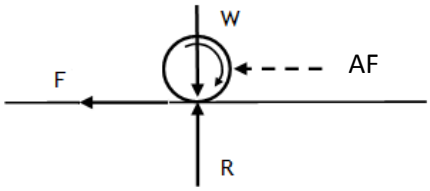
| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 13 (a) (i) | Any two of -<br><br>MP1. arrow downwards, labelled weight;<br><br>MP2. arrow upwards, labelled reaction/contact force;<br>MP3. arrow to the left, labelled air friction / air resistance / drag;<br>MP4. arrow along the surface, labelled friction;<br>e.g.<br>  <br> | In MP1, 2 & 3, position of arrows unimportant, but direction must match label<br>Allow initial letters as shown in example<br>ignore<br>• gravity<br>allow<br>• mg<br>• force of gravity<br><br>• arrow drawn on left or right<br><br>Accept arrow in either direction for MP4<br><br>N = normal contact force | 2 |
| (ii) | Any three of -<br><br>MP1. friction/resistance /drag (acts);<br>MP2. (there is an) unbalanced force;<br><br>MP3. (hence) ball decelerates;<br><br>MP4. reference to $f_{(R)} = ma$;<br>MP5. (kinetic) energy dissipates / fate of energy discussed; | ignore<br>stem<br>allow<br><br>• resistive forces > {forward/driving} force<br>• there is a resultant force<br>• its momentum changes<br>• accelerates | 3 |
| (b) (i) | idea that friction is (much) less in the air; | allow<br>• RA<br>• no contact / ground friction<br>• less energy lost | 1 |