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| Year 12 Worksheet 1 – Formative Assessment 4 | | | |
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| **Name:** | **Teacher:** | **Score /10** | |
| **Comment:** | | | **Time allowed:**  **10 minutes** |

A car travelling at 30.0 ms–1 comes to a circular dip in the road. The radius of curvature of the dip is 20.0 m. The driver has a mass of 70.0 kg.

a) Draw a diagram showing the two forces acting on the driver, and the net force.

**N (upward force of seat on the driver)**

**FC**

**W = mg = (70.0)(9.80)**

**= 686 N**

**The two forces acting on the driver are**

* **Normal reaction force of seat**
* **Weight (W, due to gravity)**

**Net (resultant of N and W) force is FC**

**N = FC + W**

**Remember**

**The normal force, N, is like the tension of a string when a ball is whirled in a vertical circle.**

2 marks

b) What centripetal acceleration does the driver experience?

**aC = v2 / r**

**= (302)(20.0)**

**= 45.0 ms–2**

2 mark

c) What centripetal force does the driver experience?

**FC = mv2 / r**

**= (70.0)(302) / 20.0**

**= 3150**

**= 3.15 x 103 N**

**FC = m aC**

= (70.0)(45.0)

**= 3150**

**= 3.15 x 103 N**

2 mark

d) What upward force (called the *normal* force) does the car seat exert on the driver?

**N = W + FC**

**= mg + mv2 / r**

**= (70.0)(9.80) + (70.0)(302) / 20**

**= 686 + 3150**

**= 3836 = 3.84 x 103 N**

2 marks

e) How much heavier than normal does he feel?

**His normal weight is 686 N**

**The seat pushes upward on him with a force of 3836 N**

**He feels heavier by**

**3836 – 686 = 3150 = 3.15 x 103 N**

**OR, he feels 3836/686 = 5.59 times as heavy as normal.**

2 marks