

Department of Physics
University of Maryland, College Park
First Midterm Exam, Physics 106 — Fall 1999

QA. Which of the following are self-luminous objects?

- (1) a lighted candle. +
- (2) a photograph. -
- (3) the moon. -

QB. Light wave

- (4) travels 30,000 km in 0.1 sec in vacuum. +
- (5) requires electric charge to propagate. -

QC. Which of the following common everyday periodic phenomena are examples of resonance?

- (6) A cork bobbing up and down in waves in water. -
- (7) A rattle in your car while idling, which stops as the motor increases speed. +

QD. In a rough sea, a boat oscillates left and right once every 3 seconds; the frequency of the oscillation is

- (8) 3 Hz. -
- (9) 1/3 Hz. +

QE. TV signals have a frequency of near 300 MHz, so their wavelength is about

- (10) 1cm. -
- (11) 100cm. +
- (12) 10m. -

QF. The color of light corresponds (in general) to which of the following

- (13) intensity. -
- (14) frequency. +
- (15) speed in a dispersive medium. -
- (16) polarization. -
- (17) wavelength. +

QG. As a blackbody gets hotter

- (18) it emits more radiation. +
- (19) it radiates predominantly at longer wavelength. -

QH. Facts about incandescent and fluorescent bulbs

- (20) Incandescent bulbs emit more infrared radiation than visible light. +
- (21) Fluorescent bulbs use ultraviolet radiation to produce visible light. +

QI. Consider an extended light source and an extended object between the source and a screen. By moving the object closer to the screen, you

- (22) increase the size of umbra. +
- (23) increase the size of penumbra. -

QJ. In a pinhole camera

- (24) the image is inverted up-to-down. +
- (25) the image always becomes clearer with a smaller hole. -
- (26) you get a larger image if the object is closer to the camera. +

QK. Silver is more reflective than copper because

- (27) silver has a higher plasma frequency. +
- (28) silver can be better polished. -

QJ. When a fish underwater takes vengeance at a fisherman on the shore, it must aim its weapon directly

- (29) at the fisherman. -
- (30) below the fisherman. +
- (31) above the fisherman. -

QK. The total internal reflection happens

- (32) more easily in a piece of glass than in a diamond. -
- (33) when light travels from a less dispersive to a more dispersive medium. -
- (34) in a diffuse reflection. -

QL. The small fish tank we passed around the class was meant to show

- (35) the phenomenon of dispersion. -
- (36) the phenomenon of internal reflection. +

QM. A big corner reflector model as shown in class

- (37) is made from two plane mirrors. -
- (38) always reflects the light back to the original direction. +
- (39) uses the principle of multiple reflection. -

QN. A mirage involves

- (40) refraction by the atmosphere. +
- (41) refraction by the ionosphere. -
- (42) reflection by tiny ice crystals. -
- (43) temperature gradient in the atmosphere. +
- (44) dispersion by the atmosphere. -

QO. A rainbow

- (45) is always seen at the opposite direction from the sun. +
- (46) has red color on the outer ring. +
- (47) can be seen by your friends down the street. -
- (48) has to do with the phenomena of dispersion, refraction but not reflection. -

QP. The following phenomena are related to dispersion

- (49) red light travels faster in a medium than blue light. +
- (50) blue light bends more when refracted. +

QQ. A plane mirror image

- (51) is a virtual image. +
- (52) is $1/2$ the size of the original object. -
- (53) can be multiply reflected. +
- (54) has the same distance to the mirror as the object. +
- (55) is what you see in a kaleidoscope. +

QR. For an object at twice the focal length in front of a convex mirror, the image

- (56) is real. -
- (57) is inverted up-to-down. -
- (58) has the same size as the object. -
- (59) is further from the mirror's surface than the object. -
- (60) appears to be further from the mirror than the image from a plane mirror at the same distance from the object. -

QS. For an object at twice the focal length in front of a concave mirror, the image is

- (61) real. +
- (62) is inverted up-to-down. +
- (63) the same size as the object. +
- (64) closer to the mirror than the object. -

QT. For an object inside the focal point of a concave mirror, the image is

- (65) real. -
- (66) inverted up-to-down. -
- (67) smaller than the object. -

QU. For an object at twice the focal length from a concave lens, the image is

- (68) real. -
- (69) inverted up-to-down. -
- (70) larger than the object. -
- (71) closer to the lens than the object is. +

QV. For an object at twice the focal length from a convex lens, the image is

- (72) real. +
- (73) inverted up-to-down. +
- (74) larger than the object. -
- (75) closer to the lens than the object is. -

QW. Depth of field refers to

- (76) the width of the picture. -
- (77) the range of object distances which are in focus. +
- (78) the area of the film used for development. -

QX. To better focus a camera,

- (79) move the lens closer to the film when taking a photo of a distant object. +
- (80) make the stop's hole as small as possible. +
- (81) send out an infrared signal. -

QY. Compared with a standard lens, a telephoto lens

- (82) has a longer focal length. +
- (83) has a wider field of view. -
- (84) magnifies the image more. -
- (85) has a greater depth of field. +

QZ. Light intensity on a film

- (86) increases by a factor of 2 when the focal length is increased by the same factor. -
- (87) increases by a factor of 2 when the focal length is decreased by the same factor. -
- (88) increases by a factor of 4 when the diameter of the stop's hole is increased by a factor of 2. -
- (89) increases by a factor of 4 when the diameter of the stop's hole is decreased by a factor of 2. +
- (90) depends on the f-number only. +

QAA. Which of the following pairs of f-stops and shutter speeds provide nearly the same exposure as f4 at 1/250 second?

- (91) f5.6 at 1/125 sec. +
- (92) f5.6 at 1/500 sec. -
- (93) f2.8 at 1/1000 sec. -
- (94) f2 at 1/1000 sec. -

QAB. The film with a steep rising H & D curve is good for

- (95) photographing in a situation where there is very little light. -
- (96) photographing in a situation where there is very large variation of the light level. -
- (97) photographing in a situation where you want to enhance small differences in light level. +

QAC. The speed of a film is determined by the following properties in an H & D curve

- (98) the steepness of the curve. -
- (99) the exposure where the initial rising in the density of the developed silver grains occurs. +
- (100) the exposure where the density of the developed silver grains reaches saturation.

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