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Question 1

Which one of the following lists gives the correct order of the electromagnetic spectrum from *low to high frequencies*?

- ☐ radio waves, infrared, x-rays, microwaves, ultraviolet, visible, gamma rays
- ☒ radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays
- ☐ radio waves, ultraviolet, x-rays, microwaves, infrared, visible, gamma rays
- ☐ radio waves, infrared, microwaves, ultraviolet, visible, x-rays, gamma rays
- ☐ radio waves, microwaves, visible, x-rays, infrared, ultraviolet, gamma rays

Question 2

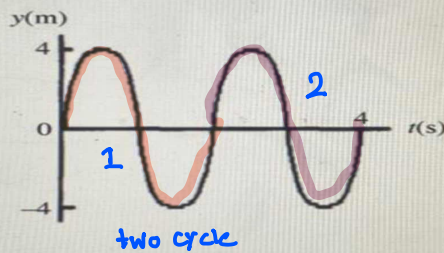
What characteristic of sound determines the "pitch" of a musical note?

- ☐ phase
- ☐ amplitude
- ☐ wavelength
- ☐ intensity
- ☒ frequency

Question 3

For the wave shown in the figure, the frequency is

$$F = \frac{1}{T} = \frac{1}{2} = 0.5 \text{ Hz}$$



- ☐ 2 Hz.
- ☒ 0.5 Hz.
- ☐ 4 Hz.
- ☐ 1 Hz.
- ☐ unable to be determined from the given information.

Question 6

Which one of the following lists gives the correct order of the electromagnetic waves from *longer wavelength to shorter wavelength*?

- ☐ radio waves, microwaves, visible, x-rays, infrared, ultraviolet, gamma rays
- ☐ radio waves, infrared, x-rays, microwaves, ultraviolet, visible, gamma rays
- ☐ radio waves, ultraviolet, x-rays, microwaves, infrared, visible, gamma rays
- ☒ radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays
- ☐ radio waves, infrared, microwaves, ultraviolet, visible, x-rays, gamma rays

Question 7

Which one of the following is *not* an electromagnetic wave?

- ☐ gamma rays
- ☒ sound waves
- ☐ ultraviolet
- ☐ infrared
- ☐ radio waves

Question 10

- In an electromagnetic wave in free space, the electric and magnetic fields are
- ☒ perpendicular to one another and perpendicular to the direction of wave propagation.
 - ☐ parallel to one another and perpendicular to the direction of wave propagation.
 - ☐ perpendicular to one another and parallel to the direction of wave propagation.
 - ☐ parallel to one another and parallel to the direction of wave propagation.

Question 4

The wavelength of an electromagnetic wave is 600 nm. What is its frequency? ($c = 3.0 \times 10^8$ m/s)

- ☐ 400×10^{12} Hz
- ☐ 300×10^{12} Hz
- ☒ 500×10^{12} Hz
- ☐ 200×10^{12} Hz
- ☐ 600×10^{12} Hz

$$\lambda = 600 \text{ nm} \times 10^{-9}$$

$$f = ?? \text{ unknown}$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

$$n \Rightarrow 10^{-9}$$

$$\frac{c}{\lambda} = \frac{f \cancel{\lambda}}{\cancel{\lambda}}$$

$$f = \frac{c}{\lambda} = \frac{3.0 \times 10^8}{600 \times 10^{-9}}$$

$$\boxed{\frac{3000 \times 10^{5+9}}{600 \times 10^{-9}}}$$

الد شيء أخذت 8, 3 zero

$$\downarrow$$
$$5 \times 10^{14}$$

$$= 500 \times 10^{12} \text{ Hz}$$

بعدت بأخذ 14

, 2 zeros

هو يعطى على ثو الجواب نقدر نأخذ الحز من zeros

Question 5

How long does it take light to travel 1.0 m? ($c = 3.0 \times 10^8$ m/s)

- ☒ 3.3 ms
- ☐ 3.3 s
- ☐ 3.3 μ s
- ☐ 3.3 ns

How long $\Rightarrow$ time

$$\text{Time} - \text{Speed} = \frac{\text{distance}}{\text{Time}}$$

distance = 1.0 m

$c = 3.0 \times 10^8$ m/s

$$\cancel{\text{Time}} \cdot \cancel{\text{speed}} = \frac{\text{distance}}{\cancel{\text{speed}}}$$

$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$t = \frac{d}{c}$$

$$= \frac{1.0 \text{ m}}{3.0 \times 10^8 \text{ m/s}}$$

$$= 3.3 \text{ ms}$$

$$\begin{array}{r} 3.3333 \\ 3 \overline{) 10.0} \\ \underline{9} \\ 10 \\ \underline{9} \\ 10 \end{array}$$

Question 8

How far does light travel in 1.0 μ s? ($c = 3.0 \times 10^8$ m/s)

- ☐ 3.0 m
- ☐ 30 cm
- ☐ 3.0×10^{14} m
- ☒ 0.30 km

How far $\Rightarrow$ distance

$$\text{Time} = 1.0 \mu\text{s} \times 10^{-6} = 1 \times 10^{-6} \text{ s}$$

$$\text{distance} = \text{speed} \times \text{time}$$

$$= 3.0 \times 10^8 \times 1 \times 10^{-6}$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

$$3 \times 10^2$$

$$= 3 \times 100$$

$$= 300 \text{ m}$$

$$1) 300 \text{ m} \rightarrow \text{km}$$

$$300 \times 10^{-3}$$

$$0.3 \text{ km}$$

$$300 \text{ m} \rightarrow \text{km}$$

$$300 \div 1000$$

$$\begin{array}{r} 300 \\ 1000 \end{array}$$

$$0.3 \text{ km}$$

Both methods are correct
you can choose anyone

$$= 3 \times 10^{8+(-6)}$$

$$= 3 \times 10^2 \text{ m}$$

$$= 3 \times 100$$

$$= 300 \text{ m} \rightarrow \text{km}$$

$$= 0.30 \text{ km}$$

answer

Question 9

What is the frequency of 20-mm microwaves? ($c = 3.0 \times 10^8 \text{ m/s}$)

- ☐ 73 GHz
- ☒ 15 GHz
- ☐ 400 MHz
- ☐ 100 MHz

$$F = ??$$

$$\lambda = 20 \text{ mm} \times 10^{-3}$$

$$c = 3.0 \times 10^8 \text{ m/s}$$

$$\frac{c}{\lambda} = \frac{F \cancel{\lambda}}{\cancel{\lambda}}$$

$$F = \frac{c}{\lambda}$$

$$= \frac{3.0 \times 10^8 + 3}{20 \times 10^{-3}}$$

$$= \frac{3 \times 10^{11}}{20} = \frac{300000000000}{20}$$

$$= 15 \text{ GHz}$$

$$\begin{array}{r} 15 \\ 2 \overline{) 30000000000} \\ \underline{2} \\ 10 \\ \underline{10} \\ 00000000 \end{array}$$

View prefixes and its notation



Prefix	Symbol	Notation
tera	T	10^{12}
giga	G	10^9
mega	M	10^6
kilo	k	10^3
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}