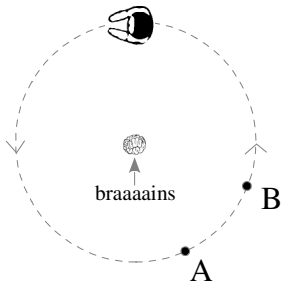
Year 12 Physics Test NAME_____

Uniform Circular Motion

1. Consider a zombie shambling in uniform circular motion[1] on flat ground.

   The zombie's speed is 1.3 ms^{-1} and the radius of the circle of motion is 9.6 m.



   (a) Derive the formula $T = \frac{2\pi r}{v}$ for the period of the zombie's circular motion. /2

   (b) Hence calculate the zombie's period of motion. /2

   (c) Calculate the magnitude of the zombie's acceleration. /2

   (d) Using vector subtraction, show that the zombie's average acceleration between points A and B is towards the braaaains. /3

   (e) Identify the force causing the zombie's centripetal acceleration. /1

2. Fortunately for the citizens fleeing the zombie outbreak zone by vehicle, the corners of the zombie outbreak emergency exit roads are banked, allowing them to flee to safety at high speed.

   (a) With the aid of a diagram, explain how banking a curve decreases the reliance upon friction between the tyres and the zombie outbreak exit road. /4

   (b) Hence show that the relationship between the banking angle, the speed of a fleeing car and the radius of the curve when no centripetal acceleration is provided by friction can be given by $\tan\theta = \frac{v^2}{rg}$. /3

TOTAL /17

[1] In search of braaaains. This zombie has one blocked nostril so he hasn't realised he's not getting any closer to the braaaains.