

Solutions

2.1 Answer: B. Objective focal length is $72-12=60$ cm; $60/12=5$.

Compare the rejected options: 4; 6; 12; 60. Use the stated model and conditions.

2.2 Answer: C. $R \approx 400/2=200$; wavelength and separation use the same units.

Compare the rejected options: 2; 100; 400; 800. Use the stated model and conditions.

2.3 300. The light crosses the changed distance outbound and returning.

2.4 False. They are measured from its normal; the surface angle is complementary.

3.1 $|m\lambda/d| \leq 1$ gives $m \leq 3.33$, hence largest integer order 3. $R = mN = 15000$ and $\Delta\lambda = \lambda/R = 600 \text{ nm}/15000 = 0.040 \text{ nm}$. Spacing sets the order angles; illuminated slit count narrows the peaks and improves resolution. Award order condition, order, resolving limit and distinction. The ideal limit assumes uniform illumination.