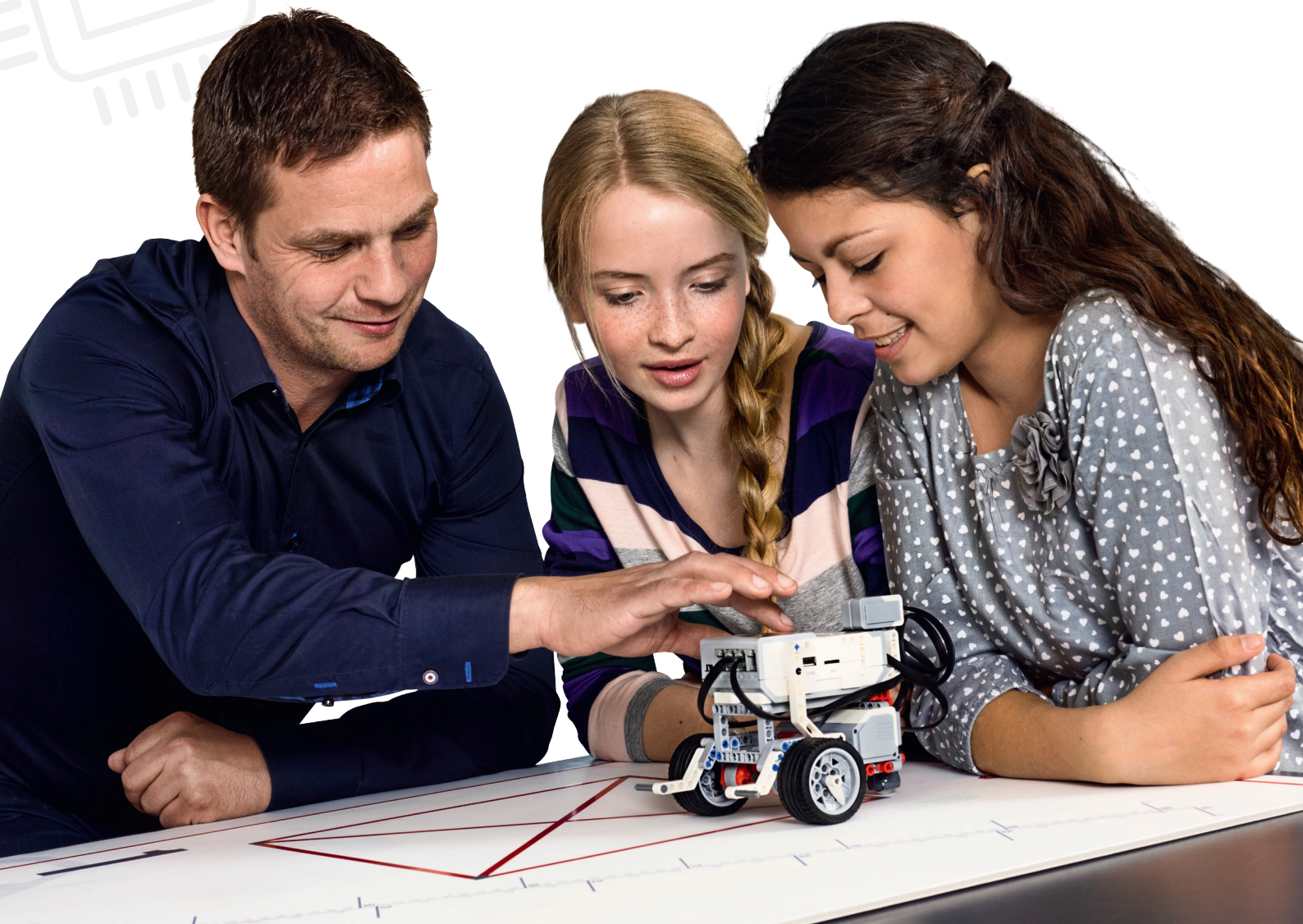


LEGO® MINDSTORMS® Education EV3

Coding Activities

Student Worksheets



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Activity 1

Student Worksheets

CHALLENGES FOR TODAY

Today is designed to introduce you to and get you started with the LEGO® MINDSTORMS® Education EV3 Software.

You have already had some time to experiment with the Move Tank Block to get your wheeled robot moving around the room. Now you will need to hone those skills to carry out three challenges.

Good luck!

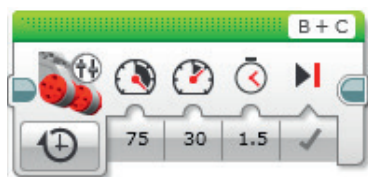
CHALLENGE 1

Program your wheeled robot to perform a three point turn.

You will need to turn your wheeled robot while going forward, then reverse it before driving forward again.

Watch an online video clip to remind you what a three point turn looks like, and make sure you don't cross the road markings!

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 1

Student Worksheets

CHALLENGE 2

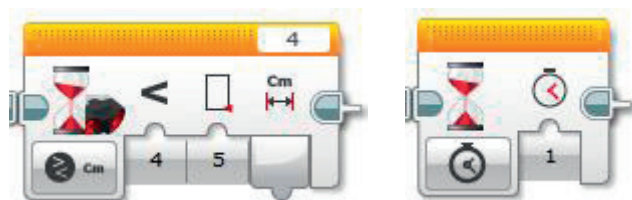
You are now going to experiment with one of the EV3 sensors – the Ultrasonic Sensor.

Program your wheeled robot to perform a three point turn and use the Ultrasonic Sensor as a “parking sensor,” so that your wheeled robot stops a given distance from an obstacle when it is reversing.

Can your wheeled robot “put the brakes on” before it drives off again?

You will need to use your knowledge of the Wait Block here, and attach the Ultrasonic Sensor to the rear of your wheeled robot.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 1

Student Worksheets

CHALLENGE 3

You are now going to simulate warning sounds.

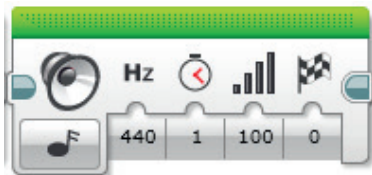
What often happens when a car is reversing and it approaches an obstacle?

Currently, your wheeled robot stops in response to the Ultrasonic "parking sensor." Can you extend your program so that your wheeled robot emits a warning sound just after the brakes are applied when reversing?

You will need to constantly debug your program so that the warning sound stops at the same time as your wheeled robot. Which parts of your program will need to change?

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 1

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- How could you improve your program?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?



Thoughts and Observations

Activity 2

Student Worksheets

CHALLENGES FOR TODAY

Today is designed to introduce you to, and get you started with the ROBOTC software.

You have had some time to experiment with the `setMotorSpeed` command to get your wheeled robot moving around the room. Now you will need to hone those skills to carry out three challenges.

Good luck!

CHALLENGE 1

Program your wheeled robot to perform a three point turn.

You will need to turn your wheeled robot while going forward, then reverse it before driving forward again.

Watch an online video clip to remind you what it looks like, and make sure you don't cross the road markings!

Programming Commands to Consider

`setMotorSpeed`, `sleep`

Plan your program first. Write it in pseudocode below:



Activity 2

Student Worksheets

CHALLENGE 2

You are now going to experiment with one of the EV3 sensors – the Ultrasonic Sensor.

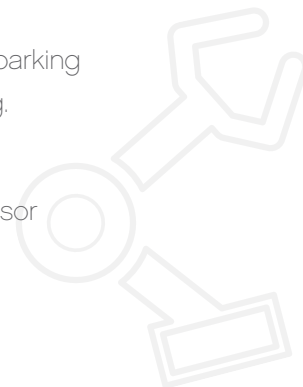
Program your wheeled robot to perform a three point turn and use the Ultrasonic Sensor as a “parking sensor,” so that your wheeled robot stops a given distance from an obstacle when it is reversing.

Can your wheeled robot “put the brakes on” before it drives off again?

You will need to use your knowledge of the while command here, and attach the Ultrasonic Sensor to the rear of your wheeled robot.

Programming Commands to Consider

setMotorSpeed, sleep, while, getUSDistance



Plan your program first. Write it in pseudocode below:

Activity 2

Student Worksheets

CHALLENGE 3

You are now going to simulate warning sounds.

What happens when some cars back-up and approach an obstacle?

Currently, your wheeled robot stops in response to the Ultrasonic "parking sensor." Can you extend your program so that your wheeled robot emits a warning sound just before the brakes are applied when reversing?

You will need to constantly debug your program so that the warning sound stops at the same time as the wheeled robot. Which parts of your program will need to change?

Programming Commands to Consider

setMotorSpeed, sleep, while, getUSDistance playTone

Plan your program first. Write it in pseudocode below:

Activity 2

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- How could you improve your program?
- Could your program have been more streamlined? Have you used too many lines of code? Is there a more efficient way of writing your program?
- How could your program be used in real world scenarios?



Thoughts and Observations

Activity 3

Student Worksheets

CHALLENGES FOR TODAY

Your challenges today will require you to build on what you have already learned about programming. You will be using another sensor (the Touch Sensor), and the screen and lights on the EV3 Brick. You will program your EV3 Brick to activate the on-brick lights and use the screen as a visual indicator. By the end of the third challenge, your programs will make your wheeled robot simulate forward and reverse gears, reversing lights, and a dashboard indicator.

CHALLENGE 1

Can you write a program that will drive your wheeled robot forward and put it into reverse when you press the Touch Sensor?

Try this first and then extend your program:

What happens on the outside of vehicles when they are reversing to let pedestrians and other drivers know what is happening?

Your wheeled robot should display reversing warning lights.

Use the EV3 Brick's status light to simulate reversing warning lights.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 3

Student Worksheets

CHALLENGE 2

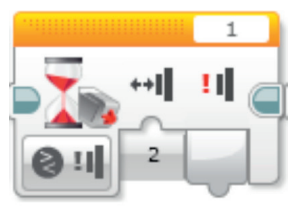
Can you extend your program so that your wheeled robot has two gears (forward and reverse)?

Your wheeled robot should “start” (drive forward) when the “drive” gear is activated.

Tip: You will need a second Touch Sensor.

Blocks to Consider

Use the same blocks as in challenge 1, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 3

Student Worksheets

CHALLENGE 3

What happens inside a car when it is in different gears?

There is often an indicator / image on the dashboard to let the driver know which gear the car is in.

Can you simulate this in your program by using the Display Block?

You may want to explore the Display Block to find suitable images to indicate forward and reverse.

Your program should extend what you have done before, and should still include the reversing lights!

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 3

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- How could you improve your program?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?



Thoughts and Observations

Activity 4

Student Worksheets

CHALLENGES FOR TODAY

Today, you are going to explore one of the functions of the Color Sensor; its ability to measure and respond to changes in ambient light intensity.

Automatic lights on cars measure the amount of ambient light and respond accordingly (they will turn on and off automatically).

You will also learn how to use parallel programming (multitasking) to give your wheeled robots two instructions at once.

CHALLENGE 1

What happens on certain cars when it becomes dark? The lights come on!

Can you write a program that will simulate the automatic lights on a car?

Can you find a "light bulb" image for the EV3 display to incorporate into your program?

You will need to use the Color Sensor to trigger your light bulb to turn on.

You will need to take ambient light readings from the Port View in order for your program to work properly.

Note: You could explore the possibility of substituting the Display Block for the Brick Status Light Block, or even use both!

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 4

Student Worksheets

CHALLENGE 2

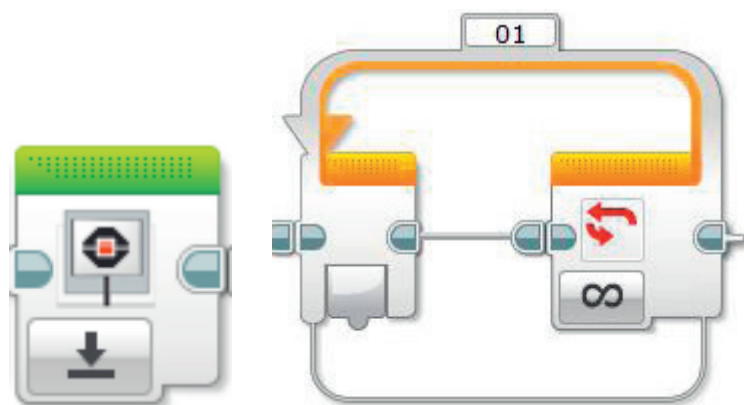
Now that your automatic lights come on successfully, you will need to extend your program so that they switch off when it becomes “light” again.

To do this, you will need to create a program that repeats itself so you don't need to keep restarting it.

Note: Again, you could explore the possibility of substituting the Display Block for the Brick Status Light Block, or even use both!

Blocks to Consider

Use the same blocks as in challenge 1, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 4

Student Worksheets

CHALLENGE 3

What if you, as a driver, wanted more control over your car's automatic lights and wanted to switch the lights on and off manually?

Many modern cars have this function, which gives the driver the option to override the automatic program.

Can you simulate this in your program by using parallel programming, or multitasking?

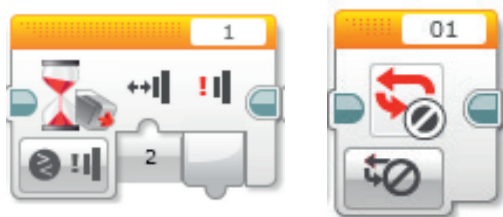
You could use a Touch Sensor to simulate the manual switch.

Tip: You will also need to use the Loop Interrupt Block to override the automatic control.

Note: Again, you could explore the possibility of substituting the Display Block for the Brick Status Light Block, or even use both!

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 4

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- What challenged you? Where there any surprises? How could you improve your program?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?



Thoughts and Observations

Activity 5

Student Worksheets

CHALLENGES FOR TODAY

Today you are going to use the Color Sensor and the Switch Block to make decisions (Boolean logic). These two blocks will allow the wheeled robot to make choices depending on the colors it sees.

CHALLENGE 1

When driving a car, it is important to recognize and abide by the rules of the road.

What should a driver do when approaching traffic lights?

If cars were automated, they would need to use some sort of sensor to recognize and respond to traffic lights automatically.

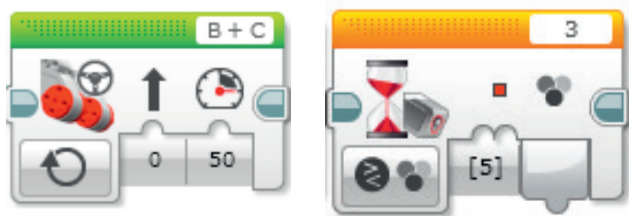
For this challenge, you will need to program your wheeled robot so that it responds to a “stop” command. What color should you use in your program?

Use the Wait Block to program the Color Sensor to recognize red, and stop the wheeled robot.

Refine your program by making your wheeled robot stop at an appropriate distance from the traffic lights.

Make sure the wheeled robot is only responding to red by eliminating the other colors.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 5

Student Worksheets

CHALLENGE 2

Now that you have programmed your wheeled robot to stop at traffic lights, you need to make sure it goes again!

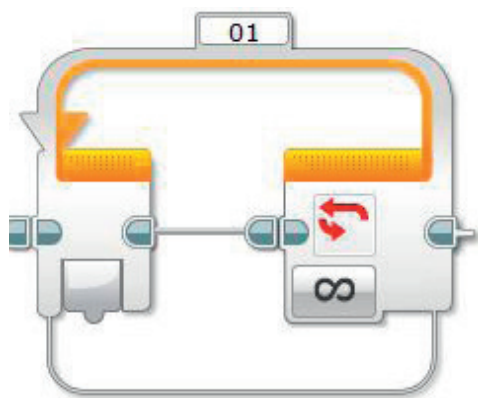
Create a program that uses the Color Sensor to recognize and respond to both "stop" and "go" commands.

Which colors will you use?

What if there were multiple sets of traffic lights along the street? Can you change your program so that the "stop – go" algorithm is repeatable?

Blocks to Consider

Use the same blocks as in challenge 1, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 5

Student Worksheets

CHALLENGE 3

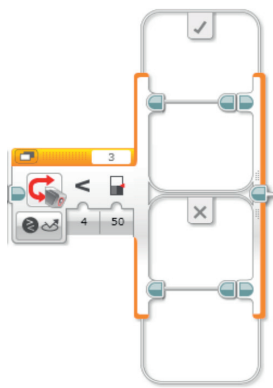
For this challenge, you will begin to make your wheeled robot even more autonomous. You will need to alter your model slightly so that the Color Sensor is pointing downward. Imagine if cars could drive on "autopilot" along a given route, a little bit like driverless trains at an airport.

Your challenge is to program your wheeled robot to do just that! You will need to create a program that recognizes and responds to a black or blue line, which has been laid out for you. You will create a line - following program. Your wheeled robot will need to travel along the line without losing contact with it. You will need to constantly debug your program to make your wheeled robot travel as smoothly as possible along the line.

Tip: In the Port View, you will need to change the Color Sensor settings so that it measures reflected light intensity.

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 5

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- What challenged you? Where there any surprises? How could you improve your program?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?



Thoughts and Observations

Activity 6

Student Worksheets

CHALLENGES FOR TODAY

Today, you are going to explore how a yellow Sensor Block is used in conjunction with the Math Block. You will also use the Loop Block.

CHALLENGE 1

Over the course of today's challenges, you will be programming your wheeled robot to simulate a car's parking sensor.

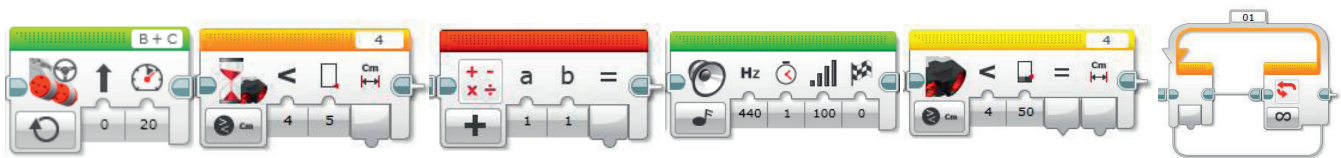
What happens when some cars reverse? There is a beeping sound, which becomes quicker the closer the car gets to an obstacle.

Can you devise a program that drives your wheeled robot backward, emits beeping noises as it approaches an obstacle, and then stops automatically at a set distance away?

Tip 1: You will need to use parallel programming (multitasking).

Tip 2: You will need to use what you have learned about the Math Block and ata wires, in order the increase the frequency of the beeps as the wheeled robot gets closer to the obstacle.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 6

Student Worksheets

CHALLENGE 2

What have you noticed about your program and in particular the beeping sounds?

They should become quicker as your wheeled robot approaches the obstacle.

However, in real life, the warning sounds only begin when the vehicle is a certain distance from an obstacle.

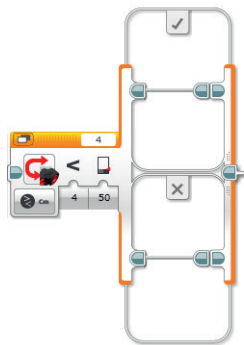
Can you simulate this in your program?

You will need to build on the program you have already created. Alter it so that the beeping begins at a given distance from the obstacle.

Tip: You will need to utilize a true/false statement and Boolean logic. Which programming block do you need for this?

Blocks to Consider

Use the same blocks as in challenge 1, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 6

Student Worksheets

CHALLENGE 3

By now, your wheeled robot should be simulating rear parking sensors more and more.

It's time now to take your programming one stage further.

You will need to add two more features:

1. Can you make the beeping stop when your wheeled robot stops at a given distance from the obstacle?
2. Can you make your wheeled robot slow down as the beeping starts?

Tip 1: For the beeping to stop, you will need to interrupt the loop.

Tip 2: You will need to connect distance to speed through a second Math Block somewhere in your program.
Can you work out where?

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 6

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following points, and then in the box below, record how the activity went.

- Congratulations! You have used many coding concepts to finish this activity. List the coding concepts you have used.
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?



Thoughts and Observations

Activity 7

Student Worksheets



CHALLENGES FOR TODAY

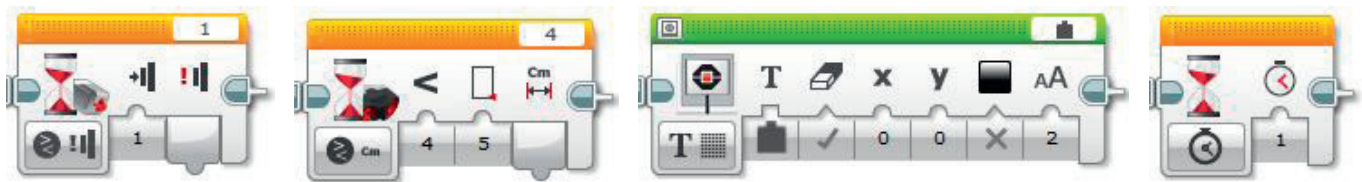
Today, you are going to create a keyless entry system for your wheeled robot. When a combination of sensors is activated, your drive program will be executed. In today's challenges, you will need to use a number of different sensors, and challenges 2 and 3 will require you to use one or more Logic Operations Blocks. On this sheet, there are no answers, we give possible programming blocks for you to explore that will solve the problem. There is room for you to write pseudocode and to record your observations.

CHALLENGE 1

Program your wheeled robot to display the text "Welcome" when the Ultrasonic Sensor sees an object, and display the text "Ignition" when the Touch Sensor is pressed.

Tip: Set the Ultrasonic Sensor's parameter to **less than (<)**.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

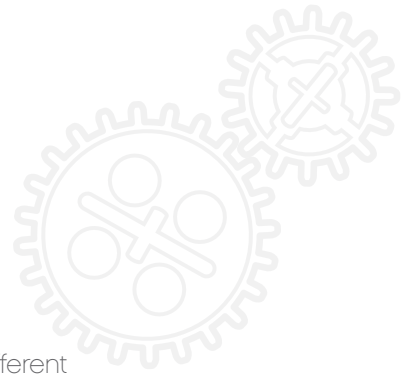
Challenge 2 is all about using the Logic Operations Block, and making sure that two sensors work together to provide information to another block. Think about how a keyless car works. For this task, the Touch Sensor is the "Ignition" and the Ultrasonic Sensor is used to "see" the key inside the car. Both Sensors will need to be activated correctly in order for your wheeled robot to start. Use the sound output of your wheeled robot to indicate that it has started.

Blocks to Consider

Plan your program first. Write it in pseudocode below:

Activity 7

Student Worksheets



CHALLENGE 3

You now need to program your wheeled robot to "start" when the conditions of three different sensors have been met. The sensors will be:

- Touch Sensor = Ignition
- Ultrasonic Sensor = Detect key in car
- Brick Buttons = Brake/Clutch

The Logic Operations Block can receive two inputs. But what happens if we want three inputs? Think about using two logic blocks to achieve this.

Two sensors will need to enter the first Logic Operations Block. The output is then taken to the next Logic Operations Block with the third input (sensor).

That result is then taken to the Switch Block.

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 7

Student Worksheets

After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- How did it go using many Data Wires?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?
- Comparing text-based with visual programming, which is easier to follow? If you have not done so, try writing in the other program to see which is more efficient.



Thoughts and Observations

Activity 8

Student Worksheets



CHALLENGES FOR TODAY

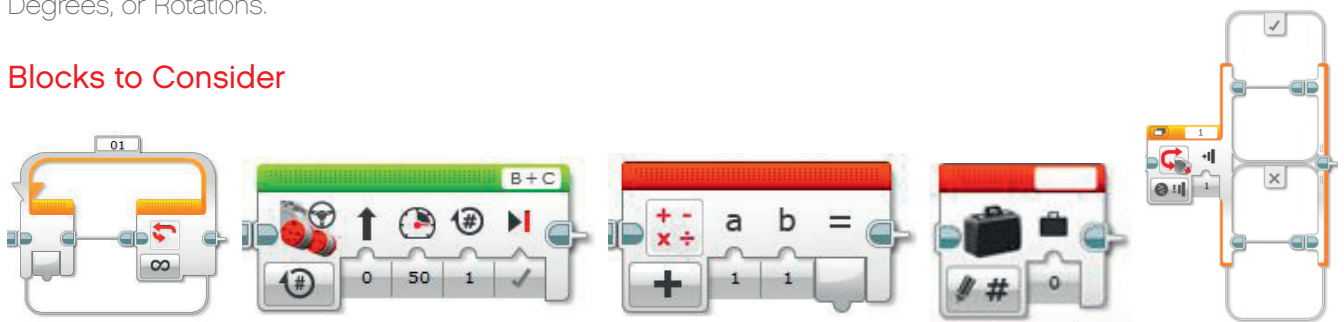
Today, you are going to create a “cruise control” for your wheeled robot, as found in many cars today. You will need to use the two Touch Sensors in the EV3 set to simulate the buttons found on the steering wheel of a car with cruise control.

CHALLENGE 1

Program the car to speed up in increments of ten when the Touch Sensor is pressed. Use the Variable Block as the “set” speed that can be added to.

Tip: Ensure that the Move Steering Block mode is set to *On* instead of *On for Seconds*, *Degrees*, or *Rotations*.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 8

Student Worksheets



CHALLENGE 2

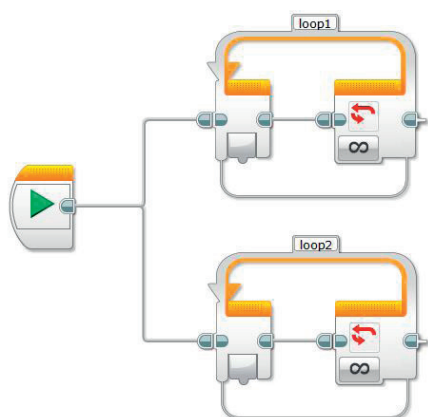
Now that you have created a program that can accelerate your wheeled robot, a new subsection needs to be written to decelerate the car. This is done by simply adding a second Loop and Switch Block.

Inside the extra loop will be a second Touch Sensor Block and Math Block, set to subtract rather than add mode.

Remember that you will be using multitasking with two lines of programming running simultaneously.

Blocks to Consider

Use the same blocks as in challenge 1, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 8

Student Worksheets



CHALLENGE 3

Now that the speed of your wheeled robot can be controlled by using two Touch Sensors, it would be great to be able to read its speed (motor power) and show this speed on the display of the EV3 Brick. Your teacher will have shown you how to create My Blocks from the programs you have already written. These are useful in two ways. The first is to save room on the programming screen, and the second is that these subroutines can be used again in other programs you write, as they are saved in their own Programming Palette (the green My Blocks) category.

To create a visual power reading, take the value of the variable that controls the motor power and display it on the EV3 Brick using a Display Block set to Text – Pixels mode.

Blocks to Consider

Use the same blocks as in challenges 1 and 2, but also consider using the following:



Plan your program first. Write it in pseudocode below:

Activity 8

Student Worksheets



After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- What challenged you? What surprised you about your programs?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?

Thoughts and Observations

Activity 9

Student Worksheets



CHALLENGES FOR TODAY

Today, you are going to learn how to use an array, an important block that allows lots of information to be stored and then reused when needed. You will create an automated car that will be programmed to move in a series of steps. Turn commands will be entered with the EV3 Brick Buttons. Have fun!

CHALLENGE 1

Having watched the Color Sorter in action, it's now your turn to create an array so that you can program your wheeled robot to move around the room using the buttons on the EV3 Brick. The four brick buttons can be used as controls (left, right, backward and forward).

To start, limit the program to five commands by entering 5 in the Loop Block.

Tip 1: Your program will have two distinct phases:

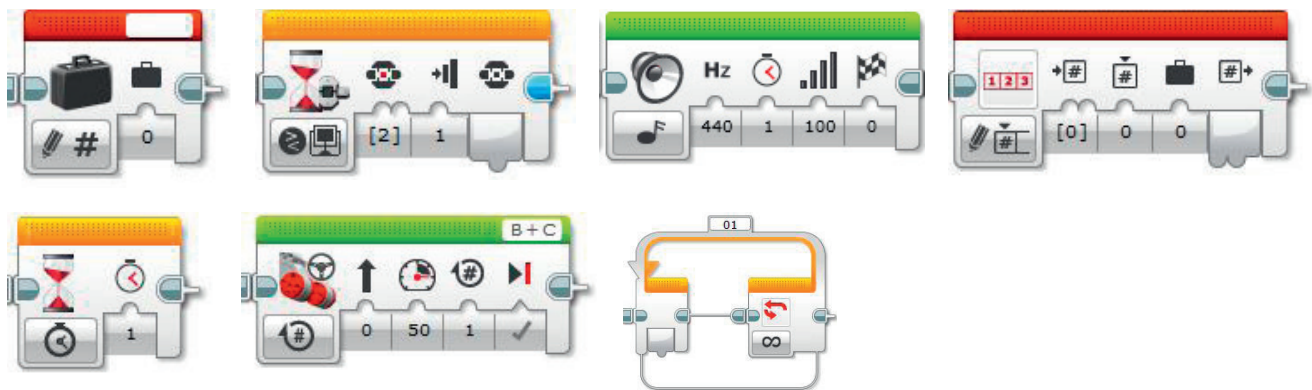
1. Collecting the data
2. Using that data

Tip 2: Two Loop Blocks will be needed for this activity to allow for the two phases above.

Tip 3: Using the Variable Block often requires a three-step process:

Read the Variable Block, add information to it, and then write to the Variable Block to save the new data.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 9

Student Worksheets



CHALLENGE 2

Create a MyBlock to easily be able to edit the number of steps in the program.

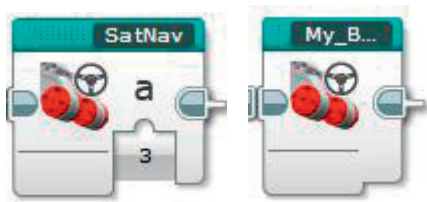
To change the number of movement steps from five to something else will require you to edit both Loop Blocks within the program. This can be made much simpler by creating a My Block with a parameter. The My Block will allow the number of loops to be changed easily and clearly. Your task is to create a My Block of your program that you created in Challenge 1.

Tip 1: When creating a My Block, highlight the blocks that need to be included but not the Start Block.

Tip 2: When you need to enter parameters at a later stage, ensure that a parameter has been added to the My Block as shown below. Use the "+" key when creating the block.

Tip 3: The parameter must be joined to the input on the block within the program. In our case, the two loops.

Blocks to Consider



Plan your program first. Write it in pseudocode below:

Activity 9

Student Worksheets



After a programming activity, it is important to write down your thoughts and observations. Consider the following questions, and then in the box below, record how the activity went.

- What was challenging? What surprised you during this activity?
- Could your program have been more streamlined? Have you used too many blocks? Is there a more efficient way of building your program?
- How could your program be used in real-world scenarios?

Thoughts and Observations

Activity 10

Student Worksheets

YOUR FINAL PROJECT: CHALLENGES FOR TODAY



Think about the design process.

Today, you will need to address the first three aspects: receiving the **design brief**, **brainstorming** in your group, and **selecting a solution**.

Here is your design brief:



DESIGN AND BUILD A DRIVERLESS, AUTOMATED, WHEELED ROBOT THAT CAN GET FROM A TO B WHILE AVOIDING OBSTACLES.

The first part of the design process is working within your team to come up with a great idea. Once you have weighed all the pros and cons for your different ideas, you need to select one of them and give reasons for your choice. Teamwork is important here and is often one of the most challenging parts of a project. It may not always be your idea that is chosen. You will need to reach agreement on the best solution and then present the reasons for choosing it.



Activity 10

Student Worksheets



BRAINSTORMING THE DESIGN BRIEF



Discuss the design brief. Which version of automated wheeled robot would your group like to design?

- **Base Model (GL):** the wheeled robot avoids obstacles
- **Deluxe (DX):** GL, plus the car responds to traffic signals and pedestrian warnings
- **Luxury (LX):** DX, plus keyless start
- **Extra (EX):** LX, plus cruise control

Now brainstorm ideas for the design. What features do you intend to include in the build, and consequently in the programming? Will changes be needed in the physical design of the robot? Write down all of your thoughts and sketches below.

Activity 10

Student Worksheets



ASSIGNING ROLES

Every project needs a team and you are all part of that team.

What tasks will need to be done?

List the different roles you think are needed in your team, and assign these roles to the team members.

Activity 10

Student Worksheets



CHOOSING AND PRESENTING THE BEST SOLUTION



It's time to select the best solution from your brainstorming.

Prepare a short presentation, explaining to your teacher and fellow students which design option you have opted for, and give reasons for your choice.

You should also explain the roles assigned to each group member.

Explain how you reached this conclusion.

Your presentation should be no longer than five minutes. Who presents and how it is presented is entirely up to you.

Use the box below to make notes.

Activity 11

Student Worksheets



BUILD AND PROGRAM A SOLUTION



Look back at the work you did in Activity 10, in particular the design for your wheeled robot.

Which version did you opt for (Base Model, Deluxe, Luxury, or Extra)?

Review your ideas from Activity 10 and discuss the design and programming implications.

You may wish to reassign the roles you had in Activity 10, and use the time wisely by dividing tasks.

Do you want to split your group, so that some of you are building while the rest are focused on programming?

Do not worry about “solving” the design brief, or reaching your own design goals with your first attempt. Be prepared to iterate on your ideas today.

Record your work below or in the Content Editor.

Activity 11

Student Worksheets



TEST AND ANALYZE



This is an ongoing process and should not be left until the end of the activity. Testing and analyzing are very important factors in the engineering process.

You may wish to complete the whole build and program before testing. Alternatively, you may want to go through the process one small step at a time.

You should discuss this with your group and employ whichever technique works for you.

During this phase, you should be constantly referring to the design brief and your own designs and ideas.

When you test, you will need to ask yourselves the following questions:

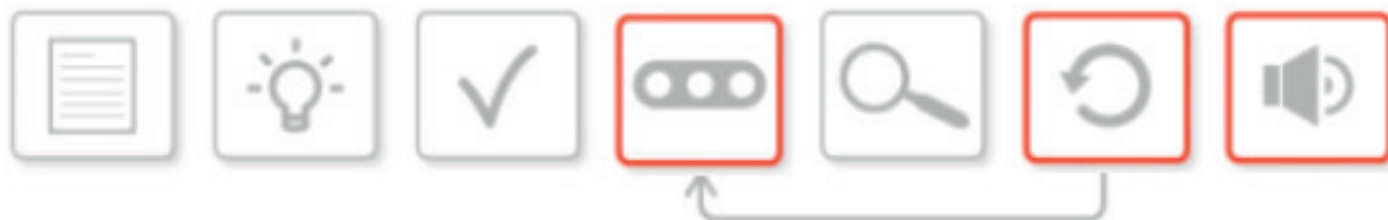
- Does our wheeled robot fulfill the design brief?
- Does it look like our design drawings?
- Does it do what we want it to (i.e., does our program work)?

You may find that your ideas change and evolve as the activity progresses. This is all part of the process, and should be recorded either on this worksheet or in the EV3 Software Content Editor.

Activity 12

Student Worksheets

YOUR FINAL PROJECT: CHALLENGES FOR TODAY



This is the final activity in this particular unit of work. Once again, you will need to refer constantly to the design brief, and your build and programming solution from last time.

Remember, your design brief was to **design and build a driverless, automated wheeled robot that can get from A to B while avoiding obstacles.**

Look at the diagram of the engineering process. Today, you will be focusing on **reviewing, revising (leading to further building and programming), and communicating.**

Remember to record your work in the Content Editor of the EV3 Software, or here on your worksheet.

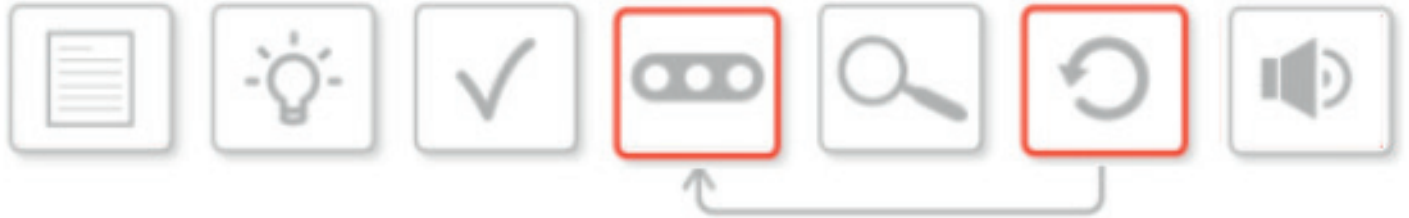


Activity 12

Student Worksheets



REVIEW AND REVISE/BUILD AND PROGRAM A SOLUTION



During this challenge, you will need to continually review, test, and (quite possibly) rebuild your wheeled robot.

It is possible that you, your fellow students, and your teacher have created specific criteria you must meet for this challenge. If so, you must remember to refer to it at all times.

What “class” or “trim level” of wheeled robot did you settle on and build during the previous two activities? It is quite possible that, during this revision and review stage, you will redesign and reprogram your wheeled robot so that it evolves into a higher “class.”

In your teams, run the program from last time on your wheeled robot. Does it fulfill the design brief? Could it be improved either by reprogramming or rebuilding (or both)? Explore further programming options, and where appropriate, change your build.

Towards the end of this activity, you will demonstrate your wheeled robot to the rest of the class and evaluate it against the design brief and your design criteria.

Record your work below or in the Content Editor.

Activity 12

Student Worksheets

COMMUNICATE



Now that you have come this far and have built the final version of your wheeled robot and programmed it, the final stage of the engineering process is to present what you have done to the other groups.

You should have been keeping a record of what you have been doing since Activity 10, either on these student worksheets, or in the EV3 Software Content Editor.

This could include text notes, videos, photographs, and screenshots of your programming solutions.

You should now prepare a short presentation that explains your journey through the engineering process, and the decisions you made as a group that led you to the design for your final wheeled robot and program.

The presentation should communicate how you have met the design brief, and which “trim level” of wheeled robot you have built and programmed.

It should highlight your successes and failures, and how these failures were overcome.

The presentations may be in any format you wish. You may want to use presentation software (e.g., PowerPoint, Keynote, or Prezi), the Content Editor in the EV3 Software, or something else of your choosing.

