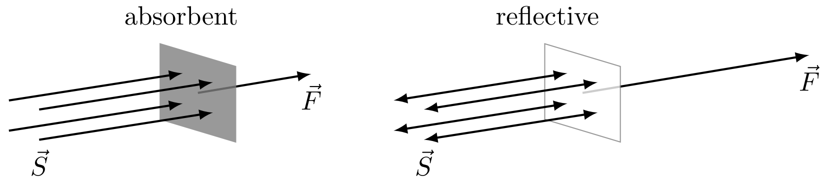
1. It is harder to create electric and magnetic fields in materials than in free space so $\epsilon_m > \epsilon_0$ and $\mu_m > \mu_0$, so $c_m < c$.
2. If light had longitudinal waves, the information transmitted by these waves would exceed the speed of light.
3. $-E_0(\omega/c)^2 \cos((\omega/c)z - \omega t) = -E_0(\omega/c)^2 \cos((\omega/c)z - \omega t)$
4. 300 [V/m]/3×10^8 [m/s] = 10^{-6} [T]. It takes a lot of electric field to create a magnetic field.
5. $\omega(k) = ck$, this is a linear dispersion which corresponds to the group and phase velocities being the same.
6. The material would have a non-linear dispersion corresponding to the separation of colors. In particular, $E = pc \mapsto E = pc/n(\omega)$ where $n(\omega)$ is the frequency dependent refractive index.
7. 

   The reflective material has twice the momentum change and thus twice the force of the absorbent material since there is a Poynting vector for both the incoming and outgoing light.
8. If $c = 3 \times 10^8$, then $|\vec{F}| = 5/6\pi c = 8.84 \times 10^{-10}$ [N], or $|\vec{a}| = 8.84 \times 10^{-7}$ [m/s^2]
9. (a) $|\vec{F}| = \langle S \rangle A/c = IA/c = 0.000297$ [N] (b) $|\vec{a}| = |\vec{F}|/m = 0.000357$ [m/s]
10. $F_{\text{light}} + F_{\text{gravity}} = 0$, so $PA/c(4\pi r^2) - GmM_\odot/r^2$, or $A = 4\pi cGmM_\odot/P$. This is independent of distance because both the gravitational force and the light force fall off as $1/r^2$.