

- 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  $90^\circ$  to monochromatic light of wavelength  $\lambda$ .

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

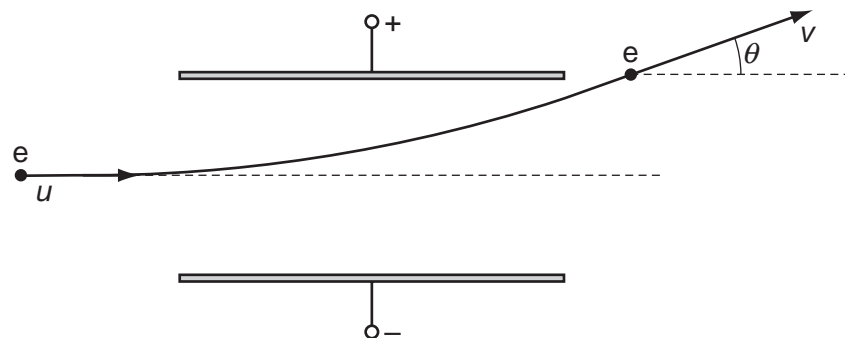
- A  $\sin \theta = \frac{1}{3N\lambda}$       B  $\sin \theta = 3N\lambda$       C  $\sin \theta = \frac{N\lambda}{3}$       D  $\sin \theta = \frac{3\lambda}{N}$

- 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  $\theta$  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  $v = u \sin \theta$