Optics Answer Key (UChicago 2018)

1. 19.2 cm
2. 146 degrees (half credit for 33.6)
3. a) 1.72, b) 3.08
4. 36.4 degrees
5. 5
6. 10.7 cm
7. 1.77
8. a. ⅓
   b. $T^2$=¼, which is lower than the actual value
9. a. $\theta_B = 56.7^o$=0.989 (radians) (half credit for $33.3^o$=0.582) (the reflection and transmission coefficients are the same whether the goes from glass to air or air to glass)
   b. Brewster's angle
   c. No, you'd need to turn your head (flip the picture upside-down and it looks like the reflection of light from the sun off of the ground)
   d. Perpendicular
10. n = 1.456
11. specular
12. wavelength
13. diverging
14. 0.400 m
15. Crystallin
16. blue: 420 - 440 nm
    green: 534 - 545 nm
    red: 564 - 580 nm
17. Paschen series
18. Radio
19. 1.13 m
20. 92 nm
21. reflecting telescopes fix chromatic aberration
    (also acceptable: reflecting telescopes allow for larger objectives)
22. birefringence
23. 3.14 x $10^{-33}$ kg·m/s
24. thin-film interference
25. shorter wavelength (translates to higher spatial resolution)