Motion & Force at Robin Hill

Describing force and motion at the park!

Student Introduction

- Motion, acceleration and velocity can be measured all around Robin Hill Country Park!
- What can you discover about your own and others' velocity and acceleration capabilities?

TASK

- ✓ You can work alone or in pairs.
- ✓ Enjoy the different activities at Robin Hill.
- ✓ Complete the tasks on the following pages.

Background

- » As you slide down the toboggan run your speed will increase, you will accelerate.
- » **Acceleration** is the rate at which you change speed.
- » To calculate acceleration you use the formula:

Acceleration (m/s²) = change in velocity (m/s) ÷ time taken for the change (s)

STEP 1 Practise your calculations.

- » Chris was stationary at the top of the toboggan run.
- » His velocity at the end of the toboggan run was 8 m/s
- » It took Chris 40 seconds to travel down the toboggan run from the top of the hill.

What was his acceleration?

acceleration (m/s²) = change in velocity (m/s) ÷ time taken for the change (s)

acceleration = 8 ÷ 40

acceleration = 0.2 m/s²

Q. It took Jessie 30 seconds to travel down the toboggan run.
She was stationary at the top of the toboggan run and her velocity was 10 m/s at the end.
Calculate her acceleration.

STEP 2

The table below shows information about some of the activities found at Robin Hill. Use this information to **calculate the acceleration** of the different objects

Activity	Velocity at start (m/s)	Velocity at end (m/s)	Time taken (s)	Calculation: Acceleration = change in velocity / time taken for change	Acceleration m/s²
Colossus	0	15	5		
Cows Express Children's Train Ride	0	3	60		
Hill Billy Slides	0	10	3		
Pitch & Putt	0	4	2		
Cheetah Zip Wire	0	8	4		
Falconry Display	0.5	86	1		

STEP 3

You can change the formula around to find a different value:

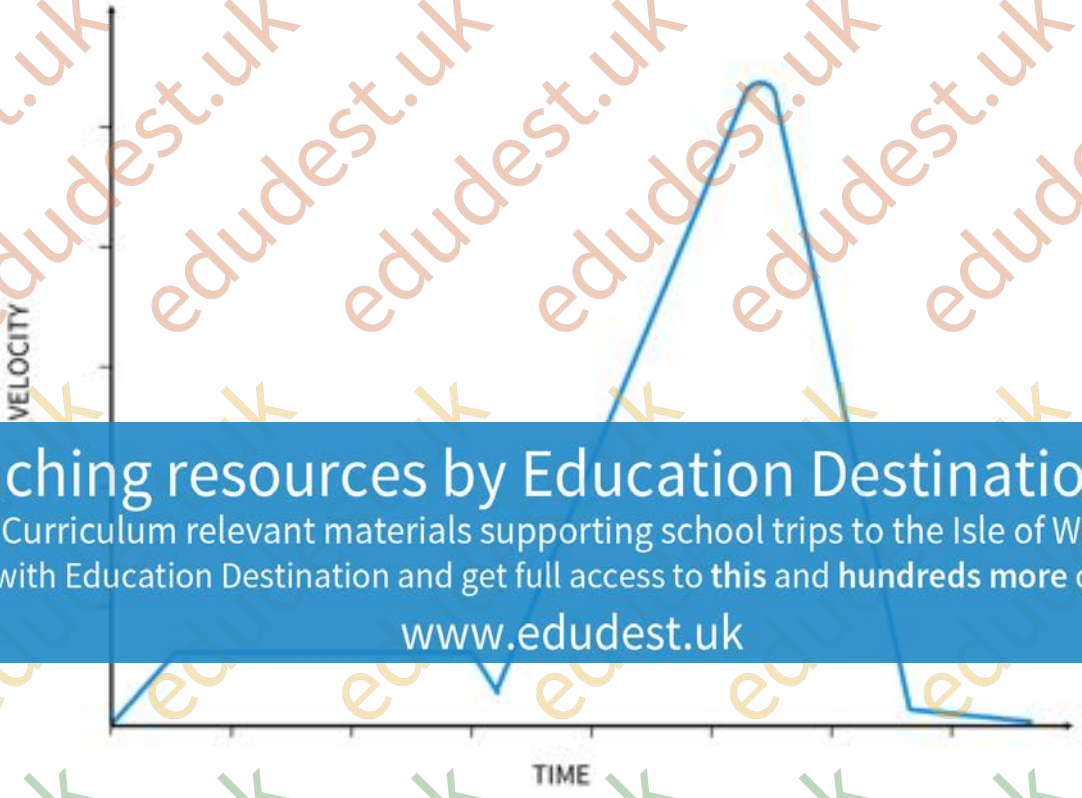
Time taken for change = change in velocity ÷ acceleration

The toboggan was stationary at the top of the hill and reached a maximum velocity of 15 m/s. The acceleration for this toboggan ride was 0.5 m/s²

What would be the time taken to travel down the toboggan run?
Show your working out. Don't forget to include the units.

STEP 4

VELOCITY-TIME GRAPH



The complete journey of the toboggan run can be represented by this velocity-time graph.

Add these labels to the velocity-time graph above:

1. *Accelerating at the start.*
2. *Moving at a constant velocity up the hill.*
3. *Slowing down at the top of the hill for a few seconds.*
4. *Accelerating down the hill.*
5. *Decelerating to a stop back at the bottom of the hill.*

STEP 5

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Draw a velocity-time graph to show your journey on the Hill Billy Slide.

Add these labels to your velocity-time graph:

1. *Waiting for your go at the top of the slide.*
2. *Accelerating down the Hill Billy slide.*
3. *Slowing down to a stop at the bottom of the slide.*