RF=ma with Lifts : Answers to Exam 2

7) 1st stage

$RF = ma$
$65g - R = 65(3{\cdot}2)$
$637 - 208 = R$
$429\,N = R$

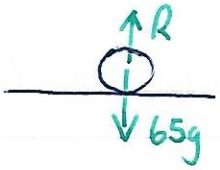
2nd Stage

$R = 65g\ N$ (zero acc means forces are equal)
$R = 637\,N$

3rd stage

$RF = ma$
$R - 65g = 65(2{\cdot}4)$
$R = 156 + 637$
$R = 793\,N$.

8)



↑ acc = 1·2 m/s²

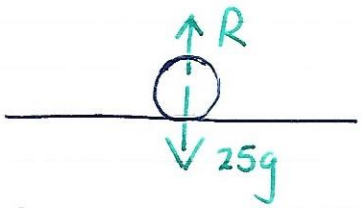
$Rf = ma$

$R - 65g = 65(1{\cdot}2)$

$R = 78 + 637$

$R = 715\ N$

9)



↓ motion

a) ↓ acc = 1·2 m/s²

$Rf = ma$

$25g - R = 25(1{\cdot}2)$

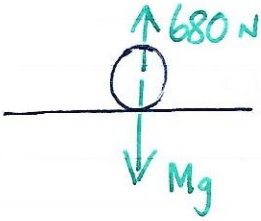
$245 - 30 = R$

$215\ N = R$

b) ↓ constant vel

$R = 25g\ N$

10)



↑ acc = 0·2 m/s²

~~$Rf = ma$~~

~~$680 - Mg = 680(0{\cdot}2)$~~

~~$680 - 136 = Mg$~~

~~$544 = M$~~

~~$9{\cdot}8$~~

$Rf = ma$

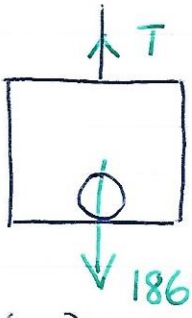
$680 - Mg = M(0{\cdot}2)$

$680 = 0{\cdot}2M + 9{\cdot}8M$

$680 = 10M$

$68\ kg = M$

Now whole system



↑ acc = 0·2 m/s²

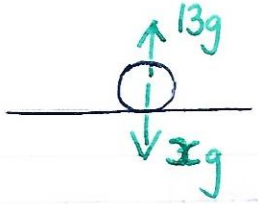
$Rf = ma$

$T - 1868g = 1868(0{\cdot}2)$

$T = 373{\cdot}6 + 18306{\cdot}4$

$T = 18{,}680\ N$

11) a)



↓ acc = 0·7 m/s²

$RF = ma$

$xg - 13g = x(0{\cdot}7)$

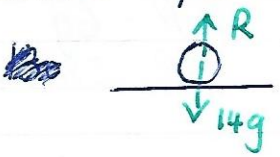
$9{\cdot}8x - 0{\cdot}7x = 13(9{\cdot}8)$

$9{\cdot}1x = 127{\cdot}4$

$x = \frac{127{\cdot}4}{9{\cdot}1}$

$x = 14\text{ kg}$

b) (i) ↑ a constant speed (irrelevant what the speed value is)



$R = 14g$

∴ Reading on scale = 14 kg.

(ii) ↓ motion but acc is ↑ 1·4 m/s²

$RF = ma$

$R - 14g = 14(1{\cdot}4)$

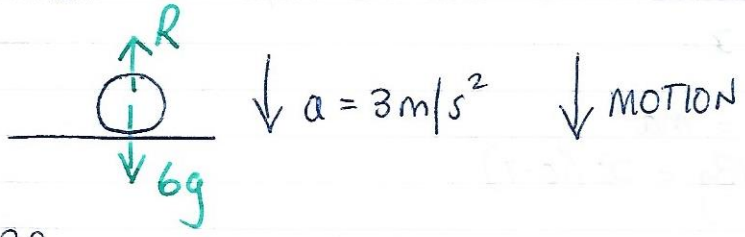
$R = 19{\cdot}6 + 137{\cdot}2$

$R = 156{\cdot}8\text{ N}$

i.e. $R = 16g\text{ N}$

∴ Reading on scale = 16 kg.

12) 1ST STAGE



$Rf = ma$

$6g - R = 6(3)$

$6(9.8) - 18 = R$

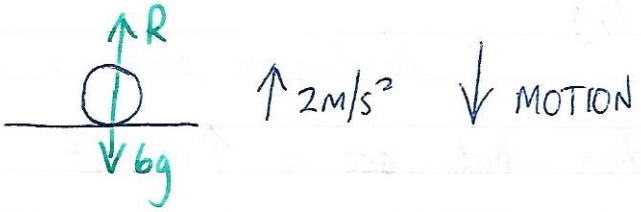
$40.8\ N = R$

2ND STAGE

Constant speed ∴ $R = 6g$

$R = 58.8\ N$

3RD STAGE



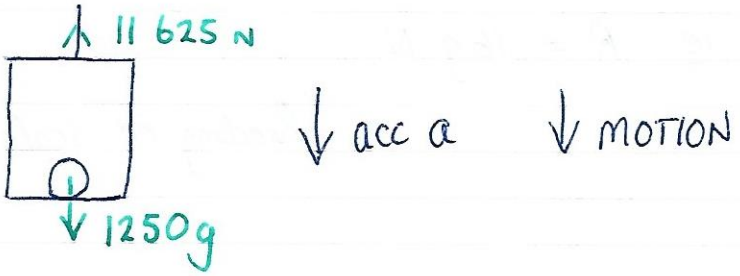
$Rf = ma$

$R - 6g = 6(2)$

$R = 12 + 58.8$

$R = 70.8\ N$

13)



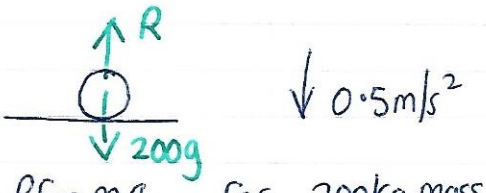
a) $Rf = ma$ whole system

$1250g - 11\,625 = 1250a$

$\frac{12250 - 11625}{1250} = a$

$0.5\ m/s^2 = a$

b)



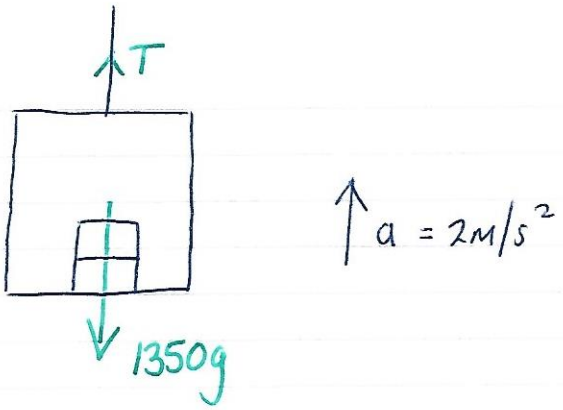
$Rf = ma$ for 200kg mass

$200g - R = 200(0.5)$

$1960 - 100 = R$

$1860\ N = R$

14) a)



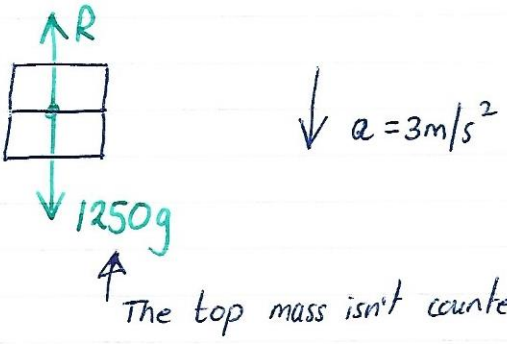
$Rf = ma$ whole system

$T - 1350g = 1350(2)$

$T = 2700 + 1350(9.8)$

$T = 15\,930\ N$

b)



$Rf = ma$ for lift and bottom mass only

$1250g - R = 1250(3)$

$1250(9.8) - 1250(3) = R$

$8500\ N = R$

NB This is the reaction between the 2 crates.

It is NOT the reaction between the floor and bottom crate!!