**Scholarship Level Score /8**

1. Harry grew some plants on a turntable spinning at 1.0 rev/sec for a Bio expt. The turntable’s radius is 15 cm.

Why did they grow on an angle?

[Geotropism a response where a plant grows towards gravity…Biology!]

What was the angle between the plant and the turntable? [2]

1. a) Jock is at the Highland Games. He swings a 5.0 kg ball and chain at 800 to the vertical axis as shown. The radius of rotation is 1.0 m.

Calculate the **period**. [2]

(b) Assuming the ball is moving at a constant speed in a horizontal circle, explain why the wire from Jock’s hands to the ball cannot be **parallel** to the ground. [2]

(c) Explain how Jock can give the chain a tangential **acceleration**. [2]

**Scholarship Level Solutions - Horizontal UCM**

1. Mrs Jones grew some plants on a turntable spinning at 1.0 rev/sec for a Biology experiment. The turntable’s radius is 15 cm. What was the angle between the plant and the turntable?

Determine linear speed:

**

FC

FW

**

 = 58.88…

≈ 59° from plant to table

1. a) Jock is at the Highland Games. He swings a 5.0 kg ball and chain at 800 to the vertical as shown. The radius of rotation is 1.0 m. Calculate the **period**.

mg

mv2/r

Solve the vector triangle, using 

T = 0.84 s

b) *The chain must provide an upward force on the ball to support it against gravity. If the chain was horizontal, it can supply the centripetal force but cannot provide an upward force.*

 c) *If the chain was pointing towards the centre of the orbit the force is perpendicular to the velocity so cannot produce an acceleration in the direction of the motion. The angle between the chain and the velocity must be less than 90o so that there is a component of the tension in the direction of the velocity. He has to “lead” the ball around.*

*No tangential acceleration*

*Chain on an angle gives tangential acceleration*