**Dear student,**

**if your background does not include an expertise in Crystallography, to allow you to obtain the maximum profit from the Hamburg School, you are invited to study, before attending the School, the first 11 pages of Fundamental of Crystallography, by Oxford University Press, ed. by C. Giacovazzo, ed. 2. The pages are enclosed for your convenience.**

**It will be assumed, for teaching economy, that any student perfectly knows the scientific content of such pages: in particular he should dominates the meaning and the notation of the crystallographic symmetry operators. In absence of this information, it will be very difficult to make a reasonable profit from the School .**

**Once the 11 pages have ben studied, please check your expertise by answering the following exercises. If you are unable to answer some of them, please return to study the text of the released pages.**

**If you have still difficulties, you can contact Carmelo at** [**carmelo.giacovazzo@ic.cnr.it**](mailto:carmelo.giacovazzo@ic.cnr.it) **. He will be pleased to help you.**

**For the Organizing Commettee**

**Questions and exercises for homework**

1. If an operator 41 exists, should you find a 21 operator along the same direction?

2. If an operator -6 exist, should you find a mirror *m* perpendicular to the -6 direction ?

3. How should you orient your hands to simulate a -1?

4. How should you orient your hands to simulate a *-4*? Does *-4* implies an inversion centre?

5. Are you able to provide a definition for the symmetry axis *n* and for the symmetry axis *-n* ?

6. Can you orient your hands to simulate a twofold axis?

7. Can you suitably orient two enantiomeric molecules in such a way that they are related by a twofold axis?

8. Please derive the equivalent positions drawn in Fig.1.3 of Fundamentals , by using the same international notation.

9. Can you define what a lattice represents?

10. Can you define what a lattice point represents?

11. Are the coordinates of the lattice points always integer numbers?

12. When you fix the origin of a direct lattice, are you obliged to locate the origin lattice point on an atom?

13. Can you find a centred unit cell smaller than a primitive?

14. How do you express a crystallographic direction?

15. To which direction the symbol [132] corresponds? Are you able to draw such direction?

16. Do the crystallographic directions exhaust all the possible directions?

17. Are you able to draw the family of crystallographic planes (2 6 3)?

18. Which the difference between the families (hkl) and (-h –k –l) ?

19. Can you tile your room by regular pentagonal or octagonal tiles?

20. In the crystals is the symmetry operator 41 different from 45?

21. Does the glide plane of type *b* perpendicular to the **b** axis exist?

22. Which are the symmetry restrictions fixed by the periodic nature of the crystals to the order of the symmetry operators?

23. Which are the symmetry restrictions fixed by the periodic nature of the crystals to the translational components of the symmetry operators?

24. In crystallography, do you need the screw axis 46? Is it different from 42?

25. Are you able to represent, as in Fig. 1.3 of Fundamentals, the symmetry of the space when a crystallographic screw axis exists?