

## Contest 1

1. I am a thermodynamic process.
2. For an ideal gas, I can be accompanied by changes in internal energy.
3. For an ideal gas, I can also be accompanied by volume changes.
4. My name is derived from the Greek word for weight.
5. I am the thermodynamic process in which pressure remains constant.

Who am I?

**Isobaric process**

## Contest 2

1. I am a physical quantity frequently encountered in mechanics.
2. I am a vector quantity.
3. I am featured in quite a few physical laws, notably those of Isaac Newton.
4. According to Newton, I equal the rate of change of linear momentum.
5. I am just a push or a pull.

Who am I?

**Force**

### Contest 3

1. I am a dynamical quantity.
2. I am a vector quantity.
3. My SI unit is the  $\text{kg m s}^{-1}$  or the N s.
4. I equal the product of a scalar and a vector quantity.
5. For slowly moving objects, I am calculated as the product of mass and velocity.

Who am I?

**Linear momentum**

## Contest 4

1. I am a dynamical quantity.
2. I am a vector quantity.
3. I arise in the study of central forces.
4. My SI unit is the J s or equivalently the  $\text{kg m}^2 \text{s}^{-1}$ .
5. I equal the cross product of position vector and linear momentum.

Who am I?

**Angular momentum**

## Contest 5

1. I am a type of magnetic material.
2. I have a distinctive magnetic behavior.
3. Unlike iron, my magnetic response is weak.
4. I am repelled by a strong magnetic field.
5. My magnetic properties are temperature independent.

Who am I?

**Diamagnetic material**

## Contest 6

1. I am a physical quantity.
2. I am associated with force.
3. I am dimensionally equivalent to energy divided by volume.
4. I am one of the quantities in the equation of state of an ideal gas.
5. My SI unit is the pascal.

Who am I?

**Pressure**

## Contest 7

1. I am a type of force.
2. My primary aim in life is to change the direction of velocity.
3. I occur in curvilinear motion.
4. I am equated to mass times velocity squared divided by radius of curvature.
5. I am always directed towards a center of curvature.

Who am I?

**Centripetal force**

## Contest 8

1. I am a vector quantity.
2. An object is considered to be a true vector only if it transforms the same way I do under a transformation of coordinates.
3. I have the same dimension as length.
4. I am not distance moved in a specified direction.
5. I am simply change in position.

Who am I?

**Displacement**



## Contest 9

1. I am a type of force.
2. Like many everyday forces, I have electromagnetic roots.
3. I am frequently associated with friction.
4. I am the force exerted by a surface on an object in contact with it.
5. I am always perpendicular to the contact surface.

Who am I?

**Normal force (or normal reaction)**

## Contest 10

1. I am a thermodynamic function of state.
2. In an equilibrium state of a system, my value is the same throughout the system.
3. For an ideal gas, I am proportional to pressure times volume divide by number of particles.
4. I equal the first derivative of internal energy with respect to entropy evaluated at constant volume and particle number.
5. Heat spontaneously flows from regions where my value is high to regions where my value is low.

Who am I?

**Temperature**

## Contest 11

1. I am a phenomenon associated with electric and magnetic fields.
2. I am associated with time-dependent electromagnetic fields.
3. I am the phenomenon to which Faraday's law applies.
4. I am responsible for the occurrence of an electromotive force when magnetic flux changes.
5. I am the principle on which a transformer operates.

Who am I?

**Electromagnetic induction**

## Contest 12

1. I am a type of nuclear decay.
2. I am accompanied by the emission of an electron neutrino.
3. I produce a daughter nuclide whose atomic number is less than that of the parent nuclide by unity.
4. The daughter nuclide I produce has the same mass number as the parent nuclide.
5. I am distinguished from positive beta decay by the absence of a beta particle in the final state.

Who am I?

**Electron capture**

## Contest 13

1. I am a mechanical property of matter.
2. I specify an elastic characteristic of a substance.
3. As a modulus, my SI unit is the pascal.
4. I relate stress applied parallel to a surface to the resulting deformation.
5. I am the modulus appropriate for the deformation initiated by a pair of scissors.

Who am I?

**Shear modulus**

## Contest 14

1. I am a property of a swarm of moving particles such as a gas.
2. I am a statistical property.
3. For an ideal gas, I am directly proportional to the internal energy of the gas.
4. For an ideal gas, I equal the square of the greatest of the statistical measures frequently used in the description of the speed distribution of the gas molecules.
5. For an ideal gas at temperature  $T$ , I equal  $3kT/m$  where  $m$  is the mass of a gas molecule and  $k$  is the Boltzmann constant.

Who am I?

**Mean square speed**

## Contest 28

1. I am a mechanical property of matter.
2. I specify an elastic property of a substance.
3. I am associated with volume changes.
4. I am a modulus and my SI unit is the pascal.
5. I relate volume strain and pressure change.

Who am I?

**Bulk modulus**

## Contest 29

1. I am a celestial body.
2. I am one of the non-self-luminous objects of the solar system.
3. I am a natural satellite.
4. My orbit is slightly elliptical with a sidereal period of 27.3 days.
5. I am the natural satellite in the solar system that is closest to the sun.

Who am I?

**Earth's Moon**



## Contest 30

1. I am a dynamical quantity.
2. I am closely associated with a conservation law.
3. A stationary object has none of me.
4. Work is always done whenever a change in me occurs.
5. I am the energy an object possesses by virtue of its motion.

Who am I?

**Kinetic energy**

## Contest 31

1. I am a property of a sound wave.
2. I characterize how a sound wave is perceived.
3. I am high for a piccolo or an oboe.
4. I am low for a bassoon or a tuba.
5. I am primarily determined by the frequency of a sound wave.

Who am I?

**Pitch**

## Contest 32

1. I am a number.
2. I am usually greater than or equal to zero and less than or equal to unity.
3. I quantify the degree to which a collision is elastic.
4. For perfectly elastic collisions I equal unity.
5. For two colliding particles, I equal final relative speed divided by initial relative speed.

Who am I?

**Coefficient of restitution**

### Contest 33

1. I am a phenomenon associated with waves.
2. I occur at a boundary at which an abrupt change in wave speed occurs.
3. I only occur when a wave propagating in a medium encounters a boundary separating the medium from another medium in which the wave speed is greater.
4. I cause an otherwise transparent boundary to become exclusively reflecting.
5. I occur when the angle of incidence exceeds a critical value.

Who am I?

**Total internal reflection**

## Contest 34

1. I am a type of wave.
2. I am composed of two disturbances that propagate in phase.
3. I am transverse and I exhibit polarization phenomena.
4. I propagate in empty space at the ultimate signal speed.
5. I am the disturbance that emanates from an oscillating electric charge.

Who am I?

**Electromagnetic wave**

## Contest 35

1. I am a type of force.
2. At a fundamental level, I am electromagnetic.
3. I operate between objects in contact.
4. I am a type of friction force.
5. I prevent relative motion between two solid bodies in contact.

Who am I?

**Static frictional force**

## Contest 36

1. I am a mechanical property of matter.
2. I specify an elastic property of mater.
3. I am concerned with volume and pressure changes.
4. I am not the bulk modulus.
5. My SI unit is the reciprocal pascal.

Who am I?

**Compressibility**

## Contest 37

1. I am a particle.
2. I am emitted in certain nuclear decay processes.
3. I am electrically neutral.
4. I am nearly massless.
5. I am the neutral particle emitted in nuclear decay by  $\beta^+$  emission.

Who am I?

**Electron neutrino**



## Contest 38

1. I am a particle.
2. I am emitted in a particular nuclear decay process.
3. I am a spin-0 charged particle.
4. My name suggests I am the first of sorts.
5. I am composed of two protons and two neutrons.

Who am I?

**Alpha particle**

## Contest 39

1. I am a physical quantity.
2. I am frequently encountered in the study of dynamics.
3. I am a conserved quantity.
4. I permeate the whole of the universe.
5. I can be transformed into matter and matter can be transformed into me.

Who am I?

**Energy**

## Contest 40

1. I am a particle with mass.
2. I am deflected by an inhomogeneous magnetic field, which can split an unpolarized beam of me into two beams.
3. I am composed of three spin-1/2 fractional charge particles.
4. In the free state, I decay with a half-life of about 10 minutes and 11 seconds.
5. I am the particle that distinguishes the deuteron from the proton.

Who am I?

**Neutron**

