

NANO 703/703L - Quiz 1

1) The following questions are multiple choice. Please *circle* the correct answer.

Show work for maximum credit.

a) Find the wavelength of an electron accelerated to an energy of 265 KeV:

- (i) 0.278 nm (ii) 0.00363 nm (iii) 0.00238 nm
(iv) 0.00468 nm (v) 0.00212 nm (vi) 0.00871 nm
(vii) none of the above
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b) The angle θ subtended by an arc of length $\ell = 0.587$ mm with radius of curvature $R = 27.9$ mm is:

- (i) 0.1314 rad (ii) 21.0 mrad (iii) 0.754 rad
(iv) 1.205 mrad (v) 0.484 mad (vi) 0.298 rad
(vii) none of the above
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c) The sine of angle $\theta = 0.0050$ rad is approximately:

- (i) 0.010 (ii) 8.7×10^{-5} (iii) 1
(iv) 0.0050 (v) 0.50 (vi) -0.010
(vii) none of the above
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2) Identify the following statements as true or false (T/F):

Additional justification may be added to clarify your answer.

- a) ____ De Broglie proposed that the *wavelength* of any particle depends on its *momentum*.
- b) ____ An electron's wavelength *decreases* when its kinetic energy is increased.
- c) ____ Electrons are accelerated to high energies in the TEM column by the application of *magnetic* fields. *Electric* fields are mainly used by lenses to focus the electrons.
- d) ____ Forward, elastically scattered electrons are mostly *incoherent* with respect to the incident beam, whereas elastically backscattered electrons are mostly *coherent*.