

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 342KeV:

- (i) 0.00210 nm (ii) 0.00363 nm (iii) 0.00504 nm
(iv) 0.00182 nm (v) 0.278 nm (vi) 0.00871 nm
(vii) none of the above
(viii) more than one of the above
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b) The angle θ subtended by an arc of length $\ell = 0.652$ mm with radius of curvature $R = 31.8$ mm is:

- (i) 0.1314 rad (ii) 20.5 mrad (iii) 0.645 rad
(iv) 1.175 rad (v) 0.484 rad (vi) 0.298 rad
(vii) none of the above
(viii) more than one of the above
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c) The quantity 47.60921783 cm rounded off to four significant figures is:

- (i) 47.00 cm (ii) 47.6092 cm (iii) 47.60 cm
(iv) 47.6000 cm (v) 48.00 cm (vi) 47.61 cm
(vii) none of the above
(viii) more than one 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) ___ An electron's wavelength *decreases* when its kinetic energy is increased.
- b) ___ De Broglie proposed that the *wavelength* of any particle depends on its *momentum*.
- 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 highly *coherent*.