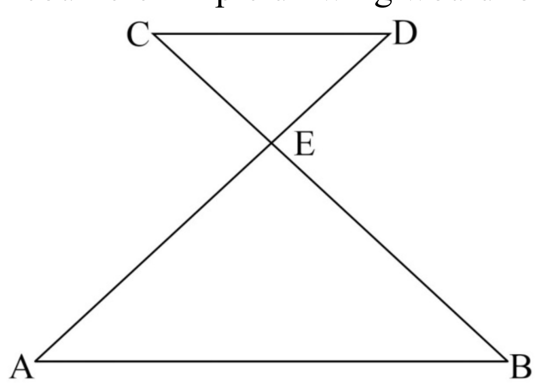
11) Even though you can match three sides/angles in the one triangle with three corresponding sides/angles in the other, triangles ACD and BCD are not necessarily congruent because there is no ASS Theorem. A counterexample drawing would look something like this:



12) Triangles ABD and CDB both share side BD so segment BD is congruent to BD. Since opposite sides of a parallelogram are parallel to each other, angles ABD and CDB are congruent because they are alternate interior angles. Likewise, angles CBD and ADB are congruent because they are alternate interior angles. Therefore, triangles ABD and CDB are congruent by the ASA Theorem.

13) Triangles ABC and ADC both share side AC so segment AC is congruent to AC. Since it is given that $\overline{AD} \cong \overline{AB}$ and $\overline{CD} \cong \overline{CB}$, triangles ABC and ADC are congruent by the SSS Theorem.

14) Even though you can match three angles in the one triangle with three corresponding angles in the other, triangles ECD and EAB are not necessarily congruent because there is no AAA Theorem. A counterexample drawing would look something like this:



15) This problem can be proved using AAS, SAS, SSS, or ASA. What follows is the SSS proof. Triangles ABC and CDA both share side BC so segment BC is congruent to BC. Since opposite sides of a rectangle are congruent to each other, segments AB and CD are congruent. Likewise, segments BC and DA are congruent. Therefore, triangles ABC and CDA are congruent by the SSS Theorem.

16) Triangles ABD and CBD both share side BD so segment BD is congruent to BD. Since segment BD is an angle bisector, angles ABD and CBD are congruent. Since it was given that angles C and A are congruent, triangles ABD and CBD are congruent by the AAS Theorem.

17) Triangle ABC is congruent to triangle DEF by the ASA Theorem.

18) Triangles BCE and DCE both share side CE so segment CE is congruent to CE. Perpendicular lines create right angles and all right angles are equal. Therefore, angle CEB is congruent to angle CED. It is given that segments BE and ED are congruent. Therefore, triangle BCE is congruent to triangle DCE by the SAS Theorem. Applying the same logical argument, triangle BEA is congruent to triangle DEA by the SAS Theorem.

19) Triangles EFH and HGF are not congruent. Triangles EFH and HGF both share side FH so segment FH is congruent to FH. Since opposite sides of a parallelogram are parallel to each other, angles GFH and EHF are congruent because they are alternate interior angles. Likewise, angles EFH and GHF are congruent because they are alternate interior angles. However, this means that vertex E in triangle EFH corresponds to vertex G in triangle HGF. Therefore, triangles EFH and GHF are congruent by the ASA Theorem but triangles EFH and HGF are not.

20) Since E is the midpoint of segment AD, segments AE and ED are congruent. Angles AEB and DEC are vertical angles so they are congruent. However, even though you can match three sides/angles in the one triangle with three corresponding sides/angles in the other, triangles ABE and DCE are not necessarily congruent because there is no ASS Theorem. A counterexample drawing would look something like this: