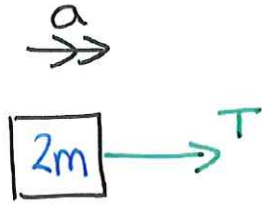


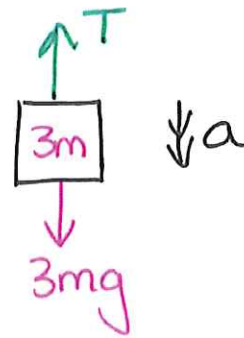
Q1.

a)



$$F = ma$$

$$T = 2ma$$



$$F = ma$$

$$3mg - T = 3ma$$

sub T

$$3mg - 2ma = 3ma$$

$$3mg = 5ma$$

$$\underline{\underline{\frac{3g}{5} = a}}$$

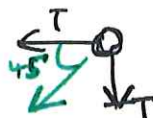
b) $T = 2ma$

$$T = 2m\left(\frac{3g}{5}\right)$$

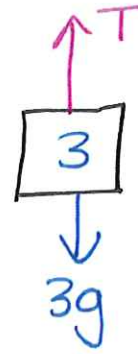
$$T = \frac{6mg}{5}$$

c) $2T \cos 45 = 2\left(\frac{6mg}{5}\right) \frac{\sqrt{2}}{2} = \frac{6mg\sqrt{2}}{5}$

Direction



Q2.



$$\begin{aligned} \text{a) } T - 0.3g &= 1.5a \\ \times 2 \\ 2T - 0.6g &= 3a \end{aligned}$$

$$3g - T = 3a$$

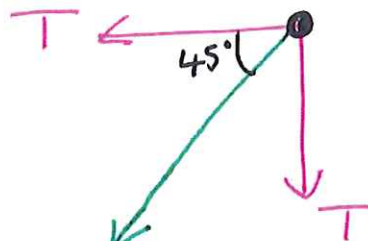
$$2T - 0.6g = 3g - T$$

$$3T = 3.6g$$

$$T = 1.2g$$

$$T = \underline{\underline{11.76 \text{ N}}}$$

b)

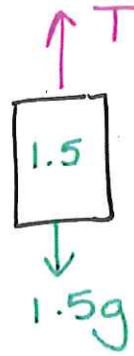


$$2T \cos 45$$

$$= 2(1.2g) \frac{\sqrt{2}}{2}$$

$$= \underline{\underline{16.6 \text{ N}}}$$

Q3.



a) $T - 12.7 = 2.5a$

$1.5g - T = 1.5a$

b)

$T = 1.5g - 1.5a$

sub in T

$1.5g - 1.5a - 12.7 = 2.5a$

$2 = 4a$

$a = \underline{\underline{\frac{1}{2} \text{ ms}^{-2}}}$

c)

1.5

$s = 1$

$u = 0$

v

$a = 0.5$

1.5

t

$s = ut + \frac{1}{2}at^2$

$1 = \frac{1}{2}(\frac{1}{2})t^2$

$4 = t^2$

$\underline{\underline{t = 2 \text{ sec}}}$

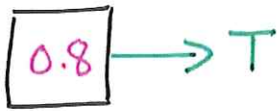
d)

Does not include air resistance

Do not model ball B as a particle but give it dimensions.

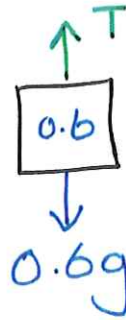
Q4.

a)



$$F = ma$$

$$T = 0.8a$$



$$F = ma$$

$$0.6g - T = 0.6a$$

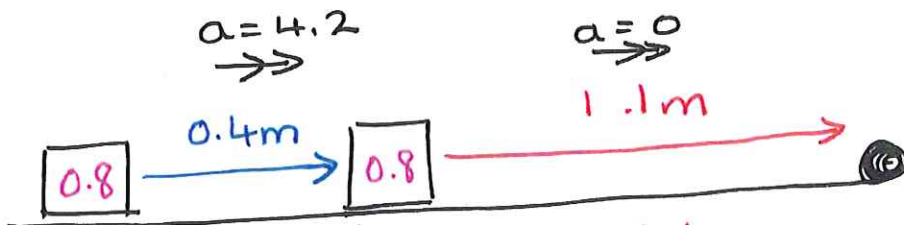
sub in T

$$0.6g - 0.8a = 0.6a$$

$$0.6g = 1.4a$$

$$a = \underline{\underline{4.2}}$$

b)



$$s = 0.4$$

$$u = 0$$

$$v$$

$$a = 4.2$$

$$t$$

$$v^2 = u^2 + 2as$$

$$v^2 = 0 + 2(4.2)(0.4)$$

$$v = 1.83$$

$$v = u + at$$

$$1.83 = 0 + 4.2t$$

$$t = 0.436$$

$$s = 1.1$$

$$u = 1.83$$

$$v = 1.83$$

$$a = 0$$

$$t$$

$$s = ut + \frac{1}{2}at^2$$

$$1.1 = 1.83t + \frac{1}{2}(0)t^2$$

$$t = \frac{1.1}{1.83} = 0.601$$

$$\text{total } t = \underline{\underline{1.037 \text{ sec}}}$$

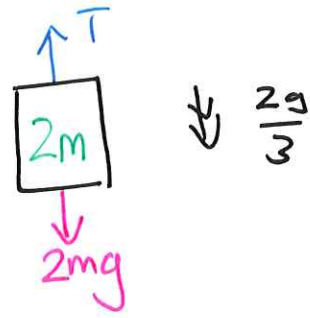
Q4.

- c) pulley being smooth
rope being light
rope being inextensible
balls being particles

* Bo for air resistance
Bo for table being smooth

Q5

$$\vec{a} = \frac{2g}{3}$$



(a) $F = ma$

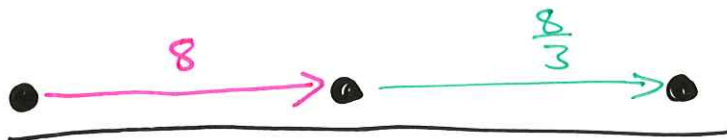
$$2mg - T = 2m \left(\frac{2g}{3} \right)$$

$$2mg - T = \frac{4mg}{3}$$

$$T = 2mg - \frac{4mg}{3}$$

$$T = \frac{2mg}{3}$$

(b)



$$s = 0$$

$$u = 0$$

$$v =$$

$$a = \frac{2g}{3}$$

$$t =$$

$$v^2 = u^2 + 2as$$

$$v^2 = 2 \left(\frac{2g}{3} \right) 8$$

$$v^2 = \frac{32g}{3}$$

$$v = \sqrt{\frac{32g}{3}}$$

$$s = \frac{8}{3}$$

$$u = \sqrt{\frac{32g}{3}}$$

$$v = \sqrt{\frac{32g}{3}}$$

$$a = 0$$

$$t$$

$$s = ut + \frac{1}{2}at^2$$

$$\text{or } s = \frac{D}{T} \therefore T = \frac{D}{s}$$

$$T = \frac{8}{3} \div \left(\sqrt{\frac{32g}{3}} \right)$$

$$T = \frac{\sqrt{30}}{21} = 0.261 \text{ (3sf)}$$