1 → 2 $E_v \rightarrow E_l + E_z$

2 → 3 $E_l \rightarrow E_z$

3 → 4 $E_z \rightarrow E_l$

4 → 5 $E_z \rightarrow E_l$

A)

E_{voor}	E_{na}
$\frac{1}{2}mv_1^2$	$\frac{1}{2}mv_2^2$
	mgR

En geldt $E_{voor} = E_{na}$

$\Rightarrow \frac{1}{2}mv_1^2 = mgR + \frac{1}{2}mv_2^2$

$\Rightarrow \frac{1}{2} \cdot 2{,}00^2 = 9{,}81 \cdot R + \frac{1}{2} \cdot 0{,}653^2$

$\Rightarrow R = 0{,}182\ m$

B)

E_{voor}	E_{na}
$\frac{1}{2}Cu^2$	
	$\frac{1}{2}mv^2$

En geldt $E_{voor} = E_{na}$

$\Rightarrow \frac{1}{2}Cu^2 = \frac{1}{2}mv^2$

$\Rightarrow C \cdot (5{,}0 \cdot 10^{-2})^2 = 0{,}100 \cdot 2{,}00^2$

$\Rightarrow C = 160\ N/m$

C)

E_{voor}	E_{na}
$\frac{1}{2}mv_1^2$	$\frac{1}{2}mv_2^2$
	mgR
	Q

En geldt $E_{voor} = E_{na}$

$\Rightarrow \frac{1}{2}mv_1^2 = mgR + \frac{1}{2}mv_2^2 + Q$

$\Rightarrow \frac{1}{2} \cdot 0{,}100 \cdot 2{,}00^2 = 0{,}100 \cdot 9{,}81 \cdot R + \frac{1}{2} \cdot 0{,}100 \cdot 0{,}653^2 + 8{,}52 \cdot 10^{-3}$

$\Rightarrow R = 0{,}173\ m$

A)

E_{veer}	E_{na}
mgh	-
-	$\frac{1}{2}mv^2$

En geldt $E_{veer} = E_{na}$

$\Rightarrow mgh = \frac{1}{2}mv^2$

$\Rightarrow 9,81 \times 0,20 = \frac{1}{2} \times v^2$

$\Rightarrow v = 2,0 \ m/s$

B)

E_{veer}	E_{na}
mgh	
	$\frac{1}{2}mv^2$

En geldt $E_{veer} = E_{na}$

$\Rightarrow mgh = \frac{1}{2}mv^2$

$\Rightarrow 9,81(0,10 + 0,26) = \frac{1}{2}v^2$

$\Rightarrow v = 3,0 \ m/s$

C)

E_{veer}	E_{na}
mgh	
	$\frac{1}{2}mv^2$
	Q

En geldt $E_{veer} = E_{na}$

$\Rightarrow mgh = \frac{1}{2}mv^2 + Q$

$\Rightarrow 20,0 \times 10^{-3} \times 9,81 \times 0,46 = \frac{1}{2} \times 20 \times 10^{-3} \times 2,5^2 + Q$

$\Rightarrow Q = 2,775 \times 10^{-2} \ J = 2,8 \times 10^{-2} \ J$

D) $Q = W_{F_w} = F_w \times s$

* $Q = 2,775 \times 10^{-2} \ J$
* $s = 2,0 \times 10^{-2} + \frac{0,20}{\sin 35} = 0,369 \ m$

$\Rightarrow F_w = 0,075 \ N$