**PHYSICS 2021 - 22 May 24, 2022**

**Today’s Agenda (Day 164)**

1. HOUSEKEEPING ITEMS

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1. HOMEWORK CHECK:

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1. CLASS ACTIVITY

🡪TEST: Chapter 18

 \*Go to [www.socrative.com](http://www.socrative.com) 🡪 enter room “MSBPHYSICS” 🡪 enter ID #

🡪 WEDNESDAY: Ch 19 PPT Review

1. **Section 19.2 - Diffraction**

HOMEWORK:

* READ: Chapter 18 – Refraction and Lenses
* READ: Chapter 19 – Interference and Diffraction
* STUDY: Chapter 18Test

<http://glencoe.mheducation.com/sites/0078807220/student_view0/self-check_quizzes.html>

Ch 19 – Interference and Diffraction

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| Incoherent light | Coherent light | Interference fringes | Monochromatic light |
| Thin-film interference | Diffraction pattern | Diffraction grating | Rayleigh criterion |

REMINDERS:

* TEST: Chapter 18 **🡪 May 24**
* TEST: Chapter 19 **🡪 June 2**

**PHYSICS 2021 - 22 Review Questions**

 **CH 19 PRACTICE PROBLEMS**

SECTION 19.1 - Interference

1. Violet light falls on two slits separated by 1.90×10−5 m. A first-order bright band appears 13.2 mm from the central bright band on a screen 0.600 m from the slits. What is the λ?
2. Yellow orange light from a sodium lamp of wavelength 596 nm is aimed at two slits that are separated by 1.90 x 105 m. What is the distance from the central band to the first-order yellow band if the screen is 0.600 m from the slits?
3. In a double-slit experiment, physics students use a laser with λ = 632.8 nm. A student places the screen 1.00 m from the slits and find the first-order bright band 65.5 mm from the central line. What is the slit separation?
4. Yellow-orange light with a wavelength of 596 nm passes through two slits that are separated by 2.25×105 m and makes an interference pattern on a screen. If the distance from the central line to the first-order yellow band is 2.00×10−2 m, how far is the screen from the slits?
5. A glass lens has a non-reflective coating placed on it. If a film of magnesium fluoride is placed on the glass, how thick should the layer be to keep yellow-green light (λ = 555 nm) from being reflected? See the sketch in Figure 9.



1. You can observe thin-film interference by dipping a bubble wand into some bubble solution and holding the wand in the air. What is the thickness of the thinnest soap film at which you would see a black stripe if the light illuminating the film has a wavelength of 521 nm? Use n = 1.33 for the bubble solution.
2. What is the thinnest soap film (n = 1.33) for which light of wavelength 521 nm will constructively interfere with itself?
3. Two very narrow slits are cut close to each other in a large piece of cardboard. They are illuminated by monochromatic red light. A sheet of white paper is placed far from the slits, and a pattern of bright and dark bands is seen on the paper. Describe how a wave behaves when it encounters a slit, and explain why some regions are bright while others are dark. Sketch the pattern described.
4. Sketch what happens to the pattern in the previous problem when the red light is replaced by blue light.
5. Lucien is blowing bubbles and holds the bubble wand with a soap film (n = 1.33) in it vertically.

a) What is the second thinnest width of the soap film at which he could see a bright stripe if the light illuminating the film has a wavelength of 575 nm? B) What other widths produce a bright stripe at 575 nm?

SECTION 19.2

1. Monochromatic green light of wavelength 546 nm falls on a single slit with a width of 0.095 mm. The slit is located 75 cm from a screen. How wide will the central bright band be?
2. Yellow light with a wavelength of 589 nm passes through a slit of width 0.110 mm and makes a pattern on a screen.  If the width of the central bright band is 2.60×10−2 m, how far is it from the slits to the screen?
3. Light from a He-Ne laser (λ = 632.8 nm) falls on a slit of unknown width. A pattern is formed on a screen 1.15 m away, on which

the central bright band is 15.0 mm wide. How wide is the slit?

1. Yellow light falls on a single slit 0.0295 mm wide. On a screen that is 60.0 cm away, the central bright

band is 24.0 mm wide. What is the wavelength of the light?

1. White light shines through a grating onto a screen. Describe the pattern that is produced.
2. If blue light of wavelength 434 nm shines on a diffraction grating and the spacing of the resulting lines

on a screen that is 1.05 m away is 0.55 m, what is the spacing between the slits in the grating?

1. A diffraction grating with slits separated by 8.60×10−7 m is illuminated by violet light with a wavelength of 421 nm. If the screen is 80.0 cm from the grating, what is the separation of the lines in the diffraction pattern?
2. White light falls on a single slit that is 0.050 mm wide. A screen is placed 1.00 m away. A student first puts a blue-violet filter (λ = 441 nm) over the slit, then a red filter (λ = 622 nm). The student measures the width of the central bright band.

a) Which filter produced the wider band?

b) Calculate the width of the central bright band for both filters.

1. A diffraction grating with slits separated by 8.60×10−7 m is illuminated by violet light with a wavelength of 421 nm. If the screen is 80.0 cm from the grating, what is the separation of the lines in the diffraction pattern?
2. Light of wavelength 632 nm passes through a diffraction grating and creates a pattern on a screen that

is 0.55 m away. If the first bright band is 5.6 cm from the central bright band, how many slits per centimeter does the grating have?