Solutions

Problem 1:
(D) The average count rate is 2/s. To establish an uncertainty of 1% we need
$\Delta N/N = N^{1/2}/N = 1/N^{1/2} = 0.01$. N = 10000. It takes 5000s to obtain 10000 counts.

Problem 2:
(A) Accuracy is the degree of veracity while precision is the degree of reproducibility

Problem 3:
(C) Single slit, first minimum: $d\sin\theta = \lambda$
$d = 4*10^{-7}m/4*10^{-3} = 10^{-4}$

Problem 4:
(A) Precision is the degree of reproducibility.

Problem 5:
(E) Beam expander: magnification = 10. $f_2 = f_1*10$, $d = f_1 + f_2$.

Problem 6:
(B) Electrical measurements:

Problem 11:
(C) Single slit, first minimum: $d\sin\theta = \lambda$
$d = 4*10^{-7}m/4*10^{-3} = 10^{-4}$

Problem 8:
(C) Differential scattering cross section: small beam, big target:
(# of particles scattered per second into $d\Omega$
= [(# of beam particles)/s] × [(# of target particles)/area] × $\sigma(\Omega)d\Omega$
$10^2 = 10^{12}*10^{20}*\sigma(\Omega)10^{-4}$ with $\sigma(\Omega)$ in units of cm^2.

Problem 9:
(C) propagation of errors. Let c = ab, the $\Delta c/c = [(\Delta a/a)^2 + (\Delta b/b)^2]^{1/2}$.