

Wave optics

Name: _____

Class: _____

Start time: _____

End time: _____



Worksheet: Interference vs Diffraction

Part 1: Conceptual Questions (Short Answer)

1. Define interference and diffraction in your own words.

- _____
- _____

2. Explain why interference requires coherent sources but diffraction can occur with a single wave.

- _____
- _____

3. Describe the appearance of the central maximum in a diffraction pattern. How is it different from an interference pattern?

- _____
- _____

4. What happens to the width of the central diffraction maximum if the width of the slit is reduced? Explain why.

- _____
- _____

5. Give two everyday examples of diffraction in real life.

- _____
- _____

Part 2: Multiple Choice Questions (MCQs)

1. In an interference pattern, the bright and dark fringes are:

- a) Equally spaced and equally bright.
- b) Unequally spaced, but equally bright.
- c) Equally spaced, and bright fringes have the same intensity.
- d) Unequally spaced, and bright fringes have varying intensity.

Answer: _____

2. In a diffraction pattern, the central maximum is:
- a) Of the same width as the other maxima.
 - b) Wider and more intense than the other maxima.
 - c) Narrower and less intense than the other maxima.
 - d) Equal in intensity to the other maxima.

Answer: _____

3. Diffraction occurs when light:
- a) Passes through two closely spaced slits.
 - b) Passes through a small slit or around an obstacle.
 - c) Travels in straight lines only.
 - d) Interacts with a smooth surface.

Answer: _____

4. Interference is caused by the:
- a) Bending of light around an obstacle.
 - b) Superposition of light from two or more coherent sources.
 - c) Reflection of light from a smooth surface.
 - d) Refraction of light through a medium.

Answer: _____

5. As the slit width decreases in a diffraction experiment, the diffraction pattern will:
- a) Become narrower.
 - b) Spread out wider.
 - c) Remain the same.
 - d) Disappear completely.

Answer: _____

Part 3: Fill-in-the-Blanks

1. In interference, the pattern is created by the _____ of light from two or more coherent sources.

Answer: _____

2. Diffraction occurs when a wave passes through a _____ or around an _____.

Answer: _____

3. In diffraction, the central bright fringe is _____ and _____ compared to the other fringes.

Answer: _____

4. _____ refers to the phenomenon where light bends around obstacles or spreads after passing through a narrow opening.

Answer: _____

5. The intensity of the bright fringes in an interference pattern is typically _____, whereas in a diffraction pattern, the intensity _____ as you move away from the central maximum.

Answer: _____

Part 4: True or False

1. **True or False:** Diffraction patterns are created by two or more coherent light sources.

o **Answer:** _____

2. **True or False:** The central maximum in diffraction is the brightest and widest fringe.

o **Answer:** _____

3. **True or False:** Interference patterns are always produced by a single slit.

o **Answer:** _____

4. **True or False:** The interference pattern has equally spaced bright and dark fringes, while diffraction patterns do not.

o **Answer:** _____

Part 5: Match the Columns

Column A	Column B
1. Interference	a. Requires a single slit
2. Diffraction	b. Central maximum is wider and more intense
3. Fringe Intensity in Diffraction	c. Superposition of light from two sources
4. Central Maximum in Diffraction	d. Requires coherent light sources
5. Fringe Spacing in Interference	e. Intensity decreases as we move from the center

Answer:

- 1. _____
 - 2. _____
 - 3. _____
 - 4. _____
 - 5. _____
-

Part 6: Application-Based Question (3 Marks)

Imagine a situation where you observe diffraction in real life. Describe the situation, identify the obstacle causing diffraction, and explain how diffraction affects the behavior of the waves you observe.

- _____
 - _____
 - _____
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