TAMWORTH SIXTH FORM — CURIOSITY · COMPASSION · COURAGE

CONSTANT ACCELERATION

KEY WORDS & DEFINITIONS

1. **Velocity**
   The rate of change of displacement
2. **Acceleration**
   The rate of change of velocity

SUVAT EQUATIONS

For motion in a straight line with constant acceleration:

$$v = u + at$$
$$v^2 = u^2 + 2as$$
$$s = ut + \frac{1}{2}at^2$$
$$s = vt - \frac{1}{2}at^2$$
$$s = \frac{1}{2}(u+v)t$$

s – displacement
u – initial velocity
v – final velocity
a – acceleration
t - time

To derive the SUVAT equations:
• Find the gradient of a velocity time graph labelled with u, v, t
• Find the area underneath the velocity-time graph
• Use these two equations to replace each variable at a time to derive the other three equations.

WHAT DO I NEED TO KNOW

1. The gradient on a displacement-time graph = velocity

2. If a displacement-time graph is a straight line then the velocity is constant.

3. The gradient on a velocity-time graph = acceleration

4. If a velocity-time graph is a straight line then the acceleration is constant.

5. The area between a velocity-time graph and the time axis = Distance travelled

6. Average Speed = $\dfrac{\text{Total Distance Travelled}}{\text{Total Time Taken}}$

7. Average velocity = $\dfrac{\text{Displacement From Start Point}}{\text{Total Time Taken}}$

8. Acceleration due to gravity = 9.8m/s²

9. Acceleration due to gravity does not depend on the mass of the object.

10. The degree of accuracy in your answers must be consistent with the values given in the question. I.e. if g = 10m/s² in the question, your answer should also be given to 1 sig. fig.

ALWAYS DRAW A SKETCH!

u — Initial velocity — Initial position

a — Constant acceleration

v — Velocity after t seconds — Position after t seconds

s