

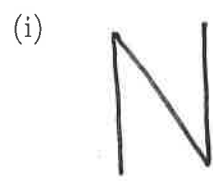
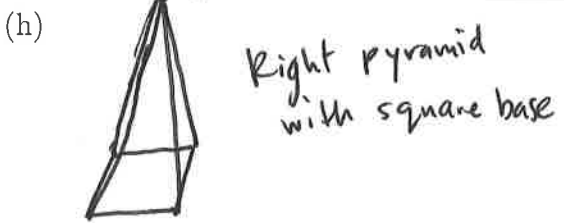
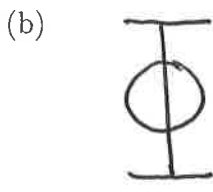
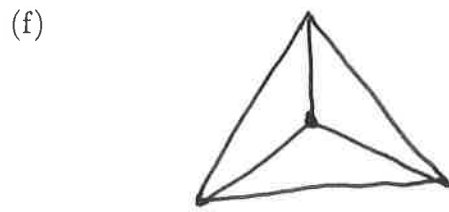
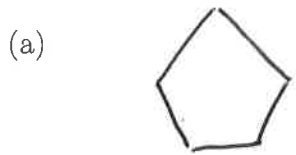
MATH 113, QUIZ #5

SEPTEMBER 24

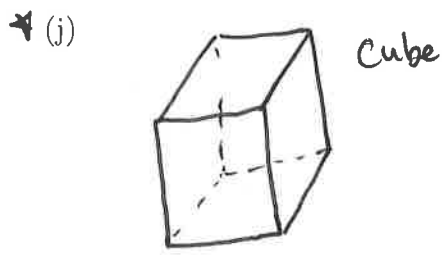
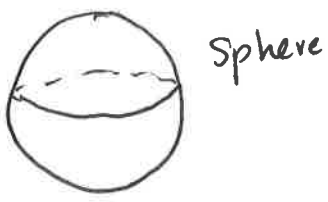
1. Consider the symmetry groups of each of the following objects. Each object has a symmetry group which is isomorphic to a familiar group – your task is to figure out which one. No justification needed.

Answer Bank (answers may be used more than once or not at all)

- any \mathbb{Z}_n (say which n)
- any D_n (say which n)
- Klein-4 group
- S_4
- S_5
- S_6
- \mathbb{Z}
- \mathbb{Q}
- \mathbb{R}



↓ Challenge/bonus (e)
Answers might not be in answer bank.



2. Show very brief justification for each of the following T/F questions.

(a) **TRUE FALSE** The element $\bar{2}$ has order 2 in \mathbb{Z}_n whenever n is even.

(b) **TRUE FALSE** If $G = \{e, x, x^2, \dots, x^{23}\}$ is a cyclic group of order 24, then G has exactly one subgroup of order 4.

(c) **TRUE FALSE** In S_8 , the element $(1, 2)(1, 3, 4, 6)(2, 8)$ has order 4. (*This is in cycle notation.*)

(d) **TRUE FALSE** Every cyclic group of order 48 has at least 5 different generators.

(e) **TRUE FALSE** Every dihedral group D_n with $n \geq 3$ has a subgroup containing exactly half its elements.