# Math 116: Practice exam #2
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1. The next mileage chart shows the distances between five cities (A, B, C, D, and E). Use Kruskal's algorithm to find a minimum spanning tree connecting the cities. Give the total mileage for this tree.

|	A	B	C	D	E
A		30	27	66	43
B	30		55	108	23
C	27	55		71	83
D	66	108	71		54
E	43	23	83	54	

2. Find the length of the shortest network connecting the tree points A, B and C shown in the following figure. Explain your answer.
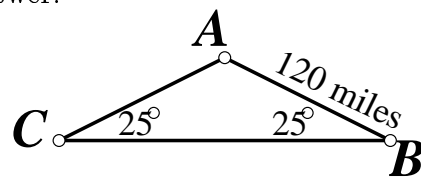
3. For the following border pattern give its symmetry type using the standard crystallography notation (mm, mg, $m1$, $1m$, $1g$, 12, 11). Indicate (if applicable) the axes of reflections, rotocenters, and axis of a glide reflection.

4. Find the symmetry group of the following figure. List all the symmetries and write down the multiplication table for the group.
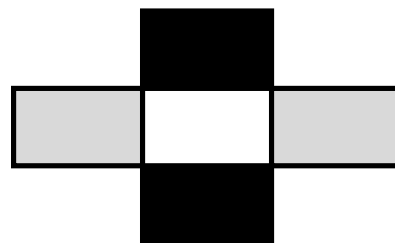
5. Given a rotation that moves the point A to the point A' and the point B to the point B' as shown in the figure, find the rotocenter and the image of the shaded region under the rotation.