

- 2 (a) Define *force*.

.....

[1]

- (b) Mechanical power P can be calculated using the formula $P = Fv$.

Use the concept of work and the definition of power to show how this formula is derived.

[2]

- (c) The engine of a lorry provides 130 kW of power to the lorry's wheels when it is travelling at a constant speed of 25 m s^{-1} along a straight horizontal road.

- (i) Show that the resistive force opposing the forward motion of the lorry is 5200 N.
Explain your working clearly.

[2]

- (ii) Describe, in terms of Newton's third law, the horizontal forces acting on the tyres of the lorry and on the road.

.....

.....

..... [2]

- (d) The lorry in (c) travels up a straight section of road that is inclined at an angle θ to the horizontal, as shown in Fig. 2.1.

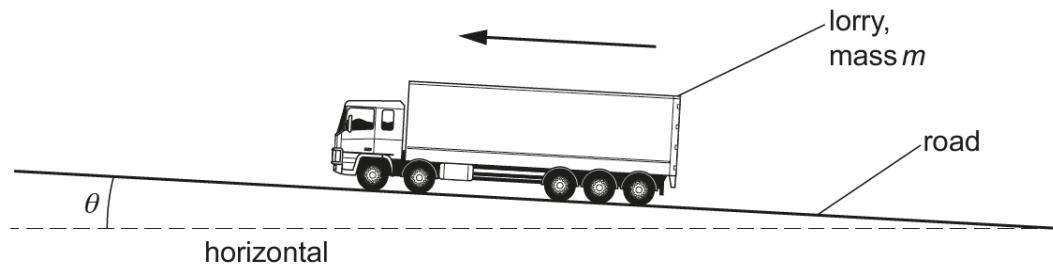


Fig. 2.1 (not to scale)

The total resistive force remains unchanged at 5200 N and the engine now provides greater power to cause an acceleration of 0.15 m s^{-2} . The total mass of the lorry is 36 000 kg. The angle θ is 1.4° .

Determine the total force provided by the engine.

$$\text{force} = \dots \text{N} [2]$$

[Total: 9]

