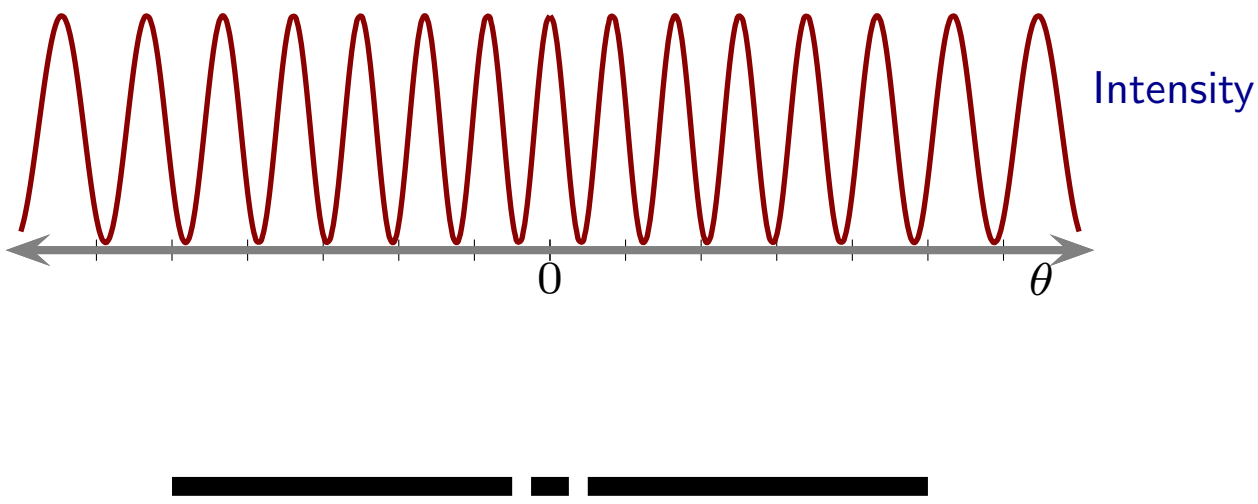
Double Slit Pattern

Double slit interference pattern for two slits of negligible width.

$$I = I_0 \cos^2(\beta)$$

where

$$\beta = \frac{\pi d}{\lambda} \sin\theta.$$



Question 1

Two slits with negligible width are separated by distance d. The intensity at angle θ on a distant screen is

$$I = I_0 \cos^2(\beta)$$

where

$$\beta = \frac{\pi d}{\lambda} \sin\theta.$$

The intensity will clearly be a maximum when $\theta = 0$. What is the next smallest angle at which a maximum intensity occurs?

1. $\theta = \pi/2$
2. $\theta = \pi$.
3. θ such that $d \sin\theta = \lambda/2$
4. θ such that $d \sin\theta = \lambda$

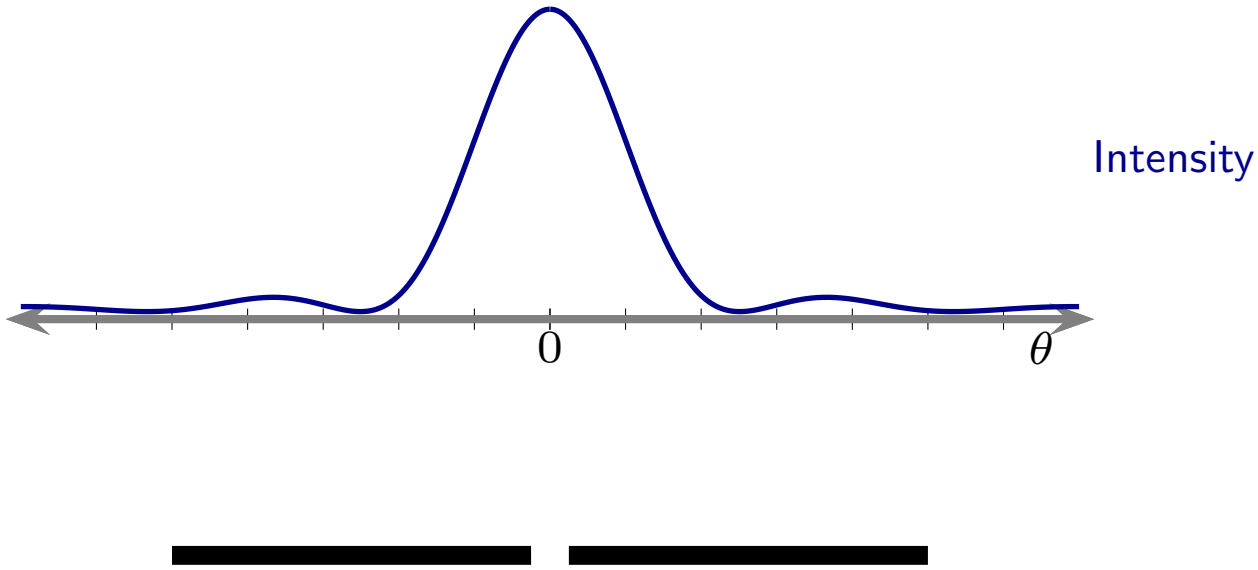
Single Slit Pattern

Single slit interference pattern.

$$I = I_0 \left(\frac{\sin \alpha}{\alpha} \right)^2$$

where

$$\alpha = \frac{\pi a}{\lambda} \sin \theta.$$



Double Slit Pattern: Width Included

Double slit interference pattern including width features.

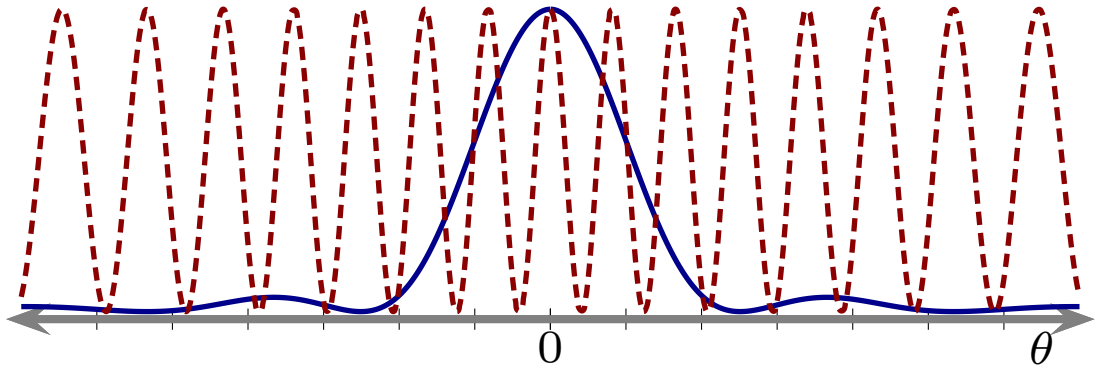
$$I = I_0 \left(\frac{\sin\alpha}{\alpha}\right)^2 \cos^2\beta$$

where

$$\alpha = \frac{\pi a}{\lambda} \sin\theta$$

and

$$\beta = \frac{\pi d}{\lambda} \sin\theta.$$



Double Slit Pattern: Width Included

Double slit interference pattern including width features.

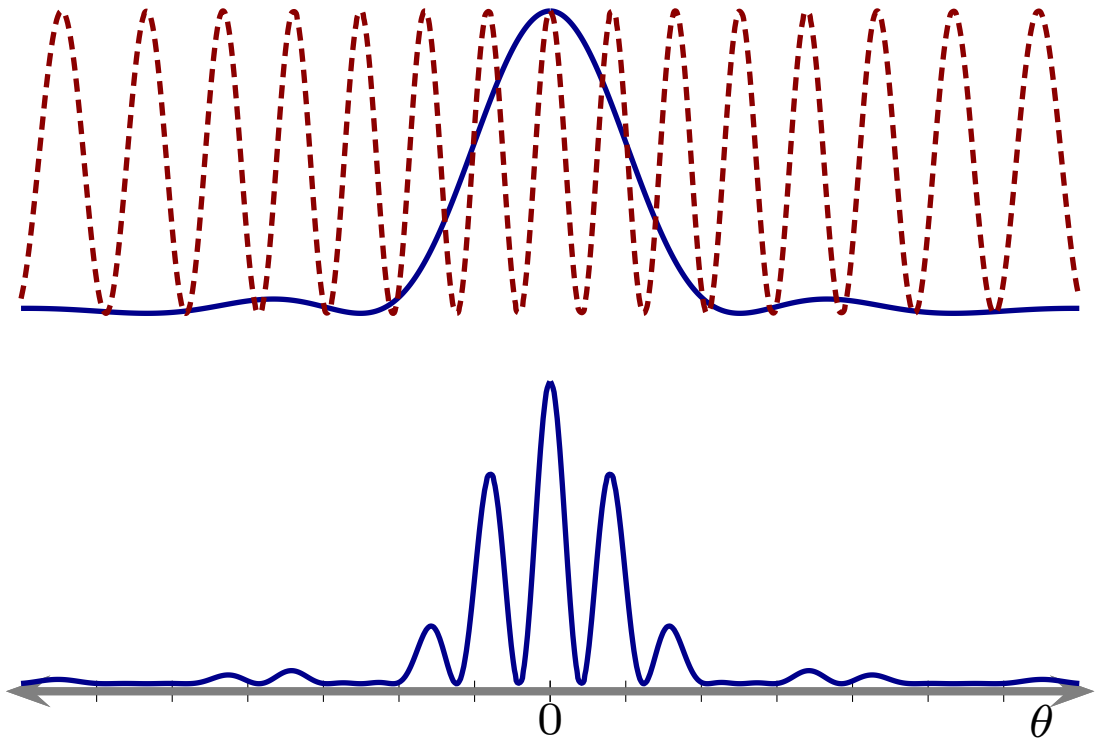
$$I = I_0 \left(\frac{\sin\alpha}{\alpha}\right)^2 \cos^2\beta$$

where

$$\alpha = \frac{\pi a}{\lambda} \sin\theta$$

and

$$\beta = \frac{\pi d}{\lambda} \sin\theta.$$



Question 2

Let

$$z_1 = x + iy$$

and

$$z_2 = x - iy.$$

Which of the following is true?

1. $z_1 z_2 = x^2 + y^2$
2. $z_1 z_2 = x^2 - y^2$
3. $z_1 z_2 = 2xy$
4. $z_1 z_2 = 2ixy$
5. $z_1 z_2 = x^2 + 2ixy - y^2$

Question 3

Let

$$z = i(3 + 4i)$$

Which of the following best represents z^*?

1. $i(3 - 4i)$
2. $i(3 + 4i)$
3. $-i(3 + 4i)$
4. $-i(3 - 4i)$

Question 4

Let

$$z_1 = 3 + i4$$

and

$$z_2 = -4 + i3.$$

Which of the following is true?

1. $|z_1 z_2| = 0$
2. $|z_1 z_2| = -5$
3. $|z_1 z_2| = +5$
4. $|z_1 z_2| = 25$