1. A 60 kg runner moves at 5.0 $\frac{\text{m}}{\text{s}}$. What is the kinetic energy?

   _____ J

2. How much energy raises 2.0 kg of water from 20 °C to 70 °C? (c = 4200)

   _____ J

3. A current of 0.50 A flows for 2 minutes. How much charge passes?

   _____ C

4. A sealed can of gas is heated. Why does the pressure rise?

   ☐ The particles get bigger

   ☐ The particles move faster and hit the walls harder and more often

   ☐ More particles are made

   ☐ The particles stick to the walls

5. Carbon-12 and carbon-14 are isotopes. What is different about their nuclei?

   ☐ The charge

   ☐ The number of neutrons

   ☐ The number of protons

   ☐ The number of electrons in the nucleus

6. A car moves at a constant 25 $\frac{\text{m}}{\text{s}}$ on a straight road. What is the resultant force on it?

   ☐ Forwards, equal to the engine force

   ☐ It depends on the car's mass

   ☐ Zero

   ☐ Backwards, equal to air resistance

7. A distance–time graph is a horizontal line from 10 s to 20 s. What is the object doing?

   ☐ Moving backwards

   ☐ Accelerating

   ☐ Standing still

   ☐ Moving at a constant speed

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_____ s

9. Where is the magnetic field around a bar magnet strongest?

   ☐ Halfway between the poles, at the side

   ☐ Near the poles, where the field lines are closest

   ☐ It is the same everywhere

   ☐ Far from the magnet

10. A lamp is moved from 1.0 m to 4.0 m from a light meter. By what factor does the reading fall?

    _____

1. **750 J**

   $\frac{1}{2} \times 60 \times 5.0^2 = 30 \times 25 = 750$ J. Square the speed first.

2. **420000 J**

   $\Delta E = 2.0 \times 4200 \times 50 = 420\,000$ J.

3. **60 C**

   $Q = It = 0.50 \times 120 = 60$ C. Change minutes to seconds.

4. **The particles move faster and hit the walls harder and more often**

   Heating raises the particles' kinetic energy; the number and size of particles do not change.

5. **The number of neutrons**

   Both have 6 protons (that makes them carbon); C-14 has 8 neutrons and C-12 has 6.

6. **Zero**

   Constant velocity means no acceleration, so the forces are balanced and the resultant is zero.

7. **Standing still**

   The distance does not change, so the gradient – the speed – is zero.

8. **0.02 s**

   $T = \frac{1}{f} = \frac{1}{50} = 0.02$ s.

9. **Near the poles, where the field lines are closest**

   Field-line spacing shows strength; the lines crowd together at the poles.

10. **16**

    Four times the distance gives $4^2 = 16$ times less flux.

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