For each question, select the best answer from the four alternatives.

1. A man pulls his luggage on a 30.0° incline with a constant force of 25 N. How much work does he do after walking 20.0 m? (5.1) T/I
   (a) 1500 J
   (b) 250 J
   (c) 430 J
   (d) 330 J
2. The type of energy possessed by moving objects is
   (a) kinetic energy
   (b) potential energy
   (c) chemical energy
   (d) work energy (5.2) K/U
3. What is the kinetic energy of a 25 kg object moving at 5.0 m/s? (5.2) T/I
   (a) 120 J
   (b) 63 J
   (c) 620 J
   (d) 310 J
4. According to the law of conservation of energy, which of the following is true? (5.3) K/U
   (a) Since the Big Bang the amount of energy in the universe has been increasing.
   (b) Energy only disappears during nuclear reactions.
   (c) When an energy transformation occurs, no energy is lost.
   (d) Energy can be created out of space.
5. To transfer input energy into kinetic energy, which of the following devices is most efficient? (5.4) K/U
   (a) electric car
   (b) bicycle
   (c) gas vehicle
   (d) animal muscles
6. What power input is needed for a 70.0 kg person to go up 5.00 m of stairs in 2.00 s? (5.5) T/I
   (a) 3430 J
   (b) 175 J
   (c) 1720 J
   (d) 340 J
7. An increase in the motion of the particles that make up a substance will have what effect? (6.1) K/U
   (a) It will make the substance warmer.
   (b) It will make the substance colder.
   (c) It will make the substance spin.
   (d) It will not have any effect on the substance.
8. The term used to describe the transfer of thermal energy that occurs when warmer objects are in physical contact with colder objects is
   (a) thermal convection
   (b) thermal induction
   (c) thermal radiation
   (d) thermal conduction (6.2) K/U
9. The specific heat capacity of a substance measures which of the following? (6.3) K/U
   (a) the amount of energy required to raise the temperature of 1 L of the substance by 1 °C
   (b) the amount of energy required to change the state of matter of the substance from liquid to gas
   (c) the amount of energy required to raise the temperature of 1 kg of the substance by 1 °C
   (d) the amount of energy required to bring the substance into a plasma state
10. The amount of energy released or absorbed by a substance during a phase transition is called
    (a) latent heat
    (b) specific heat
    (c) phase heat
    (d) transition heat (6.4) K/U
11. Which of the following systems uses thermal energy from Earth for heating and cooling? (6.5) K/U
    (a) electrical heating systems
    (b) geothermal systems
    (c) forced-air system
    (d) hot water heating system
12. Which particle can only occupy certain energy levels and circles the nucleus of an atom? (7.1) K/U
    (a) proton
    (b) neutron
    (c) electron
    (d) positron
13. How does the atomic number of an element change when it undergoes alpha decay? (7.2) K/U
    (a) increases by 1
    (b) decreases by 1
    (c) increases by 2
    (d) decreases by 2
14. If a substance has a half-life of 3.00 h, how much of a 512 mg sample will remain in 5.00 h? (7.3) T/I
    (a) 144 mg
    (b) 161 mg
    (c) 212 mg
    (d) 256 mg

15. How does the mass of the nucleus of an atom compare to the sum of the masses of its individual particles? (7.4) K/U
    (a) The mass of the nucleus is smaller than the sum of the masses of the individual particles.
    (b) The mass of the nucleus is larger than the sum of the masses of the individual particles.
    (c) The mass of the nucleus is the same as the sum of the masses of the individual particles.
    (d) The particles in the nucleus do not exist in free form.
16. Which of the following is used to cool Canada's CANDU reactors? (7.4) K/U
    (a) regular water
    (b) salt water
    (c) light water
    (d) heavy water
17. The process of getting energy by combining two small nucleons to form a larger one is known as
    (a) nuclear fission
    (b) nuclear fusion
    (c) nuclear reaction
    (d) nuclear bombardment (7.5) K/U

Indicate whether each statement is true or false. If you think the statement is false, rewrite it to make it true.

18. A force that acts in a direction perpendicular to the motion of an object does positive work on the object. (5.1) K/U
19. The kinetic energy of an object can be determined by multiplying the mass by the square of the velocity of an object. (5.2) K/U C
20. Gravitational potential energy is equal to the mass of an object times the acceleration of gravity times the height above a given reference point. (5.2) K/U
21. A person who jumps into a pool will hit the water with the same amount of kinetic energy as the amount of potential energy they had from the height they jumped. (5.3) K/U
22. A hydroelectric power plant is about twice as efficient at producing electrical energy as a nuclear power plant. (5.4) K/U
23. Power is equal to the amount of mechanical work done divided by the distance over which the work was performed. (5.5) K/U
24. Temperature is a measure of the average kinetic energy of the particles in a substance. (6.1) K/U
25. The Fahrenheit scale is based on the total amount of thermal energy that a substance possesses. (6.1) K/U
26. Two objects that are made out of the same substance and have the same mass will also have the same amount of thermal energy when they are at the same temperature. (6.2) K/U
27. Heat is a term used in science to describe the transfer of thermal energy from a colder object to a warmer one. (6.2) K/U
28. The specific heat of water is 2.18×10^3 J/(kg•°C). (6.3) K/U
29. The increase in volume of a substance due to an increase in temperature is known as thermal expansion. (6.3) K/U
30. The specific latent heat of a substance is the amount of thermal energy required for 1 kg of a substance to change from one state into another. (6.4) K/U
31. When an atom is in its normal state, the number of protons is usually greater than the number of electrons. (7.1) K/U
32. The second shell of an atom can hold 18 electrons. (7.1) K/U
33. Different isotopes of the same element contain the same number of protons but a different number of neutrons. (7.1) K/U
34. During beta positive decay, the nucleus of the atom emits an electron. (7.2) K/U
35. The half-life of carbon-14 and the amount known in our environment can be used to determine the age of fossils. (7.3) K/U
36. Per gram of material, nuclear fission produces more energy than nuclear fusion. (7.4, 7.5) K/U