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

Distance Time graphs

Race 2: Prescot 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

Activity

Data from the activity sheet "How fast …?"

Speed km/h
- Flat ……
- Up slope ……
- Down slope ……

Use graph paper to draw distance time graphs for your car competing in the 3 races
Racing team name: .............................

Assemble your car and test its performance

Data collection

<table>
<thead>
<tr>
<th>Test surface</th>
<th>Distance (m)</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Trial 4</th>
<th>Trial 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up slope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down slope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data analysis

\[ \text{Speed} = \frac{\text{Distance}}{\text{Time}} \]

<table>
<thead>
<tr>
<th>Test surface</th>
<th>Average time (s)</th>
<th>Speed m/s</th>
<th>Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up slope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down slope</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Basic car
Find out what gradient stops your car from climbing?

Gradient = ............
Angle = .............

Comments:
............... 
............... 
............... 
............... 
............... 

2. Modified car
Engineer your car for improved hill climbing

Engineering Factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Description</th>
<th>Gradient / angle</th>
<th>% improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel size / position</td>
<td>grip of tyres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor gears</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight distribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Our modifications:

Factor | Description | Gradient / angle | % improvement |
--------|-------------|------------------|---------------|
        |             |                  |               |
        |             |                  |               |
        |             |                  |               |
        |             |                  |               |

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?

Hill climb picture kindly provided by Peter Mc Fadyen
### Modify your car to get the best performance

#### Test track

- Distance (m): 
- Time (s): 
- Average time (s): 
- Speed (m/s): 
- Estimated race time (s):

#### Race track

- Distance (m): 
- Actual race time (s): 
- How good was your time estimate? estimated (s) - actual (s):
- Car position:

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* to 2 decimal places

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Racing team name: 

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Formula 8