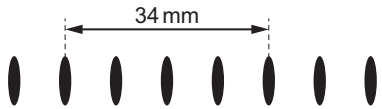
28 A student carries out a double-slit experiment using a laser emitting red light of wavelength of 680 nm. The light is incident normally on a double slit.

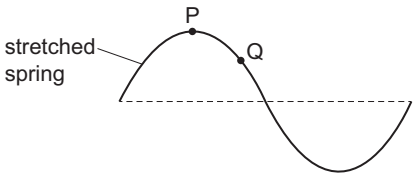
The diagram shows part of the pattern of bright fringes visible on a screen at a distance of 2.4 m from the slits. The distance across five bright fringes is measured as 34 mm.



What is the slit separation?

A 8.5×10^{-3} m **B** 2.4×10^{-4} m **C** 1.9×10^{-4} m **D** 4.8×10^{-5} m

29 The diagram shows a stationary wave on a stretched spring at an instant in time.



Two particles on the spring, P and Q, are shown.

Which statement about the vibrations of P and Q is correct?

A They have different frequencies.

B They have the same amplitudes.

C They have different periods.

D They are always in phase.

30 Green laser light passes through a diffraction grating and forms an interference pattern.

The diffraction grating contains 400 lines per mm.

The wavelength of the laser light is 550 nm.

What is the highest order diffraction maximum produced by the grating?

A 4 **B** 5 **C** 8 **D** 9

28 A light wave passes through a single slit and a diffraction pattern forms.

What happens to the frequency and the speed of the wave when it is diffracted?

	frequency	speed
A	decreases	increases
B	increases	decreases
C	no change	decreases
D	no change	no change

29 The equation $n\lambda = d\sin\theta$ can be used with a diffraction grating to find the wavelength of visible light.

Which quantity is **not** correct for use in this equation?

	symbol	quantity
A	d	distance from grating to screen
B	λ	wavelength of light
C	n	order of intensity maximum
D	θ	diffraction angle of intensity maximum

30 Two progressive sound waves move in opposite directions and superpose to form a stationary wave.

Which statement describes an antinode of this stationary wave?

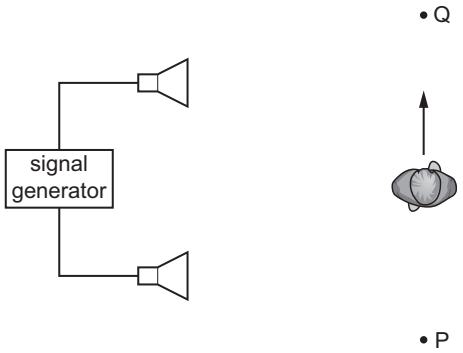
A a position where the phase difference between the two waves is always 0°

B a position where the phase difference between the two waves is always 180°

C a position where the stationary wave has maximum amplitude

D a position where the stationary wave has minimum amplitude

31 A student connects two loudspeakers to a signal generator.



As the student walks from P to Q, he notices that the loudness of the sound rises and falls repeatedly.

What causes the loudness of the sound to vary?

A diffraction of the sound waves

B Doppler shift of the sound waves

C interference of the sound waves

D reflection of the sound waves

24 Which row is correct for sound waves?

	can travel in a vacuum	can be polarised	can diffract through a gap
A	no	no	yes
B	yes	no	no
C	no	yes	no
D	no	yes	yes

26 For a progressive transverse wave, what describes the term diffraction?

A the change in observed frequency of a wave due to a movement of the wave source

B the spreading of a wave as it passes through a gap or around an obstacle

C when oscillations of a wave are confined to one plane

D the resultant displacement of two waves is equal to the sum of the displacements of the individual waves when the waves meet

29 A wire is fixed at both ends and is vibrated by a source of frequency *f*. A stationary wave is formed on the wire with a total of two antinodes.

The frequency of the source is increased to 3*f* and a new stationary wave is formed.

What is the total number of antinodes on the new wave?

A 4 **B** 5 **C** 6 **D** 9