27 Sound waves, emitted by a small loudspeaker, are reflected by a wall.

The frequency f of the waves is adjusted until a stationary wave is formed with the antinode nearest the wall at a distance x from the wall.

Which expression gives f in terms of x and the speed of sound c?

A $f = \frac{4c}{x}$ **B** $f = \frac{2c}{x}$ **C** $f = \frac{c}{2x}$ **D** $f = \frac{c}{4x}$

28 A diffraction grating has N lines per unit length and is placed at 90° to monochromatic light of wavelength λ.

What is the expression for θ, the angle to the normal to the grating at which the third order diffraction peak is observed?

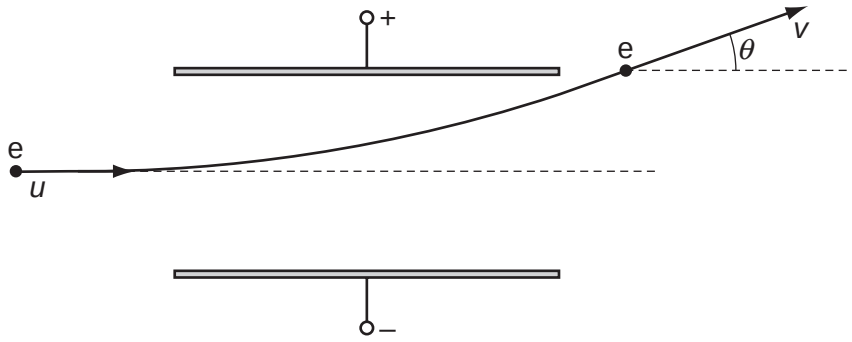
A $\sin\theta = \frac{1}{3N\lambda}$ **B** $\sin\theta = 3N\lambda$ **C** $\sin\theta = \frac{N\lambda}{3}$ **D** $\sin\theta = \frac{3\lambda}{N}$

29 Light of wavelength 700 nm is incident on a pair of slits, forming fringes 3.0 mm apart on a screen.

What is the fringe spacing when light of wavelength 350 nm is used and the slit separation is doubled?

A 0.75 mm **B** 1.5 mm **C** 3.0 mm **D** 6.0 mm

30 An electron enters the space between two parallel charged plates with an initial velocity u.



While in the electric field, its direction changes by θ and it emerges with a velocity v.

What is the relation between v and u?

A $v = \frac{u}{\cos\theta}$ **B** $v = u\cos\theta$ **C** $v = \frac{u}{\sin\theta}$ **D** $v = u\sin\theta$