EXAMPLE PROBLEMS:

1. A micrographic investigation has been carried out by using a light microscope with different incident light each having different wavelengths of λyellow=0.589 μm and λblue=0.436 μm. Estimate the followings by assuming, NA=1.4, the numerical aperture of objective, and k = 0.6:
2. The minimum power of resolution for each colour,
3. What is the minimum magnification of microscope to be for a person to distinguish two points sererately at the minimum resolution found in (a). Power of resolution of a person resolution from a distance of 250 mm is assumed to be 0,3 mm.

**Answer**

**1.a.**

$d\_{yellow}={k.λ}/{NA={0,6\*0,589}/{1,4 ≅0,252 μm}}$

$$d\_{blue}={k.λ}/{NA={0,6\*0,436}/{1,4≅0,187 μm}}$$

**1.b.**

$$X Magnification of the microscope={300 µm}/{0.187µm=}1604$$

1. Answer the followings:
	1. Estimate the numerical aperture of a microscope with a depth of resolution, $T\_{green}=0,02 μm$, for the light with λgreen=589 Ao.
	2. What is the smallest distance between two points to be for a person to discerned the points separately at a magnification of X1500.

(Resolution of a person from a distance of 250 mm is assumed to be 0,25 mm)

Answer 2.

1. $T\_{f}=\frac{λ\sqrt{n^{2}-NA^{2}}}{NA^{2}}$ $0.02=\frac{58.10^{-4}\sqrt{1-NA^{2}}}{NA^{2}}$ $(\frac{0,02\*NA}{589\*10^{-4}}^{2})^{2}=1-NA^{2}$

By making a conversion $NA^{2}=x$ and rearranging the equation

0,1153.x2=1-x 0,1153.x2+x-1=0 when this equation is resolved

x1=0,905andx2=-9,579

$NA^{2}=x=0,905$ NA=0,95

1. 250 µm = 1500.d $d={250}/{1500=0,167 μm}$