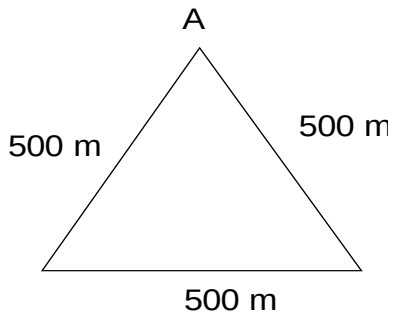
1. A chap walks round the triangle below in 3000.0 s. He starts and finishes at point A.



i) Calculate the distance travelled. 1500 m (add three sides)

ii) Write down his displacement 0 m (displacement is distance to where he started plus direction)

iii) Calculate his average speed. (0.5 ms^{-1} …using d = v.t

iv) Calculate his average velocity. (0 ms-1) (velocity = displacement / time

2. Write down two vectors and two scalars. Vectors are Force, Displacement, velocity, Scalars are distance, time, speed.

3. What is the difference between the weight and mass of a woman? Weight is the force a planet exerts on her but mass is just the number of kilograms that make up her body.

4. A girl stands on scales on Earth and they read 60.0 kg. i) Write down her mass (60.0 kg) ii) Calculate her weight 588 N …using W = mg

5. A balloon is blown up and released. The balloon flies around due a reaction force. Name this reaction force and the corresponding action force. (The reaction force is the force the expelled air exerts on the balloon and the action force is the force the balloon exerts on the escaping air exerts on the balloon)

6. A car is travelling at a constant speed, what can we say about the forces acting on the car? (The forces are balanced).

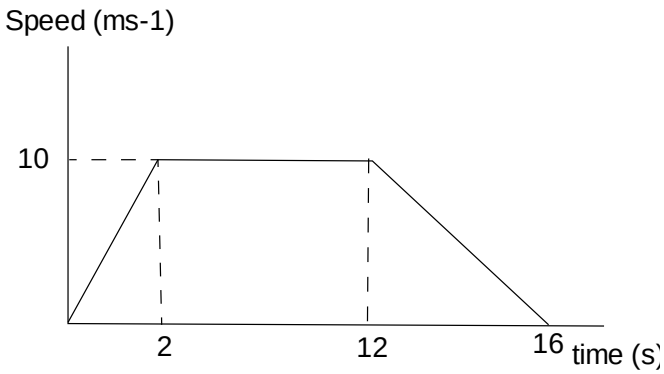
7. A cyclist is freewheeling down a hill of constant steepness. What physical quantity increases and what physical quantity stays the same. You may ignore friction. (The speed of the cyclist increases but his acceleration is constant)

8. What physical quantity of a body stays the same as a projectile falls towards the ground? (Its horizontal velocity)

9. What physical quantity of a body increases as a projectile falls towards the ground? (Its vertical velocity)

10. A 1000.0 kg car speeds up to 10.0 ms^{-1} in 2.0 s, it travels at a steady speed for 10.0 s then slows down to 0.0 ms^{-1} in 4.0s

i) Draw the speed time graph.



ii) Calculate the acceleration of the car during the first 2.0 s. 5.0 ms^{-2} … using a= (v-u)/t

iii) Calculate the kinetic energy of the car when it is travelling at a steady speed.

(50,000 J … using $E_k = ½ mv^2$)

iv) Calculate the total distance travelled by the car.

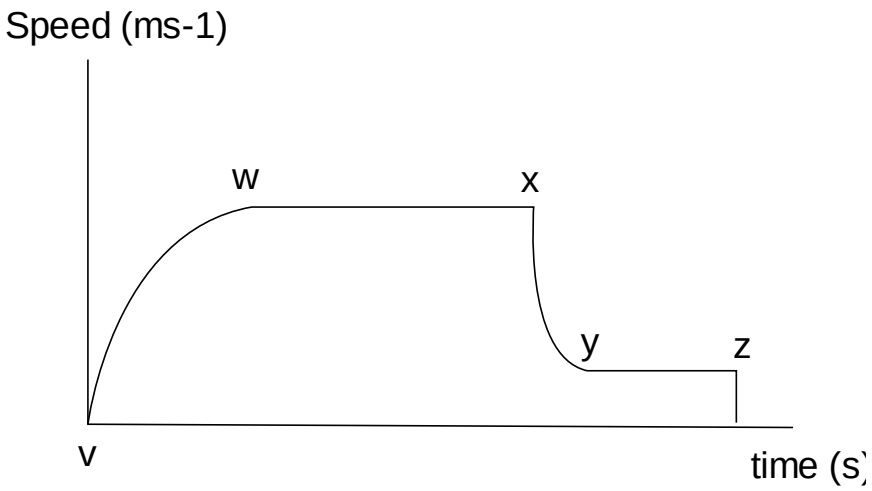
130 m; Area under graph .. First Triangle 10 m + Rectangle 100 m + second triangle 20 m)

v) Calculate the Unbalanced force on the car during the first 2.0 s.

5000 N … using F = ma

11. The kinetic energy of a vehicle is 20000.0 J. If the vehicle has a mass of 1000.0 kg and velocity of 10.0 ms^{-1} rearrange $E_k = ½ mv^2$ to find its mass. $m = 2E_k/v^2 = 40000/100 = 400$ kg

12. Look at the sky diver poster on the wall and identify the change at each point, v, w, x, y and z.



v – jumps out

w – reaches steady speed (terminal velocity)

x - opens parachute

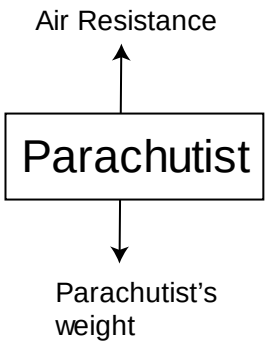
y - reaches steady (much slower speed)

z – lands.

i) When the forces on the parachutist are balanced. Between w and x and y and z)

13. A 70.0 kg parachutist is falling towards the ground at a constant speed.

i) Draw a free body diagram of the parachutist.



ii) Calculate the force of friction acting on the parachutist. (This is the same as the parachutist's weight when the forces are balanced. 686 N, using W = mg. (The force of friction (air resistance) = the parachutist's weight when the forces are balanced)

14. A radio wave travels 500 km to a satellite dish and back again. How long did it take?

0.0034 s, use d = vt and put 3.0 x 10^8 ms^{-1} for the speed of radio waves and 5.0 x10^5 m for the distance and rearrange formula to t = d/v and use knowledge of indices). Remember to multiply by 2 because the wave goes to dish and back. If you prefer to not use indices take 300 000 000 ms^{-1} for speed of radio waves and 500 000 m for distance. Use t = d/v = 500 000 / 300 000 000. And use your calculator.

15. A electromagnetic wave has a wavelength of 10 mm, calculate its frequency

3.0 x 10^1 Hz or 300000000000 Hz, use v = fλ and put 3.0 x 10^8 ms^{-1} for the speed of radio waves and 1.0 x10^{-3} m for the distance and rearrange formula to f = v/ λ and use knowledge of indices). If you prefer to not use indices take 300 000 000 ms^{-1} for speed of radio waves and 0.001 m for distance. Use f = v/ λ = 300 000 000/ 0.001. And use your calculator.

16. Use your understanding of F = ma to explain why a train (or a large ship) needs a long distance to slow down to a stop or gain a high speed.