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Science Bowl Questions 10/11/10

9th Grade

**Toss-Up**

1) PHYSICS *Multiple Choice* What is the wavelength of a wave?

W) the frequency

X) the distance from trough to crest

Y) the amplitude

Z) the distance from a crest to a consecutive crest

ANSWER: Z) the distance from a crest to a consecutive crest

**Bonus**

1) PHYSICS *Short Answer* If the period of a wave is 1/12 s, and the wavelength is 16 m, then what is the speed of the wave?

ANSWER: 192 m/s

**Toss-Up**

2) PHYSICS *Short Answer* What is the Atomic Number of Cadmium?

ANSWER: 48

**Bonus**

2) PHYSICS *Short Answer* How many neutrons are in the element Erbium?

ANSWER: 99

**Toss-Up**

3) PHYSICS *Short Answer* How many electrons are in the third level of the electron cloud in the element Neon?

ANSWER: ‘There is no third level of the electron cloud in the element Neon’ OR ‘None’

**Bonus**

3) PHYSICS *Short Answer* Denote which of the following statements are true for tritium?

1: It has 3 electrons.

2: It has 3 protons.

3: It has 3 neutrons.

ANSWER: ‘Neither 1, 2, or 3’ OR ‘None of them’

**Toss-Up**

4) PHYSICS *Multiple Choice* What is the density of an object with a mass of 610 000 grams, and a volume of 30 500 cubic meters?

W) 200 g/m3

X) 1 500 g/m3

Y) 20 g/m3

Z) 3 g/m3

ANSWER: Y) 20 g/m3

**Bonus**

4) PHYSICS *Short Answer* If the price of water is 1 dollar and12 cents a quart, what is the price of 1 liter of water, in cents, to three significant figures?

ANSWER: 119 cents

**Toss-Up**

5) PHYSICS *Multiple Choice* What is the mass of 12 liters of water?

W) 1 200 decigrams

X) 120 hectograms

Y) 120 000 grams

Z) 1.2 kilograms

ANSWER: 120 hectograms

**Bonus**

5) PHYSICS *Short Answer* If the weight of an object on Earth is 140 kilograms, then what is weight of the object on the Moon, which has 4/25 the amount of gravity that the Earth has? Express your answer in kilograms.

ANSWER: 22.4 kilograms

**Toss-Up**

6) PHYSICS *Short Answer* Using numbers or words, denote which of the following statements are true about an object massing 100 kilograms?

1: It will have more inertia than an object massing 500 kilograms.

2: It will be smaller than an object massing 50 kilograms.

3: Its weight on Earth will be 100 000 grams.

ANSWER: 2 and 3

**Bonus**

6) PHYSICS *Short Answer* Would an object with a density of 0.825 g/mL sink or float in Ethyl Alcohol?

ANSWER: It would sink

**Toss-Up**

7) PHYSICS *Multiple Choice* What is a vector?

W) an arrow denoting the direction of a force

X) a line denoting the magnitude of a force

Y) an arrow denoting the direction and magnitude of a force

Z) an line denoting the direction and magnitude of a force

ANSWER: Y) an arrow denoting the direction and magnitude of a force

**Bonus**

7) PHYSICS *Short Answer* Using numbers or words, denote which of the following are true for an object in dynamic equilibrium.

1: It is not moving.

2: It is accelerating.

3: It is in static equilibrium also.

ANSWER: ‘Neither 1, 2, or 3’ OR ‘None of them’

**Toss-Up**

8) PHYSICS *Short Answer* Using numbers or words, denote which of the following are true about terminal velocity.

1: It creates no net force.

2: It creates dynamic equilibrium.

3: Heavier objects reach terminal velocity faster than lighter objects.

ANSWER: 1 and 2

**Bonus**

8) PHYSICS *Short Answer* When an object is in terminal velocity, at what speed is it going?

ANSWER: 9.8 m/sec2

**Toss-Up**

9) PHYSICS *Multiple Choice* A book is pushed across a table and stops. It is now:

W) in static equilibrium

X) accelerating

Y) decelerating

Z) in dynamic equilibrium

ANSWER: W) in static equilibrium

**Bonus**

9) PHYSICS *Short Answer* If an object is in static equilibrium, are there no forces acting on it?

ANSWER: NO

**Toss-Up**

10) PHYSICS *Multiple Choice* The acceleration produced by a net force on an object is directly proportional to the net force, is in the same direction as the net force, and is inversely proportional to the mass of the object according to

W) Newton’s First Law

X) Newton’s Second Law

Y) Newton’s Third Law

Z) Newton’s Fourth Law

ANSWER: X) Newton’s Second Law

**Bonus**

10) PHYSICS *Short Answer* Which of Newton’s three laws deals with the concept of action and reaction?

ANSWER: Newton’s Third Law

**Toss-Up**

11) PHYSICS *Multiple Choice* In a closed system, when the outside pressure is increased, the volume of the gas inside the system will decrease, according to:

W) Charles’ Law

X) Boyle’s Principle

Y) Boyle’s Law

Z) Charles’ Principle

ANSWER: Y) Boyle’s Law

**Bonus**

11) PHYSICS *Short Answer* Boyle’s Law is an example of what kind of a relationship?

ANSWER: An indirect relationship

**Toss-Up**

12) PHYSICS *Multiple Choice* What is the third level of the Earth’s atmosphere called?

W) The Troposphere

X) The Thermosphere

Y) The Stratosphere

Z) The Mesosphere

ANSWER: Z) The Mesosphere

**Bonus**

12) PHYSICS *Short Answer* What does the temperature in the Mesosphere do as you go higher?

ANSWER: It decreases

**Toss-Up**

13) PHYSICS *Multiple Choice* What does it mean for an object to be neutrally buoyant?

W) The object will rise in water.

X) The object will sink in water.

Y) The object will neither float nor sink in water.

Z) The object doesn’t exist.

ANSWER: Y) The object will neither float nor sink in water.

**Bonus**

13) PHYSICS *Short Answer* When an object is neutrally buoyant, what is its mass equal to?

ANSWER: The mass of the displaced fluid

**Toss-Up**

14) PHYSICS *Multiple Choice* What is the pressure of air at sea level?

W) 1000 g/cm2

X) 1047 g/cm2

Y) 850 g/cm2

Z) 1035 g/cm2

ANSWER: Z) 1035 g/cm2

**Bonus**

14) PHYSICS *Short Answer* If 1 ATA = 1035 g/cm2, then how many g/cm2 are in 6 ATA’s?

ANSWER: 6210 g/cm2

**Toss-Up**

15) PHYSICS *Short Answer* What are the two types of energy?

ANSWER: Kinetic (Energy) and Potential (Energy)

**Bonus**

15) PHYSICS *Short Answer* What are the six forms of energy?

ANSWER: Mechanical (Energy), Heat (Energy), Electrical (Energy), Chemical (Energy), Electromagnetic (Energy), and Nuclear (Energy)

**Toss-Up**

16) PHYSICS *Multiple Choice* An object placed in fluid is pushed by the weight of the displaced fluid according to:

W) The rules of buoyancy

X) Archimedes’ Principle

Y) Boyle’s Law

Z) Galileo

ANSWER: X) Archimedes’ Principle

**Bonus**

16) PHYSICS *Short Answer* What causes buoyancy?

ANSWER: ‘Fluid Displacement’ OR ‘Displacement’

**Toss-Up**

17) PHYSICS *Multiple Choice* In the formula E=mc2, what does c represent?

W) Energy

X) The Speed of Light

Y) Inertia

Z) Weight

ANSWER: X) The Speed of Light

**Bonus**

17) PHYSICS *Short Answer* How much energy is in a one gram paperclip?

ANSWER: ‘90 000 000 000 grams’ OR ‘9 X 1010 grams’

**Toss-Up**

18) PHYSICS *Multiple Choice* What is the formula for work?

W) force X distance

X) weight X force

Y) distance X weight

Z) force2

ANSWER: W) force X distance

**Bonus**

18) PHYSICS *Short Answer* What is the amount of work done on an object if 600 Newtons is exerted to move it 20.55 meters? Express your answer to 2 significant figures.

ANSWER: 29 Joules

**Toss-Up**

19) PHYSICS *Multiple Choice* What does the law of conservation state?

W) Energy must be conserved.

X) Energy can be destroyed.

Y) Energy cannot be destroyed or created, only transferred.

Z) Energy can be created out of nothing.

ANSWER: Y) Energy cannot be destroyed or created, only transferred.

**Bonus**

19) PHYSICS *Short Answer* When fossil fuels are burned, what form of energy are they converted to?

ANSWER: Heat and/or Electricity

**Toss-Up**

20) PHYSICS *Multiple Choice* What is the density of an object that masses 200 grams and has a volume of 3 000 000 milliliters

W) 0.0067 g/mL

X) 0.000067 g/mL

Y) 15000 g/mL

Z) 0.0000067 g/mL

ANSWER: X) 0.000067 g/mL

**Bonus**

20) PHYSICS *Short Answer* If an object’s density is 1 200 g/mL and has a volume of 0.0005 mL, what is its mass?

ANSWER: ‘2 400 000 grams’ OR ‘2 400 kilograms’

**Toss-Up**

21) PHYSICS *Multiple Choice* In a closed system, when the temperature of the gas inside the system increases, the volume of the gas will increase, according to

W) Charles’ Principle

X) Charles’ Theory

Y) Charles’ Law

Z) Boyle’s Theory

ANSWER: Y) Charles’ Law

**Bonus**

21) PHYSICS *Short Answer* Charles’ Law is an example of what type of relationship?

ANSWER: A Direct Relationship

**Toss-Up**

22) PHYSICS *Multiple Choice* How long is one half-life of Uranium-238?

W) 4.5 million years

X) 4.6 billion years

Y) 3 billion years

Z) 4.5 billion years

ANSWER: Z) 4.5 billion years

**Bonus**

22) PHYSICS *Short Answer* If 10 grams of Uranium-238 decays over 13.5 billion years, how much will be left after the time elapses?

ANSWER: 1.25 grams

**Toss-Up**

23) PHYSICS *Multiple Choice* What is the formula for power?

W) Time/Work

X) Joules/Watts

Y) Work/Time

Z) Work2

ANSWER: Y) Work/Time

**Bonus**

23) PHYSICS *Short Answer* How much power has been exerted if 20 Joules of work has been done in 2.2 seconds? Express your answer to 2 significant figures.

ANSWER: 9.1 Watts

**Toss-Up**

24) PHYSICS *Multiple Choice* What is the formula for the volume of a sphere.

W) 3/4 X pi X r3

X) 4/3 X pi X d2

Y) 4/3 X pi X r3

Z) 5/4 X pi X r2

ANSWER: Y) 4/3 X pi X r3

**Bonus**

24) PHYSICS *Short Answer* What is volume of a sphere with a diameter of 10 cm? Express your answer to 1 significant figure.

ANSWER: 500 cm3

**Toss-Up**

25) PHYSICS *Short Answer* How much work is done on an object that is pushed 0 meters with a force of 500 000 000 Newtons

ANSWER: 0 Joules

**Bonus**

25) PHYSICS *Short Answer* How much power is exerted on an object that has 6 000 000 Joules of work done on it over a period of 5 000 seconds?

ANSWER: 1 200 Watts