Answer **all** the questions in the spaces provided.

**1** **(a)** The drag force $F_D$ acting on a sphere moving through a fluid is given by the expression

$$F_D = K\rho v^2$$

where $K$ is a constant,
$\rho$ is the density of the fluid
and $v$ is the speed of the sphere.

Determine the SI base units of $K$.

base units .....[3]

**(b)** A ball of weight 1.5 N falls vertically from rest in air. The drag force $F_D$ acting on the ball is given by the expression in **(a)**. The ball reaches a constant (terminal) speed of 33 m s$^{-1}$.

Assume that the upthrust acting on the ball is negligible and that the density of the air is uniform.

For the instant when the ball is travelling at a speed of 25 m s$^{-1}$, determine

**(i)** the drag force $F_D$ on the ball,

$F_D$ = ..... N [2]

**(ii)** the acceleration of the ball.

acceleration = ..... m s$^{-2}$ [2]

**(c)** Describe the acceleration of the ball in **(b)** as its speed changes from zero to $33\,m\,s^{-1}$.

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.....[3]

[Total: 10]