1. Newton's law of gravitation was first formulated in which year?
A. 1687 B. 1787
C. 1986 D. 1887 (A)
Explanation : Newton published the law of universal gravitation in Principia Mathematica in 1687.

2. Which of the following correctly states Kepler's first law?
A. Planets revolve in circular orbits with constant speed.
B. Planets move in elliptical orbits with the Sun at one focus.
C. The line joining a planet and the Sun sweeps equal distances in equal times.
D. The square of orbital period is proportional to cube of semi-major axis. (D)
Explanation : Kepler's first law describes the shape of the orbit as an ellipse with the Sun at one focus.

3. The areal velocity of a planet around the Sun remains constant because:
A. The orbit is circular.
B. Angular velocity is constant.
C. The force is non-central.
D. Angular momentum is conserved. (D)
Explanation : Gravitational force is central, producing zero torque, so angular momentum is conserved, which implies constant areal velocity.

4. Which relation expresses Kepler's third law for planetary motion?
A. $T^2 \propto a^2$ B. $T^2 \propto a^3$
C. $T \propto a$ D. $T^3 \propto a^2$ (D)
Explanation : The square of the orbital period is directly proportional to the cube of the semi-major axis.

5. Newton's law of gravitation in vector form is expressed as:
A. $F = G(m1\ m2)/r^2$
B. $F = G(m1\ m2)/r^3\ (r1 - r2)$
C. $F = -G(m1\ m2)/r$ D. $F = G(m1\ m2)/r$ (D)
Explanation : In vector form, force acts along the line joining the two masses, pointing towards each other.

6. Which experiment first measured the value of the gravitational constant G?
A. Michelson–Morley experiment
B. Cavendish torsion balance experiment
C. Rutherford's scattering experiment
D. Young's double slit experiment (D)
Explanation : Cavendish in 1798 used a torsion balance to determine G.

7. The dimensional formula of the gravitational constant G is:
A. $[M^0L^0T^0]$ B. $[M^1L^1T^{-2}]$
C. $[M^{-1}L^3T^{-2}]$
D. $[M^2L^{-2}T^2]$ (C)
Explanation : From $F = G(m1m2)/r^2$, dimensional analysis gives $[G] = [M^{-1}L^3T^{-2}]$.

8. Which of the following is not true about the gravitational constant G?
A. It is a universal constant.
B. It is independent of the medium.
C. It varies with location on Earth.
D. It has units $N{\cdot}m^2/kg^2$ (D)
Explanation : G is universal and constant; it does not depend on place or medium. Acceleration due to gravity g, however, does vary.

9. In the Cavendish experiment, the restoring torque is proportional to:
A. Displacement B. Velocity
C. Angular displacement
D. Mass (D)
Explanation : The restoring torque is given by $\tau = C\theta$, where C is the torsion constant and θ the angular displacement.

10. The equal-area law (Kepler's second law) physically implies:
A. The orbit is circular
B. Planetary motion is uniform in time.
C. Planets move faster near perihelion and slower near aphelion
D. Force of attraction is non-central. (C)
Explanation : Equal areas in equal times mean variable speed—higher near perihelion and lower near aphelion—while conserving angular momentum.