Exam 6

Please see next page for solutions

Summer2014						
Rnumber	Exam1	Exam2	Exam3	Exam4	Exam5	Exam6
R00296499	87	100	100	100	100	34
R00450847	100	87	100	100	100	17
R00451366	100	100	100	100		74
R00497452	100	87	100	87	100	34
R00671146	100	100	100	100	100	50
R00671670	100	100	100	100	100	34
R00838754	100	100	100	100	100	74
R00846648	100	87	100	74	100	74
R00857859	100	100	100	74	100	34
R00869505	100	100	100	87	100	34
R00895512	100	100	100	100	87	50
R00918606	87	87	100	100	100	34
R00926737	100	100	100	100	100	17
R00930302	100	87	100	100	100	50
R00931942	100	100	100	87	100	34
R00957322	100	100	100	100	100	34
R00992757	100	100	100	100	100	50
R01001345	100	100	100	100	100	17
R01009853	100	87	100	100	100	
R01010199	100	87	100	100	100	74
R01015329	87					
R01038967	100	95	100	100	100	34
R01070373	100	100	100	100	100	34
R01082320	100	95	100	100	100	50
R01106408	100	100	100	100	100	34
R01118694	100	100	100	100	100	50
R01125414	100	100	100	100	100	50
R01207322	100	87	100	87	100	74
R01309865	100	87	100	100	100	
R01343012	100	100	100	100	100	34

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#1. A single slit diffraction pattern has the central maximum width of 1 mm. Given the wavelength of 500 nm and slit width of 0.01 mm, what is the distance from the slit to the observation screen?
A. **1 m**
B. 0.1 m
C. 71 cm
D. 0.71 m
E. None of the above

#2. In a two slit experiment, the second diffraction minimum coincides with the 11-th interference maximum. Which statement is true:
1. The ratio of slit width over inter-slit distance is 23
2. The light wavelength is 507 nm.
3. The light pathway goes slightly below horizontal
4. One slit is wider than the other.
5. None of the above

#3. In a diffraction grating, the line width is 1000 times narrower than fringe width obtained in the diffraction experiment with just one ruling of that grating. Which statement is true:
A. **The number of rulings is 1000**
B. The number of rulings is 33
C. The number of rulings is 100,000
D. The number of rulings is impossible to evaluate
E. None of the above

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#4. According to Special Relativity, which statement is true:
1. The linear dimension of an object remains the same in any two inertial systems
2. **The linear dimension of an object is shorter in a system that uses two clocks**
3. The linear dimension of the object depends on the acceleration due to gravity
4. The linear dimensions of all objects have bean determined by Einstein
5. None of the above

#5. Evaluate the energy needed to accelerate the electron from zero velocity to 0.99 c
A. 0.51 MeV
B. **5.11 MeV**
C. 13 J
D. 22°
E. 18 C

#6. As the light of frequency ν =12 THz penetrates a medium of refraction index n=2, its momentum:
A. changes to $2.4*10^{-24}$ kg-m/s
B. Remains the same
C. Becomes real and smaller than the object
D. Becomes virtual and the same size as the object
E. changes to $4.8*10^{-24}$ kg-m/s
F. Can't be evaluated

This problem has a typo. Therefore everybody was given a credit of 17% for #6