P6 Forces and Movement Fact Sheet

Distance, displacement and speed	
1. Is distance a scalar or vector quantity? Why? (2)	• **Scalar** • **It doesn't have a direction**
2. Is speed a scalar or vector quantity? Why? (2)	• **Scalar** • **It doesn't have a direction**
3. What do we call the distance in a straight line from an object's starting position to is end position	Displacement
4. Is displacement a scalar or vector quantity? Why (2)	• Vector • Is has a magnitude (size) and direction
5. List factors that affect the speed of running, walking and cycling (3)	• **Wind / air resistance** • **Road surface** • **Gradient of road** • **Energy / effort of person**
6. State typical values for walking, running and cycling (3)	**Walking: 1.5 m/s** **Running: 3m/s** **Cycling: 6m/s**
7. State the speed of sound in air (1)	**330 m/s**
8. Write the equation for calculating speed (1)	**Speed = distance ÷ time**
9. If a car travels 500m in 20 seconds, what is its speed? (4)	**Speed = distance ÷ time** **500 ÷ 20=** **25m/s**
10. If a rabbit hops 30m at a speed of 2 m/s, how long will it take? (4)	Time = distance ÷ speed 30 ÷ 2 = 15s
11. If a plane travels 40km at a speed of 50 m/s, how long will it take? (5)	Time = distance ÷ speed 40km = 40,000m 40,000 ÷ 50 = 800s
12. If a car travels for 300 seconds at a speed of 15 m/s, how far has it travelled? (4)	**Distance = speed x time** **300 x 15** **= 4500m**

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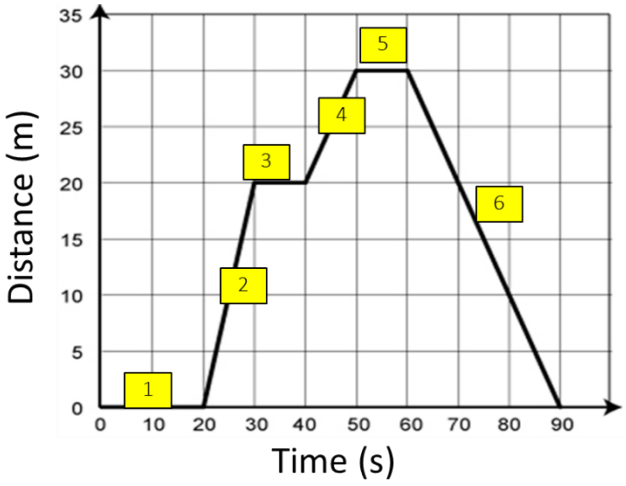
Distance time graphs	
1. State what is happening to the object at each section of the graph (6)  	**1. Stationary/ stopped** **2. Moving at constant speed** **3. Stationary/ stopped** **4. Moving at constant speed** **5. Stationary/ stopped** 6. Moving back towards where it started from, at a constant speed
2. At which point on the graph above is the object moving fastest? How can you tell? (2)	• **2** • **Steepest gradient**
3. What does the gradient on a distance time graph show? (1)	**Speed**
4. What does a steeper gradient tell you? (1)	**Faster speed**
5. What does a curved line on a distance time graph show? (1)	Acceleration or deceleration
Velocity and acceleration	
1. Is velocity a scalar or vector quantity? Why? (2)	• **Vector** • **It has magnitude (size) and direction**
2. State the units for velocity	**m/s**
3. State the equation for calculating acceleration, when you know the change in velocity and time (1)	Acceleration = change in velocity ÷ time
4. State the units for acceleration (1)	**m/s^2**
5. What is deceleration? (1)	**Slowing down**
6. If a car starts from rest (starting velocity is 0 m/s) and accelerates to a velocity of 100 m/s in 20 seconds, what is its acceleration? (4)	**Acceleration = change in velocity ÷ time** **100 ÷ 20** **=5m/s^2**

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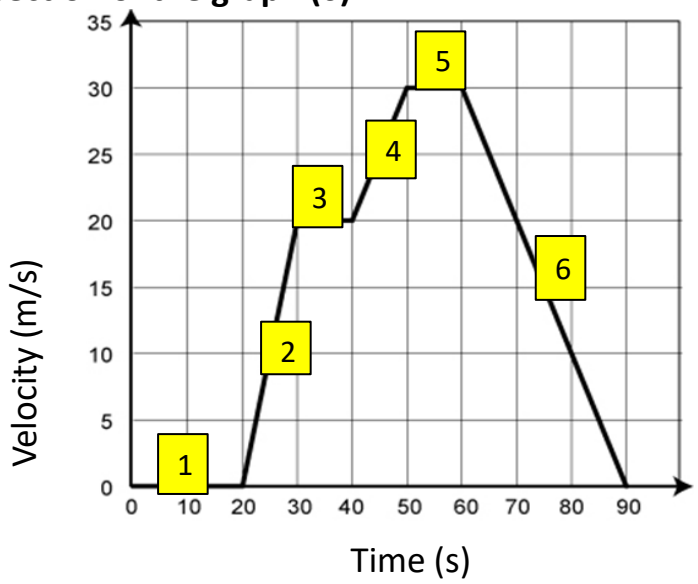
7. If a car starts to accelerate from a velocity of 5 m/s to a velocity of 25 m/s in 20 seconds, what is its acceleration? (4)	**Acceleration = change in velocity ÷ time** **(25-5) ÷ 20** **= 1m/s²**
8. If a train starts from rest and accelerates to a velocity of 80 m/s with an acceleration of 20 m/s², how long did it accelerate for? (4)	Time = change in velocity ÷ acceleration 80 ÷ 20 = 4s
9. If a bike starts from rest and travels for 10 seconds with an acceleration of 2 m/s², what is the final velocity? (4)	Change in velocity= time x acceleration 10x2 =20m/s Because it started from rest (0), 20 m/s is the final velocity
10. You should also be able to use the equation 'final velocity² – initial velocity² = 2 x acceleration x distance' This is on the data sheet	
11. HT Motion in a circle involves constant ____ but changing ____	*Motion in a circle involves constant speed but changing velocity*
Velocity time graphs	
1. State what is happening to the object at each section of the graph (6)  	**1. stopped** **2. accelerating** **3. constant speed of 20m/s** **4. accelerating** **5. constant speed of 30 m/s** **6. decelerating / slowing down**
2. At which point is the object accelerating the fastest? How can you tell? (2)	• **2** • **The gradient is steepest**
3.What does the gradient on a velocity time graph show? (1)	**Acceleration**
4. What does steeper gradient show? (1)	**Greater acceleration**
5. HT what does the area under a velocity time graph show? (1)	*The distance travelled*

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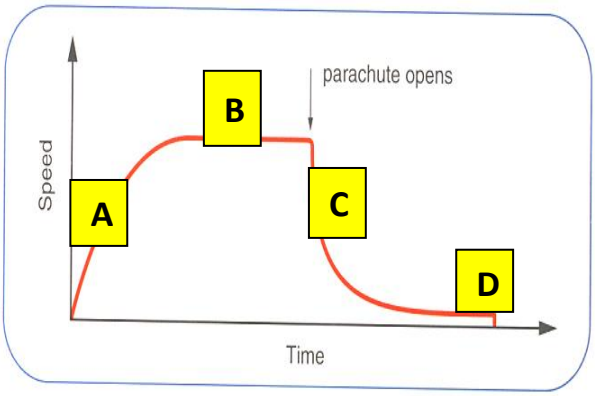
Terminal velocity	
1. State the acceleration of an object falling freely under gravity	9.8 m/s^2
2. What do we call the constant speed a falling object reaches, when forces are balanced?	**Terminal velocity**
3. Name the force which pulls objects downwards	**Gravity**
4. Name the force which acts against gravity	**Drag/ air resistance**
5. State what is happening to the parachutist at each stage of the graph, which starts when the parachutist jumps out of the plane 	**A. Accelerating** **B. Constant speed** **C. Decelerating** **D. Constant speed**
6. At which points on the graph is the parachutist travelling at terminal velocity?	**B and D**
7. What can you say about the forces acting on an object when it is moving at terminal velocity?	**They are balanced**
8. Describe how the motion of the parachutist changes, from jumping out of the parachute until hitting the ground	• Accelerates • Constant speed/ terminal velocity • Decelerates when opens parachute • Constant speed/ terminal velocity
9. Explain why the motion of the parachutist changes	• Accelerates as air resistance is less than weight • As speed increases, air resistance increases • Terminal velocity as air resistance and weight are equal/ balanced • Decelerates as air resistance is greater than weight, parachute increases air resistance, it has a large surface area • As speed decreases, air resistance decreases • Terminal velocity as air resistance and weight are equal/ balanced

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Stopping Distance and thinking distance	
1. What is stopping distance? (2)	• **The total distance a vehicle travels to come to a stop.** • **Thinking distance + braking distance**
2. What is thinking distance? (1)	**The distance a vehicle travels during the driver's reaction time**
3. State the range for typical human reaction times (1)	0.2s – 0.9 s
4. List factors that increase thinking distance (3)	• **Drugs or alcohol** • **Being tired** • **On a mobile phone** • **Distracted by people in the car**
Stopping distance and braking distance	
1. What is braking distance? (1)	**The distance a vehicle travels whilst the brakes have been applied (1)**
2. List 3 ways of increasing braking distance (3)	• **Wet or icy road** • **Worn brakes** • **Worn tyres**
3. Describe the relationship between the speed and the distance needed for a vehicle to stop (1)	The higher the speed, the longer the distance needed to stop
4. Describe the relationship between speed and the braking force needed to stop (1)	The higher the speed, the bigger the braking force needed to stop
5. What happens to the temperature of brakes when they are used? (1)	**Increases/ they get hot**
6. How do brakes stop a car?	• Friction force between the brake and the wheel • Reduces the kinetic energy of the vehicle
7. Explain why large decelerations are dangerous	• **Brakes may overheat** • **The driver may lose control of the vehicle**
HT ONLY Momentum	
1. State the equation to calculate momentum	*Momentum = mass x velocity*
2. State the units for momentum	*kg m/s*
3. State the law of the conservation of momentum	*Total momentum before collision/explosion = total momentum after the collision/ explosion*

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