

Welcome!

The Robot Doctor: Math Concepts

Math Concepts by Lesson

Lesson 101: Robotics: An Introduction	None (Design Elements of a Robot)
Lesson 102: Sense - Plan - Act Framework	None (Sense - Plan - Act Framework)
Lesson 103: Robot Measurements	Conversion to Metric Units and Unit Prefixes (mili, kilo, etc...); Scientific Notation; Angles and Conversion to Radians; Basic Speed, Distance and Time relations; Basic Trigonometry
Lesson 104: Robot Localization	Circle Equation: -Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation, -Intersection Points of two Circle Equations; Roots of quadratic equations

Math Concepts by Lesson

Lesson 105: Robot Motion

Circle Circumference; Speed, Distance and Time: Linear and Angular Velocity and the relationship between them; Basic Trigonometry: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle.

Lesson 106 : Robot Vision

Pinhole Model and Camera Calibration: Equation of a Line given two points, Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Math Concepts by Lessons

Lesson 107: Robot Sensing

Probability: Describe events as subsets of a sample space (the set of outcomes), Conditional Probability: (+)Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. (+)Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$ Construct and interpret two-way frequency tables of data, Total Probability, Bayes' Theorem

Lesson 108: Robot Controls

Vectors: -Vector Format of a Line using the start and end points of the line $(P_{end} - P_{start})$ -Cross Product of 2D Vectors -Using Dot Product and Normal Vector of a line to calculate the distance from a point to a line, Pythagorean Theorem