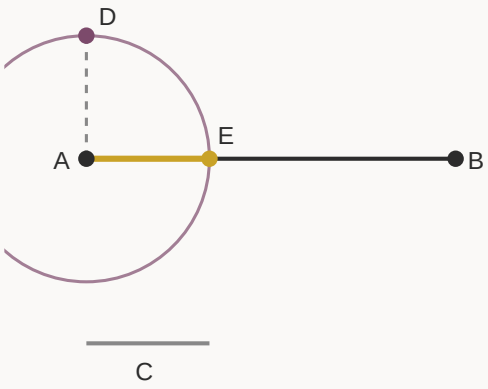
Worksheet: Proposition 3

To cut off from the greater of two given unequal straight lines a straight line equal to the less.



Circle with radius = shorter line C cuts segment AE from longer line AB

Student Name: _____ Date: _____

Part A: Construction Practice

Using only your compass and straightedge, carry out the construction described in Proposition 3. Label all points clearly.

After completing, answer:

1. What tools did you use, and in what order?

2. Which postulates justify each step of your construction?

Part B: Proof Justification

Below is the proof broken into steps. For each step, write the toolkit item that justifies it.

Available Toolkit:

• P3 — Draw a Circle

• D15 — Circle

• CN1 — Transitivity of Equality

• Prop 2 — To place a straight line equal to a given straight line with one end at a given point.

• P1 — Draw a Line

• Prop 1 — To construct an equilateral triangle on a given finite straight line.

• CN3 — Subtraction Preserves Equality

Step	Statement	Justification
1	Place a line AD at point A equal to the shorter line C	
2	Draw a circle centered at A with radius AD; let E be where it meets AB	
3	AE = AD (both radii of the circle centered at A)	
4	Since AD = C (by construction), we have AE = C	

Part C: Thinking Deeper

Question 1: Why do we need Proposition 2 first before we can do this?

Question 2: What if the shorter line were longer than AB? Would this construction fail?

Question 3: How is this different from just using a ruler to measure?

Part D: Challenge Problem

Can you extend the construction from Proposition 3 to build something more complex? Sketch your result below and explain what you created.

Part E: Self-Assessment

Reflect honestly on your understanding. There are no wrong answers here.

1. Could you explain to someone else why this proof works, without looking at your notes?

- ☐ Yes, I could explain the whole proof
- ☐ I could explain most of it but might get stuck
- ☐ I'd need to look at the steps again

2. Which part of this lesson was hardest for you?

- ☐ Drawing the construction / diagram
- ☐ Understanding why the proof works (the logic)
- ☐ Matching proof steps to toolkit items
- ☐ The extension questions

3. What would you do differently next time?
