



QUESTION WORKBOOK

Forces and Newton's laws

Mechanics · Year 12–13

6 questions · 21 marks

PRINT EDITION

SECTION A · Warm-up

- A1** State Newton's first law, and what it implies about the forces on a car cruising at a steady 30 m s^{-1} in a straight line. [2]

- A2** A 1000 kg car accelerates at 2 m s^{-2} against a total resistance of 500 N. Find the driving force. [2]

SECTION B · Standard

- B1** A 6 kg crate is dragged along a floor by a horizontal rope of tension 42 N against friction of 12 N. Find the acceleration, and the normal reaction from the floor. [4]

- B2** A person of mass 70 kg stands on scales in a lift. Taking $g = 9.8 \text{ m s}^{-2}$, find the scale reading (the normal reaction) when the lift accelerates upwards at 1.5 m s^{-2} , and when it accelerates downwards at 1.5 m s^{-2} . [4]

- B3** A book rests on a table. Identify the Newton's third law partner of the normal reaction on the book, and explain why the reaction and the book's weight are not a third-law pair. [3]

SECTION C · Stretch

- C1** A car of mass 900 kg travelling at 20 m s^{-1} brakes uniformly to rest in 50 m on a level road. Find the braking force. The same braking force is then applied at 20 m s^{-1} while the car descends a slope inclined at 5° to the horizontal. Find the new stopping distance. [6]