LESSON
24
RoboTrig

IK Elbow Configurations

Two solutions. One target. You choose.

Name:	Team:	Date:

IK gives you one θ2. But there are often two physical configurations that reach the same point. Choosing which to use is an engineering decision, not a math problem.

ROBOT FIRST *Run IK both ways*

User's target: (x = ___, y = ___) L_1 = ___ L_2 = ___

Configuration	θ2 value	θ1 value	Measured tip position	Matches target?
Elbow-down (θ2 positive)	+___°	___°	(___, ___)	YES / NO
Elbow-up (θ2 negative)	−___°	___°	(___, ___)	YES / NO

NAME IT

Both configurations reach the same tip position.
Obstacles BELOW the arm → use elbow-UP (θ2 negative)
Obstacles ABOVE the arm → use elbow-DOWN (θ2 positive)
The math gives you both. The engineer uses the physical requirements of the task to decide.

PRACTICE *Show your work*

P1. Run IK for a second target (different from above). Show both configurations.

Second target: (x = ___, y = ___) L_1 = ___ L_2 = ___

P2. For your user's task, which configuration makes more sense? Justify using the physical requirements of the task.

REFLECT

My user's task requires the elbow-___ configuration because: