**Diffraction Questions from 12.2A**

**Young’s Double Slit:**

1. Two slits are separated by a small distance and are illuminated by 575 nm light. The interference pattern has bright fringes that are 1.13 cm apart on a screen that is 2.46 m away. a. What distance separates the two slits? (0.125 mm) b. What is the angle between the second order and the fifth order fringes on one side? (0.790o)

2. Two slits are separated by a distance of 0.245 mm and are illuminated by monochromatic light. The interference pattern has bright fringes separated by 1.41 cm and falls on a screen that is 5.59 m away. a. What is the wavelength of light? (618 nm) b. What is the distance on the screen between the central maximum and the fourth order maximum? (5.64 cm)

3. Two slits are separated by a distance of 0.251 mm and are illuminated by 647 nm light. The interference pattern has fringes separated by a distance of 1.52 cm on a screen some distance away. a. What is the distance to the screen? (5.90 m) b. What is the angle between the central maximum and the fourth order maximum? (0.591o)

4. Two slits are separated by a small distance and are illuminated by 478 nm light. The interference pattern has fringes separated by 1.65 cm on a screen that is 3.25 m away. a. What distance separates the slits? (9.42x10-5 m) b. What is the distance on the screen between the first order and the third order maximum on one side? (3.30 cm)

5. Two slits are separated by a distance of 0.280 mm and are illuminated by 652 nm light. The interference pattern falls on a screen that is 2.06 m away. a. What distance separates the fringes on the screen? (0.480 cm) b. What is the angle between the central maximum and the second order maximum? (0.267o)

**Single Slit:**

6. A single slit is illuminated by 460. nm light. The angular width of the central maximum is 1.20o. What is the width of the slit? (0.0439 mm)

7. A single slit has a width of 0.0680 mm and is illuminated by 715 nm light. What is the angle between the center of the central maximum, and the second minimum on one side? (1.20o)

8. A single slit has width of 0.0287 mm. There is an angle of 2.15o separating the center of the first maximum on one side with the center of the first maximum on the other side. What is the wavelength of light? (359 nm)

9. A single slit is illuminated by 656 nm light, and there is a 3.10o angle between the second maximum on one side, and the center of the central maximum. What is the width of the slit? (0.0303 mm)

10. A single slit has a width of 0.0243 mm, and there is a angle of 2.61o between the first maximum on one side, and the third minimum on the same side. What is the wavelength of the light? (738 nm)

11. A single slit has a width of 0.130 mm and is illuminated by monochromatic light. A screen 1.51 m away has a pattern where the center of the central maximum is separated from the center of the next maximum by a distance of 0.857 cm. What is the wavelength of light? (492 nm)

12. A single slit has a width of 0.113 mm and is illuminated by 635 nm light. The interference pattern is projected on a screen that is 4.51 m away. What is the distance on the screen from the center of the first maximum on the left side to the center of the first maximum on right side? (7.60 cm)

13. A single slit has a width of 0.0748 mm and is illuminated by 524 nm light. A screen some distance away has a central maximum pattern that is 3.24 cm wide. What is the distance to the screen? (2.31 m)

14. A single slit is illuminated by 524 nm light. A screen 4.20 m away has a central maximum pattern where the first minimum on one side is separated from the second by a distance of 1.26 cm. What is the width of the slit? (1.75x10-4 m)

15. A single slit has a width of 0.152 mm and is illuminated by 740 nm light. The interference pattern is projected on a screen that is 2.57 m away. What is the distance on the screen from the center of the central maximum to the center of the second maximum on one side? (3.13 cm)

**Diffraction Gratings:**

16. A diffraction grating has 6126 lines per cm. It is illuminated by a monochromatic light, and the central maximum and third order fringe are separated by 31.0o. What is the wavelength of the light? (280 nm)

17. A diffraction grating has 3852 lines per cm. It is illuminated by 398 nm light. What angle separates the second order and the fourth order fringes? (20.0o)

18. A diffraction grating is illuminated by 428 nm light. There is an angle of 3.58o between the central maximum and the second order fringe on one side. How many lines per cm does the grating have? (729 lines/cm)

19. A diffraction grating has 2083 lines/cm. It is illuminated by a monochromatic light beam. There is an angular separation of 8.13o between the central maximum and the first order fringe. What is the wavelength of light? (679 nm)

20. A diffraction grating is illuminated by a 596 nm light. There is an angle of 38.2o between the central maximum and the third order fringe on one side. How many lines per cm does the grating have? (3459 lines/cm)