1. Every physical quantity has two parts: a number (its _____) and a unit.

   _____

2. Select **all** the SI **base** units.

   ☐ metre (m)

   ☐ kilogram (kg)

   ☐ kelvin (K)

   ☐ joule (J)

   ☐ newton (N)

   ☐ ampere (A)

   ☐ second (s)

   Tick every correct option.

3. A careful enough measurement can be exactly correct, with zero uncertainty.

   ☐ True ☐ False

4. You walk 4 km east, then 4 km back west. What is your displacement, in km?

   _____ km

5. Saying "the speed is 90" – with no unit – gives a complete physical quantity.

   ☐ True ☐ False

6. Which of these are SI base units? Select **all** that apply.

   ☐ the kelvin

   ☐ the newton

   ☐ the ampere

   ☐ the kilogram

   Tick every correct option.

7. Which of these is a **systematic** error?

   ☐ Pressing the timer button slightly late, sometimes early

   ☐ Readings that scatter randomly above and below

   ☐ A scale that reads 0.2 mm when nothing is being measured

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8. Select **all** the quantities that are **vectors**.

   ☐ mass

   ☐ velocity

   ☐ speed

   ☐ force

   ☐ energy

   ☐ displacement

   ☐ momentum

   Tick every correct option.

9. An answer of "5" to a question asking for a length is complete as long as the working is shown.

   ☐ True ☐ False

10. Is the equation $v = u + at$ homogeneous?

    ☐ True ☐ False

1. **magnitude**

   The two parts are the **magnitude** (the number) and the **unit**.

2. **metre (m); kilogram (kg); kelvin (K); ampere (A); second (s)**

   The five SI base units are the kilogram, metre, second, ampere and kelvin. The newton and joule are **derived** units, built from the base units.

3. **False**

   No real measurement is exact – every reading has some **uncertainty**. The skill is estimating how big it is.

4. **0 km**

   Displacement is a **vector** – start to finish. You end where you began, so it is 0. The distance travelled is 8 km.

5. **False**

   Without a unit the number is ambiguous. "90 $\frac{\text{km}}{\text{h}}$" is complete; "90" is not.

6. **the kelvin; the ampere; the kilogram**

   The newton is derived: $1\ \text{N} = 1\ \frac{\text{kg m}}{\text{s}^2}$, straight from $F = ma$. The five you need are the metre, kilogram, second, ampere and kelvin.

7. **A scale that reads 0.2 mm when nothing is being measured**

   A **zero error** shifts every reading by the same amount in the same direction – that is systematic. The others vary randomly from reading to reading.

8. **velocity; force; displacement; momentum**

   Vectors have a direction: displacement, velocity, force and momentum. Mass, energy and speed are scalars (speed is the size of velocity, with no direction).

9. **False**

   A physical quantity is a magnitude AND a unit. 5 metres, 5 centimetres and 5 kilometres are three different lengths, and the mark scheme asks for the unit.

10. **True**

    Yes – every term is a speed. v and u are $\frac{\text{m}}{\text{s}}$, and $at = \frac{\text{m}}{\text{s}^2} \times \text{s} = \frac{\text{m}}{\text{s}}$.

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