Name: _____ Date: _____

Chapter 1 Problems of the Week

1. In chess, the knight moves two spaces forward or backward and one space to the left or right. The moves can be in any order.

a) If the knight were placed on a coordinate grid, to how many spaces could the knight move from (0, 0)? Record your moves.

b) If the knight were placed on a coordinate grid, and assuming that the knight cannot return over the previous move, how many moves would it take to return to the original starting position? Record your moves.

2. A cross is located at (2, 6), (2, 2), (6, 2), (6, −2), (2, −2), (2, −6), (−2, −6), (−2, −2), (−6, −2), (−6, 2), (−2, 2), and (−2, 6). Lines cut the cross into four parts. One line runs from (0, 6) to (4, −2) and another line runs from (−6, −2) and extends past (2, 2).

a) Draw and label a coordinate grid. Label the smallest part 1, the second smallest part 2, the third smallest part 3, and the largest part 4.

b) Use transformations to rearrange the parts of the cross to form a square. Record the coordinate pairs of the square.

3. Tammy challenges her younger brother Billy to a race. Tammy starts at (−9, −80) and Billy starts at (−9, −45). For every gain of 1 unit along the *x*-axis, Tammy makes a gain of 10 units along the *y*-axis. For every gain of 1 unit along the x-axis, Billy makes a gain of 5 units along the *y*-axis. Plot the runners on a coordinate grid and determine who will cross the *x*-axis first. What are the coordinates?

4. Triangle XYZ is formed at (−9, 9), (−7, 6), and (−9, 3). Triangle KLM is formed at (4, −1) (2, −4), and (6, −4). Using ΔXYZ and ΔKLM, draw translations, reflections, and rotations to form a rectangle ABCD at (4, 8) (4, 14), (8, 14), and (8, 8).

Hint: The triangles may be used more than once.

5. Three red markers are located as follows: (0, 1), (0, 2), and (0, 3). Three blue markers are located as follows: (0, −1), (0, −2), and (0, −3). Switch the location of the red markers and the blue markers by following these rules.

- A red marker may move only to the left.
- A blue marker may move only to the right.
- No marker may share a space with any other marker.
- Red markers may jump blue markers, and blue markers may jump red markers.

a) Record each move.

b) What is the least number of moves needed to switch the markers?