Name: Date:
Group members: Class:

Estimating Storage Capacity Worksheet

1. Calculate d

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

- d is the spacing of the structure (here: track pitch)
- θ is the angle of the m^{th} diffracted ray
- m is the *order* of the diffracted ray. Here we only use the first order, i.e. m=+1, -1

To get a better estimate for d, calculate the average $d_{mean} = \frac{d_{+1} + d_{-1}}{2}$ in the last column.

	Laser color	**Wavelength *(nm)***	**Θ, m=+1**	**Θ,m=-1**	**d, m=+1**	**d, m=-1**	d_{mean}
CD							
DVD							

2. Estimate the storage

Using your measured distance d between tracks, how many tracks fit on a disc if 33mm are writable?

A CD track has around 270,000 pits. A DVD track fits around 500,000 pits because the pits are smaller. How many pits fit on a CD and DVD?

Divide the number by 8 to get an estimate of the storage in bytes. Compare with the info on the CD/DVD. Note that the DVD has two layers.

3. **Blu-ray discs** need special readers that rely on blue lasers. How can a blu-ray disc store more information? Why is the laser blue?

4. What are two advantages of using digital media to store data? What is a disadvantage?