Choose one correct response for the following.

___ 1. The quantity known as specific heat is:
   a) any temperature reported on a more specific thermometer.
   b) the energy needed to increase the temperature of one gram of a substance by 1°C.
   c) any temperature of a 1 kg sample reported in °C.
   d) all of the above

___ 2. Identify the correct phase change for a solid changing into a liquid.
   a) melting  b) boiling  c) sublimation  d) freezing

___ 3. The heat transfer that occurs when energy is directly transferred between molecules is:
   a) radiation  b) conduction  c) convection  d) temperature

___ 4. Which of the following is false concerning the latent heat of fusion.
   a) It is the heat involved in a solid/liquid phase change.
   b) It can be calculated by the equation, \( q = n L_{\text{fus}} \).
   c) The solid must absorb the calculated heat in order to change into the liquid.
   d) It can be calculated by the equation, \( q = n C \Delta T \)

___ 5. A ratio of (\( \Delta \text{distance} / \Delta \text{time} \)) without direction is known as:
   a) velocity  b) acceleration  c) speed  d) density

___ 6. Ignoring air resistance, a falling object has an acceleration that is:
   a) constant  b) zero  c) increasing  d) decreasing

___ 7. How many forces are acting on a bullet fired horizontally from a rifle after leaving the rifle (ignoring air resistance)?
   a) one, from the gunpowder explosion
   b) one, from the pull of gravity
   c) two, one from the gunpowder explosion and one due to gravity
   d) none

___ 8. A change in the state of motion of an object is evidence of:
   a) a force.  b) an unbalanced force.  c) inertia.  d) momentum.

___ 9. If the unbalanced force applied to an object is doubled, then its:
   a) acceleration doubles  b) velocity doubles  c) acceleration halves  d) velocity halves
10. A 100 kg object is traveling at 10 m/s while a second 100 kg object travels at 20 m/s. The momentum of the second object is ______ that of the first one.
   a) one half  b) the same as  c) twice  d) four times

11. According to the universal law of gravitation, if the distance between two objects is doubled then the force will be______.
   a) doubled  b) quadrupled  c) one half  d) one fourth

12. An electrostatic charge can be obtained from a charged object by:
   a) friction  b) contact  c) induction  d) all of these

13. The unit and symbol that describes electrical charge (q) is ___   and ____.
   a) Coulomb, C  b) volt, V  c) Amphere, A  d) Ohms, Ω

14. Compared to a short silver wire, a longer silver wire with the same diameter and temperature will have a ______ resistance.
   a) larger  b) smaller  c) similar  d) negible

15. The earth's north magnetic pole
   a) is located exactly at the geographic north pole.
   b) has always had the same orientation
   c) is really a magnetic south pole
   d) is due to the North Star.

16. A moving charge is surrounded by __________.
   a) a magnetic field  b) an electrical field  c) a and b  d) neither a or b.

Part 1 - short answer or essay
(8 pts) 1. A sample of silver at 25.0°C is warmed to 80.0°C when 800 calories of heat is added. Find the mass of the silver sample, \( C_{\text{silver}} = 0.056 \text{ cal/g °C} \). Would the mass have been larger or smaller if the sample had been made of water instead?

(5 pts) 2. Why does a rocket become progressively easier to accelerate through space? Is this an example of Newton's first, second or third law of motion?
(7 pts) 3. Can an object be moving if its acceleration is zero? Is this an example of uniform or non-uniform motion? Discuss the net forces acting on the object. Is this an example of Newton's first, second or third law of motion?

(9 pts) 4. Discuss and explain the following schematic for an electrical circuit.

| a) Indicate the number of batteries, bulbs and wires. |
| b) If the total voltage potential was 4 V, what voltage would you expect to read on each bulb? |
| c) What splits between the bulbs - current or voltage? |
| d) If a bulb were unscrewed, would the other one work? |

(8 pts) 5. A 12.0 Ω light bulb is connected to a 120 V battery.

| a) What is the current in the bulb? |
| b) Find the power of the bulb. |
| c) How much would it cost to leave the bulb on for one day if the utility company charges 10¢ per kWh? |

(8 pts) 6. Roughly sketch out the race between the tortoise and the hare. The tortoise wins the race by consistently plodding along at a slow constant speed. The hare takes off really fast in the beginning then decides to go to sleep. The tortoise passes him. After a while the hare wakes up and races even faster than before but reaches the finish line after the tortoise.

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  hare
  turtle
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distane

time
Part Three - longer answer or work

(12 pts) 1. A 1.50 kg rock in knocked loose from a cliff, striking the ground below 3.57 seconds later.
   a) How high was the cliff?

   b) What was the average velocity during the fall?

   c) What the velocity right before it struck the ground?

   d) What was the acceleration, force and momentum at impact?

Choose either 2 or 3 (or do both for extra credit).

(10 pts) 2. Determine the amount of heat that is needed to covert 500 grams of water from ice at -15.0°C to steam at 100°C. (C_{ice} = 0.500 cal/g°C, C_{water} = 1.00 cal/g°C, L_{fus} = 80.0 cal/g, L_{vap} = 540 cal/g) Please draw a heat curve for the water.
(10 pts) 3. A ball starts from rest and rolls on the tracks below. The length of each track and the time that it takes the ball to roll across the section is indicated.
   a) Draw the distance vs. time plot
   b) Draw the velocity vs. time plot
   c) Draw the acceleration vs. time plot

\[
\begin{align*}
\Delta d &= 2.0 \text{ m} \\
\Delta t &= 1.6 \text{ s} \\
\Delta d &= 0.80 \text{ m} \\
\Delta t &= 0.40 \text{ s}
\end{align*}
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The final two topics that I would like to see discussed in this class are (circle two)
Earth Science  Astronomy  Nuclear Chemistry  Wave Motions and Sound

Other _____________________ (has to be covered in Tillery)