1. Newton's Third Law of Motion states that:
   A. Forces always act on the same body
   B. For every action, there is an equal and opposite reaction
   C. Action and reaction forces act at different times
   D. Action and reaction forces are not equal in magnitude (D)

Explanation : Action and reaction forces are not equal in magnitude

2. Which of the following is an example of Newton's Third Law?
   A. Heating a metal rod
   B. Swimming in a pool
   C. Melting of ice
   D. Expansion of gas (B)

Explanation : Swimming is possible because the swimmer pushes water backward, and the water pushes forward with equal force, propelling the swimmer.

3. A bullet of mass m is fired from a gun of mass M. The recoil velocity of the gun is:
   A. (m/M) v B. (M/m) v
   C. v/(mM) D. Mv (D)

Explanation : By conservation of momentum: Before firing: Total momentum = 0. After firing: mv + M(-V) = 0. So, recoil velocity V = (m/M) v.

4. The law of conservation of linear momentum holds true only when:
   A. Internal forces are present
   B. External force is absent
   C. Both internal and external forces are absent
   D. Only gravitational force acts (B)

Explanation : Conservation of momentum applies when the net external force on the system is zero. Internal forces cancel due to Newton's Third Law.

5. Which principle is used in the working of a jet engine?
   A. Conservation of angular momentum
   B. Conservation of energy
   C. Conservation of linear momentum
   D. Conservation of mass (C)

Explanation : Jet propulsion works because gases expelled backward push the engine forward with equal and opposite momentum.

6. The recoil velocity of a gun can be reduced by:
   A. Making the gun light
   B. Using a shorter barrel
   C. Making the gun heavy
   D. Using bullets of smaller size (C)

Explanation : Recoil velocity is inversely proportional to the mass of the gun. A heavier gun has less recoil.

7. When two forces act at 0° to each other, the resultant force is:
   A. F1 + F2 B. F1 - F2
   C. sqrt(F1^2 + F2^2) D. Zero (A)

Explanation : When θ = 0°, forces are in the same direction, so the resultant is the sum of magnitudes.

8. When two forces of equal magnitude act in opposite directions on a particle, the particle will:
   A. Accelerate B. Rotate
   C. Remain in equilibrium
   D. Move in circular motion (C)

Explanation : Equal and opposite forces cancel out, leading to zero net force. The body remains in equilibrium.

9. In an explosion, a bomb of mass 3m breaks into two parts: one of mass 2m moving with velocity V, and the other of mass m. The velocity of the smaller fragment is:
   A. V B. 2V
   C. −2V D. -V (C)

Explanation : By momentum conservation: 2mV + m v = 0 ⟶ v = −2V.

10. Three concurrent forces act on a particle: F1 = 2i N, F2 = −6j N, F3 = 3j N. Is the system in equilibrium?
    A. Yes, because vector sum is zero
    B. No, because net force is not zero
    C. Yes, because forces are perpendicular
    D. Cannot be determined (B)

Explanation : Net force = 2i + (−6 + 3)j = 2i − 3j. Since it is not zero, the system is not in equilibrium.