Year 12 Physics Assessment Task **ID Number:** _____

Practical and Processes

Teacher: ☐ **Mr Coombes** ☐ **Mr Pitt** ☐ **Mr Trotter** ☐ **Mr Robson**

TOTAL MARKS _____/ 30

Task Weighting: 15% **Time allowed: 45 minutes**

- **Attempt all questions**
- Show **all** working
- **For question 5, watch the movie on the screen. You will require a stopwatch to carry out question 5. This may be shared between two students. Check that the stopwatch is working before the task commences and notify your teacher if there is a problem.**

Data and Equations

g = 9.8 m s^{-2}

Mass of Earth = 6 x 10^{24} kg

Radius of Earth = 6400 km

Universal Gravitational Constant

G = 6.67 x 10^{-11} N m^2 kg^{-2}

$T = 2\pi\sqrt{\frac{l}{g}}$

$E_p = \frac{Gm_1m_2}{r}$

$F = mg$

$v_x^2 = u_x^2$

$v = u + at$

$v_y^2 = u_y^2 + 2a_y\Delta y$

$\Delta x = u_x t$

$\Delta y = u_y t + \frac{1}{2}a_y t^2$

Question 1

Complete the following table that describes the mass and weight of the same astronaut in different locations. 2M

Planet	Mass of astronaut (kg)	Acceleration due to gravity (ms^{-2})	Weight of astronaut (N)
Earth			980
Mars	100		380
Venus		8.9	

Question 2

A projectile is launched at 60ms^{-1} at an elevation of 30^0.

(a) Calculate the time of flight of the projectile.

.....

.....

.....

(b) Calculate the range of the projectile.

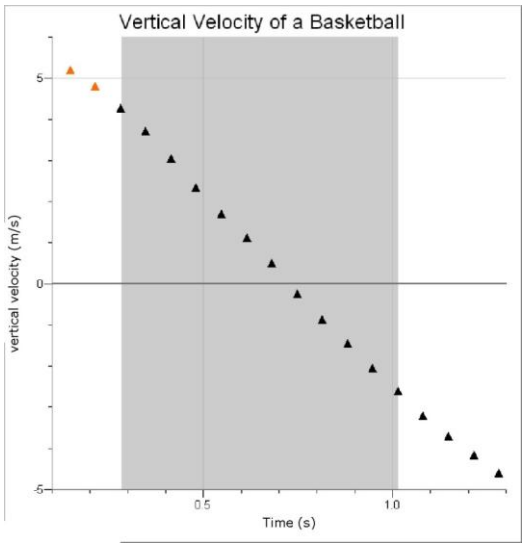
.....

.....

.....

Question 3

The graph below was produced using Logger Pro® to analyse a movie of a basketball being thrown in a curved trajectory between two students. The origin was set at the top of the flight.



(a) Draw a line of best fit for the highlighted section of this data. 1M

(b) Outline the physical behaviour of the projectile that is consistent with this graph. 1M

.....

.....

(c) Using the graph and any relevant equations, calculate the acceleration of the ball. 3M

.....

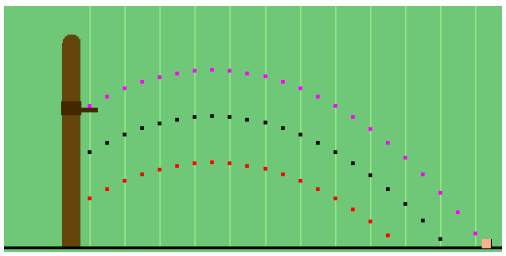
.....

.....

(d) The horizontal velocity of the basketball was determined to be $3ms^{-1}$. Calculate the total instantaneous velocity at t=1s. 3M

Question 4

A student carried out an investigation of projectile motion using a computer model. The results of part of this investigation are shown in the following diagram. The dots on the three trajectories are shown at the same time intervals.



(a) Make a hypothesis consistent with what the student was testing in this investigation. 1M

.....

.....

.....

(b) What can be deduced about the initial horizontal velocity of the projectile in the three tests carried out? Justify your answer. 2M

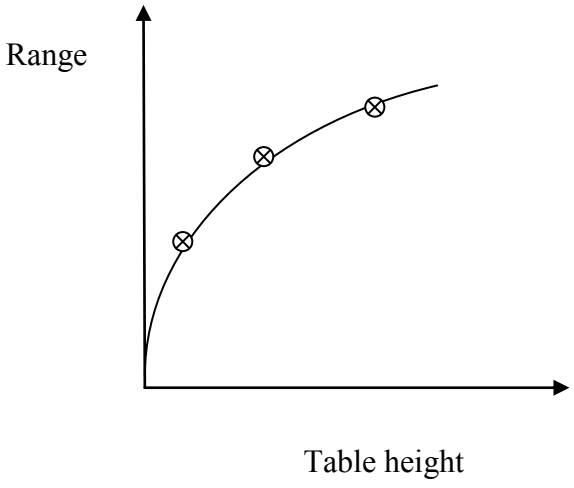
.....

.....

.....

.....

(c) The following graph of range vs table height was produced.



Qualitatively describe the relationship between the variables indicated by the graph. 2M

.....

.....

.....

Question 5

Watch the movie on the screen. The movie has not been speeded up or slowed down – you are watching it in real time.

(a) Determine a reliable value for period of the pendulum. Tabulate your results. 3M

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) The length of the pendulum was measured to be 1m.
Calculate the acceleration due to gravity, "g" from the data about this pendulum. 2M

.....

.....

.....

Question 6

A group of students carried out an investigation to determine the acceleration due to gravity using a pendulum.

They tied a dense cylindrical mass to the end of a light, inextensible string. The length of the pendulum was measured and recorded. The period was then measured using a data logger with a motion sensor pointed at the pendulum. This process was repeated for 5 different lengths and the following results obtained.

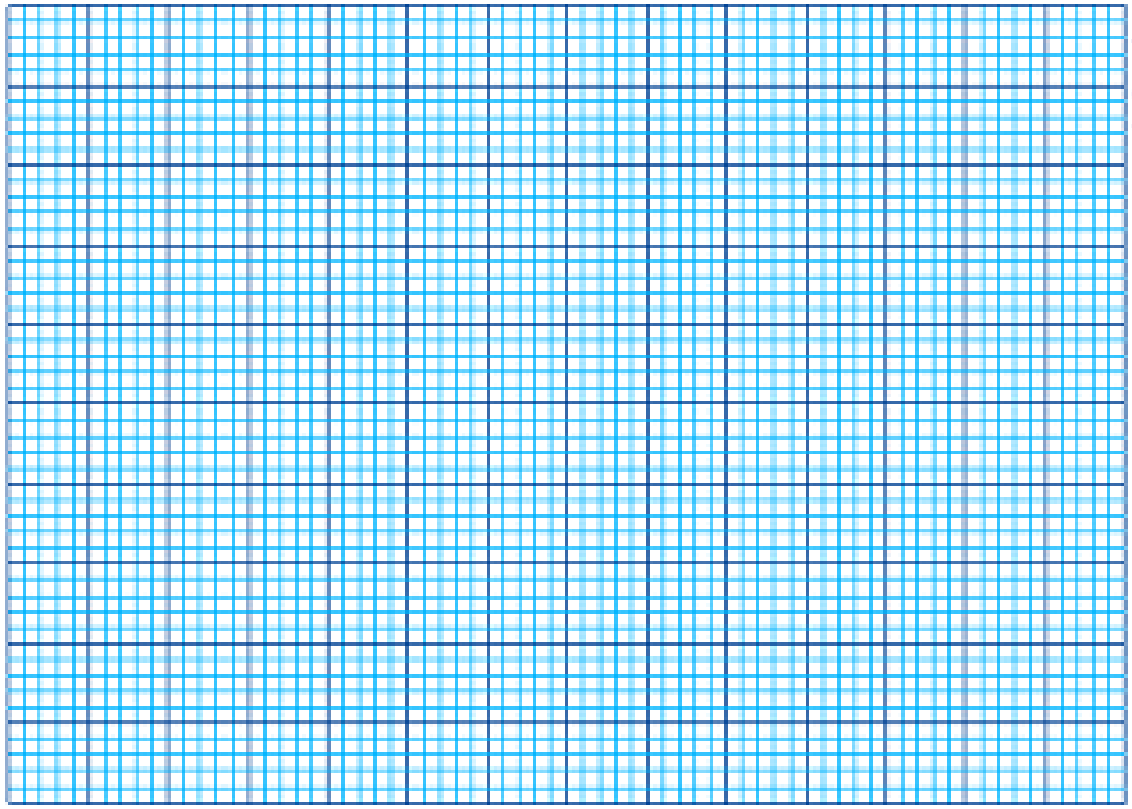
Period (s)	Length (m)	
0.93	0.21	
1.31	0.39	
1.61	0.6	
1.87	0.79	
2.07	1.1	

(a) Identify the dependent variable in this investigation. 1M

.....

This question continues on the next page

(b) Use a graph and any relevant calculations to determine the acceleration due to gravity 5M



.....

.....

.....

.....

.....

.....

.....

.....

`

END OF EXAM