Station 1—Light the Way—1 pt. each **Team #_____**

For #1-3 correct the word in italics if the phrase is false.

1. (T) or F _____

2. T or (F) electrons

3. T or (F) reflect

4. C

5. C

6. C

7. D

8. B

9. Spectrometer

10. polarized

11. Nothing in the universe is capable of traveling faster than light in a vacuum. (This fact forms the cornerstone of Albert Einstein's theory of relativity, a theory relating space and time.)

12. The speed decreases, the frequency remains the same, and the wavelength decreases.

13. *Answers may vary*. Correct answers include any three of the following:
It travels in straight lines.
It has color.
It can be bent (refracted or diffracted) or reflected.
It has intensity (brightness).
It travels at the highest possible speed.

14. It has a frequency and wavelength.

joules/sec/m^2 or watts/m^2

15. (show work)

speed of light = 3×10^8 m/sec

time = distance ÷ speed = $\left(40{,}000\text{ m}\right) \div \left(3 \times 10^8\text{ m/sec}\right) = 1.3 \times 10^{-4}$ seconds

_____/15

Station 2—Don't Interfere with Me **TEAM #_____**

For #1, correct the word in italics if the phrase is false.

1. T or (F) diverge

2. C

3. B

4. B

5. C

6. C

7. B

8. C

9. (worth 6 pts) 1. absorbing 2. translucent
3. reflecting 4. transparent
5. translucent 6. absorbing

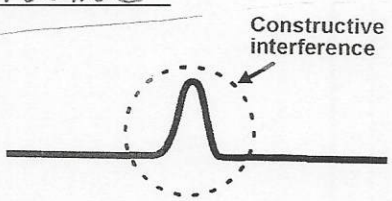
10. (2 pts) a. water b. glass c. air d. diamond

11. (4 pts) A. The focal length B. the lens
C. focal point of the lens D. optical axis of the lens

12. (3 pts) a. refraction
b. reflection
c. diffraction

13. (2 pts) a. constructive

b. (draw)



14. Could the index of refraction for a material ever be less than 1.0? (Explain)

The index of refraction will never be less than one because that would require thd speed of light in a material to be faster than the speed of light in a vacuum. Nothing travels faster than that.

_____/28

Station 3- Waves-R-Us **TEAM #_____**

1. Energy

2. (4 pts) a. crest b. trough

   c. amplitude d. wavelength

3. (8 pts) a. wavelength or freq, amplitude

   b. amplitude, _____

   c. T (give letter)

   d. S (give letter)

   e. Q (give letter), R (give letter)

4. (4 pts) a. longitudinal

   b. compression, rarefaction

   c. wavelength

5. d

Sorry I forgot a question for number 6

7. C

8. C

9. d

10. false

11. C

12. 4.5

_____/24

STATION 4—WAVES IN THE REAL WORLD **TEAM #____**

1. B
2. B
3. B
4. C
5. B
6. D
7. C
8. B
9. A
10. A
11. A
12. B
13. A
14. B
15. light sound water
16. Doppler Effect
17. (2 PTS) SHOW WORK

$$\text{speed} = \frac{\text{wavelength}}{\text{period}} = \frac{25\text{ m}}{13\text{ sec}} = 1.9\text{ m/sec}$$

18. (2 PTS)

The microwave oven produces a wave that matches the resonant frequency of water molecules. The energy of the wave is absorbed by the water molecules and manifests itself as heat. The hot dog contains water; it becomes hot since it is in contact with the heated water molecules. The paper plate does not contain water, so it becomes hot only where it touches the "hot" hot dog.

_____/20

STATION 5—CATCH AN E-M OR SOUND WAVE **TEAM #_____**

1. C
2. C
3. D
4. B
5. B
6. B
7. D

8. (5 PTS)

Steel at 20°C | Water at 20°C | Helium 20°C | Air 20°C | Air 0°C

9. (2 PTS)

Sound requires the oscillations of atoms to be transmitted and cannot travel in a vacuum. Since space is a vacuum beyond Earth's atmosphere, there would be no noise associated with an exploding asteroid in space.

10. (1 PT)

Electromagnetic waves are created by the oscillation of magnetic or electric fields.

11. (2 PTS)

The gun produces the sound and the smoke at the same time. Since light (3×10^8 m/sec) travels faster than sound (340 m/sec), the timers at the other end of the track see the smoke before they hear the sound but at the same time as runners hear the gun. Timers start their watches when runners hear the gun instead of 0.29 seconds later when they would hear the gun.

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STATION 6—COLOR MY WORLD **TEAM #____**

For #1, correct the word in italics if the phrase is false.

1. T OR (F) red, green, blue

2. C

3. B

4. A

5. C

6. A

7. D

8. D

9. A

10. D

11. (2 PTS)

Objects that produce light (such as a computer screen) create colors by the additive process. To produce the yellow banana image on a computer screen, small dots of red and green light are combined to produce yellow light by addition. To produce the same color on paper, the CMYK process, a subtractive process is used. For the banana, yellow pigment would probably be used.

12. (4 PTS)

B+D a.

A+C b.

C c.

B d.

13. Magenta

14. White

15. Yellow

16. Green

_____/20