

## Car Distance Graph / 2 versions

### Younger version

In this self contained activity the user moves a car manually on the screen and a graph of its horizontal distance from its origin is plotted. This way the user can experience the relationship between car's movement, its (horizontal) distance and the slope of the graph of the distance.

**Math objectives:** identifying: Speed with slope of the graph; No change in distance with horizontal segment in the graph; Positive slope of the graph with forward movement of the car; Negative slope with going backward; Steeper slope with higher speed

A build-in Squeak Book contains directions and suggested activities: Recreating, by manually moving the car, a set of given graphs;

Recreating, by scripting the car's movement, a set of graphs close to those produced by manual movement;

NO Squeak programming is necessary for the manual part.

Scripting of the car's movement adds an opportunity to quantify the experience of the manual movement.

A set of solutions for the challenges is supplied bellow.

Nice when added to a motion detector walking activities.

**Math Key Words:** Graph; Slope; Distance; Positive and Negative slopes; Speed; Linear Graph; Non-Linear Graph

**Squeak Key words:** X and Y coordinates; Numeric variable; test for numeric value;

**Grade Level:** Elementary School, Middle School

### NCTM Standards:

**Algebra 3-5:** Analyze change in different contexts (Identify and describe situations with constant or varying rates of change and compare them)

Distance Speed Graphs (Squeak)

**Algebra 6-8:** Understand patterns, relations, and functions

Analyze change in various contexts (Use graphs to analyze the nature of changes in quantities in linear relationships)

**Algebra 9-12:** Understand patterns, relations, and functions.

Represent and analyze mathematical situations and structures using algebraic symbols

Use mathematical models to represent and understand quantitative relationships

Analyze change in various contexts

**Squeak project:** Car Distance by Hand

## **Car Distance Graph /High School version**

In this self contained activity the user moves a car manually on the screen and a graph of its horizontal distance from its origin is plotted. This way the user can experience the relationship between car's movement, its (horizontal) distance and the slope of the graph of the distance.

**Math objectives:** identifying: Speed with slope of the graph; No change in distance with horizontal segment in the graph; Positive slope of the graph with forward movement of the car; Negative slope with going backward; Steeper slope with higher speed; **Linear change in speed with Parabola;**

A build-in Squeak Book contains directions and suggested activities: Recreating, by manually moving the car, a set of given graphs;

Recreating, by scripting the car's movement, a set of graphs close to those produced by manual movement;

NO Squeak programming is necessary for the manual part.

For high school students the scripting of the car's movement adds an opportunity to quantify the experience of the manual movement.

A set of solution scripts for the challenges is supplied bellow.

Nice when added to a motion detector walking activities.

**Math Key Words:** Graph; Slope; Distance; Positive and Negative slopes; Speed; Linear Graph; Non-Linear Graph; Parabolic Graph

**Squeak Key words:** X and Y coordinates; Forward by-; Numeric variable; test for numeric value;

**Grade Level:** High School

### **NCTM standards:**

**Algebra 9-12:** Understand patterns, relations, and functions.

Represent and analyze mathematical situations and structures using algebraic symbols

Use mathematical models to represent and understand quantitative relationships

Analyze change in various contexts

**Squeak project:** Car Distance by Hand

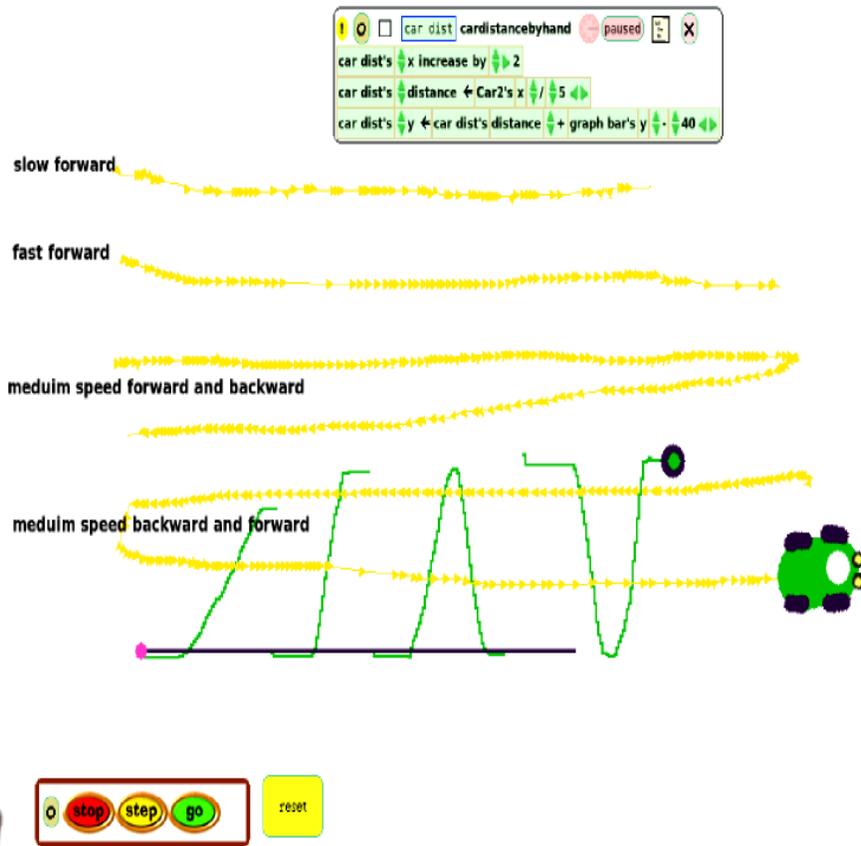
### **Related projects:**

Squeak takes the distance graphing activity a little further (Word);

Solutions to "Car Distance by Hand" (word);

# Distance Speed Graphs (Squeak)

## Solutions to Car Movement by Hands in: Car Distance Graph



Solutions to the scripted movement questions in: Car Distance Graph  
1-4

**1**

Car2 script1 ! paused

Car2 forward by 10

**2**

Car2 speed5 ! paused

Car2 forward by 5

**3**

Car2 backward5 ! paused

Car2 forward by -5

Car starts to the right of the "blue starting line" at x=400

**Car2 forwardAndBackward ! paused**

Test Car2's gas <= 200

Yes Car2 forward by 5

No Car2 forward by -5

Car2's gas increase by 5.0

Car gas starts at 0

## Solutions to the scripted movement questions in: Car Distance Graph 5-8

5

Car2 steps ! paused

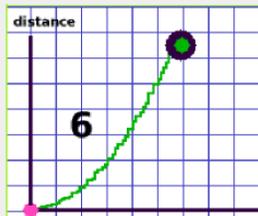
Car2's gas increase by 1

Test Car2's gas divisible by 30

Yes Car2 forward by 80

No

Car gas starts at 0



6

Car2 parabola ! paused

Car2's gas increase by 0.4

Car2 forward by Car2's gas

Car gas starts at 0

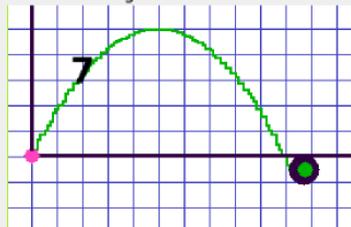
7

Car2 parabola ! paused

Car2's gas decrease by 0.4

Car2 forward by Car2's gas

Car gas starts at 20



8

Car2 wave ! paused

Car2 forward by 5

Car2 turn by 5

