

Solutions

2.1 D $d \sin\theta = n\lambda$ and $a \sin\theta = \pm\lambda$ coincide when $n = \pm d/a = \pm 4$.

Compare the rejected options: ± 1 ; ± 2 ; ± 3 ; Only 0. Use the stated model and conditions.

2.2 C Spacing $\lambda L/d$ is unchanged; central envelope width $2\lambda L/a$ halves.

Compare the rejected options: Spacing and envelope both double; Fringe spacing halves; envelope fixed; Envelope doubles; fringe spacing fixed; All intensity zeros disappear. Use the stated model and conditions.

2.3 6. $2L\lambda/a = 0.006 \text{ m} = 6 \text{ mm}$.

2.4 False. The limit is one; the apparent $0/0$ is removable, and the centre is the intensity maximum.

3.1 Coincidence requires $n = m(d/a) = 3m/2$ with both m, n nonzero integers. Thus m must be even and missing orders are $n = 3, 6, 9, \dots$. Central centres obey $|n| < 3/2$, so $n = -1, 0, 1$: three. Fractional d/a describes actual geometry; rounding changes which zeros coincide. Award integer condition, missing sequence, count and explanation.