Designing Mobile Games

A module on linear functions

Pupil task

CORNERSTONE MATHS

On the cover
Once upon a time, there was a company founded by an artist and a computer programmer, both graduates of University College London. In an old office building in the Silicon Roundabout area of London, they launched SandCircle Mobile Games, a company dedicated to delivering the most exciting mobile phone games in the world. The name, SandCircle, is a play on silicon, which is made from sand, and roundabout, also known as a circle. SandCircle's logo evokes the road configuration of the Old Street Roundabout while the logo colour scheme calls to mind the London Tube's station signs.

The stories in this work are fictional. All characters and events appearing in this work are fictitious. Any resemblance to real persons, living or dead, is purely coincidental.

Designing Mobile Games

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This unit is inspired by and based on the work and ideas of Jim Kaput.

For more information about Cornerstone Mathematics, please visit www.ucl.ac.uk/cornerstone-maths

Controlling Characters with Graphs

In America, there is a car race called the Texas Road Rally. SandCircle is building a game for sale in America based on the race. We need to set up the mathematics for a new game. In our simulation, we will use graphs to control motion. Remember, we'll make the game cool later!

In road rally races, professional drivers compete as they travel from town to town.

Same motion, different representations

Graphs, tables, and equations are mathematical representations. Each can show the same motion in a different way.

1. Your computer shows a graph of a race between the Green Grass team car and the Blue Waters team car.

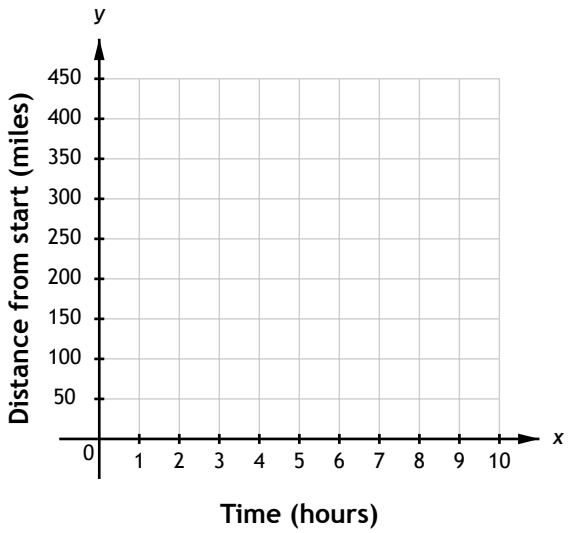
   A. Using the graph, predict which car will win.

   Predict which car is faster.

   Check your prediction by calculating the cars' speeds.

   Now run the simulation and check your answers.

B. Now edit the graph to change the speed of each car so that the other car is faster this time. Then fill in the boxes below. Don't forget to label your lines (the ones representing each car's motion) in the graph.



Faster Car

Speed of Each Car

Now play the simulation and check your answers.

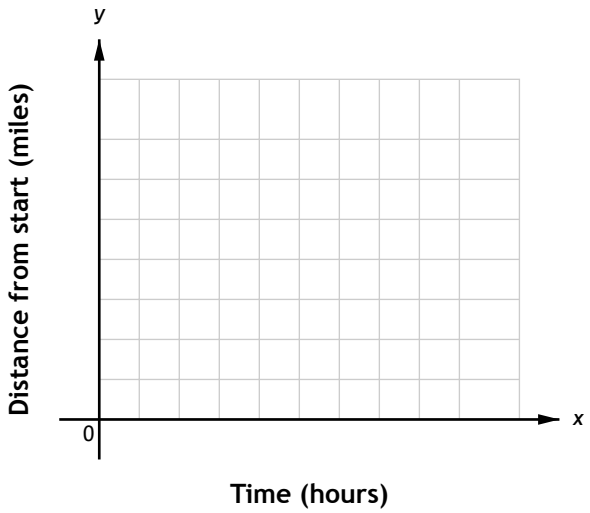
C. By looking at the distance/time graphs of two cars in a rally, how can you predict which one will win?

D. Explain how a car's speed and its graph line are related to each other.

2. Below are ideas to use in other games. *Note: There is more than one way to draw the graph for most of these situations*.

   A. **Predict**: Sketch a graph of a race in which the Green Grass and Blue Waters team cars start at the same position and travel the same distance but at different speeds.

   Don't forget to label your graph lines.



   B. **Check**: Now create the graphs to match your drawing. Then run the simulation. Do not alter your prediction in the graph above.

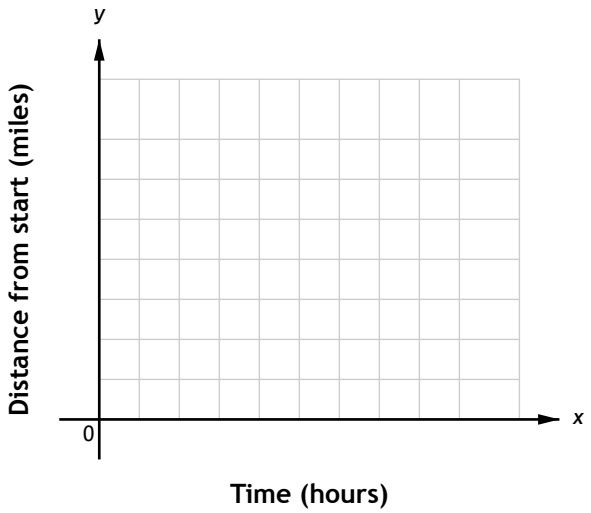
   C. **Explain**: Explain any changes you would have needed to make to the graph in order to correctly represent the race described in instruction A.

D. Now edit the equation for each car so that:

- The two team cars start at different positions,
- the two team cars travel the same speed, but
- Green Grass finishes before Blue Waters.

Run the simulation and check that your model matches the situation. Edit the equations if necessary to match the situation correctly.

Now sketch the graph below.



E. Explain how the table provides evidence that you correctly modeled the situation above.