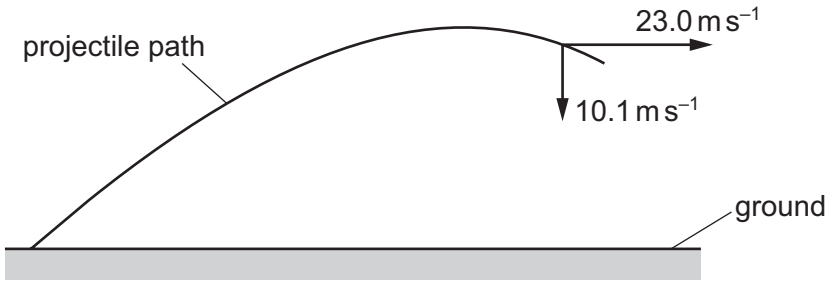
18 A projectile is thrown at an angle to the ground.



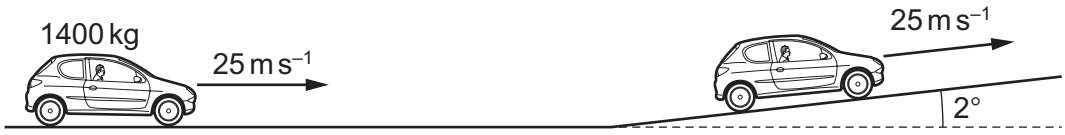
At a certain time, the projectile has a horizontal velocity of $23.0\,m\,s^{-1}$ and a vertical velocity of $-10.1\,m\,s^{-1}$.

What is the speed of the projectile at this time?

A $12.9\,m\,s^{-1}$ **B** $20.7\,m\,s^{-1}$ **C** $25.1\,m\,s^{-1}$ **D** $33.1\,m\,s^{-1}$

19 A car of mass 1400 kg is travelling on a straight, horizontal road at a constant speed of $25\,m\,s^{-1}$. The output power from the car's engine is 30 kW.

The car then travels up a slope at 2° 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 kW **B** 31 kW **C** 42 kW **D** 65 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 kN is placed on top of a metal column. The length of the column is compressed by 0.25 mm. The column obeys Hooke's law when compressed.

How much energy is stored in the compressed column?

A 15 J **B** 30 J **C** 15 kJ **D** 30 kJ