



# Exercise Prompts

## Fundamentals of Phase Diagrams with Ansys Granta EduPack Software

Mike Ashby<sup>1</sup> and Kaitlin Tyler<sup>2</sup>

<sup>1</sup>Department of Engineering, University of Cambridge

<sup>2</sup>Ansys Academic Program

Edited by the Ansys Academic Program

[education@ansys.com](mailto:education@ansys.com)

## Ansys Software Used

This resource uses Ansys Granta EduPack™ teaching software for materials education.

## Instructions

Use the Phase Diagram section of the Granta EduPack Materials Science & Engineering database to explore the basics of reading phase diagrams, using the lever rule, and understanding the impact of cooling on microstructure in two-phase alloys in this set of exercises.

1. In the *Phase Diagram glossary*, there are three binary diagrams to explore. Explain the terms Liquidus and Solidus. Which important phase points only appear in the Fe-C diagram and what do they mean?
2. In the *Phase Diagram glossary*, the Fe-C diagram has both a eutectic and eutectoid reaction. What is the difference between the two of them? How do they compare to the peritectic reaction?
3. Read and understand the text that comes up when you click on *Lever rule* for the first time. Move on to the Lever rule diagram. There are two important concepts: weight fraction and composition. What's the difference between the two?
4. The *Lever Rule* can be used at any composition. On the same diagram, what is the composition of the liquid and solid phases for a 60 wt% B alloy at 1300°C?
5. By looking at the Cu-Ni diagram in *Phases*, how are the copper and nickel atoms arranged in the solid phase? What does the term solid solution mean?
6. Look at the eutectic phase in the Pb-Sn *Phases* phase diagram. What does it mean that the Sn atoms are found in the Pb solid phase and vice versa? Can this be predicted by the phase diagram itself?
7. In *Cooling paths*, looking at the eutectic phase diagram, which of the five cooling paths contains the eutectic transformation? This transformation is isothermal, what does that mean?
8. Which of the three diagrams in *Cooling paths* contains a eutectoid point? When you cool eutectoid carbon steel (0.8 wt%) what's the final solid microstructure called? Is this, strictly speaking, a phase?
9. In the *Phase diagram datatable*, which one is not a binary metal alloy diagram? What's special about the components in this diagram?
10. In the *Phase diagram datatable*, how many of the binary diagrams have a eutectic reaction? How many have a eutectoid reaction?

© 2026 ANSYS, Inc. All rights reserved.

## Use and Reproduction

The content used in this resource may only be used or reproduced for teaching purposes; and any commercial use is strictly prohibited. The full Academic Terms & Conditions can be found [using this link](#).

## Document Information

This case study is part of a set of teaching resources to help introduce students to topics related to fluids.

## Ansyes Education Resources

To access more undergraduate education resources, including lecture presentations with notes, exercises with worked solutions, microprojects, real life examples and more, visit [www.ansys.com/education-resources](http://www.ansys.com/education-resources).

## Feedback

Here at Ansys, we rely on your feedback to ensure the educational content we create is up-to-date and fits your teaching needs.

[Please click the link here](#) out a short survey (~7 minutes) to help us continue to support academics around the world utilizing Ansys tools in the classroom.

**ANSYS, Inc.**  
Southpointe  
2600 Ansys Drive  
Canonsburg, PA 15317  
U.S.A.  
724.746.3304  
[ansysinfo@ansys.com](mailto:ansysinfo@ansys.com)

If you've ever seen a rocket launch, flown on an airplane, driven a car, used a computer, touched a mobile device, crossed a bridge or put on wearable technology, chances are you've used a product where Ansys software played a critical role in its creation. Ansys is the global leader in engineering simulation. We help the world's most innovative companies deliver radically better products to their customers. By offering the best and broadest portfolio of engineering simulation software, we help them solve the most complex design challenges and engineer products limited only by imagination.

visit [www.ansys.com](http://www.ansys.com) for more information

Any and all ANSYS, Inc. brand, product, service and feature names, logos and slogans are registered trademarks or trademarks of ANSYS, Inc. or its subsidiaries in the United States or other countries. All other brand, product, service and feature names or trademarks are the property of their respective owners.

© 2026 ANSYS, Inc. All Rights Reserved.