This is Ryan. Ryan practices skateboarding everyday on a straight path.

His idol is Gary Hardwick, the Guinness Book of Records fastest skateboarder. Gary was clocked at 100.66 km/hour. That’s the maximum speed for many Ontario Highways. He credits his speed to the aerodynamic shape of his helmet.

Ryan plans to build a skateboard park that will provide him and his friends hours of excitement. He has searched the internet to get ideas for different designs. He has checked out the links to Skateboard park builders. (Select the link to this web page)

The information posted by the SiteDesignGroup has given him lots of ideas. View the video of their Skateboard park designs.

Many of the decisions Ryan will need to make about the park design, ramps and turns will depend on the speeds that students like Ryan can reach with their skateboard. Ryan will begin by collecting data about his speed. He will ride the skateboard between two positions; one marked by a red flag, the other by a blue flag.

We will join Ryan as he collects, records and analyzes his speed.
Ryan begins by exploring the distance between the red and blue flag. He uses a counter that measures the distance in meters from the blue flag. The display on the counter reads 30m. That means that Ryan’s distance from the blue flag is 30m.

He also created a vertical axes that records his distance from the blue flag. The distance is marked with a red point. The axes show that he is starting 30m from the blue flag.

Move Ryan to any position by dragging the back of his skateboard between the two flags. Notice how the distance counter and vertical axes record his distance from the blue flag. Use the RESET button if you would like to begin again.

Watch Ryan’s position from the blue flag, the counter and the vertical axes as you collect the data.

Watch Ryan’s position from the blue flag, the counter and the vertical axes as you collect the data.

LEARNING CHECK-IN

Record your answers to the Explore Distance questions.
Next, Ryan explores the amount of time it takes him to travel between the red and blue flag. He uses a stop clock to record the time in seconds.

He also created a horizontal axes that records the elapsed time in seconds. Every 10 seconds is marked with a number.

You can explore how both of these devices keep track of time by clicking on the Start/Stop button. Use the RESET button if you would like to begin again.

LEARNING CHECK-IN

Record your answers to the Explore Time questions
Ryan is almost ready to explore the relationship between distance and time. He needs two more tools: the co-ordinate axes and data points.

- **Click on Distance Axis**
- **Click on Time Axis**

The co-ordinate axes is created when the distance and time axes are displayed. The co-ordinate axes will allow Ryan to explore the amount of time it takes for him to travel any distance.

- **Click on Show Data Point**

The display that will show his distance from the blue flag at any time as follows: (time, distance)

- **Click on Start/Stop/Reset**

Ryan completes a test run from a position 30m from the blue flag.

**LEARNING CHECK IN**
- What are the co-ordinates of his starting position? What does each number represent?
- What are the co-ordinates of his position at the end of the test run. What does each number represent?
- What happens to the co-ordinate points as Ryan gets closer to the blue flag?
- Explain how the shape of the graph represents Ryan's motion.
Explore the shape of the graph created by Ryan as he moves away from the blue flag. Follow the on-screen instructions.

LEARNING CHECK IN
What are the co-ordinates of his starting position? What does each number represent?

What are the co-ordinates of his position at the end of the test run. What does each number represent?

What happens to the co-ordinate points as Ryan gets closer to the blue flag?

Explain how the shape of the graph represents Ryan's motion. Key words to include in your explanation are:
- distance
- steepness
- direction of motion
- faster
- slower
- stopped
- time
Explore the shape of the graph created by Ryan as he moves between the red and blue flag. Follow the on-screen instructions.

LEARNING CHECK IN
Explain how the shape of the graph represents Ryan’s motion.
Key words to include in your explanation are:
- distance
- steepness
- direction of motion
- faster
- slower
- stopped
- time
Match the graph using the red and blue buttons to move Ryan between the flags. Follow the on-screen steps.

LEARNING CHECK IN
Describe the five different parts to graphical model of Ryan's motion between the red and blue flags.
Key words to include in your explanation are:
- distance
- steepness
- direction of motion
- faster
- slower
- stopped
- time
Match the graph using the red and blue buttons to move Ryan between the flags. Follow the on-screen steps.

**Step 1**
Start/Stop Clock
Elapsed Time = 0.0 s

**Step 2**
Step slowly
Move Ryan
Step quickly

**Step 3**
Describe the seven different parts to the graphical model of Ryan's motion between the red and blue flags.
Show Key Words

**LEARNING CHECK IN**
Describe the seven different parts to graphical model of Ryan's motion between the red and blue flags.
Key words to include in your explanation are:
- distance
- steepness
- direction of motion
- faster
- slower
- stopped
- time
Match the graph using the red and blue buttons to move Ryan between the flags. Follow the on-screen steps.

LEARNING CHECK IN
Describe the different parts to graphical model of Ryan's motion between the red and blue flags.
Key words to include in your explanation are:
- distance
- steepness
- direction of motion
- faster
- slower
- stopped
- time
Pair Challenge is a game for two players. The object of the game is to challenge your partner to match the motion story that you create by moving Ryan between the red and blue flags.

There are a variety of ways to play this game. For example:
- The first player moves Ryan while the challenge player views the screen.
- The first player moves Ryan and the challenge player can’t view the screen.
- Both players write a motion story. For example: Ryan stands still for 10 sec, at a position 10 metres from the red flag. He travels toward the blue flag at a constant pace for the next 10 seconds. Players create the motion by dragging Ryan between the red and blue flag. The player with the closest match is declared the winner.

**LEARNING CHECK IN**

Describe the different parts to one of the graphical models of Ryan’s motion between the red and blue flags.

Key words to include in your explanation are:
- distance
- steepness
- direction of motion
- faster
- slower
- stopped
- time
Explore the relationship between the shape of the graph and the direction and speed of Ryan’s motion. Follow the on-screen instructions and view the video demonstrations to learn all about it.

1. What do you notice about the relationship between the shape of the graph and the direction of Ryan's motion? Watch the video: Match It 1 - Revisited A to learn all about it.

2. What do you notice about the relationship between the steepness of the line and Ryan’s speed? Watch the video: Match It 1 - Revisited B to learn all about it.

LEARNING CHECK IN

1. What do you notice about the relationship between the shape of the graph and the direction of Ryan's motion?

2. What do you notice about the relationship between the steepness of the line and Ryan's speed? Watch the video: Match It 1 - Revisited B to learn all about it.
Analyze Ryan’s motion by calculating the slope of a line segment. Follow the on-screen instructions and view the video.

LEARNING CHECK IN
How does the slope of the line represent the shape of the graph?
Key words to use in your explanation:
- negative
- steepens
- faster
- slower
- positive
- negative
- large numbers
- small numbers
- distance
- direction of motion
- time
Practice analyzing Ryan’s motion and calculating his speed using the rate triangle and the Measure Menu.

LEARNING CHECK IN
How does the slope of the line represent the shape of the graph?
Key words to use in your explanation:
- negative
  steepness
  faster
  slower
- positive
- negative
- large numbers
- small numbers
- distance
- direction of motion
- time
This is a game for 2 players. The object of the game is to analyze Ryan's speed using the co-ordinate grid. Partner A determines his speed using the co-ordinate grid. Partner B checks for accuracy using the Rate Triangle and Rise/Run Line Tools.

LEARNING CHECK IN

Reflect on your learning using the following prompts:
1. I am really good at:
2. I am getting better at:
3. I need to know more about:
Use the on-screen tools to analyze filling and draining a tank of water in the same way that you analyzed Ryan's motion.

LEARNING CHECK IN
1. Describe how the graph represents filling and emptying the tank.
   Key words to include in your explanation:
   - full
   - empty
   - stopped
   - steepness
   - faster
   - slower
   - height
   - time

2. Analyze the graph using the co-ordinate grid. Check the accuracy of your calculations using the Rate Triangle and Rise/Run Line Tool.
   Key words to use in your analysis:
   - full
   - empty
   - stopped
   - steepness
   - faster
   - slower
   - positive
   - negative
   - large numbers
   - small numbers
   - height
   - time
Brainstorm a list of contexts with 2 variables then select one context for your motion story.

Choose a scale that is appropriate for your context by moving the Adjust scale points and change origin point (if necessary).

Create the motion story in words and type it into the on screen text box.

Drag the blue point to create a graphical representation of your story. Click on see example to view one possibility.

Print this screen to save your story and graph.