GEM1518 Mathematics in Art and Architecture, 2003/04 II, Tutorial 6 Solutions

Determine the symmetry group of the following wallpaper patterns

a. p1
b. cmm
c. p4
d. pg
e. cm
f. pgg
g. p2
h. pmm
i. pmg
j. pm
k. p3
l. p31m
m. p4g
n. p4m
o. p6
p. p3m1
q. p6m
Flow chart for wallpaper patterns.

None

Is there a reflection?

yes → cm

no → pm

Is there a glide reflection in an axis that is not a reflection axis?

yes → p1

no → pg

Is there a glide reflection?

Are there reflections in two directions?

yes → pgg

no → pmg

Are there reflections in lines that intersect at 45°?

yes → p4m

no → p4g

Are all rotation centres on reflection axis?

yes → pmm

no → cmm

What is the smallest rotation?

180°

Is there a reflection?

yes → Is there a glide reflection in an axis that is not a reflection axis?

no → Is there a glide reflection?

Are there reflections in two directions?

yes → Are there reflections in lines that intersect at 45°?

no → Is there a glide reflection?

Are all rotation centres on reflection axis?

yes → p3m1

no → p31m

90°

Is there a reflection?

yes → Are there reflections in lines that intersect at 45°?

no → p4

Are there reflections in lines that intersect at 45°?

120°

Is there a reflection?

yes → Are all rotation centres on reflection axis?

no → p3

Are all rotation centres on reflection axis?

60°

Is there a reflection?

yes → p6m

no → p6