

## Mathematics Questions by Topic

Motion and Force

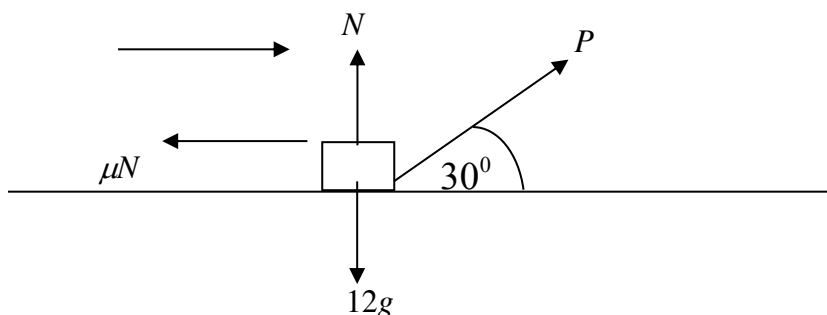
Answer 49 Source: K5SM1S25

### Question 49

A suitcase of mass 12 kilograms rests on a rough, level ground. The suitcase is pulled with a force of magnitude  $P$  newtons acting at an angle of  $30^\circ$  to the horizontal. The suitcase is just on the point of sliding along the ground. If the coefficient of friction between the suitcase and the plane is 0.25, then  $P$  is closest to

- A. 58.8
- B. 29.67
- C. 39.67
- D. 3.03
- E. 33.95

### ANSWER B



resolving parallel to the plane (1)  $P \cos(30^\circ) - 0.25N = 0$

resolving perpendicular to the plane (2)  $P \sin 30^\circ + N - 12g = 0$

from (2)  $N = 12g - P \sin(30^\circ)$  substituting into (1) gives

$$P \cos(30^\circ) - 0.25(12g - P \sin(30^\circ)) = 0$$

$$P(\cos(30^\circ) + 0.25 \sin(30^\circ)) = 0.25 \times 12g$$

$$P = \frac{3g}{\cos(30^\circ) + 0.25 \sin(30^\circ)} = 29.67 \text{ newton}$$

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