

Name: 2017 Key

Class: \_\_\_\_\_

Date: \_\_\_\_\_

ID: A

## FINAL EXAM PRACTICE TEST

### Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

### Unit 06 WAVES

- C 1. When the absorption lines of a galaxy shift toward the red end of the spectrum, it means that the galaxy is
- moving closer to Earth.
  - small and young.
  - moving away from Earth.
  - large and old.
- A 2. The big bang theory explains the
- origin of the universe.
  - life cycle of a star.
  - Doppler effect.
  - arrangement of constellations.
- D 3. Which of the following provides support for the big bang theory?
- red shift
  - cosmic microwave background radiation
  - elliptical galaxies
  - both a and b
- C ~~X~~ Dark matter can be detected by its
- cosmic microwave background radiation.
  - red shift.
  - gravitational effects on visible matter.
  - velocity.
- B 5. In a diagram depicting the solar system as heliocentric, what is located at the center?
- Earth
  - the sun
  - the moon
  - Mars
- C ~~X~~ Which of the following is the most likely reason that ancient observers believed that Earth was the center of the universe?
- The Earth seemed to move on its axis.
  - Earth's motions are only recently known because of high-powered telescopes.
  - Objects in the sky appear to circle around Earth.
  - Ancient observers believed the universe was stationary.
- A ~~X~~ The orbit of a planet around the sun is a(an)
- ellipse.
  - straight line.
  - circle.
  - parabola.
- D 8. Which of the following helps explain why the planets remain in motion around the sun?
- density
  - gravity
  - inertia
  - both b and c
- C 9. Which of the following objects does NOT orbit directly around the sun?
- planets
  - comets
  - moons
  - all of the above
- A ~~X~~ What led to the discovery of three more planets than those that the ancient observers knew about?
- the invention of the telescope in 1600
  - the Hubble telescope launched in 1990
  - space missions in the Apollo program
  - observations by *Sputnik 1* in 1957
- B ~~X~~ Who was the first American in space?
- Yuri Gagarin
  - Alan Shepard
  - Chuck Yeager
  - Neil Armstrong

Name: \_\_\_\_\_

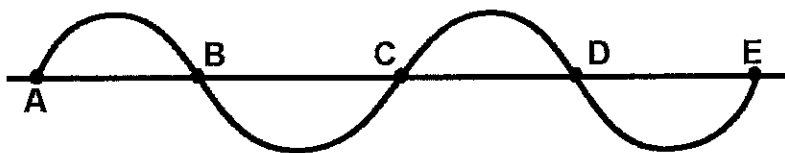
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- C 12. Why was Wegener's hypothesis of continental drift originally rejected by geologists?
- Wegener did not have any data to support his hypothesis.
  - The continents of South America and Africa do not fit well together.
  - Wegener could not explain how the continents could move through the ocean floor.
  - Wegener's data was incorrect.
- A 13. New ocean crust is formed along
- mid-ocean ridges.
  - subduction zones.
  - mountain belts.
  - trenches.
- C 14. A subducting oceanic plate
- is less dense than the plate it moves under.
  - is pushed up and over the continental crust.
  - sinks into the mantle, forming a trench.
  - moves horizontally in the opposite direction past the other plate.
- B 15. The heat that drives mantle convection comes from the cooling of Earth's interior and
- the sun.
  - the decay of radioactive isotopes.
  - sea-floor spreading.
  - trenches.
- D 16. Plates slide past each other, and crust is neither created nor destroyed at a
- convergent boundary.
  - divergent boundary.
  - mid-ocean ridge.
  - transform boundary.
- C ~~17~~ What is a break in a rock mass along which movement occurs?
- fold
  - earthquake
  - fault
  - epicenter
- B 18. Stress in Earth's crust is caused by
- folds.
  - plate movements.
  - earthquakes.
  - faults.
- C 19. What causes the magma inside a volcano to rise towards the surface?
- It is a thick liquid, denser than the surrounding rock.
  - It does not contain dissolved gases.
  - It is less dense than the surrounding rock.
  - It is cooler than the surrounding rock.
- B 20. Electromagnetic waves vary in
- the speed they travel in a vacuum.
  - wavelength and frequency.
  - the way they reflect.
  - their direction.
- A 21. To calculate the frequency of an electromagnetic wave, you need to know the speed of the wave and its
- wavelength.
  - intensity.
  - refraction.
  - amplitude.
- C 22. Infrared rays have a shorter wavelength than
- ultraviolet rays.
  - X-rays.
  - radar waves.
  - gamma rays.
- C 23. The full range of frequencies of electromagnetic radiation is called
- visible light.
  - radio waves.
  - the electromagnetic spectrum.
  - invisible radiation.
- B 24. The waves with the longest wavelengths in the electromagnetic spectrum are
- infrared rays.
  - radio waves.
  - gamma rays.
  - X-rays.

- C 25. The visible light spectrum ranges between  
 a. radar waves and X-rays. c. infrared rays and ultraviolet rays.  
 b. television waves and infrared rays. d. ultraviolet rays and gamma rays.
- D 26. Cellular telephones utilize  
 a. radar waves. c. very low frequency waves.  
 b. very high frequency waves. d. microwaves.
- B 27. Which of the following occurs as a light wave bends when it passes from one medium into another?  
 a. constructive interference c. destructive interference  
 b. refraction d. reflection
- C 28. Newton's prism experiments showed that white sunlight is made up of  
 a. the full electromagnetic spectrum. c. all the colors of the visible spectrum.  
 b. only blue light when separated by a prism. d. only the longest wavelengths.
- A 29. The energy of motion is called  
 a. kinetic energy. c. thermal energy.  
 b. potential energy. d. work.
- B 30. A small 30-kilogram canoe is floating downriver at a speed of 2 m/s. What is the canoe's kinetic energy?  
 a. 32 J c. 120 J  
 b. 60 J d. 900 J
- B 31. A 12-kg sled is moving at a speed of 3.0 m/s. At which of the following speeds will the sled have twice as much kinetic energy?  
 a. 1.5 m/s c. 6.0 m/s  
 b. 4.2 m/s d. 9.0 m/s
- C 32. An object's gravitational potential energy is directly related to all of the following EXCEPT  
 a. its height relative to a reference level. c. its speed.  
 b. its mass. d. the acceleration due to gravity.
- C 33. Why is the gravitational potential energy of an object 1 meter above the moon's surface less than its potential energy 1 meter above Earth's surface?  
 a. The object's mass is less on the moon.  
 b. The object's weight is more on the moon.  
 c. The moon's acceleration due to gravity is less.  
 d. both a and c
- D 34. A 4-kilogram cat is resting on top of a bookshelf that is 2 meters high. What is the cat's gravitational potential energy relative to the floor if the acceleration due to gravity is  $9.8 \text{ m/s}^2$ ?  
 a. 6 J c. 20 J  
 b. 8 J d. 78 J
- B 35. The mechanical energy of an object equals its  
 a. chemical energy plus its nuclear energy. c. nuclear energy.  
 b. kinetic energy plus its potential energy. d. thermal energy.
- C ~~36~~ The equation  $E = mc^2$  relates energy and  
 a. force. c. mass.  
 b. gravity. d. work.

- C 37. Motion that occurs in repeated cycles includes all of the following EXCEPT \_\_\_\_\_ motion.
- pendulum
  - harmonic
  - linear
  - circular
- B 38. A unit of motion repeated over and over again is called the:
- amplitude.
  - cycle.
  - velocity.
  - period.
- D 39. Oscillating systems include all of the following EXCEPT:
- the moving pedals on a bicycle.
  - a radio signal from FM station 106.3.
  - Earth turning on its axis.
  - a block sliding down a ramp.
- A 40. The measure of the number of cycles per second is called:
- frequency.
  - period.
  - amplitude.
  - vibration.
- C 41. The unit for measuring the frequency of an oscillating system is the:
- meter.
  - meter/second.
  - hertz.
  - hertz/second.
- D 42. The amount of time required for one cycle to occur is called the:
- amplitude.
  - frequency.
  - harmonic.
  - period.
- A 43. A pendulum makes one complete swing over and back in 2.2 seconds. Its frequency is:
- 0.45 hertz.
  - 0.45 seconds.
  - 2.2 hertz.
  - 2.2 second.
- A 44. An insect moves its wings up and down 144 times in three seconds. The period of this movement is:
- 0.0208 seconds.
  - 48 hertz.
  - 48 seconds.
  - 144 hertz.
- B 45. When damping occurs in a moving pendulum system, it may cause the:
- mass of the pendulum to decrease.
  - amplitude of the pendulum to decrease.
  - length of the pendulum to increase.
  - period of the pendulum to decrease.

- B 46. The diagram below represents a graph of harmonic motion:



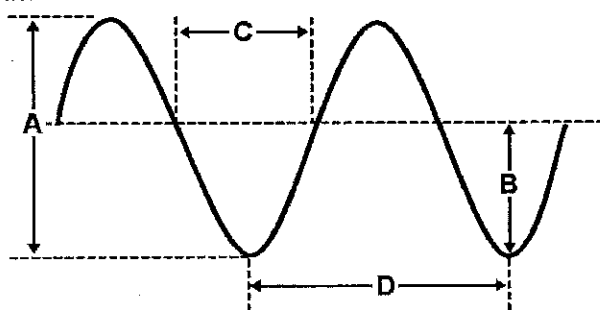
One cycle of the motion is represented by the distance from:

- A to B.
- B to D.
- B to E.
- A to E.

- A 47. Assuming that it takes exactly 24 hours for Earth to rotate on its axis, the frequency of rotation of Earth measured in hertz is:
- 0.125 seconds
  - 0.042 hertz.
  - 1400 hertz.
  - 86000 hertz.

- D ~~48~~ One full cycle of harmonic motion is represented by \_\_\_\_\_ degrees.
- 45
  - 90
  - 180
  - 360

- B 49. The graph below represents position versus time for the amplitude of a pendulum that was allowed to swing for four seconds:



Which letter correctly identifies the amplitude of the pendulum?

- A
- B
- C
- D

### Completion

Complete each sentence or statement.

50. By using a spectrograph, a star's absorption lines can identify the different elements that a star is composed of.
51. The apparent change in frequency and wavelength of a sound or light source as it moves toward or away from an observer is called the doppler effect.

52. The theory that the universe came into being in a single moment with an enormous explosion is the big bang theory.
53. The observation that cosmic microwave background radiation is detected in all directions in the universe supports the hypothesis that the universe is expanding.
54. The model of the universe in which Earth is stationary is the geocentric model.
55. The process by which oceanic plates sink into the mantle through a trench is called subduction.
56. Alfred Wegener proposed that a continent was formed by continental drift. This supercontinent was called Pangaea.
57. Due to sea-floor spreading, the youngest rocks in the ocean floor are found near a(an) mid ocean ridge.
58. Subduction occurs at convergent plate boundaries.
59. Electromagnetic waves are transverse waves consisting of changing electric and magnetic fields.
60. Warm objects give off more infrared radiation than cool objects give off.
61. The speed of light in a vacuum is  $3 \times 10^8$  m/s.
62. Electromagnetic waves can travel through a(an) vacuum.
63. Light is produced when electron change energy levels in an atom.
64. Visible light waves have a shorter wavelength than infrared waves have.
65. The electromagnetic waves with the shortest wavelengths are gamma rays.
- ~~66.~~ A mirage, or distorted image, can be caused by the refraction of light as it moves into layers of hotter and hotter air.
67. The following electromagnetic waves are arranged in order of increasing frequency: infrared, visible light, ultraviolet.
68. Energy and work are measured in the SI unit called the joule.
69. If the mass of an object doubles, its kinetic energy doubles.
70. The kinetic energy of an object is proportional to the square of its speed.
71. Energy that is stored due to position or shape is called potential energy.
72. You can calculate an object's gravitational potential energy by using the equation  $E_p = mgh$ .
73. The sum of the kinetic energy and potential energy of an object is called its mechanical energy.
74. All energy can be considered as kinetic energy, potential energy, or the energy in fields.
75. "Energy cannot be created or destroyed" is a statement of the law of conservation of energy.

Short Answer

- 76. Who was the first human to step onto the moon? *Neil Armstrong*
- 77. What theory explains how Earth's plates form and move? *Theory of plate tectonics*
- 78. In what two types of locations do most volcanoes occur? *Plate boundary & hot spots*
- 79. Why did most geologists initially reject Alfred Wegener's hypothesis of continental drift? *Didn't explain how they moved*
- 80. What is a basic difference between electromagnetic waves and sound waves? *Sound waves can't travel in a vacuum & sound is a longitudinal wave*
- 81. Which type of electromagnetic wave has the longest wavelength and lowest frequency? *Radio*
- 82. Both gamma rays and X-rays are used to see inside the body. Which one is used to make images of bones? How are the other rays used? *X-rays → bones Gamma → kill cancer cells*
- 83. Which waves have wavelengths longer than those of visible light? Give an example of how each kind of wave is used.

Problem

- 84. A communications satellite transmits a radio wave at a frequency of  $9.4 \times 10^9$  Hz. What is the signal's wavelength? Assume the wave travels in a vacuum. Show your work.

$$\frac{v}{f} = \lambda \quad \frac{3 \times 10^8 \text{ m/s}}{9.4 \times 10^9 \text{ Hz}} = 0.32 \text{ m}$$

Essay

- 85. What is the kinetic energy of a 74.0-kg sky diver falling at a terminal velocity of 52.0 m/s? Show your work.
- 86. A 0.49-kg squirrel jumps from a tree branch that is 3.6 m high to the top of a bird feeder that is 1.5 m high. What is the change in gravitational potential energy of the squirrel? (The acceleration due to gravity is 9.8 m/s<sup>2</sup>.) Show your work.

$$E_p = mgh = 0.49 \text{ kg} (9.8 \text{ m/s}^2) (3.6 \text{ m} - 1.5 \text{ m}) = 10 \text{ J}$$

- 87. What is the electromagnetic spectrum? Give examples of each kind of wave and relate each example to its relative position in the spectrum.

$$E_k = \frac{1}{2}mv^2 = \frac{1}{2}(74 \text{ kg})(52 \text{ m/s})^2 = \frac{1}{2}(74 \text{ kg})(2704 \text{ m}^2/\text{s}^2) = 100,000 \text{ J}$$

Transverse wave that moves at the speed of light. The electromagnetic spectrum has a wide range of frequencies.

Radio	Ex. AM/FM	long wavelength / low frequency
Microwave	Ex. Radar	
Infrared	Ex. Heat Lamp	
Visible	Ex. communication	Red Orange Yellow Green Blue Violet
Ultraviolet	Ex. Sun/black light	
X-Rays	Ex. Medical imaging	
Gamma	Ex. kills cancer cells	

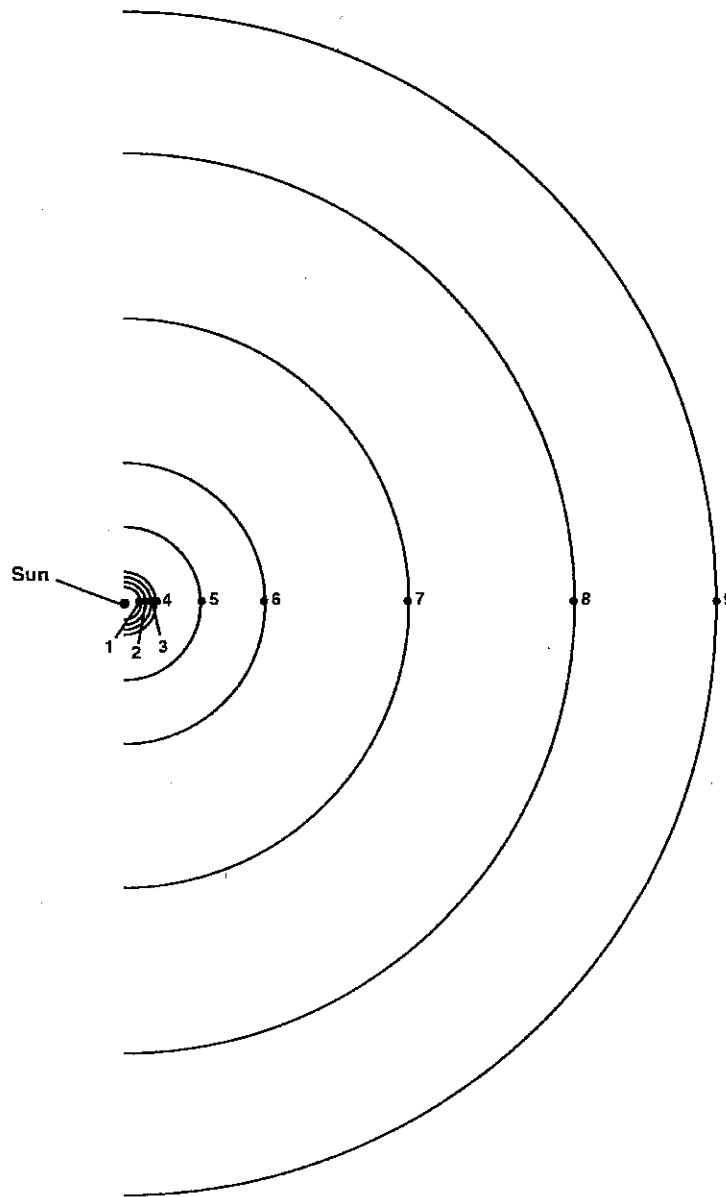
Short wavelength, high frequency

Name: \_\_\_\_\_

D.

Other

**USING SCIENCE SKILLS**

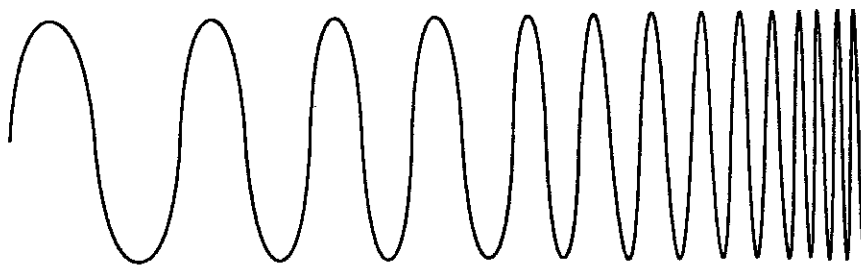


**Figure 25-2**

~~8~~ **Interpreting Graphics** Is the model in Figure 25-2 geocentric or heliocentric? Explain how you know.



USING SCIENCE SKILLS



A. Radio waves  
 B. Microwaves  
 C. Infrared  
 D. Visible light  
 E. Ultraviolet  
 F. X-rays  
 G. Gamma rays

*Red* *Violet*

Figure 18-2

89. .

90. **Classifying** In Figure 18-2, which waves can be separated into different wavelengths of colored light? *Visible*

91. **Inferring** Look at Figure 18-2. Without knowing the specific frequencies and wavelengths of the colors of the visible spectrum, at which end of the visible spectrum would you place red? At which end would you place violet? *Hint:* Use the names of the waves outside the visible spectrum to help you.

*Red next to C (Infrared) & Violet next to letter E (Ultraviolet)*

# Final Exam

## Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

### Basics

- D ~~X~~ The SI unit of force is the  
 a. joule. c. meter.  
 b. kilogram. d. newton.
- B ~~X~~ When an unbalanced force acts on an object,  
 a. the object's motion does not change. c. the weight of the object decreases.  
 b. the object accelerates. d. the inertia of the object increases.
- A ~~X~~ What kind of friction occurs as a fish swims through water?  
 a. fluid c. sliding  
 b. rolling d. static
- D ~~X~~ As you push a cereal box across a tabletop, the sliding friction acting on the cereal box  
 a. acts in the direction of motion. c. is usually greater than static friction.  
 b. equals the weight of the box. d. acts in the direction opposite of motion.
- D ~~X~~ What is the momentum of a 50-kilogram ice skater gliding across the ice at a speed of 2 m/s?  
 a.  $25 \frac{\text{kg}}{\text{m/s}}$  c. 50 kg  
 b. 48 kg-m/s d. 100 kg-m/s
- B ~~X~~ The product of an object's mass and velocity is its  
 a. centripetal force. c. net force.  
 b. momentum. d. weight.
- B ~~X~~ The forces acting on a falling leaf are  
 a. air resistance and fluid friction. c. gravity and static friction.  
 b. gravity and air resistance. d. weight and rolling friction.

### Mechanical Energy

- A 8. The energy of motion is called  
 a. kinetic energy. c. thermal energy.  
 b. potential energy. d. work.
- B 9.

Looking for	Solution
$E_k$	$= \frac{1}{2} (30 \text{ kg}) (2 \text{ m/s})^2$
Given $m = 30 \text{ kg}$ $v = 2 \text{ m/s}$	$= 15 \text{ kg} (4 \text{ m}^2/\text{s}^2)$
Relationships/Formula $E_k = \frac{1}{2} m v^2$	$= 60 \text{ J}$

A small 30-kilogram canoe is floating downriver at a speed of 2 m/s. What is the canoe's kinetic energy?  
 SHOW WORK ABOVE

- a. 32 J c. 120 J  
 (b) 60 J d. 900 J

- C 10. An object's gravitational potential energy is directly related to all of the following EXCEPT
- its height relative to a reference level.
  - its mass.
  - its speed.
  - the acceleration due to gravity.
- C 11. Why is the gravitational potential energy of an object 1 meter above the moon's surface less than its potential energy 1 meter above Earth's surface?
- The object's mass is less on the moon.
  - The object's weight is more on the moon.
  - The moon's acceleration due to gravity is less.
  - both a and c

D 12.

Looking for	Solution
$E_p$	$= 4\text{kg}(9.8\text{m/s}^2)(2\text{m})$
Given $m = 4\text{kg}$ $g = 9.8\text{m/s}^2$ $h = 2\text{m}$	$= 78.4\text{kg}\cdot\text{m}^2/\text{s}^2$
Relationships/Formula $E_p = mgh$	$= 78.4\text{J}$

A 4-kilogram cat is resting on top of a bookshelf that is 2 meters high. What is the cat's gravitational potential energy relative to the floor if the acceleration due to gravity is  $9.8\text{ m/s}^2$ ?

SHOW WORK ABOVE

- 6 J
  - 8 J
  - 20 J
  - d 78 J
- D 13. Which of the following statements is true according to the law of conservation of energy?
- Energy cannot be created.
  - Energy cannot be destroyed.
  - Energy can be converted from one form to another.
  - all of the above
- C 14. If no friction acts on a diver during a dive, then which of the following statements is true?
- The total mechanical energy of the system increases.
  - Potential energy can be converted into kinetic energy but not vice versa.
  - $(KE + PE)_{\text{beginning}} = (KE + PE)_{\text{end}}$
  - all of the above

#### Waves

- D 15. A mechanical wave moves through a medium, which can be
- a liquid.
  - a solid.
  - a gas.
  - all of the above
- B 16. Transverse and longitudinal waves both
- have compressions and rarefactions.
  - transfer energy through a medium.
  - move at right angles to the vibration of the medium.
  - are capable of moving the medium a long distance.
- D 17. Which type of mechanical wave needs a source of energy to produce it?
- a transverse wave
  - a longitudinal wave
  - a surface wave
  - all of the above
- C 18. Which wave causes the medium to vibrate only in a direction parallel to the wave's motion?
- a transverse wave
  - a surface wave
  - a longitudinal wave
  - none of the above

19. A period is the length of time it takes for
- a disturbance to start a wave.
  - two complete wavelengths to pass a fixed point.
  - a wave to travel the length of a rope.
  - one complete wavelength to pass a fixed point.

D

20. To determine the speed of a wave, you would use which of the following formulas?
- speed = frequency  $\times$  amplitude
  - speed = wavelength  $\times$  frequency
  - speed = wavelength  $\times$  amplitude
  - speed = wavelength  $\times$  period

B

21.

Looking for	Solution
$v = ?$	$= 15 \text{ mm} (4 \text{ Hz})$
Given $\lambda = 15 \text{ mm}$ $f = 4 \text{ Hz}$	$= 60 \text{ mm/s}$
Relationships/Formula $v = f\lambda$	

A wave has a wavelength of 15 mm and a frequency of 4.0 hertz. What is its speed? SHOW WORK ABOVE

- 60 mm/s
- 60 hertz/s
- 3.8 mm/s
- 0.27 mm/s

D

22. When a wave strikes a solid barrier, it behaves like a basketball hitting a backboard. This wave behavior is called
- constructive interference.
  - diffraction.
  - refraction.
  - reflection.

C

23. For refraction to occur in a wave, the wave must
- strike an obstacle larger than the wavelength.
  - change direction within a medium or object.
  - enter a new medium or object at an angle.
  - enter a new medium or object head-on.

B

24. A sound wave is an example of a
- transverse wave.
  - longitudinal wave.
  - standing wave.
  - surface wave.

D

25. In which medium does sound travel the fastest?
- salt water
  - fresh water
  - air
  - cast iron

D

26. An ambulance siren sounds different as it approaches you than when it moves away from you. What scientific term would you use to explain how this happens?
- ultrasound
  - diffraction
  - rarefaction
  - the Doppler effect

B

27. When a sound source approaches you, the pitch you hear is
- lower than when the source is stationary.
  - higher than when the source is stationary.
  - the same as when the source is stationary.
  - first higher and then lower than the pitch of the source when stationary.

### Electromagnetic Spectrum

- B 28. Electromagnetic waves vary in
- the speed they travel in a vacuum.
  - wavelength and frequency.
  - the way they reflect.
  - their direction.
- A 29. To calculate the frequency of an electromagnetic wave, you need to know the speed of the wave and its
- wavelength.
  - intensity.
  - refraction.
  - amplitude.
- C 30. Infrared rays have a shorter wavelength than
- ultraviolet rays.
  - X-rays.
  - radar waves.
  - gamma rays.
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- visible light.
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  - X-rays.
- C 33. The visible light spectrum ranges between
- radar waves and X-rays.
  - television waves and infrared rays.
  - infrared rays and ultraviolet rays.
  - ultraviolet rays and gamma rays.
- D 34. Cellular telephones utilize
- radar waves.
  - very high frequency waves.
  - very low frequency waves.
  - microwaves.

### Projectile Motion

- C ~~X~~ 46. Objects in free fall near the surface of the Earth experience
- constant speed.
  - constant velocity.
  - constant acceleration.
  - constant distance.

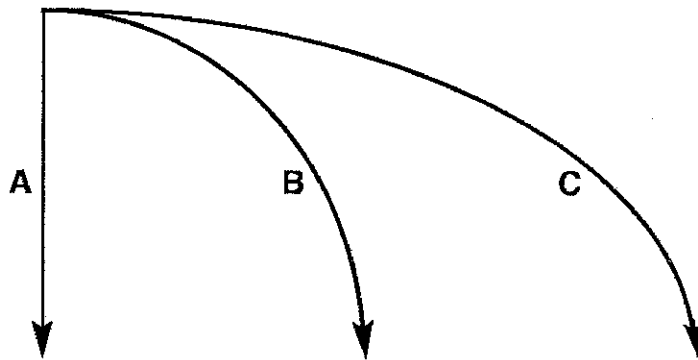


Figure 12-1

- D ~~X~~ 46. Figure 12-1 shows the motion of three balls. The curved paths followed by balls B and C are examples of
- centripetal motion.
  - constant motion.
  - linear motion.
  - projectile motion.
- D ~~X~~ 47. Projectile motion is caused by
- the downward force of gravity.
  - an initial forward velocity.
  - a final vertical velocity.
  - the downward force of gravity and an initial forward velocity.

## Universal Gravitation

48. Your weight equals your

- C
- mass.
  - mass divided by the net force acting on you.
  - mass times the acceleration due to gravity.
  - mass times your speed.

A 49. As an astronaut travels far away from Earth, her weight

- decreases because gravity decreases.
- decreases because her mass decreases.
- increases because gravity increases.
- remains the same because her mass remains the same.

C 50. The gravitational force between two objects increases as mass

- decreases or distance decreases.
- decreases or distance increases.
- increases or distance decreases.
- increases or distance increases.

### Short Answer

~~51.~~ Name the two factors that determine the strength of the gravitational force between two objects, and describe how these two factors influence the force between the two objects. Which has a greater effect?

Two factors are mass & distance

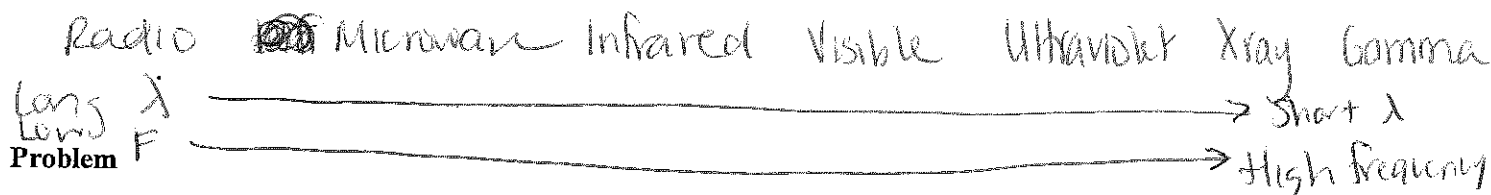
Distance bigger factor because its squared.

$$F_g = G \frac{m_1 m_2}{r^2}$$

52. Explain how the application of the Doppler effect has led to evidence which supports the Big Bang Theory.

Looking at red shifts in the universe supports the big bang because a red shift means its moving away so helps provide evidence that the universe is expanding.

53. Draw a diagram of the different waves of the electromagnetic spectrum in order. Underneath, label the ends with the longest wavelengths, the highest frequency and the highest energy.



54. Calculate the momentum of a 30-kilogram cart moving at a speed of 2.0 meters per second.

Looking for	Solution
$p$	$= 30\text{kg}(2\text{ m/s})$ $= 60\text{kg} \cdot \text{m/s}$
<b>Given</b> $m = 30\text{kg}$ $v = 2\text{m/s}$	
<b>Relationships/Formula</b> $p = mv$	

55. Calculate the kinetic energy of a 3 kg chicken running at 3 m/sec.

<p><b>Looking for</b></p> <p><math>E_k</math></p>	<p><b>Solution</b></p> <p><math>= \frac{1}{2}(3\text{kg})(3\text{m/s})^2</math></p> <p><math>= 1.5\text{kg}(9\text{m}^2/\text{s}^2)</math></p> <p><math>= 13.5\text{J}</math></p>
<p><b>Given</b></p> <p><math>m=3\text{kg}</math></p> <p><math>v=3\text{m/s}</math></p>	
<p><b>Relationships/Formula</b></p> <p><math>E_k = \frac{1}{2}mv^2</math></p>	

56. What is the mass of a book that is 3 meters high with a potential energy of 60J?

<p><b>Looking for</b></p> <p><math>m</math></p>	<p><b>Solution</b></p> <p><math>\Rightarrow 60\text{J} = m(9.8\text{m/s}^2)(3\text{m})</math></p> <p><math>\frac{60\text{kg}\cdot\text{m}^2/\text{s}^2}{29.4\text{m}^2/\text{s}^2} = \frac{m(29.4\text{m}^2/\text{s}^2)}{29.4\text{m}^2/\text{s}^2}</math></p> <p><math>2.04\text{kg} = m</math></p>
<p><b>Given</b></p> <p><math>h=3\text{m}</math></p> <p><math>E_p=60\text{J}</math></p> <p><math>g=9.8\text{m/s}^2</math></p>	
<p><b>Relationships/Formula</b></p> <p><math>E_p = mgh</math></p>	

57. What is the height of a building if it takes 1.2 seconds for a rock thrown horizontally at a speed of 3 m/s to hit the ground?

<p><b>Looking for</b></p> <p><math>h</math></p>	<p><b>Solution</b></p>
<p><b>Given</b></p>	
<p><b>Relationships/Formula</b></p>	

58. Using the situation in the problem above: How far from the base of the building (horizontal distance) did the rock land?

<b>Looking for</b>	<b>Solution</b>
<b>Given</b>	
<b>Relationships/Formula</b>	