

Racing team name : .....



### Race 1: Shelsey Walsh

**Start**

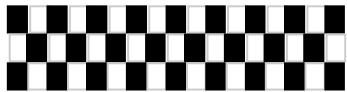
Flat for 6 km

Downhill 1:10 for 2 km

Uphill 1:10 for 6 km

Downhill 1:10 for 4 km

Flat for 7 km



### Race 2: Prescott Park

**Start**

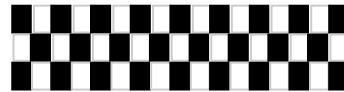
Downhill 1:10 for 4 km

Uphill 1:10 for 2 km

Flat for 7 km

Uphill for 4 km

Downhill for 8 km



### Race 3: Loton Park

**Start**

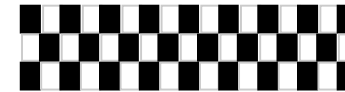
Uphill 1:10 for 0.5 km

Flat for 2.5 km

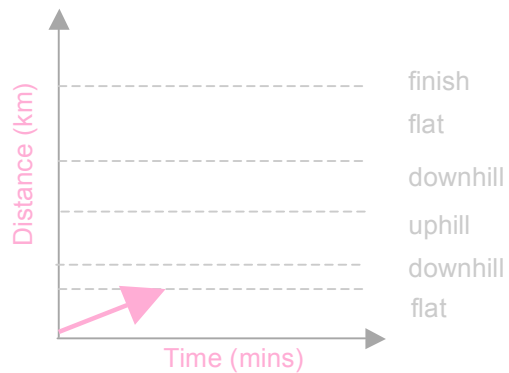
Uphill 1:10 for 4.5 km

Flat for 3.5 km

Uphill for 1.5 km



### Distance time graph



### Our car: Performance

Data from the activity sheet "How fast ...?"

### Speed km/h

Flat .....  
Up slope .....  
Down slope .....

### Activity

Use graph paper to draw distance time graphs for your car competing in the 3 races

**Race your car**

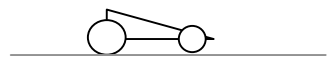
Distance Time graphs

Racing team name : .....

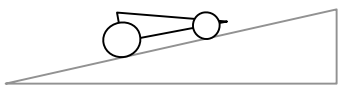
## Assemble your car and test its performance

### Data collection

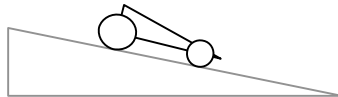
Test surface	Distance (m)	Time in seconds (to 2 decimal places)				
		Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Flat						
Up slope						
Down slope						



Flat  
gradient = 0



Up slope  
gradient = 0.1



Down slope  
gradient = -0.1

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

### Data analysis

Test surface	Average time (s)	Speed m/s	Speed km/h
Flat			
Up slope			
Down slope			



How fast ...?

Racing team name : .....

**Hill climbing** attracts many competitors and spectators.

Cars of all types are timed to race a fixed distance up a hill.





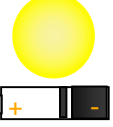
How well will your car perform?

2

**Modified car**

Engineer your car for improved hill climbing

**Engineering Factors**

 <p>Wheel size / position grip of tyres</p>	 <p>Motor gears</p>	 <p>Starting position</p>
 <p>1 ton</p> <p>Weight distribution</p>	 <p>Power</p>	<p>other</p>

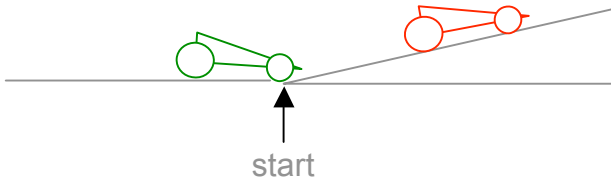
**Our modifications:**

Factor	Description	Gradient / angle	% improvement

1

**Basic car**

Find out what gradient stops your car from climbing?



Gradient = .....

Angle = .....

**Comments:**

.....  
 .....  
 .....  
 .....  
 .....

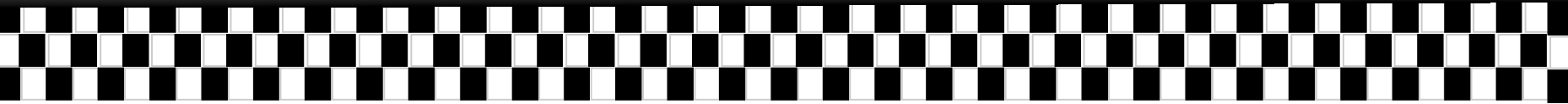


**Hill Climb**

Engineer a solution

Racing team name: .....

Modify your car to get the best performance



### Test track

Distance (m) .....

Time (s)\*

Average time (s)\* .....

Speed (m/s)\* .....

Estimated race time (s)\* .....

\* to 2 decimal places

### Race track

Distance (m) .....

Actual race time (s)\* .....

How good was your time estimate?

estimated (s) - actual (s)\* .....

Car position .....

