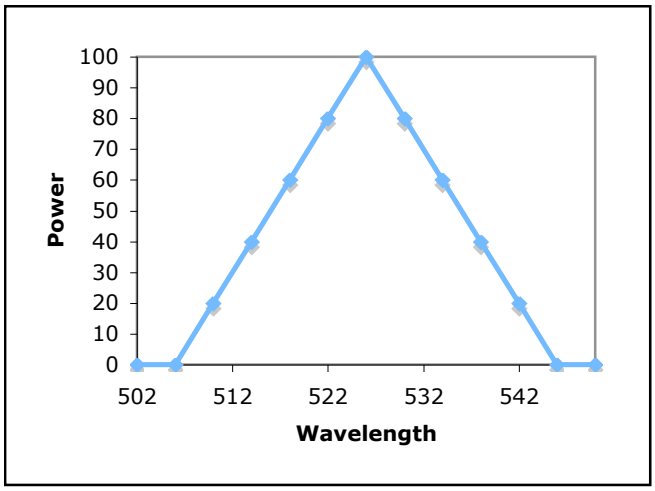
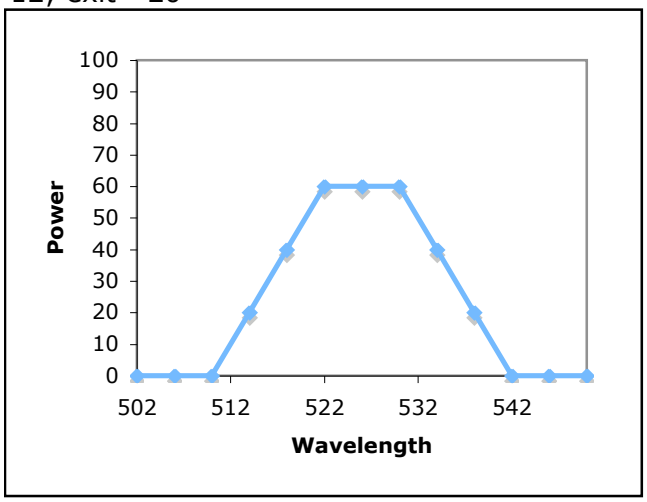
SCENARIO 1: Source 526; entrance = exit = 20

wavelength	power
550	0
546	0
542	20
538	40
534	60
530	80
526	100
522	80
518	60
514	40
510	20
506	0
502	0



SCENARIO 2: Source 526; entrance = 12; exit =20

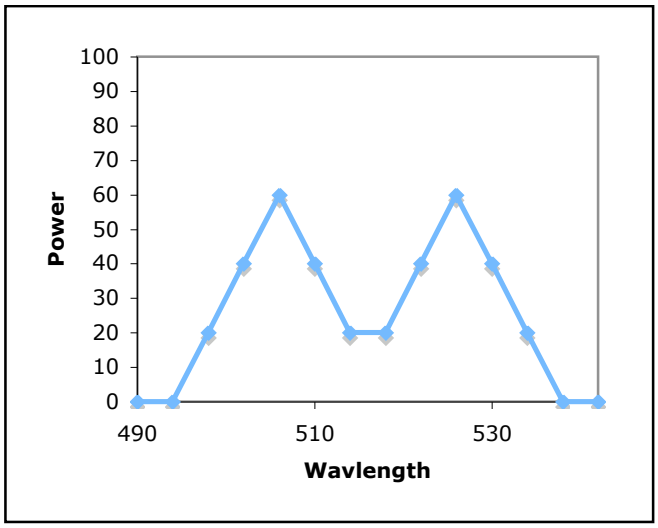
wavelength	power
550	0
546	0
542	0
538	20
534	40
530	60
526	60
522	60
518	40
514	20
510	0
506	0
502	0



Comparing Scenarios 1 and 2 with the example scenario in the handout shows how the size of the entrance and exit slits affects the amount of light, or radiant power, passing through the monochromator and its effective bandwidth. In the original scenario the entrance and exit slits are each 12 nm and the resulting radiant power and effective bandwidth are 60 units and 12 nm (520 nm to 532 nm), respectively. In Scenario 2, where the entrance and exit slits are each 20 nm, the result is an effective bandwidth of 20 nm (516 nm to 536 nm) and a radiant power of 100 units; thus, we conclude that larger slits pass more light at the cost of a greater effective bandwith. In Scenario 3 the entrance slit, at 12 nm, is smaller than the exit slit, at 20 nm. The result is an effective bandwidth that matches that of the larger slit and a power that matches that of the smaller slit, which provides no particular advantage.

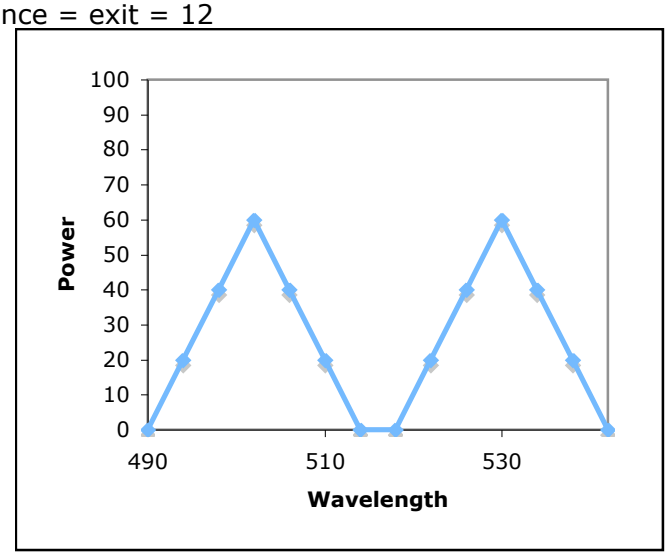
Scenario 3: Source 506 & 526; entrance = exit = 12

wavelength	power
542	0
538	0
534	20
530	40
526	60
522	40
518	20
514	20
510	40
506	60
502	40
498	20
494	0
490	0



Scenario 4: Source 502 & 530; entrance = exit = 12

wavelength	power
542	0
538	20
534	40
530	60
526	40
522	20
518	0
514	0
510	20
506	40
502	60
498	40
494	20
490	0



Comparing Scenarios 3 and 4 shows how the slit width affects the ability to resolve two closely spaced sources of radiation. With identical slit widths of 12 nm, the effective bandwidth for the monochromator is 12 nm. In Scenario 3, where the two wavelengths of source radiation are separated by less than twice the effective bandwidth ($\Delta\lambda = 20$ nm), we fail to resolve the source radiation. In Scenario 4, however, the two sources of radiation are separated by 28 nm and are resolvedy the monochromator.

In summary, narrow slits are a must when trying to resolve closely spaced spectral features, but this comes at the cost of less radiation reaching the detector and, consequently, a likely decrease in the signal-to-noise ratio. Larger slits provide for a stronger signal, but at the cost of resolution.