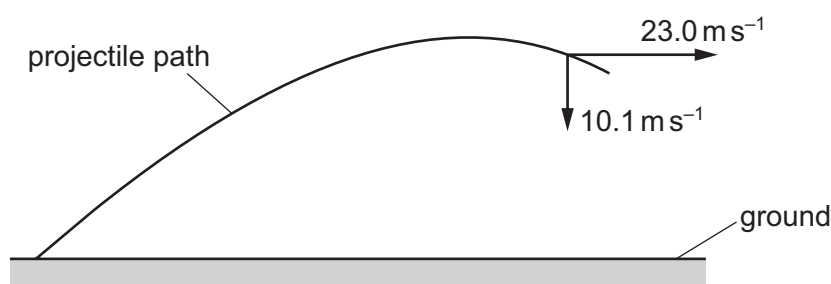


- 18 A projectile is thrown at an angle to the ground.



At a certain time, the projectile has a horizontal velocity of  $23.0 \text{ ms}^{-1}$  and a vertical velocity of  $-10.1 \text{ ms}^{-1}$ .

What is the speed of the projectile at this time?

- A  $12.9 \text{ ms}^{-1}$       B  $20.7 \text{ ms}^{-1}$       C  $25.1 \text{ ms}^{-1}$       D  $33.1 \text{ ms}^{-1}$
- 19 A car of mass  $1400 \text{ kg}$  is travelling on a straight, horizontal road at a constant speed of  $25 \text{ ms}^{-1}$ . The output power from the car's engine is  $30 \text{ kW}$ .

The car then travels up a slope at  $2^\circ$  to the horizontal, maintaining the same constant speed.



What is the output power of the car's engine when travelling up the slope?

- A  $12 \text{ kW}$       B  $31 \text{ kW}$       C  $42 \text{ kW}$       D  $65 \text{ kW}$
- 20 Two wires X and Y are made of different metals. The Young modulus of wire X is twice that of wire Y. The diameter of wire X is half that of wire Y.

The wires are extended with the same strain and obey Hooke's law.

What is the ratio  $\frac{\text{tension in wire X}}{\text{tension in wire Y}}$ ?

- A  $\frac{1}{8}$       B  $\frac{1}{2}$       C 1      D 8
- 21 A weight of  $120 \text{ kN}$  is placed on top of a metal column. The length of the column is compressed by  $0.25 \text{ mm}$ . The column obeys Hooke's law when compressed.

How much energy is stored in the compressed column?

- A  $15 \text{ J}$       B  $30 \text{ J}$       C  $15 \text{ kJ}$       D  $30 \text{ kJ}$