Name:_____

Ground Rules

1. This is a sample exam. The purpose of this document is to give you an idea of the subject material and format of the real exam. Note, there may be material on the real exam that is not covered in this exam. There may also be material on this exam that you do not find in the real exam. Use this sample exam with caution.

2. The real exam is partially open book. You may have access to your textbook and any other notes you have made in your own handwriting. You may not use any other materials, including other textbooks, sample exams, study guides, or notes written in anyone else's handwriting. ***You may not bring this sample exam into the real exam.***

3. Answers are given at the end. **You are strongly advised to work through the test completely before looking at the answers**.

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1) Neglecting air resistance, how fast is an object dropped from a height of 10 m going when it hits the ground?

A) 200 m/s B) 14 m/s C) 10 m/s D) 9.8 m/s

2) The circulation of air to heat a room is an example of

A) conduction. B) convection. C) transmission. D) radiation.

3) A metal cylinder attached to a string is dangled into a beaker of water. It has to be held up by the string, otherwise it would sink. When out of water, the string has a tension of 100 N. When the cylinder is placed in water, the tension in the string decreases to 90 N. The buoyant force on the cylinder is

A) 10 N B) 90 N C) 100N D) 9800 N

4) A car increases its speed from 30 mph to 60 mph. What happens to its kinetic energy?

A) No change
B) It increases by a factor of 2.
C) It increases by a factor of 4.
D) Not enough information is given to determine.

5) The temperature of the human body is approximately

A) 37^o F B) 98.6^o C C) 310 K D) 98.6 K

6) A 12 N book is lifted 4.0 m. The work done by the force lifting the book is

A) 3.0 J B) 4.0 J C) 12 J D) 48 J

7) A book is lifted straight up. During this process, the work done by gravity is

A) positive.
B) zero.
C) negative.
D) Not enough information is given to determine.

8) An empty 0.5 liter water bottle sits on the back seat of your car, sealed with a cap. You drive from Wilmington, where the air pressure is $1.01X10^5$ Pa, to the top of Mount Mitchell, where the air pressure is $0.81X10^5$ Pa. You find that the water bottle is somewhat crushed but still intact. What is the new volume of your water bottle? Assume the temperature of the gas inside the bottle did not change.

A) 0.2 l B) 0.4 l C) 0.6 l D) 0.8 l

9) At what depth in water is the *total* pressure twice that at the surface?
A) 1 m B) 10 m C) 20 m D) 100 m

10) Hydrogen is half as dense as helium. Therefore, the buoyant force on a hydrogen balloon is, compared to a helium balloon of the same volume,
A) twice as big. B) the same. C) half as big. D) one quarter as big.

11) Hydrogen is half as dense as helium. Therefore, ignoring the balloon material, the weight of a hydrogen balloon is, compared to a helium balloon of the same volume,
A) twice as big. B) the same. C) half as big. D) one quarter as big.

12) A simple barometer made of mercury has a column of liquid approximately 76 cm high. If you constructed a barometer of water, how high would the column of liquid be?
A) 29.9 inches B) 760 inches C) 10 meters D) 760 meters

13) A new bowling alley has just opened in which the lanes are not horizontal, but slope upward slightly from where you release the ball to where the pins are standing. The lanes in this new bowling alley are highly polished, so there is no friction between the ball and the floor. Moreover, the ball never moves fast enough for air resistance to affect its motion. Once you release the ball and allow it to roll on its own up one of these lanes, the ball
A) slows down because its kinetic energy is being transformed into gravitational potential energy.
B) moves with a constant velocity because of Newton's first law; an object in motion tends to remain in motion.
C) moves uphill because of the uphill acceleration on the ball.
D) speeds up because of a lack of friction between the ball and floor.

14) The latent heat of fusion of a substance is defined as
A) the amount of heat required to raise the temperature of a unit mass of a substance by 1°C.
B) the amount of heat required to turn a unit mass of a substance from solid into liquid.
C) the mass of a gas per unit volume of air.
D) the amount of heat hidden inside a sample of a substance.

15) Humidity has MKS units of
A) J / (kg K) B) kg / m^3 C) % D) J / kg

16) On a given day, outside air has relative humidity of 60%, and the temperature is 0 °C. A heat pump pumps outside air inside your house and warms it to 20 °C. What is the relative humidity inside your house?
A) 80% B) 21% C) 17% D) 2.1 %

17) A heat engine is a device that
A) turns temperature differences into mechanical energy.
B) increases the entropy of a system.
C) extracts heat energy from a warm reservoir and delivers it to a cooler reservoir delivering mechanical work along the way.
D) A, B and C are all true.

18) A piece of metal has a mass of 150 kg and a volume of 0.0078 m^3. This metal might be
A) aluminum B) iron C) copper D) gold

19) You measure the pressure inside your tire using a common handheld device for doing so. See http://www.2carpros.com/how_does_it_work/images/tire_pressure_gauge.jpg for example. The measured pressure is 35 psi. Atmospheric pressure is 15 psi. Therefore the *gauge* pressure inside your tire is
A) 50 psi B) 35 psi C) 20 psi D) 15 psi

20) You attempt to make a "thermometer" out of an aluminum bar, by measuring its expansion when subjected to changes in temperature. If the bar is 50 cm long, by how much will it expand when it is taken from inside a refrigerator at 0°C to room temperature at 20 °C.
A) 250 cm B) 2.5 cm C) 0.00025 cm D) 0.025 cm

Answers:

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	B	B	A	C	C	D	C	B	B	B	C	C	A	B	C	C	D	D	B	D