

Key

Goal • Test your understanding of Unit 1, Cells and Systems.

- What are the structures inside of a living cell that have specific functions?
  - A. organs D
  - B. systems
  - C. membranes
  - D. organelles
- If you were comparing a cell to a home, what part of the home would best describe the mitochondria?
  - A. furnace room A
  - B. garage
  - C. hallway
  - D. kitchen
- Which of the following structures does a plant cell have that an animal cell does not?
  - A. cytoplasm
  - B. ribosome
  - C. chloroplast C
  - D. endoplasmic reticulum
- Which of the following best describes cellular respiration?
  - A. glucose + oxygen → carbon dioxide + water + energy A
  - B. glucose + oxygen + energy → carbon dioxide + water
  - C. carbon dioxide + water → glucose + oxygen + energy
  - D. glucose + carbon dioxide → oxygen + water + energy
- The Golgi body sorts proteins and packs them into membrane-wrapped structures called
  - A. ribosomes
  - B. vacuoles
  - C. vesicles C
  - D. lysosomes
- Which of the following descriptions of the cell wall is false?
  - A. tough, rigid structure found inside the cell membrane A
  - B. protects the cell
  - C. provides support for a growing plant
  - D. helps give a plant cell its shape
- Which of the following best describes photosynthesis?
  - A. carbon dioxide + oxygen + energy → glucose + water
  - B. glucose + oxygen + energy → carbon dioxide + water
  - C. carbon dioxide + water + energy → glucose + oxygen C
  - D. glucose + carbon dioxide → oxygen + water + energy
- Which system is responsible for transporting oxygen and nutrients around the body?
  - A. respiratory system
  - B. endocrine system
  - C. nervous system
  - D. circulatory system D

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- If your bronchi became blocked, which body system would be most directly affected?
  - A. circulatory system
  - B. nervous system
  - C. excretory system D
  - D. respiratory system
- Which of the following terms best represents a disease-causing organism?
  - A. pathogen A
  - B. antigen
  - C. antibody
  - D. plaque

means it's alive

Match the Term on the left with the best Descriptor on the right.  
Each Descriptor may be used only once.

Term	Descriptor
11. gastric juice	A. holds the three objective lenses
12. fine focus knob	B. brings an object into focus at high power
13. bile	C. supports the entire microscope
14. eyepiece	D. breaks down fat into small droplets
15. revolving nosepiece	E. brings an object into focus at low or medium power
16. stage	F. is used for viewing and contains a lens that magnifies
17. pepsin	G. digested intestinal contents
18. base	H. contains hydrochloric acid
19. chyme	I. supports the slide
20. coarse focus knob	J. breaks down protein
	K. important for clotting blood

Short Answer Questions

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- Human red blood cells placed into a strong salt solution rapidly shrivel, while those placed in pure water swell and explode. Explain why this occurs.

osmosis! water moves from an area of ↑ [ ] to ↓ [ ].

- What is the difference between an organelle and an organ system?

organelle = structure cell needs to survive. organ system = 1+ organs performing tasks

organelle = mito.

organ sys = circulatory system

- Give an example of each one.

- Mixed connective tissue disease is an affliction where a person's immune system attacks and destroys their own connective tissue.

(a) What is the role of connective tissue in the body?  
holds together/supports other tissues.

(b) What do you think the consequences would be if the connective tissue in the body were damaged by this disease?  
poor support, breakdown of tissue, weak joints.

- There are many "fad diets" that advise cutting certain things out of your diet. It is usually not a good idea to abandon a well-balanced diet. Suppose a "fad diet" cuts proteins completely out of the daily diet. Why would cutting protein out of your diet be dangerous?

protein helps build muscles, skin and hair. Used for chemical reactions

- State three reasons why water is necessary for life.

transport nutrients/waste  
cooling body  
chemical reactions

- State two ways in which bacteria are beneficial to your digestive system.

breakdown food, help absorb food, produce vitamins we use.

- Calcium is a required nutrient for your body.

(a) What type of nutrient is calcium?  
mineral

(b) What are the consequences of not getting enough calcium in your diet?  
bad teeth & bones, bad nerve/muscle function.

- Why does the number of white blood cells in your blood increase when you have an infection?

immune response! they fight infection.  
# ↑ when body is invaded.

- Around the year 1800, Edward Jenner deliberately infected a boy with cowpox in order to give him immunity to the more serious disease smallpox. How is what Jenner did similar to and different from today's modern vaccines?

caused an immune response  
some of antigen was left behind and child was immune

B cells recognize antigens. without them we couldn't recognize invaders.

Goal • Test your understanding of the concepts in Unit 2.

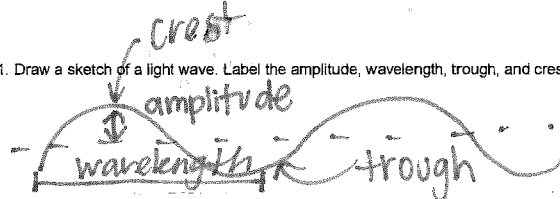
- Which describes the wavelength of a water wave?
  - A. the height of a wave crest above the wave trough
  - B. the height of a wave crest above the rest position of the wave
  - C. the distance from one point on a wave to the same point on the next wave C
  - D. the number of times per second that the crest of a wave passes a fixed point
- The complete range of all wavelengths of radiant energy is called
  - A. the visible spectrum
  - B. the invisible spectrum
  - C. the colour spectrum
  - D. the electromagnetic spectrum D
- A mirror changes the direction of a ray of light in a process called
  - A. diffusion
  - B. refraction
  - C. reflection C
  - D. absorption
- Ultraviolet rays are electromagnetic rays associated with
  - A. heat
  - B. light
  - C. radar
  - D. sunburns D
- The ray model of light explains why shadows formed in sunlight have sharp edges. This is because
  - A. light rays travel in straight lines A
  - B. the angle of incidence equals the angle of reflection
  - C. the light rays spread out as they travel
  - D. the light rays are blocked by objects between the light source and the observer

6. In a transparent material, the light rays  
 A. are absorbed and no clear image is seen through the material  
 B. are scattered and no clear image is seen through the material  
 C. are transmitted without scattering but no image is seen through the material  
 D. are transmitted without scattering and a clear image is seen through the material
7. When light rays pass from water into air,  
 A. they bend toward the normal as they move into a material with greater density  
 B. they bend away from the normal as they move into a material with greater density  
 C. they bend toward the normal as they move into a material with lower density  
 D. they bend away from the normal as they move into a material with lower density
8. Light rays that are made to come together to a point after passing through a lens are described as  
 A. merging  
 B. diverging  
 C. conjoining  
 D. converging
9. The lens in a healthy living human eye is  
 A. opaque and hard  
 B. opaque and flexible  
 C. transparent and hard  
 D. transparent and flexible
10. Near-sightedness is a vision problem that  
 A. makes it difficult to focus on nearby objects  
 B. makes it difficult to focus on distant objects  
 C. causes multiple blurry images of an object to be seen  
 D. allows a scene to be clear directly ahead but the edges of the scene are fuzzy

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
11. amplitude	A. part of the eye that does most of the focussing
12. energy	B. a transparent material that can focus light
13. refraction	C. all waves transfer this
14. concave	D. the shape of a lens or mirror in which the surface bends inwards
15. lens	E. the height of a wave
16. translucent	F. permits light to pass but the image is not clear
17. astigmatism	G. causes several fuzzy images to form on the retina
18. cornea	H. the length of a wave
19. pupil	I. connects the retina to the brain
20. optic nerve	J. transparent part of eye surrounded by the iris and which appears to be black
	K. the shape of a lens or mirror in which the surface bends inwards
	L. the bending of light as it passes from air into glass

21. Draw a sketch of a light wave. Label the amplitude, wavelength, trough, and crest.



22. Calculate the frequency, in hertz, of each of the following:  
 (a) the tic-tac sound of a wind up clock, which starts a new sound 60 times in one minute  
 1 Hz
- (b) a heart rate of a cyclist, which beats 300 times in 100 seconds  
 3 Hz
- (c) the frequency of a water wave, which laps up on the shore 6 times in one minute  
 0.1 Hz
23. For each of the following parts of the invisible spectrum, list one way in which the radiation is used to create some sort of image.  
 (a) X rays broken bones.  
 (b) infrared rays night vision  
 (c) microwaves radar!

26. The rear view mirror of a car on the passenger side usually has this warning: "Objects in the mirror are closer than they appear."

(a) Sketch and label the kind of mirror used in this application.

convex mirror

(b) Identify one other common use for this type of mirror.

security in stores.

27. Draw a sketch of a human eye from the as viewed from the front. Label the iris, sclera, pupil.

so small color white → hole

28. A swimmer uses goggles to see clearly underwater. Explain why the goggles are needed to see clearly underwater and why objects appear fuzzy if the goggles are removed.

H<sub>2</sub>O refracts light, making it hard to see thru.

Goal • Check your understanding of Unit 3, Fluids and Dynamics.

1. Which of the following statements regarding particle theory is false?  
 A. Particles that make up matter are always moving.  
 B. All matter is made up of very small particles.  
 C. All particles are attracted to one another with equal strength.  
 D. There are spaces in between particles.
2. How would kinetic energy be best described?  
 A. the energy of motion  
 B. the energy of friction  
 C. the energy of gravity  
 D. the energy of change
3. What are you calculating if you divide the mass of a substance by its volume?  
 A. weight  
 B. pressure  
 C. buoyancy  
 D. density
4. A figure skater jumps into the air to perform a jump. At the end of the jump, the skater comes back to ice, and his blades cut into the ice. Which two types of force are most evident at the end of the jump?  
 A. friction force and gravitational force  
 B. gravitational force and tension force  
 C. electrostatic force and gravitational force  
 D. elastic force and friction force
5. On very cold winter days, water vapour in the air can turn directly into a solid and form frost on the inside of windows. Which of the following changes of state occurs when frost forms on a window?  
 A. sublimation  
 B. deposition  
 C. condensation  
 D. solidification
6. Which of the following statements regarding a cyclist riding through a park is false?  
 A. There is friction between the tires and the road.  
 B. Air friction exerts a force against the motion of the cyclist.  
 C. When forces are balanced the cyclist continues at a constant speed.  
 D. When the cyclist is slowing down, forces on the cyclist are balanced.

7. Two different tennis balls (one filled with air, one with water) are struck with the same amount of force. The tennis ball filled with air can absorb much more force than the similar tennis ball filled with water. This is because

- A. air is compressible, while water is not  
 B. force of gravity is greater on the water-filled tennis ball  
 C. air is not compressible under ordinary circumstances  
 D. the forces on the air-filled tennis ball are more out of balance

8. A child throws a solid rubber ball and it bounces back up from the ground. Why?

- A. The solid rubber undergoes compression.  
 B. The ball deforms and stores elastic energy.  
 C. Friction and electrostatic energy are released.  
 D. The force of gravity drives the ball back upward.

9. What causes your ears to pop when you gain or lose altitude quickly?

- A. a difference in air pressure between the middle ear and the surrounding air  
 B. a decrease in air pressure in the brain  
 C. Pascal's principle  
 D. liquid in the ear striking the eardrum

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
11. cohesion	A. hurricane
14. adhesion	B. change from gas to liquid
15. high viscosity	C. high flow rate
16. low viscosity	D. change from solid to gas
18. condensation	E. Jaws of Life®
19. sublimation	F. vacuum cleaner
20. solidification	G. change from liquid to solid
	H. low flow rate
	I. water droplets on a spider web
	J. change from liquid to gas
	K. surface tension

Short Answer Questions

21. Explain the differences among a solid, liquid, and gas in terms of shape and volume.

Solid: fixed, fixed  
 Liquid: container, fixed  
 Gas: random.

22. List three main points of the kinetic molecular theory.

- small particles  
 - empty space  
 - always moving  
 - energy creates movement

30. Solve the following problems:

(a) A  $40 \text{ cm}^3$  cube of pure nickel is measured by a student to have a mass of 356 g. What is the density of the nickel?

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$$8.9 \text{ g/cm}^3$$

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(b) A 200 mL sample of alcohol has a mass of 158 g. What is the density of the alcohol?

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$$0.79 \text{ g/mL}$$

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(c) A football player with a weight of 125 kg stands on a  $0.5 \text{ m}$  by  $0.5 \text{ m}$  scale. What pressure does the platform of the scale exert on the spring below?

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$$500 \text{ Pa}$$

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(d) The bottom of a woman's shoe heel measures  $0.02 \text{ m}$  by  $0.04 \text{ m}$ . If the woman with a weight of 56 kg balances on a single heel, what pressure does she exert on the ground below?

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$$70000 \text{ Pa}$$

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