

# Y2M5 XMQs and MS

(Total: 8 marks)

1. P3\_2018 Q7 . 8 marks - Y2M5 Forces and friction



| Question  | Scheme  | Marks | AOs  |
|---|---|-------|------|
| 7(a)  | Resolve vertically  | M1    | 3.1b |
|   | $R + 40\sin \alpha = 20g$   | A1    | 1.1b |
|   | Resolve horizontally  | M1    | 3.1b |
|   | $40\cos \alpha - F = 20a$   | A1    | 1.1b |
|   | $F = 0.14R$   | B1    | 1.2  |
|   | $a = 0.396$ or $0.40$ ( $\text{m s}^{-2}$ )                       | A1    | 2.2a |
|   |   | (6)   |      |
| (b)   | Pushing will increase $R$ which will increase available $F$       | B1    | 2.4  |
|   | Increasing $F$ will <u>decrease <math>a</math></u> * GIVEN ANSWER | B1*   | 2.4  |
|   |   | (2)   |      |
| <b>(8 marks)</b>  |   |       |      |
| <b>Notes:</b>   |   |       |      |
| <p><b>(a)</b></p> <p><b>M1:</b> Resolve vertically with usual rules applying</p> <p><b>A1:</b> Correct equation. Neither <math>g</math> nor <math>\sin \alpha</math> need to be substituted</p> <p><b>M1:</b> Apply <math>F = ma</math> horizontally, with usual rules</p> <p><b>A1:</b> Neither <math>F</math> nor <math>\cos \alpha</math> need to be substituted</p> <p><b>B1:</b> <math>F = 0.14R</math> seen (e.g. on a diagram)</p> <p><b>A1:</b> Either answer</p> |   |       |      |
| <p><b>(b)</b></p> <p><b>B1:</b> Pushing increases <math>R</math> which produces an increase in available (limiting) friction</p> <p><b>B1:</b> <math>F</math> increase produces an <u><math>a</math> decrease (need to see this)</u></p> <p><b>N.B.</b> It is possible to score B0 B1 but for the B1, some “explanation” is needed to say why friction is increased e.g. by pushing into the ground.</p>  |   |       |      |