

- 1 A plane travelling at a height of 75 m above the ground with a constant horizontal velocity, is tasked to drop a package to reach point X as shown in Fig. 1.1.

To avoid damaging the package, the velocity at which the package strikes the ground cannot be more than 60 m s^{-1} .

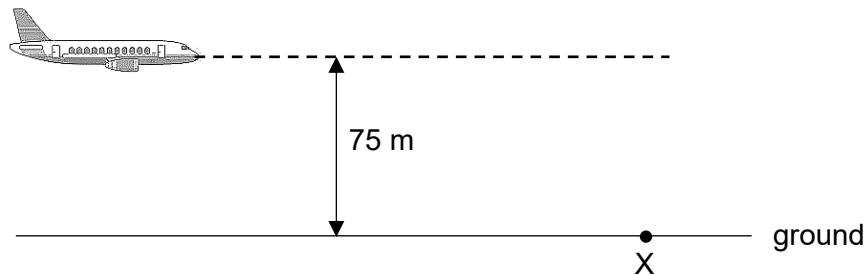


Fig. 1.1

- (a) Calculate the time taken for the package to reach the ground.

$$\text{time taken} = \dots \text{ s} \quad [2]$$

- (b) Calculate the vertical component of the velocity at which the package would strike the ground.

$$\text{vertical component of velocity} = \dots \text{ m s}^{-1} \quad [2]$$

- (c) Determine whether the package will be damaged if it is released from a horizontal distance of 150 m away from point X.

Show clear workings to justify your conclusion.

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[4]

- (d) Explain how your answer to part (a) will change if air resistance was significant.

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[2]

