St John Baptist De La Salle Catholic School, Addis Ababa

Grade 11 Physics Final Examination Answers for Multiple Choice Questions

3rd Quarter

April, 2024

Multiple Choice Questions & Answers

1. X and Z mark the highest and Y the lowest positions of a 50.0 kg boy swinging. What is the boy's speed at point Y if the distance between the points X and Y is 1.0m?
   A. 2.5 m/s B. 7.5 m/s C. 10 m/s D. 12.5 m/s E. None of the above.

   Answer: E

2. The collision between a hammer and a nail can be considered to be approximately perfect elastic. What is, approximately, the kinetic energy acquired by a 12-g nail when it is struck by a 550-g hammer moving with a speed of 4.5 m/s.
   A. 0.46 J B. 0.72 J C. 0.90 J D. 1.55 J E. 0.88 J F. None of the above.

   Answer: A

3. The engine of a rocket launches it upward with a net force of 9.3×10^6 N. The engine burns for 250 seconds. The rocket's mass is 2.9×10^5 kg. Assuming that it starts from rest on the ground, how fast is the rocket traveling after 250 seconds?
   A. 4000 m/s B. 8000 m/s C. 12000 m/s D. 18000 m/s E. None of the above

   Answer: B

4. Assume 1.0 kg of ice at 0°C starts to melt. It absorbs 300 kJ of energy by heat. What is the temperature of the water afterwards?
   A. 10° B. 20° C. 5° D. 0° E. None of the above.

   Answer: D

5. Which of the following is an example of heat transfer through convection?
   A. The energy emitted from the filament of an electric bulb B. The energy coming from the sun
   C. A pan on a hot burner D. Water boiling in a pot E. None of the above

   Answer: D

6. When a stationary uranium nucleus undergoes nuclear fission, it breaks into 2 unequal chunks that fly apart. What can you conclude about the chunks?
   A. The momenta of the chunks add up to zero. B. The momenta of the chunks add up to zero.
   C. The chunks have equal and opposite momenta. D. The chunks have equal and opposite velocities.
   E. A & C F. B & D G. None of the above.

   Answer: E

7. A room has a window made from thin glass. The room is colder than the air outside. There is some condensation on the glass window. On which side of the glass would the condensation most likely be found?

   A. Condensation is on the outside of the glass when the cool, dry air outside the room comes in contact with the cold pane of glass.

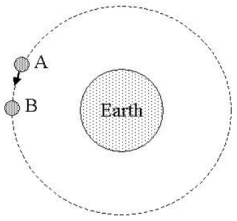
B. Condensation is on the outside of the glass when the warm, moist air outside the room comes in contact with the cold pane of glass.

C. Condensation is on the inside of the glass when the cool, dry air inside the room comes in contact with the cold pane of glass.

D. Condensation is on the inside of the glass when the warm, moist air inside the room comes in contact with the cold pane of glass.

Answer: B

8. A satellite is moving around Earth in a circular orbit at a constant speed (see Figure). The only force that acts on the satellite is Earth's gravitational force which points directly toward earth's center. Which one of the following statements is true as the satellite moves from point A to point B in the orbit?



A. The gravitational potential energy of the satellite decreases as it moves from A to B.

B. The work done on the satellite by the gravitational force is negative for the motion from A to B.

C. The work done on the satellite by the gravitational force is zero for the motion from A to B.

D. The velocity of the satellite remains unchanged as it moves from A to B.

E. None of the above.

Answer: C

Questions 9 through 12 refer to two cups, A and B, which contain different amounts of water. The water in each cup is heated as described. In questions 9 through 11 the cups are in a room where the temperature is 25 °C. In question 12 the cups are in different environments. For each question choose one of the four answers A through D.

A. Cup A had more heat energy transferred.

B. Cup B had more heat energy transferred.

C. Both cups had the same amount of heat energy transferred.

D. Not enough information is given to determine the answer.

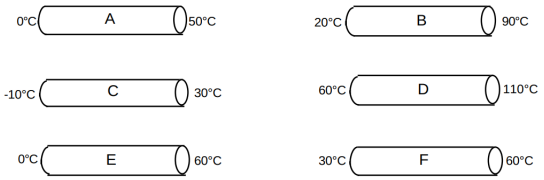
9. Cup A contains 100 grams of water and cup B contains twice as much water. The water in both cups was initially at room temperature. Cup A was heated to 75°C and cup B was heated to 50°. Which cup had more heat energy transferred to it? **C**

10. Cup A contains 100 grams of water and cup B contains 50 grams of water. The water in both cups was initially at room temperature. Cup A was then heated to 45°C and cup B was heated to 90°C. Which cup had more heat energy transferred to it? **B**

11. Cup A contains 100 grams of water and cup B contains 80 grams of water. The water in both cups was initially at room temperature. Cup A was then heated to 45°C and cup B was heated to 50°C. Which cup had more heat energy transferred to it? **C**

12. Cup A contains 100 grams of water and is initially at 10°C in a refrigerator. Cup A is heated until its temperature is 20°C. Cup B contains 50 grams of water initially at 70°C in an oven. Cup B is heated until its temperature is 90°C. Which cup had more heat energy transferred to it? **C**

13. Along which rod is the rate of heat flow the same as along rod A? *Answer **G** if you think that heat flows at the same rate along all of the rods. Answer **H** if you think that no rod has the same rate of heat flow as A*



Answer: D

14. Five minutes later, the water in the kettle is still boiling. The most likely temperature of the water now is about:
A. 88° B. 98° C. 100° D. 120° E. 150°

Answer: B

15. Four students were discussing things they did as kids. The following conversation was heard: Bethlehem: "I used to wrap my dolls in blankets but could never understand why they didn't warm up." Out of the five responses, who do you agree with?

    A. Sarah replied: "It's because the blankets you used were probably poor insulators."

    B. Aychiluhem replied: "It's because the blankets you used were probably poor conductors."

    C. Amberber replied: "It's because the dolls were made of material which did not hold heat well."

    D. Kinfe replied: "It's because the dolls were made of material which took a long time to warm up."

    E. Temtime replied: "You're all wrong."

Answer: E

16. The "triple point" of a substance is that point for which the temperature and pressure are such that:
A. only solid and liquid are in equilibrium B. only liquid and vapor are in equilibrium C. only solid and vapor are in equilibrium D. solid, liquid, and vapor are all in equilibrium E. the temperature, pressure and density are all numerically equal

Answer: D

17. There is a temperature at which the reading on the Kelvin scale is numerically:
A. equal to that on the Celsius scale B. lower than that on the Celsius scale C. equal to that on the Fahrenheit scale D. less than zero E. none of the above

Answer: C

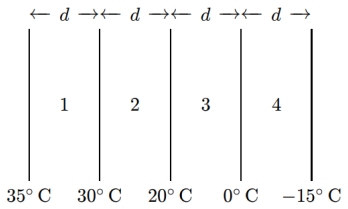
18. When the temperature of a copper penny is increased by 100◦ C, its diameter increases by 0.17%. The area of one of its faces increases by:
A. 0.17% B. 0.34% C. 0.51% D. 0.13% E. 0.27% F. None of the above.

Answer: B

19. Object A, with heat capacity C_A and initially at temperature T_A, is placed in thermal contact with object B, with heat capacity C_B and initially at temperature T_B. The combination is thermally isolated. If the heat capacities are independent of the temperature and no phase changes occur, the final temperature of both objects is:
A. $(C_AT_A - C_BT_B)/(C_A + C_B)$ B. $(C_AT_A + C_BT_B)/(C_A + C_B)$ C. $(C_AT_A - C_BT_B)/(C_A - C_B)$
D. $(C_A - C_B)|T_A - T_B|$ E. $(C_A + C_B)|T_A - T_B|$ F. None of the above.

Answer: B

20. The diagram below shows four slabs of different materials with equal thickness, placed side by side. Heat flows from left to right and the steady-state temperatures of the interfaces are given. Rank the materials according to their thermal conductivities, smallest to largest.



A. 1, 2, 3, 4 B. 2, 1, 3, 4 C. 3, 4, 1, 2 D. 3, 4, 2, 1 E. 4, 3, 2, 1

Answer: D

21. A 0.500 kg aluminum pan on a stove is used to heat 0.250 liters of water from 273.15K to 353.15K. What percentage of the heat is used to raise the temperature of the water?($c_w = 4186 J/kgK$, $c_{Al} = 900 J/kgK$)
A. 69.9% B. 77.2% C. 17.2% D. 30.1% E. 34.2% F. None of the above.

Answer: A

22. The silver coating on the glass surfaces of a Thermos bottle reduces energy that is transferred by
A. conduction. B. radiation. C. friction. D. convection. E. none of these

Answer: B

23. The reason the Sun's radiant energy is of shorter wavelengths than the earth's is because the Sun
A. has a higher temperature than the earth. B. is an energy source while the earth is primarily an energy receiver. C. has much more thermal energy. D. all of the above E. none of the above

Answer: A

24. Biruk decides to use his physics knowledge to make iced tea by heating a cup of water in a microwave oven and adding tea bags to make a concentrated hot tea. He then plans to adds equal amounts of cold water and ice, but which procedure will yield the coldest pitcher of tea after 10 minutes?

A. Wait 10 minutes for the hot tea to cool, then add cold water and ice

B. Add cold water, wait 10 minutes, then add ice

C. Add ice, wait 10 minutes, then add cold water

D. Add both cold water and ice immediately

E. All have the same effect.

Answer: A

25. It is known that one, perhaps, a popular way of modeling intermolecular interactions is the Lennard-Jones Potential model: $V(r) = \frac{A}{r^{12}} - \frac{B}{r^6}$. Which of the following terms is equivalent to A?
A. $2\varepsilon\sigma^6$ B. $4\varepsilon\sigma^6$ C. $2\varepsilon\sigma^{12}$ D. $4\varepsilon\sigma^{12}$ E. None of the above

Answer: D

26. At what net rate does heat radiate from a $275 - m^2$ black roof on a night when the roof's temperature is $30.0°C$ and the surrounding temperature is $15.0°C$? The emissivity of the roof is 0.900.
A. 21.7kW B. -21.7kW C. 43.4 kW D. -43.4kW E. None of the above

Answer: B

27. The fact that a thermometer "takes its own temperature" illustrates
A. the difference between heat and thermal energy. B. the fact that molecules are constantly moving.

C. thermal equilibrium. D. energy conservation. E. none of the above

Answer: C

28. A hot dog pants
A. to bring more oxygen into its lungs. B. to help evaporation occur in its mouth and bronchial tract. C. to impress dogs of the opposite sex. D. for no particular reason—some things just happen. E. none of the above

Answer: B

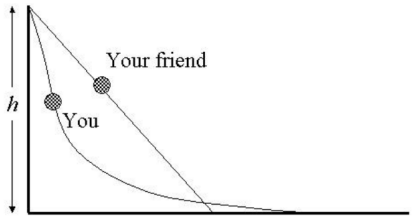
29. You lift a suitcase from the oor to a table. In addition to the weight of the suitcase, select all of the following factors that determine the work done by the gravitational force on the suitcase.

1. whether you lift it directly up to the table or along a longer path
2. whether you lift it quickly or slowly
3. the height of the table above the oor

A. (1) only B. (3) only C. (1) and (3) only D. (2) and (3) only E. (1), (2) and (3)

Answer: B

30. Two frictionless slides are shaped differently but start at the same height h and end at the same level as shown below. You and your friend, who has the same weight as you, slide down from the top on dfferent slides starting from rest. Which one of the following statements best describes who has a larger speed at the bottom of the slide?



A. You, because you initially encounter a steeper slope so that there is more opportunity for accelerating.

B. You, because you travel a longer distance so that there is more opportunity for accelerating.

C. Your friend, because her slide has a constant slope so that she has more opportunity for accelerating.

D. Your friend, because she travels a shorter distance so that she can conserve her kinetic energy better.

E. Both of you have the same speed

Answer: E