

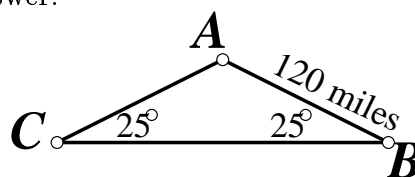
Math 116: Practice exam #2

Instructor: Sergei Chmutov

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	

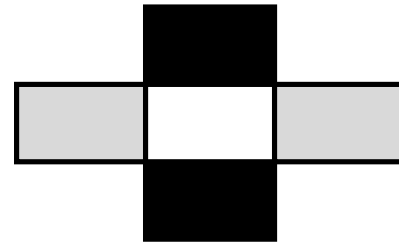
2. Find the length of the shortest network connecting the tree points A , B and C shown in the following figure. Explain your answer.



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.

... TEST#2S#T2ETLE2L#S2#LS3LTEST#2S#T2ETLE2L#S2#LS3L ...

4. Find the symmetry group of the following figure. List all the symmetries and write down the multiplication table for the group.



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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.

