

# Physics Problems to Solve Using Python For Loops and Lists

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These problems can be solved using Python for loops and lists to iterate over the given data and perform the necessary calculations. `### Numerical Values for Each Problem`

1. `**Calculate the average speed of a car over multiple trips.**`
  - Speeds: 60 km/h, 70 km/h, 80 km/h
2. `**Determine the total distance traveled by a car given a list of speeds and times.**`
  - Speeds: 60 km/h, 70 km/h, 80 km/h
  - Times: 1 hour, 2 hours, 1.5 hours
3. `**Compute the kinetic energy of multiple objects given their masses and velocities.**`
  - Masses: 1000 kg, 1500 kg, 1200 kg
  - Velocities: 10 m/s, 20 m/s, 15 m/s
4. `**Find the potential energy of objects at different heights.**`
  - Masses: 50 kg, 70 kg, 60 kg
  - Heights: 10 meters, 15 meters, 12 meters
5. `**Calculate the work done by a force over various distances.**`
  - Forces: 100 N, 150 N, 200 N
  - Distances: 5 meters, 10 meters, 8 meters
6. `**Determine the acceleration of a car given its change in velocity over time intervals.**`
  - Initial Velocities: 0 m/s, 10 m/s, 20 m/s
  - Final Velocities: 20 m/s, 30 m/s, 40 m/s
  - Times: 5 seconds, 10 seconds, 8 seconds
7. `**Compute the gravitational force between multiple pairs of objects.**`
  - Masses1: 5.97e24 kg (Earth), 1.989e30 kg (Sun)
  - Masses2: 7.35e22 kg (Moon), 5.97e24 kg (Earth)
  - Distances: 3.84e8 meters, 1.496e11 meters
8. `**Find the momentum of objects given their masses and velocities.**`
  - Masses: 1000 kg, 1500 kg, 1200 kg
  - Velocities: 10 m/s, 20 m/s, 15 m/s
9. `**Calculate the pressure exerted by a fluid at different depths.**`
  - Depths: 10 meters, 20 meters, 30 meters
  - Density: 1000 kg/m<sup>3</sup> (water)
  - Gravity: 9.81 m/s<sup>2</sup>

10. **\*\*Determine the frequency of a wave given its speed and wavelength.\*\***
  - Speeds: 340 m/s, 300 m/s, 1500 m/s
  - Wavelengths: 0.5 meters, 1 meter, 0.75 meters
11. **\*\*Compute the electric potential energy of charges at different positions.\*\***
  - Charges1:  $1\text{e-}6$  C,  $2\text{e-}6$  C
  - Charges2:  $1\text{e-}6$  C,  $3\text{e-}6$  C
  - Distances: 0.1 meters, 0.2 meters
12. **\*\*Find the magnetic force on a moving charge in different magnetic fields.\*\***
  - Charges:  $1\text{e-}6$  C,  $2\text{e-}6$  C
  - Velocities: 10 m/s, 20 m/s
  - Magnetic Fields: 0.1 T, 0.2 T
13. **\*\*Calculate the heat transferred in various processes given specific heat capacities and temperature changes.\*\***
  - Masses: 1 kg, 2 kg, 1.5 kg
  - Specific Heats:  $4200\text{ J}/(\text{kg}\cdot^{\circ}\text{C})$ ,  $3900\text{ J}/(\text{kg}\cdot^{\circ}\text{C})$ ,  $4186\text{ J}/(\text{kg}\cdot^{\circ}\text{C})$
  - Temperature Changes:  $10^{\circ}\text{C}$ ,  $20^{\circ}\text{C}$ ,  $15^{\circ}\text{C}$
14. **\*\*Determine the efficiency of different machines given input and output energies.\*\***
  - Input Energies: 1000 J, 2000 J, 1500 J
  - Output Energies: 800 J, 1600 J, 1200 J
15. **\*\*Compute the power output of engines over time intervals.\*\***
  - Work Done: 1000 J, 2000 J, 1500 J
  - Times: 10 seconds, 20 seconds, 15 seconds
16. **\*\*Find the angular momentum of rotating objects given their moments of inertia and angular velocities.\*\***
  - Moments of Inertia:  $10\text{ kg}\cdot\text{m}^2$ ,  $20\text{ kg}\cdot\text{m}^2$ ,  $15\text{ kg}\cdot\text{m}^2$
  - Angular Velocities: 5 rad/s, 10 rad/s, 7 rad/s
17. **\*\*Calculate the torque on objects given forces and lever arms.\*\***
  - Forces: 100 N, 150 N, 200 N
  - Lever Arms: 0.5 meters, 1 meter, 0.75 meters
18. **\*\*Determine the centripetal force on objects moving in circular paths.\*\***
  - Masses: 1000 kg, 1500 kg, 1200 kg
  - Velocities: 10 m/s, 20 m/s, 15 m/s
  - Radii: 50 meters, 100 meters, 75 meters
19. **\*\*Compute the buoyant force on objects submerged in fluids.\*\***
  - Volumes:  $0.1\text{ m}^3$ ,  $0.2\text{ m}^3$ ,  $0.15\text{ m}^3$
  - Fluid Density:  $1000\text{ kg}/\text{m}^3$  (water)
  - Gravity:  $9.81\text{ m}/\text{s}^2$

20. \*\*Find the refractive index of materials given angles of incidence and refraction.\*\*
- Angles of Incidence:  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$
  - Angles of Refraction:  $20^\circ$ ,  $30^\circ$ ,  $40^\circ$
21. \*\*Calculate the Doppler shift for sound waves from moving sources.\*\*
- Source Frequencies: 500 Hz, 1000 Hz, 1500 Hz
  - Source Speeds: 10 m/s, 20 m/s, 15 m/s
  - Observer Speed: 0 m/s (stationary)
  - Speed of Sound: 343 m/s
22. \*\*Determine the intensity of light at different distances from a source.\*\*
- Power: 100 W
  - Distances: 1 meter, 2 meters, 3 meters
23. \*\*Compute the capacitance of capacitors in series and parallel circuits.\*\*
- Capacitances:  $1\text{e-}6$  F,  $2\text{e-}6$  F,  $3\text{e-}6$  F
24. \*\*Find the inductance of coils given their physical properties.\*\*
- Turns: 100, 200, 150
  - Areas:  $0.01\text{ m}^2$ ,  $0.02\text{ m}^2$ ,  $0.015\text{ m}^2$
  - Lengths: 0.1 meters, 0.2 meters, 0.15 meters
  - Permeability:  $4\pi \times 10^{-7}$  H/m
25. \*\*Calculate the resonant frequency of LC circuits.\*\*
- Inductances:  $1\text{e-}3$  H,  $2\text{e-}3$  H,  $1.5\text{e-}3$  H
  - Capacitances:  $1\text{e-}6$  F,  $2\text{e-}6$  F,  $1.5\text{e-}6$  F
26. \*\*Determine the impedance of RLC circuits at different frequencies.\*\*
- Resistances: 10 ohms, 20 ohms, 15 ohms
  - Inductances:  $1\text{e-}3$  H,  $2\text{e-}3$  H,  $1.5\text{e-}3$  H
  - Capacitances:  $1\text{e-}6$  F,  $2\text{e-}6$  F,  $1.5\text{e-}6$  F
  - Frequencies: 50 Hz, 60 Hz, 70 Hz
27. \*\*Compute the energy stored in magnetic fields of inductors.\*\*
- Inductances:  $1\text{e-}3$  H,  $2\text{e-}3$  H,  $1.5\text{e-}3$  H
  - Currents: 1 A, 2 A, 1.5 A
28. \*\*Find the charge and discharge times of capacitors in RC circuits.\*\*
- Resistances: 10 ohms, 20 ohms, 15 ohms
  - Capacitances:  $1\text{e-}6$  F,  $2\text{e-}6$  F,  $1.5\text{e-}6$  F
29. \*\*Calculate the diffraction angles for light passing through slits.\*\*
- Wavelengths: 500 nm, 600 nm, 700 nm
  - Slit Widths:  $1\text{ }\mu\text{m}$ ,  $2\text{ }\mu\text{m}$ ,  $1.5\text{ }\mu\text{m}$
30. \*\*Determine the polarization of light after passing through polarizers.\*\*

- Initial Intensity:  $100 \text{ W/m}^2$
- Angles:  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$