

Problem Set 1 – Scarcity

Estimated time: 60–90 minutes. Show your work for full credit. Draw graphs neatly and label all axes, intercepts, and key points.

Part 1: Opportunity Cost (~15 minutes)

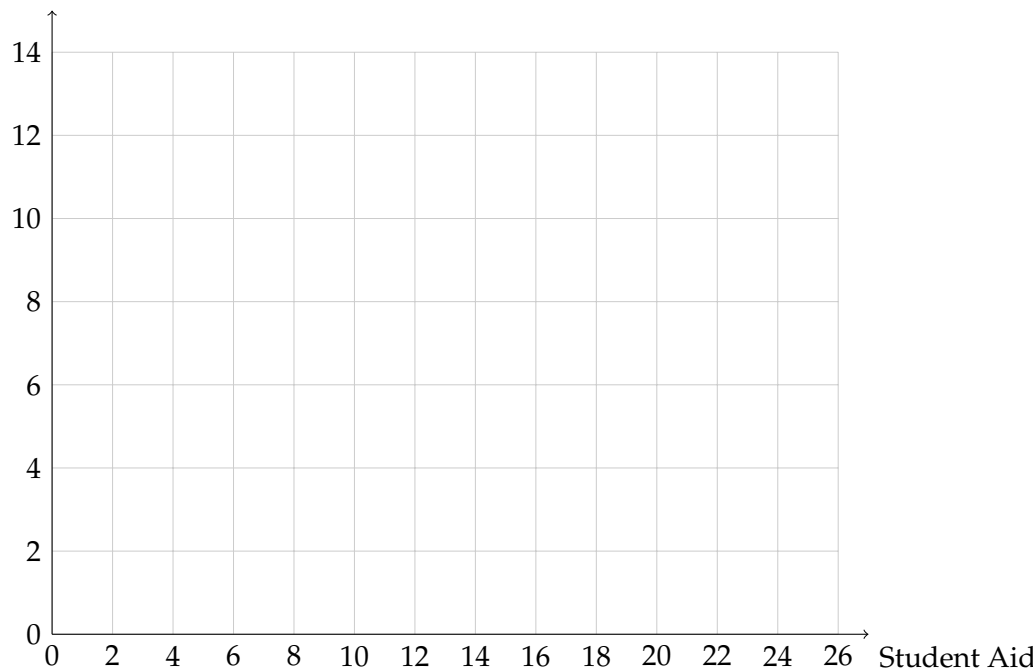
1. A teacher has one planning period each day and must choose between grading papers and preparing tomorrow's lesson. What is the opportunity cost of grading papers today?
2. A district has one open teaching position and two strong finalists. Beyond the salary paid to whichever finalist is hired, explain the opportunity cost of this hiring decision.
3. A high school senior spends a Saturday retaking the SAT instead of working her usual shift at a part-time job. Identify one **explicit** cost and one **implicit** cost of her decision to retest.
4. A superintendent must choose between funding a new STEM lab and hiring two additional school counselors. Using opportunity cost language, explain what the district gives up no matter which option is chosen.
5. True or False, and explain using a school-based example: "If something is free, it has no opportunity cost."

Part 2: Budget Constraints (~30 minutes)

Scenario: A principal has a \$600 budget to spend on classroom improvements. She is deciding between purchasing new student desks, which cost \$50 each, and hiring hours of a student aide who helps teachers with grading and classroom tasks, which cost \$25 per hour.

1. Write the budget equation relating desks and aide hours.
2. If the principal buys 8 hours of student aide time, how many desks can she afford with the remaining budget? Show your work.
3. On the axes below, draw the budget constraint. Label both intercepts.

Student Desks (\$50 each)



4. What is the opportunity cost of purchasing one additional desk, in terms of student aide hours? (Hint: how many aide hours could the principal buy with the money for one desk?)

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Now suppose a supply shortage raises the price of a desk to \$75. The price of student aide hours and the principal's total budget stay the same.

5. What are the new intercepts?

6. On the **same axes above**, draw the new budget constraint using a dashed line.
7. Compare the new line to the original one. Did both intercepts change, or only one? Explain why that makes sense given that only the price of desks changed.

8. What is the new opportunity cost of one additional desk, in terms of student aide hours? How does it compare to your answer in Question 4?

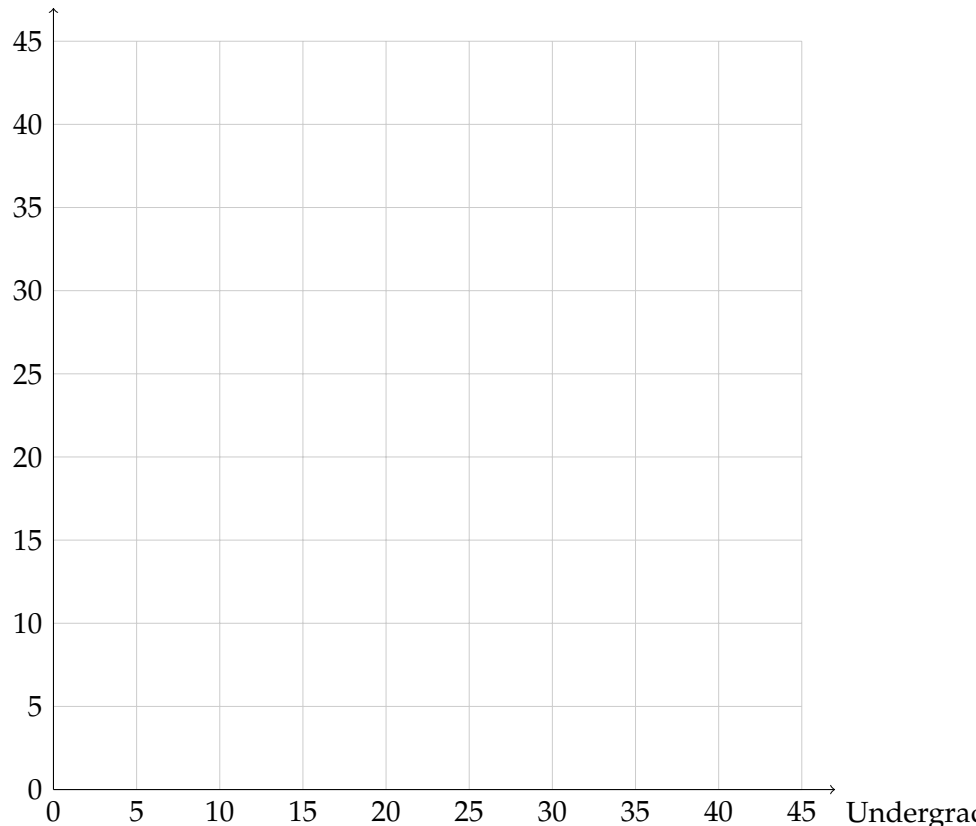
Part 3: Production Possibilities Frontier (~30 minutes)

Scenario: A university department has a fixed number of faculty-hours each semester. Depending on how those hours are allocated, the department can teach different numbers of undergraduate students and mentor different numbers of graduate students. The table below shows combinations the department could produce if it uses all of its faculty-hours.

Undergraduates Taught	Graduate Students Mentored
0	40
10	38
20	32
30	20
40	0

1. Plot these five points on the axes below and connect them to form the department's PPF.

Graduate Students Mentored



2. Is this PPF bowed outward or a straight line? What does that tell you about the faculty – are they all equally suited to teaching undergraduates and mentoring

graduate students?

3. Calculate the opportunity cost (in graduate students mentored, given up) of increasing undergraduates taught from 0 to 10. Then calculate the opportunity cost of increasing undergraduates taught from 30 to 40. Compare your two answers.
4. Give one specific, realistic example of something that would shift this PPF outward, and explain why.
5. Give one specific, realistic example of something that would shift this PPF inward, and explain why.
6. A colleague suggests the department could teach 25 undergraduates and mentor 30 graduate students in the same semester. Using your graph, is this possible? Explain using the concept of scarcity.