S3 DYNAMICS NEED TO KNOW

Speed Calculations

I can perform calculations/ solve problems involving the relationship between speed, distance and time
($d = vt$, and $d = \bar{v}t$)

I can determine average and instantaneous speed.
average speed = Total distance travelled/ Time for the journey
instantaneous speed = length/ Time to pass a point

I can describe experiments to measure average and instantaneous speed.
To measure average speed use a metre stick/trundle wheel to measure the total distance travelled and use a stopwatch to measure the time taken for the whole journey
To measure instantaneous speed use a light gate attached to an interface and computer. The length of the object divided by the time it takes the object to pass through the light gate = instantaneous speed.

Speed –time graphs

I can draw velocity–time graphs for objects from recorded or experimental data.

I can interpret velocity–time graphs to describe the motion of an object.

I can find displacement from a velocity–time graph, where s = area under the v-t graph.

To calculate distance or displacement, divide the area under the graph into shapes you know (rectangles and triangles). Calculate the area of these and add them together for the total distance travelled in metres.

Acceleration

I can define acceleration as rate of change of velocity. Which is found from the final velocity subtract the initial velocity all divided by the time for the change.

I can use $a = \frac{v-u}{t}$ to solve problems involving acceleration, initial velocity (or speed) final velocity (or speed) and time of change.

a = acceleration (ms^{-2})
v = final velocity (ms^{-1})
u = initial velocity (ms^{-1})
t = time (s)

I can find the acceleration from a velocity – time graph using the equation above.

I can describe an experiment to measure acceleration

Method one: single mask, double light gate
Use two light gates connected to interfaces and a computer. Two instantaneous velocities can be calculated. The change in these velocities should be divided by the time between readings.

Method two: double mask, single light gate. Two instantaneous velocities can be calculated. The change in these velocities should be divided by the time between readings.

Newtons Law's

I can give applications and use Newton's laws and balanced forces to explain constant velocity (or speed), making reference to frictional forces of this.

I can give applications of Newton's laws and balanced forces to explain and or determine acceleration for situations where more than one force is acting

I can use *F=ma* to solve problems involving unbalanced force, mass and acceleration for situations where more than one force is acting, in one dimension or at right angles.
F = (Unbalanced) Force (N)
m = mass (kg)
a = acceleration (ms^{-2})

I can use *W=mg* to solve problems involving weight mass and gravitational field strength, including on different planets
W = weight (N)
m = mass (kg)
g = gravitationalfield strength (N/kg)   *(9.8N/kg on Earth)*

I can use Newton's 3rd law and its application to explain motion resulting from a 'reaction' force.