Parallax Inc.	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13	Unit 14	Unit 15
For BlocklyProp Robotics with the ActivityBot	Getting Started with BlocklyProp	BlocklyProp Programming Basics	BlocklyProp Programming Functions and Multicore	Robot Construction - Mechanical	Robot Construction - Electrical & Programming Connections	Circuit-Building Basics	Robot Navigation Basics	Sensor Navigation by Touch	Sensor Navigation by Ultrasound	Sensor Navigation by Visible Light	Sensor Navigation by Infrared Light	IR Remote Control (accessory hardware needed)	Line-following (accessory hardware needed)	IR Beacon Seeking ActivityBot	Ping)))Dar Display with ActivityBot and BlocklyProp (Accessory hardware needed)
AB360° 12-pack Plus	All Parallax hardware needed for this unit is included in the AB360° 12-pack Plus Kit														
Single AB360° Robot Kit	All Parallax hardware needed for this unit is included in one ActivityBot 360° Robot Kit.											3-function Universal Remote (#020-00001)	QTI Line-follower AppKit (#28108)	Additional Propeller Activity Board WX (#32912)	Ping))) Mounting Bracket Kit (#570-28015)
Other materials needed	none	none	none	masking tape, pen	masking tape, pen	none	none	none	none	flashlight			black electrical tape, poster board, or printed tracks		target objects such as cans or boxes
Approximate time	20 - 60 minutes	60-90 minutes	60-90 minutes	60-90 minutes	45-60 minutes	60-90 minutes	60-90 minutes	60-90 minutes	60-90 minutes	60-90 minutes	60-90 minutes	90 minutes	90-120 minutes	90 minutes	90-120 minutes
Adjustment suggestions	Shorten: IT/Teacher prepare ahead: install BlocklyProp client software on computers; set up up and confirms BlocklyProp accounts for each student; test proramming connection on each computer.	Shorten: skip Graphing Data activity.	Shorten: skip New Processor blocks activity.	Shorten: Teacher/Volunteers assemble robots ahead of time. (Un-assembling each year not necessary; hardware replenishment pieces available)	Shorten: Teacher/Volunteers make and test electrical and programming connections ahead of time.	Lengthen: Try the Check Pushbuttons activity from the Circuit Practice with BlocklyProp tutorial	Shorten: Just observe each maneuver animation and discuss the Robot drive speed block, but skip the Try This and Your Turn.	Keep Touch (Unit 8) and Ultrasound (Unit 9) sensor navigation if needing to shorten the course or use simpler circuits.	Shorten: skip the Try This and Your Turn sections of the Build & Test Ping))) activity.Lengthen: Physics bonus - experient with sound reflection and absorption by taking PING))) sensor measurements to different types of surfaces and at different angles.	Skip this unit if looking to eliminate one navigation sensor option for time's sake.	Test work area for infrared light interference ahead of time. If present, skip this unit.	Shorten: skip adding obstacle detection.	No need for Unit 12 first. Shorten: use the Tracks PDF to print out line-following tracks, instead of creating them with poster board and black electrical tape. Lengthen: follow this activity with the ActivityBot 360 Line Following with Color Sensing project.	No need to do Unit 12 or Unit 13 first; they are not prerequisite.	No need for units 12_14 first. Lengthen: delve into the trigonometry used by the BlocklyProp program if grade-level appropriate.
Skills, concepts, & objectives (students will be able to...)	Log into the BlocklyProp programming tool. Connect their Activity Board WX to their computer. Create and run a BlocklyProp program. Display and modify data in a program and view the output on their computer terminal.	Use a microcontroller program to send messages to a serial monitor for display, use variables, store and retrieve values from memory, solve math problems, make decisions to control program flow, count and control repetitions.	Understand what a programming function is; make programs using functions; what microcontroller multi-tasking and multiprocessing are, how the Propeller chip multi-processes, make programs that use Propeller chip multi-processing.	Assemble a small robot from written and visual instructions. Identify different mechanical parts. Use a screwdriver and small wrench.	Connect power to a microcontroller programming board, make power and signal connections between servo motors and a microcontroller programming board, test electrical connections.	Connect electronic components together on a solderless breadboard, match a schematic symbol to an electronic component, read a resistor's color-code, build a piezospeaker circuit and make programs to play different frequency notes, build an LED circuit and make programs to blink the light at different rates.	Create programs to make a rolling robot move, understand different types of turns and how to make them by controlling each wheel's speed separately, make observations and measurements to fine-tune robot behavior.	Understand how a whisker switch completes and electrical circuit, build whisker switch circuits connected to a microcontroller, create a program to monitor the state of a whisker switch, program a rolling robot to respond to obstacles detected by the whisker switches.	Understand how sound waves are reflected or absorbed by surfaces, connect an ultrasonic distance sensor to a microcontroller, create programs to read values from an ultrasonic distance sensor, program a robot to respond to obstacles detected by the ultrasonic distance sensor.	Understand where visible light wavelengths occur on the light spectrum; build a sensor system connected to a microcontroller that detects the difference in ambient visible light levels reaching two phototransistors; program a rolling robot to navigate based on the difference in ambient light levels detected by two different light sensors.	Understand where infrared light wavelengthrs occur in the light spectrum; build a sensor system connected to a micrcontroller that emits infrared light and looks for reflections, create programs to detect obstacles using reflected infrared light, program a rolling robot to navigate by responding to obstacles detected with infrared light reflections.	Design a user interface; decode IR signals from a Sony-protocol remote; program a rolling robot to perform different actions based on the IR remote signal it receives.	Add an array of line-detection sensors to the ActivityBot. Perform subsystem testing for the sensor array. Create code to store the sensor states in a binary value that is then used to select navigation states for line-following.	Understand the difference in output between analog and digital sensors; build and program an infrared beacon; create a program allowing the ActivityBot to detect and navigate towards the IR beacon using infrared receivers.	Use a sensor to locate and plot the position of objects from a static point, create a visual representation of sensor data; use polar coordinates and trigonometry in a BlocklProp program.
Resource link	BlocklyProp Online Programming Tool	Simple BlocklyProp Programs for Propeller Boards tutorial	BlocklyProp Functions & Multicore tutorial	Build the ActivityBot chapter	Electrical Connections chapter	Circuit Training chapter	Navigation Basics chapter	Navigate with Touch chapter	Navigate with Ultrasound chapter	Navigate with Visible Light chapter	Navigate with Infrared Flashlights chapter	IR Remote Control ActivityBot with Blockly tutorial	QTI Line Following ActivityBot with BlocklyProp tutorial	IR Beacon-seeking ActivityBot with BlocklyProp project	Ping)))Dar Display with ActivityBot and BlocklyProp project
Resource link	Getting Started with BlocklyProp tutorial	Propeller BlocklyProp Block Reference		ActivityBot kits, accessories, and replacement parts	Software & Programming Check	YouTube video: The Basics of Breadboarding		YouTube video: ActivityBot: Navigate by Touch	YouTube video: ActivityBot with Ultrasound	YouTube video: ActivityBot with Light Sensor	YouTube video: ActivityBot with Infrared	3-function Universal Remote	Printable Line-following Tracks PDF		
				BlocklyProp Robotics with the ActivityBot (tutorial home page)		Schematic Symbols reference									
						Check Pushbuttons activity									