Mark scheme for Support Worksheet – Topic 2, Worksheet 2

1 The scale reads the force exerted on the scale. This force is *R*, choice **B**. [1]

2 Originally, the net force on the body is $mg\sin\theta - f$ and so $mg\sin\theta - f = ma$. In the next case, $2mg\sin\theta - 2f = 2ma'$ and so $a' = a$, choice **B**. [1]

3 $p = 4.0\times 5.0 - 3.0\times 6.0 = 2.0\ \text{N s}$ [1]

4 $\Delta p = 0.20\times 2.0 - (-0.20\times 3.0)$; $\Delta p = 1.0\ \text{N s}$ [2]

5 The average net force on the ball is $\frac{\Delta p}{\Delta t} = \frac{1.0}{0.10} = 10\ \text{N}$; the net force is $R - W \approx R - 2$; and so $R - 2 = 10 \Rightarrow R = 12\ \text{N}$ [3]

6 Impulse is the change in momentum and so is $2.4\times(6.3-4.6) = 4.1\ \text{N s}$ [1]

7 Work done by a (constant) force is the product of the force times the distance travelled in the direction of the force. [1]

8 The work done by the weight is definitely $W = -mgh$ (**A**) which is the same as **B** since $h = d\sin\theta$. But $F \neq W$ so the answer must be **D**. [1]

9 From the work–kinetic energy relation we know the answer has to be **A**. [1]

10 From the work–kinetic energy relation: $F\times 12\times(-1) = 0 - 48$ and so $F = 4.0\ \text{N}$ [1]

11 Applying total energy conservation: $mgh = \frac{1}{2}mv^2$ hence
$v = \sqrt{2gh} \approx \sqrt{2\times 10\times 1.4} = \sqrt{140} \approx 12\ \text{m s}^{-1}$ [1]