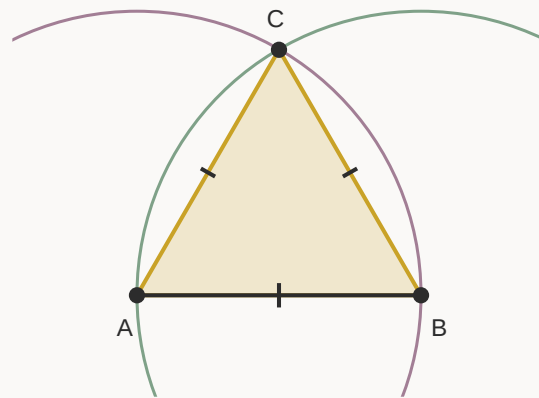


## Worksheet: Proposition 1

To construct an equilateral triangle on a given finite straight line.



Two circles (A, B) meet at C, forming equilateral triangle ABC

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Part A: Construction Practice

Using only your compass and straightedge, carry out the construction described in Proposition 1. Label all points clearly.



After completing, answer:

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

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2. Which postulates justify each step of your construction?

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## Part B: Proof Justification

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

**Available Toolkit:**

- P1 — Draw a Line
- P3 — Draw a Circle
- D15 — Circle
- D20 — Types of Triangles (by sides)
- CN1 — Transitivity of Equality
- P2 — Extend a Line
- CN2 — Addition Preserves Equality

| Step | Statement                                                       | Justification |
|------|-----------------------------------------------------------------|---------------|
| 1    | Draw a circle centered at A passing through B                   |               |
| 2    | Draw a circle centered at B passing through A                   |               |
| 3    | Mark point C where the circles intersect. Draw lines AC and BC. |               |
| 4    | $AC = AB$ (both are radii of the circle centered at A)          |               |
| 5    | $BC = BA$ (both are radii of the circle centered at B)          |               |
| 6    | $AC = AB$ and $BC = AB$ , therefore $AC = BC$                   |               |
| 7    | Since $AC = AB = BC$ , triangle ABC is equilateral              |               |

## Part C: Thinking Deeper

Question 1: Why do you think Euclid chose this as Proposition 1? What makes it a good starting point?

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Question 2: Could you construct an equilateral triangle with just a straightedge (no compass)? Why or why not?

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Question 3: The two circles intersect at two points. Why does it not matter which one we pick for C?

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### Part D: Challenge Problem

Can you extend the construction from Proposition 1 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?

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