CORNERSTONE MATHS

Linear functions

Examples of pupils' work

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Examples are from

- Investigation 2, Q. 1D "What is speed?”
- Investigation 3, Q. 1C "Explain how fast the car is going in two ways.”
- Investigation 4, Q. 1A "How fast is Shakey going? How do you know?”
- Investigation 4, Q. 1D "Compare the equations of Fast Shakey and Slow Shakey. Describe any differences”
- Investigation 4, Q. 2 “Describe how time, distance and speed are represented…”

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"What is speed?" (Inv 2, Q1D)

D. In your own words, explain what is 'speed'?

How slow or fast an object moves.

How long it takes you to get somewhere.

D. In your own words, explain what is 'speed'?

How long it takes you to travel to something or get somewhere

D. In your own words, explain what is 'speed'?

$\text{speed} = \frac{\text{distance}}{\text{time}}$

D. In your own words, explain what is 'speed'?

How quickly something moves

Discuss the responses…

- How might you use all or any of these responses to stimulate a discussion?
- What mathematical language might you need to develop?
- How could you use the software (Inv 2) to support discussion?

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"Explain how fast the car is going…"(Inv 3, 1C)

C. How fast is this car going? Explain in two ways how you know. Think about your answers to A and B or use other ideas.

- 50miles/h
- The graph (y axis + x axis)
- Every hour it went it traveled 50 miles
- 350 ÷ 7 = 50!

C. How fast is this car going? Explain in two ways how you know. Think about your answers to A and B or use other ideas.

50mph, as every hour it has gone 50 miles ✓

C. How fast is this car going? Explain in two ways how you know. Think about your answers to A and B or use other ideas.

50 mph because over 1 hour they travelled 50 miles and if you divide 350 by 7 = 50 mph

C. How fast is this car going? Explain in two ways how you know. Think about your answers to A and B or use other ideas.

50 mph
- He travels 50 miles in 1 hour
- He travels 350 miles in 7 hours 350÷7=50

C. How fast is this car going? Explain in two ways how you know. Think about your answers to A and B or use other ideas.

50 mph Because in 1 hour it traveled 50 miles

- Which concepts of speed are pupils using? (*i.e. unit rate, overall distance÷overall time, …*)
- Which show deeper understanding?

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"How fast is Shakey going? How do you know?" (Inv 4, Q.1A)

1. Open Activity 4.1, which shows Shakey the Robot.

A. Run the simulation. How fast is Shakey going? How do you know?

~~4cm per second.~~ 4cm/s

Bye looking at the Data Table and seeing how fast he travelled in 1 second.

A. Run the simulation. How fast is Shakey going? How do you know?

4cm/s ✓

I know because he goes 40cm in 10 seconds which is the same as 4cm in one second.

1. Open Activity 4.1, which shows Shakey the Robot.

A. Run the simulation. How fast is Shakey going? How do you know?

4cm/s I know this because the graph shows it

1. Open Activity 4.1, which shows Shakey the Robot.

A. Run the simulation. How fast is Shakey going? How do you know?

4cm/s because every second he goes 4cm as it said in the data table

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A. Run the simulation. How fast is Shakey going? How do you know?

4cm/s 40÷10 because he goes 40cm in 10seconds

1. Open Activity 4.1, which shows Shakey the Robot.

A. Run the simulation. How fast is Shakey going? How do you know?

he is going 4cm/s because i looked at the graph for every one second he travelled 4cm ✓

- Which representations are the pupils using to work out the speed?
- How could you use the software (Inv 4) to promote discussion of different strategies?

Compare the equations of Fast Shakey and Slow Shakey…" (Inv 4, Q1D)

D. Compare your equation from Slow Shakey with your equation from Fast Shakey. Describe any differences. Where are these differences shown in the graphs and the tables?

The line on the graph that is quicker, is steeper. Number before x is larger, if it goes quicker.

D. Compare your equation from Slow Shakey with your equation from Fast Shakey. Describe any differences. Where are these differences shown in the graphs and the tables?

If you go slower the graph goes Shakey and if it is faster it gets steeper (gradient)

The number before the x is higher if its faster

Compare your equation from Slow Shakey with your equation from Fast Shakey. Describe any differences. Where are these differences shown in the graphs and the tables?

In the faster shakey the co-efficient of x is larger.

D. Compare your equation from Slow Shakey with your equation from Fast Shakey. Describe any differences. Where are these differences shown in the graphs and the tables?

One is steep (fast shakey) and one is not steep (slow shakey)

Record your equations for Slow Shakey and Fast Shakey and describe any differences.

Slow - $y = 3.6x + 0$ The diffrence vs 3.6.
$y = 7.2x + 0$.

Where are these differences shown in the graphs and the tables?

The diffrent is shown is the graph graph because the line is longer and the othe grayph is steeper, and on the table they have diffrent numbers and equator

- Which differences is it important to focus the pupils' attentions towards?
- How might using the software help?

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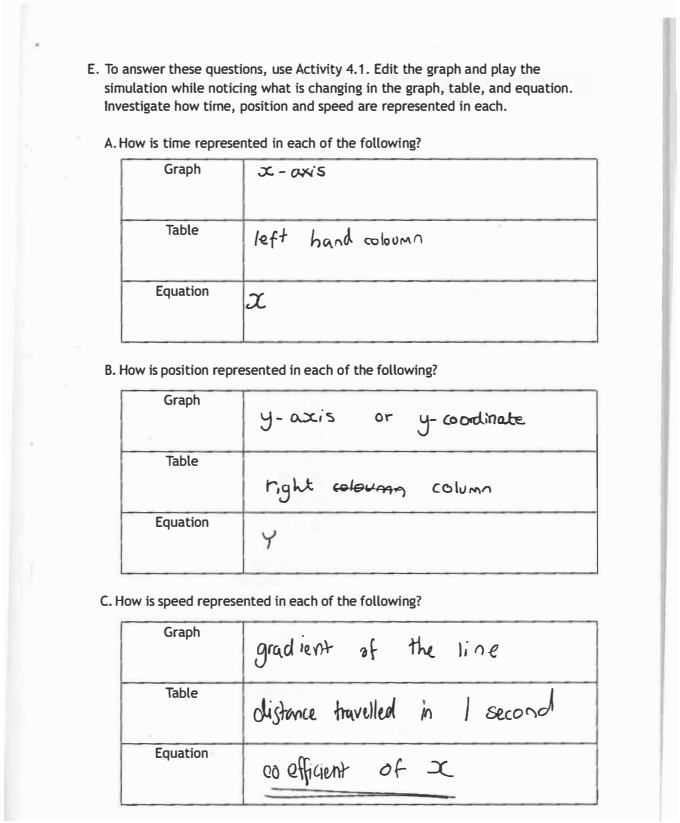
" “Describe how time distance and speed are represented…”(Inv 4, Q2a)



E. To answer these questions, use Activity 4.1. Edit the graph and play the simulation while noticing what is changing in the graph, table, and equation. Investigate how time, position and speed are represented in each.

A. How is time represented in each of the following?

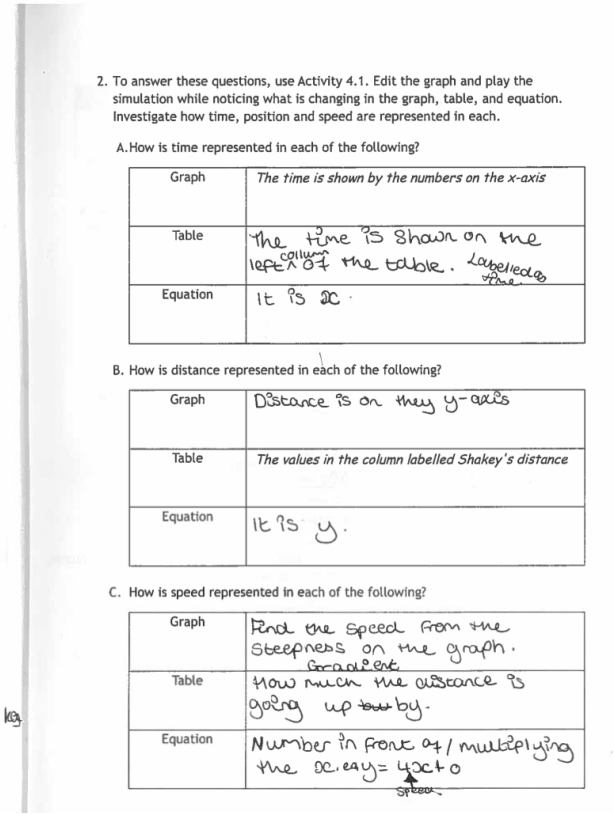
Graph	x - axis
Table	left hand column
Equation	x

B. How is position represented in each of the following?

Graph	y - axis or y - coordinate
Table	right ~~coloumn~~ column
Equation	y

C. How is speed represented in each of the following?

Graph	gradient of the line
Table	distance travelled in 1 second
Equation	coefficient of x



2. To answer these questions, use Activity 4.1. Edit the graph and play the simulation while noticing what is changing in the graph, table, and equation. Investigate how time, position and speed are represented in each.

A. How is time represented in each of the following?

Graph	*The time is shown by the numbers on the x-axis*
Table	The time is shown on the left column of the table. Labelled as time
Equation	It is x.

B. How is distance represented in each of the following?

Graph	Distance is on they y-axis
Table	*The values in the column labelled Shakey's distance*
Equation	It is y.

C. How is speed represented in each of the following?

Graph	Find the speed from the steepness on the graph. Gradient
Table	How much the distance is going up ~~by~~ by.
Equation	Number in front of / multiplying the x. eg y = 4x + 0 Speed

- How will you use the software to enable pupils to respond to this challenging set of questions?