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QUESTION WORKBOOK

# Forces and Newton's laws

Mechanics · Year 12–13

6 questions · 20 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  $30 \text{ m s}^{-1}$  in a straight line. [2]

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- A2** A 1000 kg car accelerates at  $2 \text{ m s}^{-2}$  against a total resistance of 500 N. Find the driving force. [3]

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**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  $1.5 \text{ m s}^{-2}$ , and when it accelerates downwards at  $1.5 \text{ m s}^{-2}$ . [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 900 kg car travelling at  $20 \text{ m s}^{-1}$  brakes uniformly to rest in 50 m. Find the braking force. [4]