Name:_____

Ground Rules

1. This is a sample exam. The purpose of this document is to give you an idea of the subject material and format of the real exam. Note, there may be material on the real exam that is not covered in this exam. There may also be material on this exam that you do not find in the real exam. Use this sample exam with caution.

2. The real exam is partially open book. You may have access to your textbook and any other notes you have made in your own handwriting. You may not use any other materials, including other textbooks, sample exams, study guides, or notes written in anyone else's handwriting. ***You may not bring this sample exam into the real exam.***

3. Answers are given at the end. **You are strongly advised to work through the test completely before looking at the answers**.

4. The real exam is comprised of two parts, A and B. The two parts will be graded separately. This is a sample exam that refers to part A, which includes only material covered towards the end of the semester.

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1) Specular reflection occurs when
   A) light bends as it goes around an obstacle or barrier.
   B) light changes direction as it passes from one medium to another (e.g. air to water).
   C) two light waves occupy the same space at the same time and add to or subtract from each other.
   D) light waves bounce off a smooth surface.

2) Which has a higher index of refraction, water or crown glass?
   A) water
   B) crown glass
   C) they have the same index of refraction
   D) the indices of refraction are both zero

3) Jane has a near point of 25 centimeters.
   A) She is astigmatic and requires specially shaped lenses to correct her vision.
   B) She is hyperopic and requires converging lenses to correct her vision.
   C) She is myopic and requires diverging lenses to correct her vision.
   D) She has normal vision.

4) An object is placed 30 cm from a converging lens with a focal length of 5 cm. Describe the resulting image.
   A) real, reduced, inverted, and 6 cm from the lens.
   B) virtual, reduced, upright, and 6 cm from the lens.
   C) real, enlarged, inverted, and 600 cm from the lens.
   D) virtual, enlarged, upright, and 600 cm from the lens.

5) A laser beam ray bounces off a mirror. The angle of incidence is related to the angle of reflection by
   A) the law of reflection
   B) Snell's law
   C) the lens formula
   D) the mirror equation

6) A light ray traveling in water approaches the interface between water and air at an angle of 45° to the normal. The light ray
A) will emerge into the air at an angle of 2.3° to the normal.
B) will emerge into the air at an angle of 45° to the normal.
C) will emerge into the air at an angle of 65° to the normal.
D) will be reflected off the interface back into the water.

7) A diverging lens
A) brings parallel light rays together at its focal point.
B) is thinner in the middle than at the edges.
C) must be convex on both sides.
D) has a positive focal length.

8) A B-class star has a surface temperature of about 18000K. The blackbody radiation it emits peaks in what part of the electromagnetic spectrum?
A) infrared B) visible light C) ultraviolet D) microwave

9) The earth's north *magnetic* pole
A) can be found in antarctica.
B) is underneath the north star.
C) is located at the same place as the earth's spin axis.
D) is found by following the north needle on a standard handheld compass.

10) You use a camera to take a picture of a 5-m tall house. The image on the camera's photodetector is 1 cm tall and inverted. The camera's magnification is
A) 0.002 B) -0.002 C) 0.2 D) -0.2

11) Electromagnetic induction occurs when
A) a magnetic field induces an electric charge to change from positive to negative.
B) a steady magnetic field induces a changing electric current
C) a changing magnetic field induces an electric current.
D) an electric charge induces a magnetic field.

12) In which of the following situations would diffraction occur?
A) A light ray in water is incident upon the liquid surface at an angle greater than 48.6°.
B) A light ray reflects off a smooth surface.
C) A light ray passes from air into glass.
D) A light ray passes through a narrow opening.

13) Which of the following is *not* true of concave mirrors.
A) They focus parallel rays together at their focal point.
B) They are often used as light-gathering devices in telescopes.
C) They provide a wide field of view.
D) Large ones are difficult to fabricate precisely.

14) Which of the following is *not* true of electromagnetic waves?
A) The travel at the speed of light.
B) They are longitudinal waves.
C) They consist of oscillating electric and magnetic field vectors.
D) They can be polarized.

15) Which of the following is true?
A) Magnetic poles do not exert forces on each other whereas electric charges do.
B) Magnetic poles do not exist in isolation, whereas electric charges do.
C) Magnetic fields do not exert forces on moving electric charges, whereas, electric fields do.
D) All of these are true.

16) The lowest possible frequency AM radio station broadcasts at 550 kHz. What is the wavelength in air of its carrier wave?

A	3×10^8 m	B	550×10^3 m	C	1.8×10^{-3} m	D	545 m

17) Which of the following has the greatest frequency?

A	radio waves	B	infrared radiation	C	red light	D	X-rays

18) If you double the absolute temperature of a light bulb filament, its power output increases by a factor of
A) 2 B) 4 C) 8 D) 16

19) Which of these stars has the hottest surface temperature?
A) A bluish star
B) A yellowish star
C) The sun
D) A reddish star

20) The primary coil of a transformer has 100 turns and an input of 110 V. The secondary coil has 400 turns. What is the voltage across the secondary coil?
A) 440 V B) 220 V C) 110 V D) 27.5 V

Answers:

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	D	B	D	A	A	C	B	A	A	B	C	D	C	B	D	D	D	D	A	A