1. What happens to kinetic energy when speed doubles at fixed mass?
   - ☐ It doubles
   - ☐ It quadruples
   - ☐ It stays constant
2. Why can temperature stay constant while a pure substance melts?
   - ☐ No energy enters
   - ☐ Energy changes particle arrangement
   - ☐ The thermometer must be broken
3. How is a voltmeter connected to measure voltage across a resistor?
   - ☐ In parallel with the resistor
   - ☐ In series only
   - ☐ Across the ammeter only
4. For a fixed amount of gas at constant temperature, halving volume does what to pressure?
   - ☐ Halves it
   - ☐ Doubles it
   - ☐ Leaves it unchanged
5. Which count should be used for source activity?
   - ☐ Raw source-plus-background only
   - ☐ Measured count minus background over equal times
   - ☐ The largest repeated count only
6. A 2 kg trolley travels at 3 metres per second. Find its momentum.

   _____ kg · m/s
7. Velocity changes from 3 to 15 metres per second in 6 s. Find acceleration.

   _____ $m/s^2$
8. Frequency is 8 Hz and wavelength is 0.25 m. Find wave speed.

   _____ m/s

   _____ V
10. A source gives flux 18 units. Find flux at three times the distance.

    _____

1. **It quadruples**

   Kinetic energy depends on v squared: KE = 1/2 m v^2. Doubling v squares the factor 2, giving four times the energy at the same mass - which is why braking distances grow so quickly with speed.

2. **Energy changes particle arrangement**

   During melting the incoming energy does work separating particles against their attractions - the latent heat - rather than raising kinetic energy, so temperature stays constant. Energy is still entering; it changes arrangement, not temperature.

3. **In parallel with the resistor**

   A voltmeter measures the potential difference between two points, so it connects in parallel across the component. In series it would add its very large resistance to the circuit and the current would collapse.

4. **Doubles it**

   At fixed temperature the gas particles keep their average speed, so halving the volume doubles how often they hit the walls - the pressure doubles (pV = constant). Halving the pressure would require the volume to double instead.

5. **Measured count minus background over equal times**

   The background count is always present, so it must be measured separately and subtracted over equal times to leave the source activity. Using the raw count overstates the source; picking the largest repeat is just cherry-picking noise.

6. **6 kg · m/s**

   The result is 6 kg · m/s. Known: mass 2 kg; velocity 3 metres per second. Use momentum p = mv. p = 2 x 3 = 6 kg metres per second. Momentum is a vector; the value is in the direction of travel.

7. **2 m/s$^2$**

   The result is 2 m/s$^2$. Known: velocity changes from 3 to 15 metres per second in 6 s. Use a = (v - u)/t. a = (15 - 3)/6 = 2 metres per second squared. The positive sign shows the acceleration is in the direction of motion.

8. **2 m/s**

   The result is 2 m/s. Known: f = 8 Hz; wavelength = 0.25 m. Use v = f x wavelength. v = 8 x 0.25 = 2 metres per second. If this wave entered a slower medium, f would stay 8 Hz and the wavelength would shrink.

9. **5 V**

   The result is 5 V. Known: Np = 400, Ns = 100, Vp = 20 V, ideal transformer. Use Vs/Vp = Ns/Np. Rearranging: Vs = Vp x Ns/Np = 20 x 100/400 = 5 V. Fewer secondary turns step the voltage down.

10. **2**

    The result is 2 . Known: flux 18 units at the original distance; distance triples. Use F proportional to 1/d^2. New flux = 18/3^2 = 18/9 = 2 units. This assumes constant luminosity and no extra absorption.