CHAPTER / UNIT # 16 ANSWER SHEET NAME: KEY

COPY # _____ PERIOD: _____

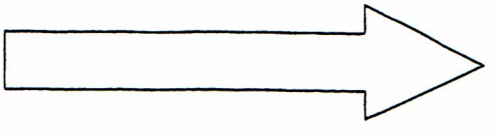
FORM PRE-TEST / DATE: _____

DIRECTIONS: Use the back side for any Bonus problems and be sure to identify the bonus area. The "Work Area" is to be used like scrap paper. If you need additional paper, raise your hand and I will provide you additional paper. Any extra scrap paper needs to be stapled to this answer sheet. GOOD LUCK!!

A	1.	____	26.
B	2.	____	27.
C	3.	____	28.
D	4.	____	29.
C	5.	____	30.
B	6.	____	31.
B	7.	____	32.
D	8.	____	33.
E	9.	____	34.
B	10.	____	35.
____	11.	____	36.
____	12.	____	37.
____	13.	____	38.
____	14.	____	39.
____	15.	____	40.
____	16.	____	41.
____	17.	____	42.
____	18.	____	43.
____	19.	____	44.
____	20.	____	45.
____	21.	____	46.
____	22.	____	47.
____	23.	____	48.
____	24.	____	49.
____	25	____	50.

WORK AREA

BONUS WORK ON BACK



UCONN Physics 1202q Name: KEY

Unit 16 / Chapter 28 Pre-Quest /20 + /50 = /70 Date: _____ Period _____

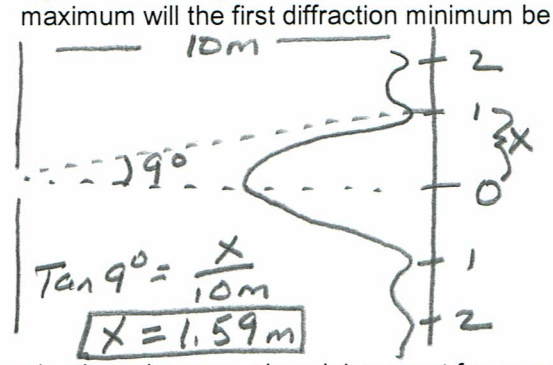
"Interference and Diffraction"

Directions: Be sure to show all of your work in the space provided below to receive credit.

Free Response Section: 10 pts each.

1. Light of wavelength 550 nm falls on a slit that is 3.5×10^{-3} mm wide. How far from the central maximum will the first diffraction minimum be if the screen is 10 m away?

$\lambda = 550\ nm$
$d = 3.5 \times 10^{-3}\ mm$
$m = 1$



$d \sin\theta = m\lambda$

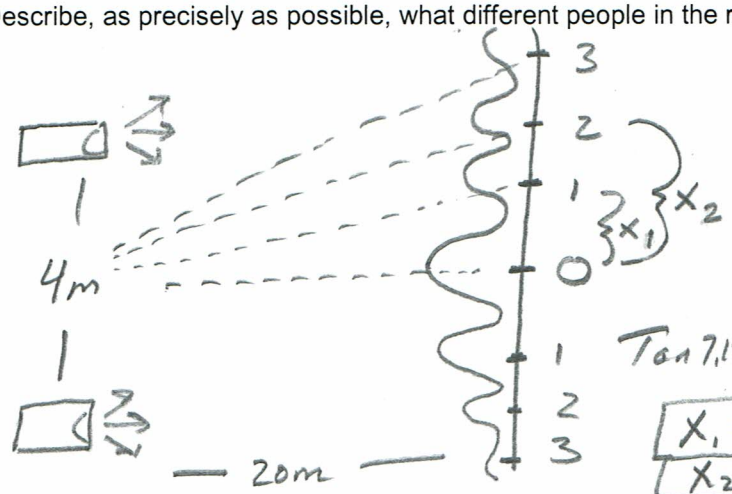
$\sin\theta = \frac{m\lambda}{d} = \frac{1 \cdot 550 \times 10^{-9}\ m}{3.5 \times 10^{-6}\ m}$

$\theta = 9°$

2. Two loudspeakers are placed 4 m apart for an open-air concert. They are playing back a flute sounding a note of 680 Hz. Members of the audience sit in a row, 20 m from the loudspeakers, parallel to the line between the loudspeakers.
Take the speed of sound as 340 m s^{-1}.

Describe, as precisely as possible, what different people in the row will hear.

$\lambda = \frac{v}{f}$
$\lambda = .5m$
$f = 680\ Hz$
$v = 340\ \frac{m}{s}$
$d = 4m$



$d \sin\theta = m\lambda$ $m = 1, 2, 3$

$\sin\theta = \frac{m\lambda}{d}$

$\theta_1 = 7.18°$
$\theta_2 = 14.48°$
$\theta_3 = 22.02°$

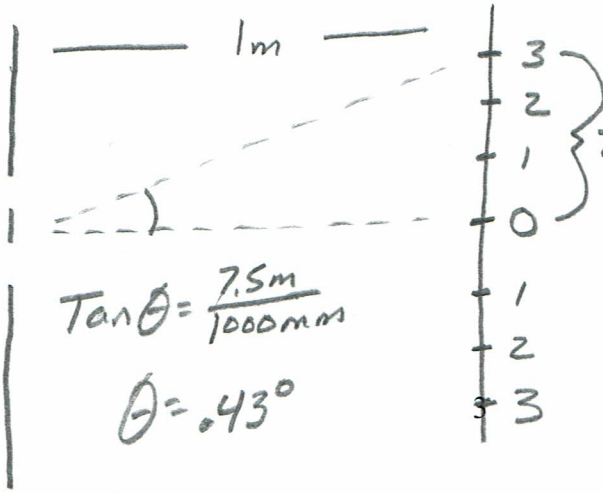
$\tan 7.18° = \frac{X_1}{20m}$

$X_1 = 2.52m$
$X_2 = 5.16m$
$X_3 = 8.09m$

Loud sound @ These points & Quiet in between

3. With two slits spaced 0.2mm apart, and a screen at a distance of *l*=1m, the third bright fringe is found to be displaced h=7.5mm from the central fringe. Show that the wavelength, λ, of the light used is $5 \times 10^{-7}\ m$.

$d = .2mm$



$\tan\theta = \frac{7.5m}{1000mm}$

$\theta = .43°$

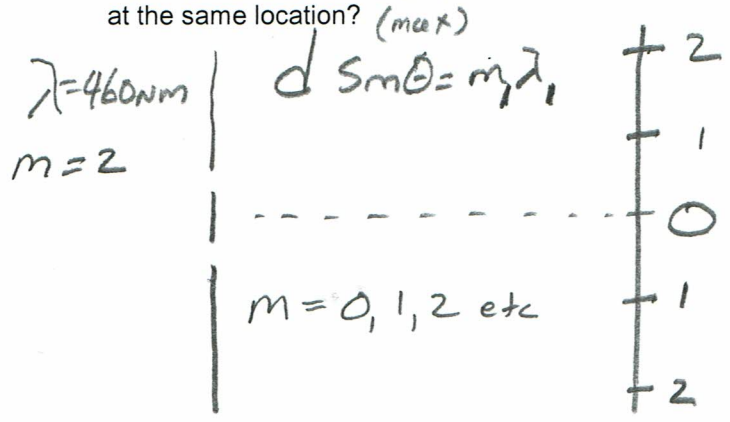
$d \sin\theta = m\lambda$

$\frac{d \sin\theta}{m} = \lambda$

$\frac{.2 \times 10^{-3}\ m \cdot \sin 0.43°}{3} = \lambda$

$5 \times 10^{-7}\ m = \lambda$

4. In a double-slit experiment it is found that blue light of wavelength 460 nm gives a second-order maximum at a certain location on the screen. What wavelength of visible light would have a minimum at the same location?



$d \sin\theta = (m + \frac{1}{2})\lambda$ (min)

(MAX) (MIN)

$m_1\lambda_1 = m_1 + \frac{1}{2}\lambda$

$2\ 460\text{nm} = (0 + \frac{1}{2})\lambda$

$2\ 460\text{nm} = (1 + \frac{1}{2})\lambda$

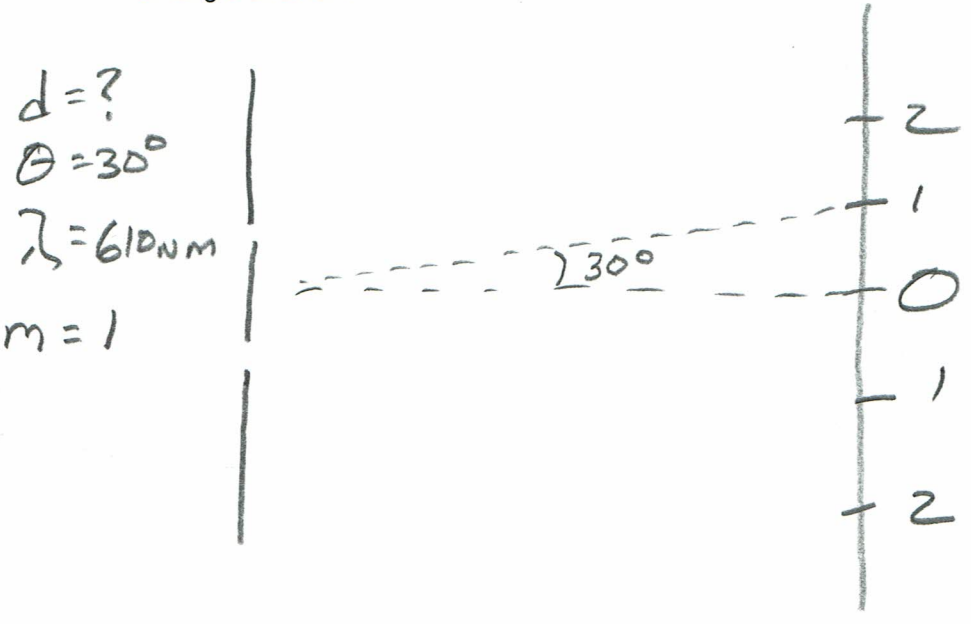
$2\ 460\text{nm} = (2 + \frac{1}{2})\lambda$

$\lambda_{@0} = 1840\text{nm}$ – TOO HIGH –

$\lambda_{@1} = 613\text{nm}$

$\lambda_{@2} = 368\text{nm}$ – TOO LOW –

5. What is the separation between two slits for which 610-nm orange light has its first maximum at an angle of 30.0°?



$d \sin\theta = m\lambda$

$d = \frac{m\lambda}{\sin\theta}$

$d = \frac{1 \cdot 610 \times 10^{-9}\text{m}}{\sin 30^\circ}$

$d = 1.22 \times 10^{-6}\text{m}$

or

$1.22\,\mu\text{m}$