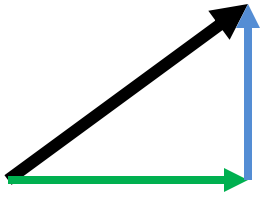
Question a day!

1. This is a kinematics equation problem.
   u = 25 ms^{-1}
   v = 10 ms^{-1}
   a = -5ms^{-2}
   s = ?
   t =

   From the data we will use $v^2 = u^2 + 2as$
   Fill in data to get: $10^2 = 25^2 + (2 \times {}^{-}5 \times s)$
   $100 = 625 - 10s$
   $10s = 625 - 100$
   $s = 525$ m

2. Use your projectile template for this problem
   a. Initial vertical velocity = 30xsin30 = 15 ms^{-1}
      Initial horizontal velocity = 30xcos30 = 26 ms^{-1}



   b. Calculate time at the max height : found when the vertical velocity = 0

Vertical	Horizontal
u = 15 ms^{-1}	dist = velocity x time
v= 0 ms^{-1}	26ms^{-1} x time
a = -9.8 ms^{-2}	
s =	
t =?	

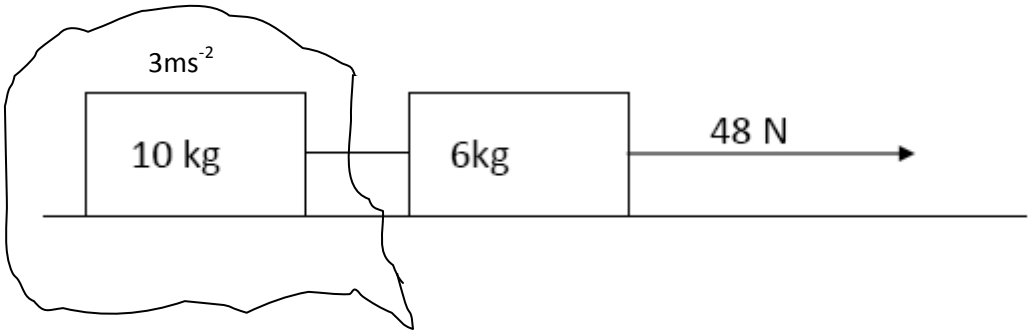
From the data given you can use	v = u + at
Insert the data	0 = 15 + (-9.8xt)
Rearrange	-15/-9.8 = t

So the time the ball reaches it max height = 1.5 seconds

c. The horizontal distance travelled by the ball can now be found by substituting double this time into the horizontal data.
We double the time because the ball will take 1.5s to reach max height and another 1.5seconds to hit the ground.
So horizontal distance = 26 x 3 = 78m

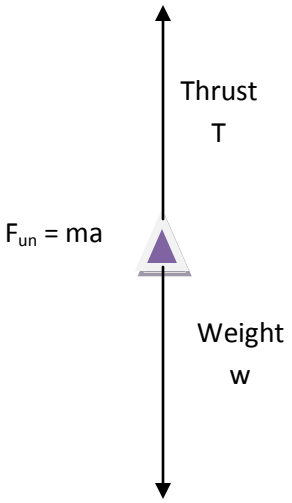
3. Unbalanced force is found as follows:
   a. $F_{un} = ma$
      $48 = 16 \times a$
      $a = 48/16$
      $a = 3ms^{-2}$ So the two masses accelerate at the same value.

   b. Now bubble wrap the 10kg mass



This 10kg mass feels a force of F = ma = 10 x 3 = 30N

4. The weight of the rocket is found from W = mg where g =9.8Nkg^{-1}
   a. So weight of the rocket = 15,000 x 9.8 = 147,000N
   b. Always draw the force diagram:
   c. From the diagram
      $F_{un} = T - w$
      Rearranging gives $T = F_{un} + w$
      Now stick in the data
      T = (15000 x 12) + (147,000)
      T = 327,000N



5. Skiers weight component parallel to the slope = mgsinΘ
    a. So Force parallel to the slope = 60 x 9.8 x $\sin 30^{o}$
       F = 294N

    b. Forces must be balanced so frictional force = 294N