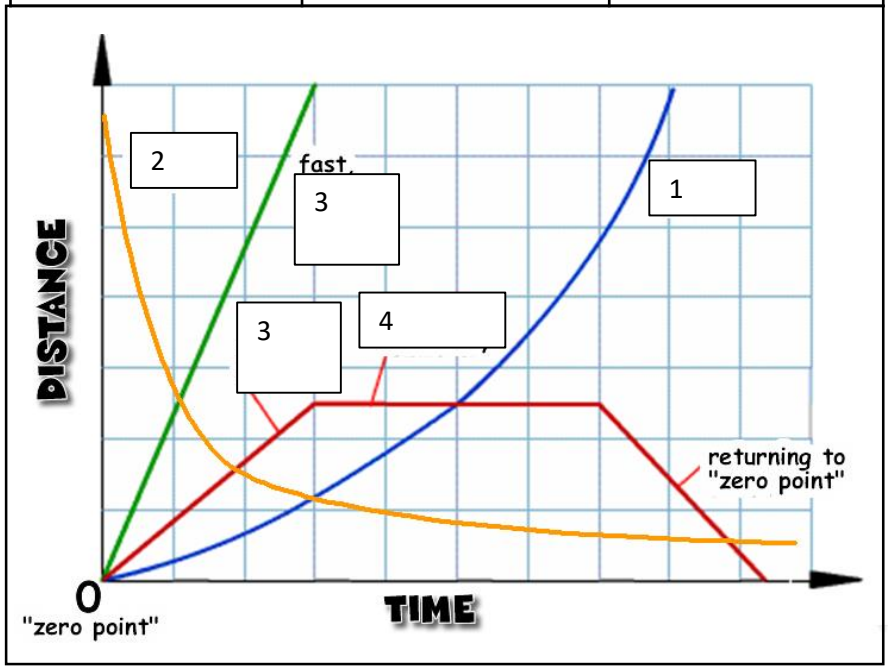
Physics Topic 5b: Forces in motion

1. Keywords	
Speed	Distance ÷ time. Scalar quantity
Velocity	Distance (in a certain direction) ÷ time. Vector quantity
Distance	How far and object moves. Scalar quantity
Displacement	The straight line distance from the start point to the end point. Vector quantity
Terminal velocity	The maximum speed reached when the forces are balanced

2. Typical speeds	
Walking	1.5 m/s
Running	3 m/s
Cycling	6 m/s
Sound	330 m/s

3. Calculating speed		
Symbol	**Name**	**Calculated by..**
s	Distance (m)	= speed x time
v	Speed/Velocity (m/s)	= distance ÷ time
t	Time (s)	= distance ÷ speed
s = v t		

4. D/T graph keywords		
Keyword	**Meaning**	**Position on distance time graph**
Accelerate	Speeding up	1
Decelerate	Slowing down	2
Constant speed	Staying the same speed	3
Stationary	Not moving	4
Speed	Distance covered in a certain time	The steepness of the line



5. Acceleration

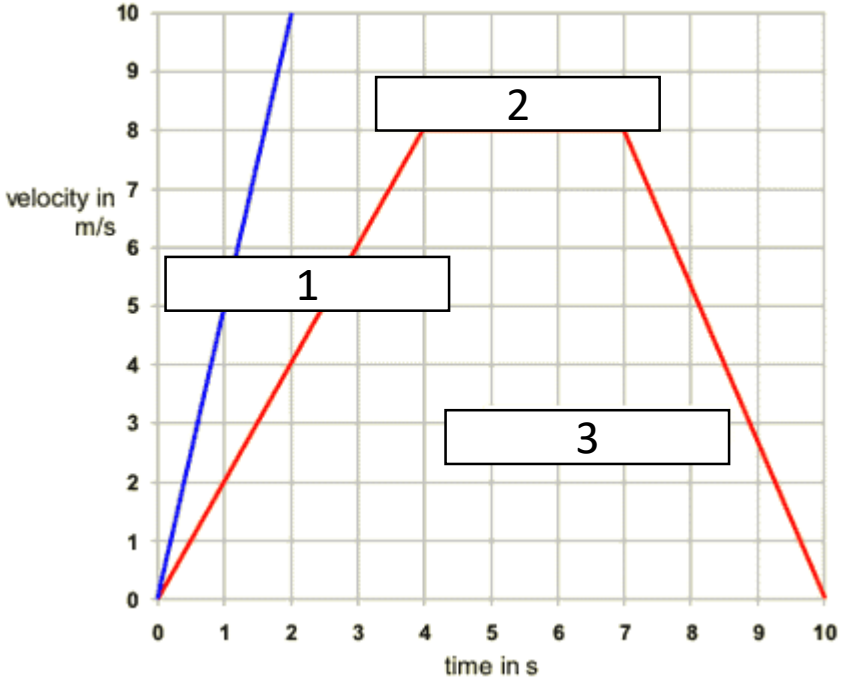
a	Acceleration (m/s^2)	$a = \frac{\Delta v}{t}$
Δv	Change in velocity (m/s)	$\Delta v = at$
t	Time (s)	$t = \frac{\Delta v}{a}$
$a = \frac{\Delta v}{t}$		

7. Uniform acceleration

$$v^2 - u^2 = 2as$$

v	Final velocity (m/s)
u	Start velocity (m/s)
a	Acceleration (m/s^2)
s	Distance (m)

6. Velocity-time graphs

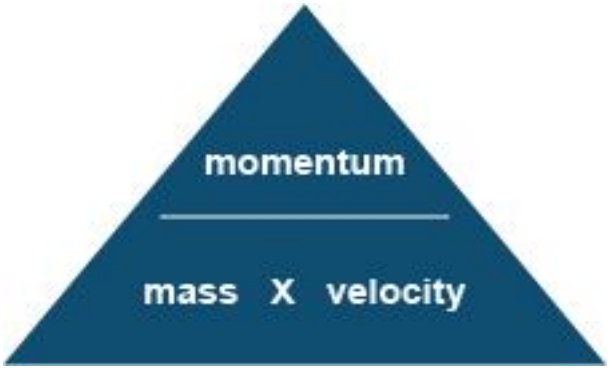


1	Constant acceleration
2	Constant speed/velocity
3	Constant deceleration
HT	Area under graph = total distance travelled

8. Newtons laws of motion	
1st	If the resultant force on an object is zero the object either remains stationary or at a constant speed
2nd	Force = mass x acceleration
3rd	When two objects interact the forces are equal and opposite

9. Forces and braking	
Stopping distance	The thinking distance + braking distance
Thinking distance	The distance travelled in the time it takes to react (typically 0.2-0.9s)
Factors affecting thinking distance	1. Tiredness 2. Drugs 3. Alcohol 4. Distractions (phones)
Braking distance	The distance travelled under a braking force
Factors affecting braking distance	1. Road conditions (ice, water) 2. Tyre condition 3. Brake condition

10. Momentum (HT ONLY)		
p	Momentum (kgm/s)	p=mv
m	Mass (kg)	m=p÷v
v	Velocity (m/s)	v=p÷m
Conservation of momentum	The total momentum before = the total momentum after	



11. Changes in momentum (PHYSICS ONLY)		
$$F = \frac{m\Delta v}{\Delta t}$$		
F	force	N
$m\Delta v$	Change in momentum	kgm/s
Δt	Change in time	s
To reduce the force we need to extend the collision time		