1. A 2.0 kg ball moves at 3.0 $\frac{\text{m}}{\text{s}}$. What is its momentum?

   _____ kg · m/s

2. Which best describes a drag (viscous) force?

   ☐ a force that speeds an object up

   ☐ a resistive force from a fluid on a moving object

   ☐ a force only ever between two solids

   ☐ another name for the weight

3. Total momentum stays constant when the resultant _____ force on the system is zero.

   _____

4. Momentum is a vector.

   ☐ True ☐ False

5. The drag force on a falling object grows as its speed grows.

   ☐ True ☐ False

6. In an inelastic collision, momentum is still conserved.

   ☐ True ☐ False

7. In its general form, Newton's second law says the resultant force equals the:

   ☐ mass times the distance

   ☐ momentum times the time

   ☐ rate of change of momentum

   ☐ mass times the velocity

8. At terminal velocity, the drag force is equal to the _____.

   _____

9. Compared with collisions in general, what is special about an **elastic** collision?

   ☐ The objects always stick together

   ☐ No forces act during it

   ☐ Kinetic energy is also conserved

   ☐ Momentum is conserved

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_____.

_____

1. **6 kg · m/s**

   $p = mv = 2.0 \times 3.0 = 6.0\ \dfrac{\text{kg} \cdot \text{m}}{\text{s}}$.

2. **a resistive force from a fluid on a moving object**

   Drag is the resistance a fluid (liquid or gas) exerts on something moving through it. Friction is the solid-on-solid case.

3. **external**

   With no resultant *external* force, the system's total momentum is conserved (internal forces come in third-law pairs and cancel).

4. **True**

   Yes – $p = mv$ points the same way as the velocity, so it has a direction.

5. **True**

   Yes – at rest the drag is zero, and it increases with speed. That is what eventually balances the weight.

6. **True**

   Momentum is conserved in **every** collision (no external force). In an inelastic one it is the *kinetic energy* that is not conserved.

7. **rate of change of momentum**

   $F = \dfrac{\Delta p}{\Delta t}$ – the rate of change of momentum. For constant mass this is $F = ma$.

8. **weight**

   Drag = weight, so the resultant force is zero and the speed stays constant.

9. **Kinetic energy is also conserved**

   All collisions conserve momentum; an elastic collision *also* conserves kinetic energy.

10. **smaller**

    Same change in momentum over a longer time means a smaller force: $F = \dfrac{\Delta p}{\Delta t}$.

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