FOR THIS QUIZ, PLEASE USE 10 m/s² AS THE VALUE FOR ACCELERATION DUE TO GRAVITY ON EARTH!

MULTIPLE CHOICE: [2 MARKS EACH]
(Circle the letter of the one alternative that best completes the statement or answers the question)

1. Compared with the mass of a certain object on Earth, the mass of the same object on the Moon is
   (a) more.
   (b) the same.
   (c) less

2. An object weighs 30 N on Earth. A second object weighs 30 N on the Moon. Which has the greater mass?
   (a) the one on the Moon
   (b) the one on the Earth
   (c) They have the same mass.
   (d) not enough information to say

3. An object travels 8 m in the first second, 8 m again during the second second and 8 m in the third second. Its acceleration, in meters per second per second, is
   (a) 5.
   (b) 8.
   (c) 10.
   (d) 0.

4. An apple falls from a tree and hits the ground 5 m below. It hits the ground with a speed of about
   a) 5 m/s.
   b) 10 m/s.
   c) 15 m/s.
   d) 20 m/s
5. An object is pulled northward with a force of 10 N and southward with a force of 15 N. The magnitude of the net force on the object is

(a) 0 N.
(b) 5 N.
(c) 10 N.
(d) 15 N.

6. If a rocket initially at rest accelerates at a rate of 50 m/s/s for 1 min, its speed will be

(a) 50 m/s.
(b) 500 m/s.
(c) 3000 m/s.
(d) 3600 m/s.

7. A block is dragged without acceleration in a straight-line path across a level surface by a force of 6 N. What is the force of friction between the block and the surface?

(a) more than 6 N.
(b) 6 N.
(c) less than 6 N.
(d) not enough information to say.

8. A falling skydiver of mass 100 kg experiences 500-N air resistance. The acceleration of the skydiver is

(a) 0 m/s².
(b) 5 m/s².
(c) 10 m/s².
(d) 15 m/s².

9. On the surface of Jupiter, where the acceleration due to gravity is about three times that of Earth, a 100-kg rock would have a mass of about

(a) 900 kg.
(b) 600 kg.
(c) 300 kg.
(d) 100 kg.

10. A sack of potatoes weighing 200 N falls from an airplane. As the velocity of fall increases, air resistance also increases. When air resistance equals 200 N, the sack's acceleration in meters per second per second is

(a) 0
(b) 5
(c) 10
(d) none of these

11. The attraction of a person's body toward the earth is called weight. The reaction to this force is

(a) the person's body pulling on the earth.
(b) Earth's surface pushing against the person's body.
(c) the person's body pushing against the earth's surface.
(d) none of these.
12. If you plug an electric toaster rated at 110-V into a 220-V outlet, current in the toaster will be about

(a) half what it should be.
(b) the same as if it were plugged into 110-V.
(c) twice what it should be.
(d) more than twice what it should be.

13. When the distance between two charges is halved, the electrical force between the charges

(a) is reduced by one-quarter.
(b) is reduced by one-half.
(c) is doubled.
(d) is quadrupled.

14. When we say an appliance "uses up" electricity, we really are saying that

(a) current disappears.
(b) the main power supply voltage is lowered.
(c) electric charges are dissipated.
(d) electron kinetic energy is changed into heat.
(e) electrons are taken out of the circuit and put somewhere else.

15. A difference between electric forces and gravitational forces is that electrical forces include

(a) the inverse-square law.
(b) repulsive interactions.
(c) infinite range.
(d) separation distance.

16. A 10 ohm resistor has 5 A current in it. What is the voltage across the resistor?

(a) 5 V.
(b) 10 V.
(c) 15 V.
(d) 20 V.
(e) more than 20 V.

17. The electric power of a lamp that carries 2 A at 120 V is

(a) 0.33 W
(b) 2 W
(c) 20 W
(d) 60 W
(e) 240 W

18. The fundamental force underlying all chemical reactions is

(a) centripetal.
(b) electrical.
(c) gravitational.
(d) nuclear.
19. An electron is pushed into an electric field where it acquires a 1-V electrical potential. If two electrons are pushed the same distance into the same electric field, the electrical potential of the two electrons is

(a) 0.25 V.
(b) 0.5 V.
(c) 1 V.
(d) 2 V.
(e) 4 V.

20. As more lamps are put into a series circuit, the overall current in the power source

(a) decreases.
(b) stays the same.
(c) increases.

21. Two charges separated by one meter exert a 1-N force on each other. If the charges are pushed to 0.25-m separation, the force on each charge will be

(a) 1 N.
(b) 2 N.
(c) 4 N.
(d) 8 N.
(e) 16 N.

22. Strip electrons from an atom and the atom becomes a

(a) negative ion.
(b) different element.
(c) positive ion.

23. When a magnet is thrust into a coil of wire, the coil tends to

(a) attract the magnet as it enters.
(b) repel the magnet as it enters.
(c) both of these
(d) neither of these

24. Magnetic field lines about a current-carrying wire

(a) circle the wire in closed loops.
(b) extend radially from the wire.
(c) both of these.
(d) neither of these.

25. An iron nail is more strongly attracted to the

(a) north pole of a magnet.
(b) south pole of a magnet.
(c) north or south pole – no difference really.
26. Several paper clips dangle from the north pole of a magnet. The induced pole in the bottom of the lowermost paper clip is a
   (a) north pole.
   (b) south pole.
   (c) north or south pole – no difference really.

27. Electromagnetic induction occurs in a coil when there is a change in
   (a) electric field intensity in the coil.
   (b) the coil's polarity.
   (c) voltage in the coil.
   (d) magnetic field intensity in the coil.
   (e) electromagnetic polarity.

28. A step-up transformer has a ratio of 1 to 10. Neglecting slight losses, if 100 W of power go into the primary coil, the power coming from the secondary coil is
   (a) 1 W.
   (b) 10 W.
   (c) 100 W.
   (d) 1000 W.

29. Surrounding every moving electron is
   (a) a magnetic field.
   (b) an electric field.
   (c) both of these
   (d) none of these

30. Voltage can be induced in a wire by
   (a) moving a magnet near the wire.
   (b) moving the wire near a magnet.
   (c) changing the current in a nearby wire.
   (d) all of these

31. Which pole of a compass needle points to a south pole of a magnet?
   (a) south pole.
   (b) north pole.
   (c) both of these

32. A transformer actually transforms
   (a) magnetic field lines.
   (b) voltage.
   (c) generators into motors.
   (d) nonsafe forms of energy to safe forms of energy.
33. A kilogram is a measure of an object's
(a) center of mass.
(b) force.
(c) gravity.
(d) mass.
(e) weight.

34. A heavy object and a light object are dropped at the same time from rest in a vacuum. The heavier object reaches the ground
(a) sooner than the lighter object.
(b) at the same time as the lighter object.
(c) later than the lighter object.

35. Compared to the amount of electric current that flows in the filament of a lamp, the amount of current that flows in the connecting wire is
(a) definitely less.
(b) often less.
(c) approximately the same.
(d) actually more.

36. When two lamps are connected in series to a battery, the electrical resistance that the battery senses is
(a) more than the resistance of either lamp.
(b) less than the resistance of either lamp.
(c) none of these

37. Power is transmitted at high voltages because the corresponding current in the wires is
(a) also high to deliver appreciable power to distant places.
(b) low so that overheating of the wires is minimized.

38. Two charged particles repel each other with a force, F. If the charge of one of the particles is doubled and the distance between them is also doubled, then the force will be
(a) F.
(b) F/2.
(c) F/4.
(d) 2 F.

39. A 60-W light bulb and a 100-W light bulb are each rated at 120-V. Which light bulb has a larger resistance?
(a) the 100-W bulb
(b) the 60-W bulb

40. The statement “If the primary coil of a transformer is connected to a dc power source the transformer would have a constant voltage output” is
(a) True
(b) False
### Physical Science Formula Sheet

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#### Quadratic Formula

To solve an equation of the form $ax^2 + bx + c = 0$, use

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

#### Half-life

Amount Remaining = Initial Amount \( \times \left( \frac{1}{\frac{\text{total time elapsed}}{\text{half-life}}} \right) \)

### Physical Constants

- **Avogadro’s Number**: $6.02 \times 10^{23}$
- **$[\text{H}_3\text{O}^+] [\text{OH}^-]$**: $1.0 \times 10^{-14}$
- **$\text{pH} = -\log [\text{H}_3\text{O}^+]$**
- **$F = m \cdot a$**
- **$g = 10 \text{ m/s}^2$**
- **$v = \Delta d / \Delta t$**
- **$a = \Delta v / \Delta t$**
- **$d = \frac{1}{2} a \cdot t^2$**
- **$F = k \frac{q_1 q_2}{r_{12}^2}$**
- **$I = \frac{V}{R}$**
- **$P = I \times V$**
- **Series**: $R_T = \sum R_i$
- **Parallel**: $I_T = \sum I_i$