Robotic Arm Design

FOR LIFTING BOXES IN INDUSTRIES

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Agenda

- **Introduction**

  Overview of robotic arms
  Problem statement
  Purpose of robotic arms

- **Math Body**

  Mathematical analysis
  Design process

- **Conclusion**

  Results and conclusion

Essential Question

“How can we, as a team, apply trigonometric principles to design and build a robotic arm that helps solve a specific problem in our community?”

Introduction

• Many factories today rely on robotic arms to complete tasks efficiently
• Some factories can produce products extremely fast using automation
• For example, BMW’s factory in Mexico can produce a car in only 48 hours
• Robotic arms reduce human labor and increase productivity
• They are designed to lift heavy objects safely and accurately

Problem of the Task

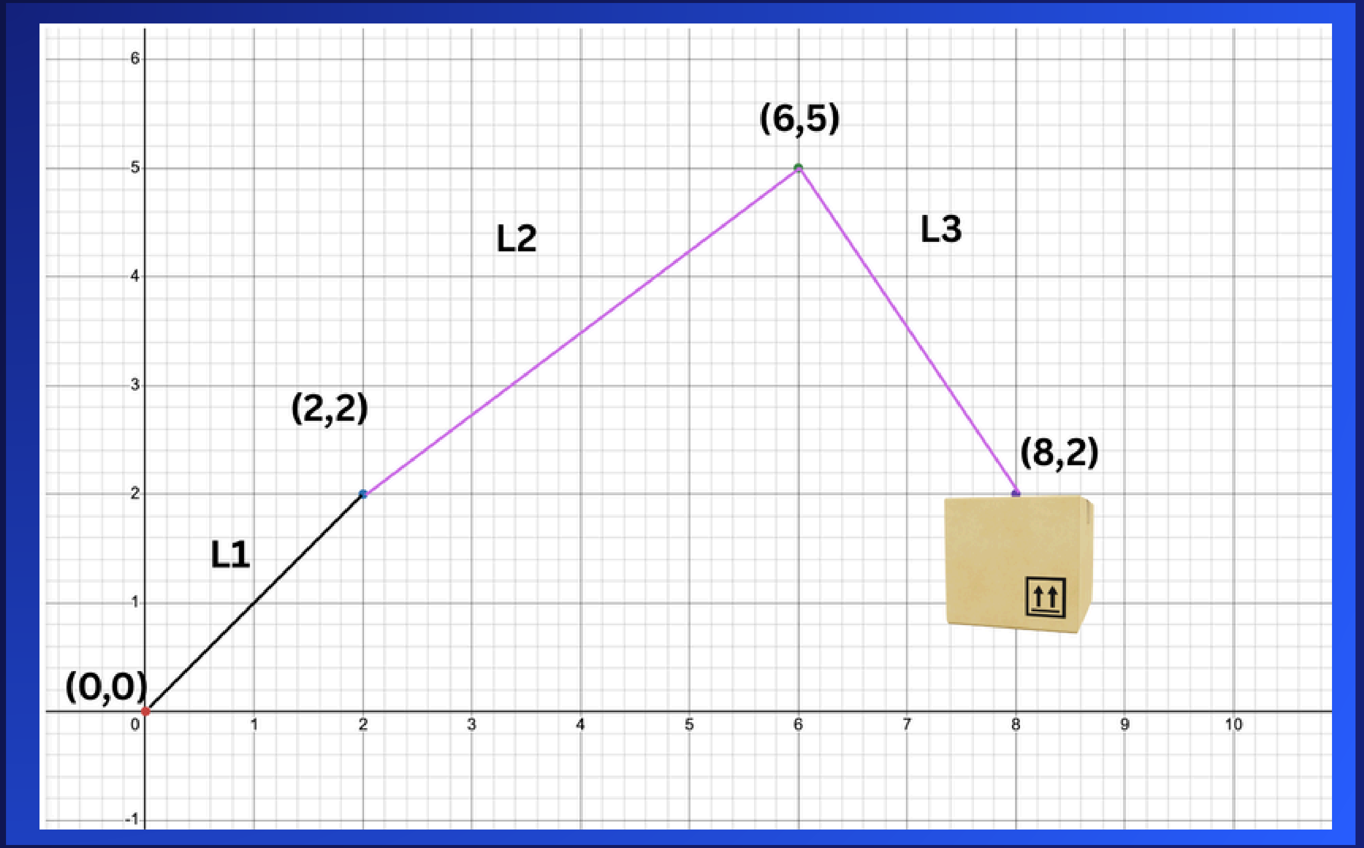
- Factory workers are required to lift heavy boxes repeatedly
- This increases the risk of injuries and fatigue
- Humans cannot work continuously without rest
- A safer and more efficient solution is needed

Why Robotic Arms?

- Can lift heavy objects safely
- Reduce workplace injuries
- Increase speed and productivity
- Work continuously without fatigue
- Improve accuracy in factories

Process

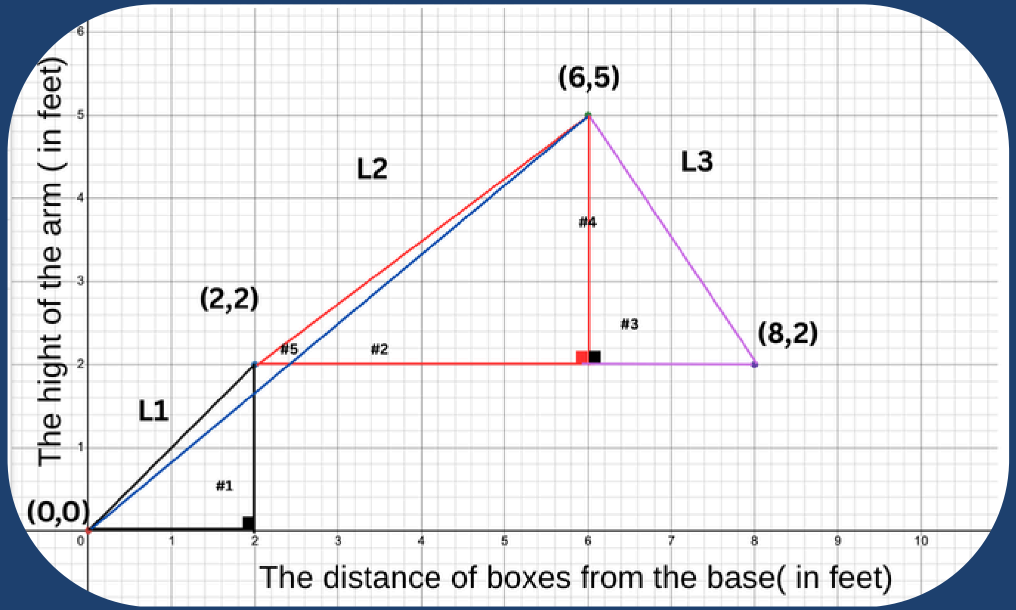
01 Identify the problem in factories where workers must lift heavy boxes repeatedly, which can cause injuries and slow productivity.

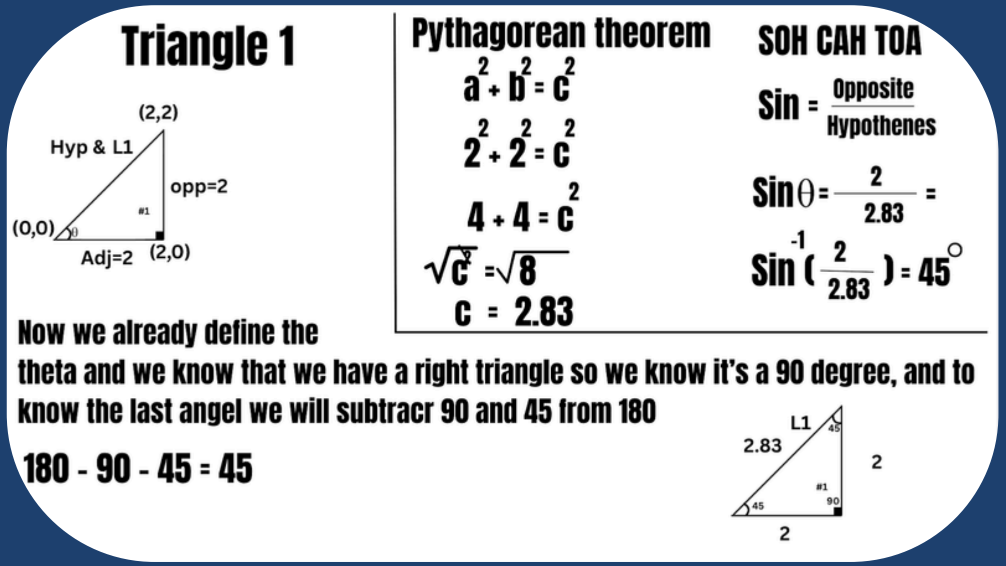


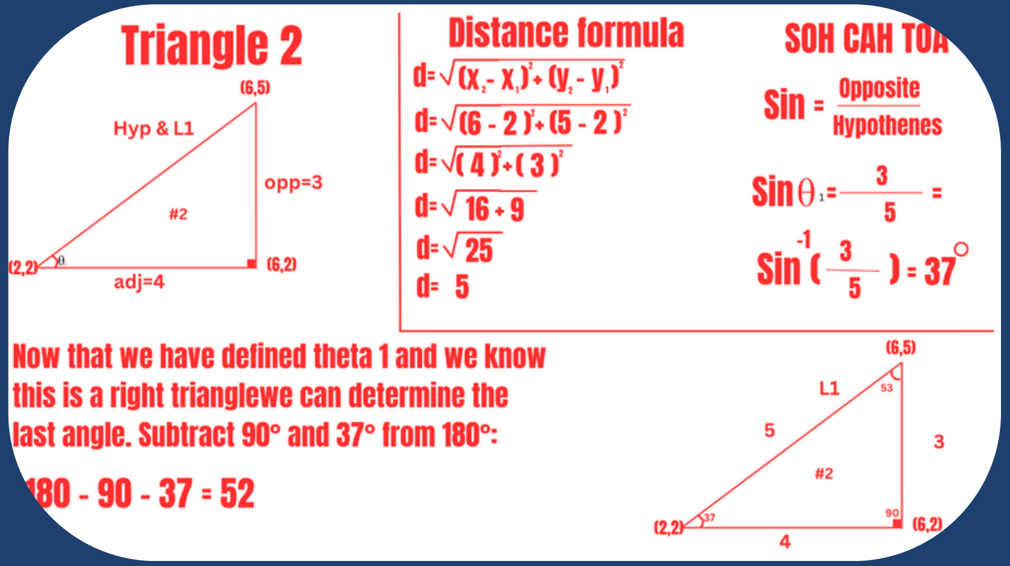
01 Design the robotic arm using a coordinate plane and divide it into segments (L1, L2, L3) to model its movement.

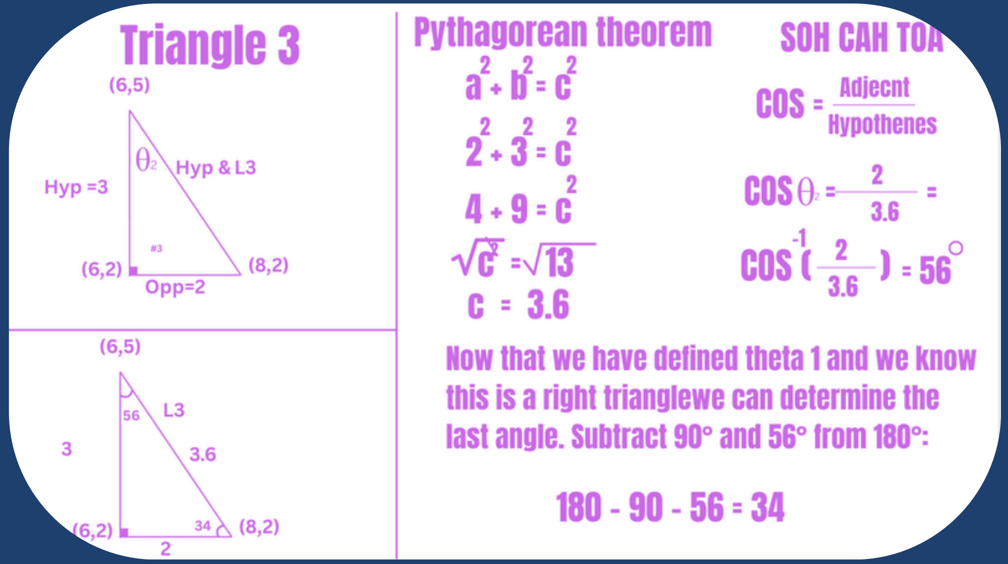
01 Apply trigonometric formulas to calculate angles and lengths, ensuring the arm can lift boxes safely and accurately.

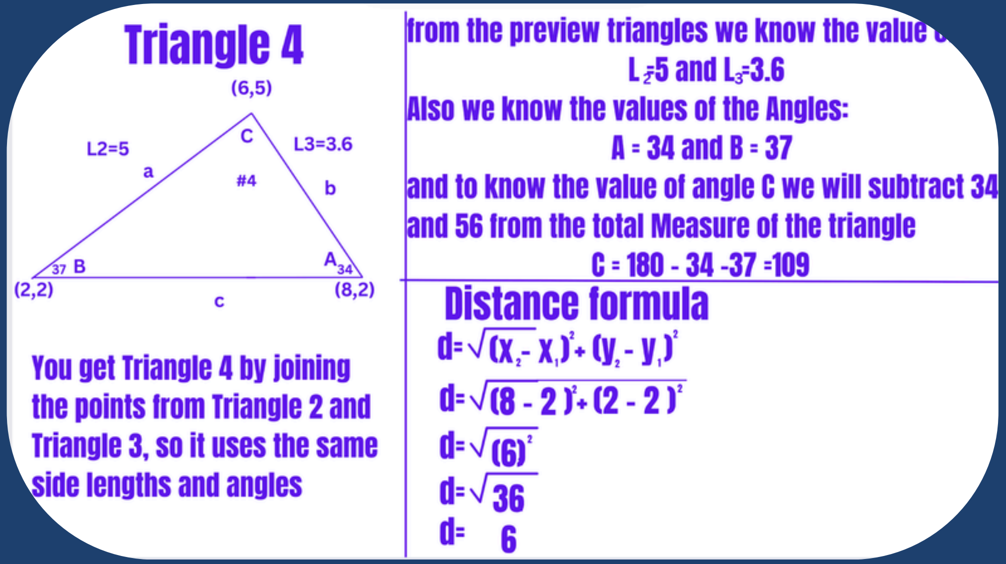
Math analysis

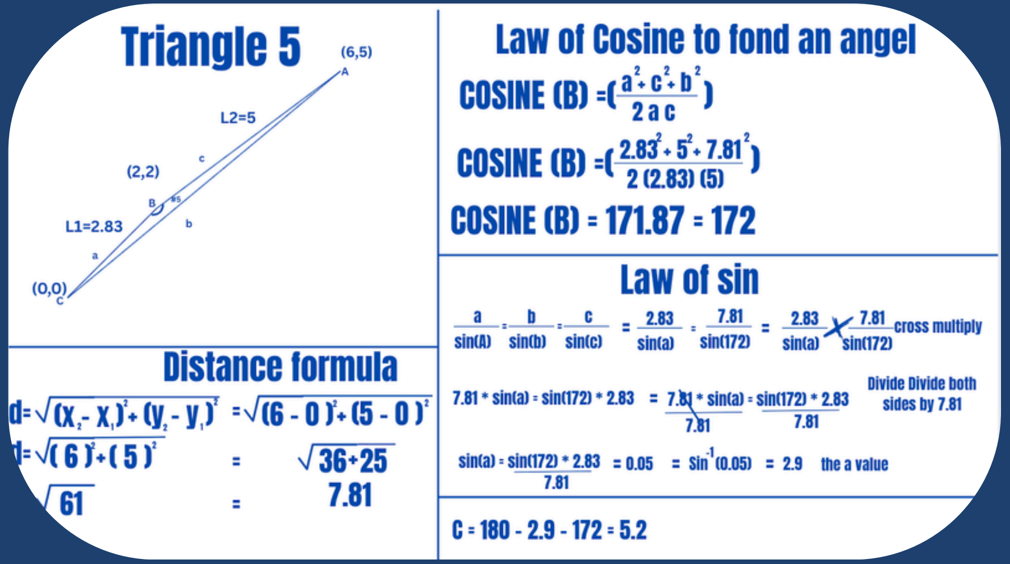




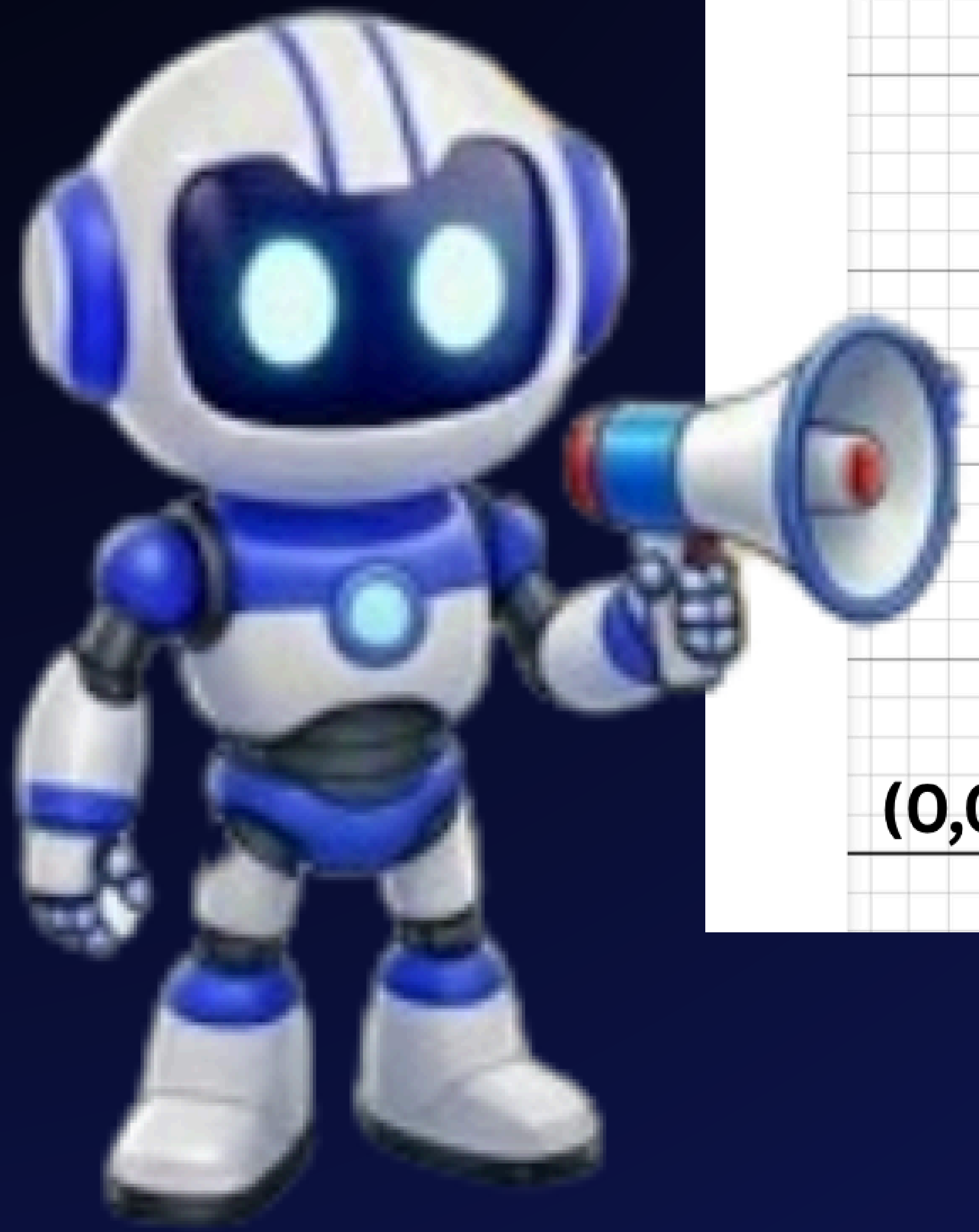


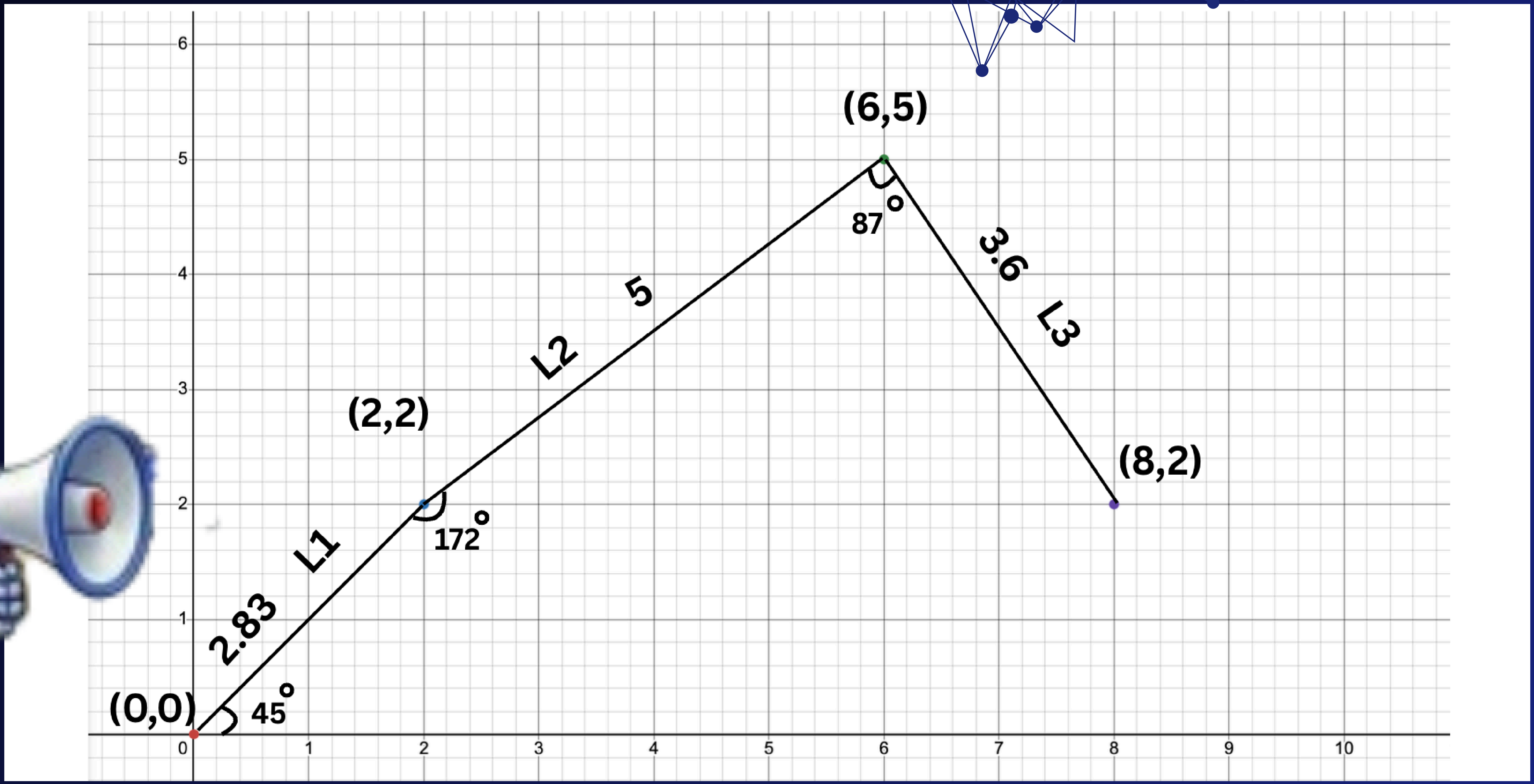






Results





Conclusion

- Trigonometry helps robotic arms move safely and precisely
- This project connects math to real-world engineering applications
- Mistakes with formulas helped me improve my problem-solving skills
- The project prepared me for future studies in computer science and engineering

Thank You

For Your Attention