

**Purdue University
School of Materials Engineering**

**MSE 230
Fall 2003
Exam II**

November 13, 2003

Show All Work and Put Units on Answers

Name: _____ Key _____

Recitation Day and Time: _____

Recitation Instructor's Name: _____

1	/17
2	/15
3	/18
4	/16
5	/12
6	/12
7	/10
Total	/100

General Concepts

(5 pts) 1.(a) Complete the following matching section by placing the appropriate letter in the blank:

 C 1010 Steel

 F 2024-T6

 B Gray Cast Iron

 A Stainless Steel

 E 1080 Steel

A. Cr

B. Graphite Flakes

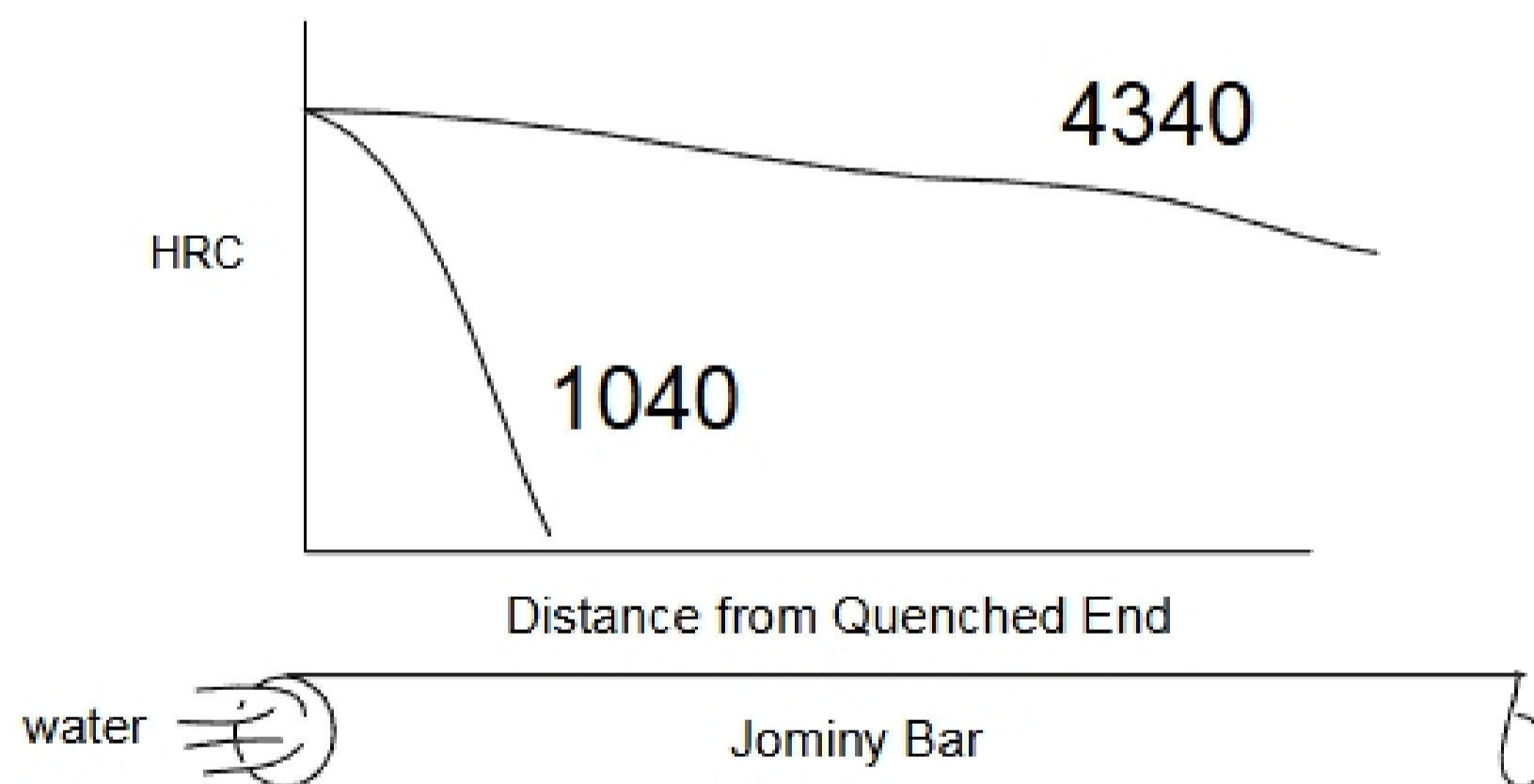
C. 0.1 wt.% carbon

D. Incoherent Precipitates

E. Eutectoid Composition

F. Coherent Precipitates

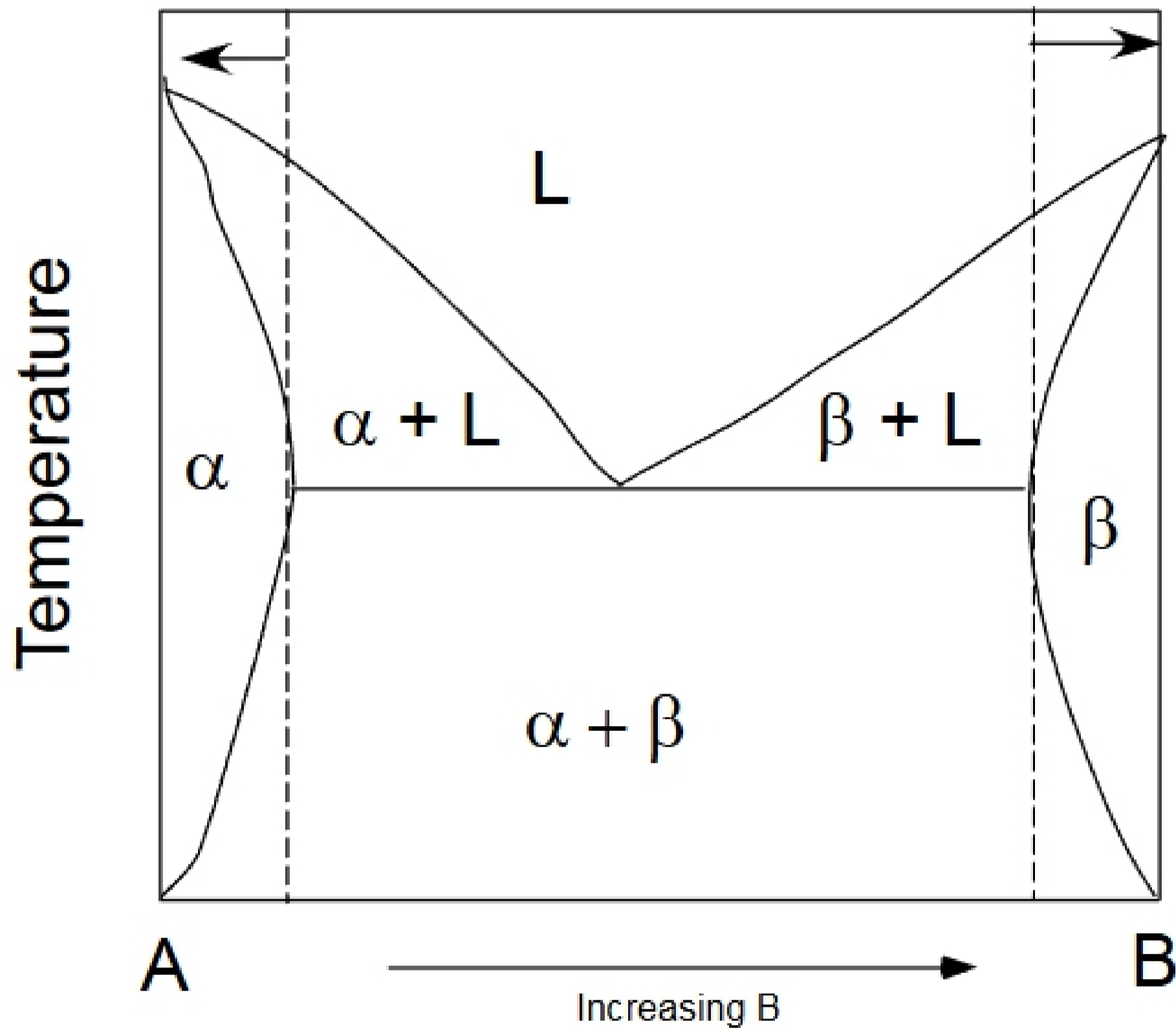
(5 pts) (b) Schematically illustrate the hardness profile for a 1040 and a 4340 steel as a function of distance from the quenched end of a Jominy bar. **Label each curve!**



(7 pts) c. Draw a schematic of a binary-eutectic phase diagram in the box provided – I've provided the "eutectic" line. Label the areas of the phase diagram with the phases present (α , β , or L or some combination).

Indicate on the diagram for what compositions would you not expect any eutectic microstructure upon equilibrium cooling to just below the eutectic temperature?

Note: no "numbers" are required for this problem.



The compositions indicated by the dotted lines and arrows would not form a eutectic microstructure because there would be no liquid phase with the eutectic composition transforming through the eutectic temperature.