LIGHT QUESTIONS

1. What does it mean to say an atom is excited?

2. How does the energy of the photon that is emitted by an electron jumping between two energy levels compare to the energy difference of the two energy levels?

3. How is the energy of a photon related to its frequency?

4. Which has the higher frequency, red or blue light? Which has the greater energy per photon, red or blue light?

5. Why does the flame of a burning log have different colors in it?

6. When a gas glows, discrete colors are emitted. When a solid glows, the colors are smudged or continuous. Why?

7. How does an absorption spectrum differ in appearance from an emission spectrum?

8. How can astrophysicists tell whether a star is receding or approaching Earth?

9. How can atoms can be excited?

10. How does the avalanche of many photons in a laser beam differ from the large number of photons emitted by an incandescent lamp?

11. Green light is emitted when electrons in a substance make a particular energy-level transition. If blue light were instead emitted from the same substance, would it correspond to a greater or lesser change of energy in the atom?

12. Ultraviolet light causes sunburns, but visible light does not. Why is this so?

13. Why doesn't a mercury vapor lamp "run out" of excited atoms and produce dimmer and dimmer light?

14. In what specific way does light from distant stars and galaxies tell astronomers that atoms throughout the universe have the same properties as those on Earth?

15. If we continue to heating a piece of initially room-temperature metal in a dark room, it will begin to glow visibly. What will be the first color and why?

16. How do the surface temperatures of reddish, bluish and whitish stars compare?

17. What is a quantum light called?

18. Which has the lower energy quanta – red light or blue light? Radio waves or X-rays?

19. What evidence is there that light is a particle?

20. Why won’t a very bright beam of red light impart more energy to an ejected electron than a feeble beam of violet light?

21. Does light travel from one place to another in a wavelike way or in a particle-like way?

22. Does light interact with a detector in a wavelike way or in a particle-like way?

23. When does light behave as a wave? When does it behave as a particle?

24. What evidence is there that particles, like electrons, are waves?

25. What is the uncertainty principle with respect motion and position?

26. Can we speak of photons of white light? Why or why not?

27. Which laser beam carries more energy per photon – a red beam or a green beam?

28. If a beam of red light and a beam of violet light have exactly the same energy, which beam contains the greater number of photons?

29. In the photoelectric effect, does brightness or frequency determine the kinetic energy of the ejected electrons? Which determines the number of the ejected electrons?

30. Why are ultraviolet photons more effective at inducing the photoelectric effect than photons of visible light?

31. A hydrogen atom and a uranium atom move at the same speed. Which possesses more momentum? Which has the longer wavelength?

32. An electron and a proton travel at the same speed. Which has more momentum? Which has the longer wavelength?

33. One electron travels twice as fast as another. Which has the longer wavelength?

34. How is it possible to take photographs in complete darkness?

35. When you look at a distant galaxy through a telescope, how is it that you’re looking backward in time?