

**10** A ball is thrown upwards with a velocity of  $29.4 \text{ m s}^{-1}$ .

**(a)** Show that the ball reaches its maximum height after 3 s. [1]

**(b)** Sketch a velocity-time graph for the first 5 s of motion. [2]

**(c)** Calculate the speed of the ball 5 s after it is thrown. [3]

A second ball is thrown at  $u \text{ m s}^{-1}$  at an angle of  $\alpha^\circ$  above the horizontal. It reaches the same maximum height as the first ball.

**(d)** Use this information to write down

- the vertical component of the second ball's initial velocity,
- the time taken for the second ball to reach its greatest height. [2]

This second ball reaches its greatest height at a point which is 48 m horizontally from the point of projection.

**(e)** Calculate the values of  $u$  and  $\alpha$ . [3]