

A-Level Physics

Name: _____ Score: _____

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

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

- ☐ metre (m)
- ☐ newton (N)
- ☐ kilogram (kg)
- ☐ joule (J)
- ☐ second (s)
- ☐ ampere (A)
- ☐ kelvin (K)

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

- ☐ True ☐ False

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

- ☐ A scale that reads 0.2 mm when nothing is being measured
- ☐ Readings that scatter randomly above and below
- ☐ Pressing the timer button slightly late, sometimes early
- ☐ A gust of wind that briefly changes a reading

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

- ☐ displacement
- ☐ velocity

- ☐ mass
- ☐ force
- ☐ energy
- ☐ momentum
- ☐ speed

Tick every correct option.

9. Which statement gives a **complete** physical quantity?

- ☐ The mass is 70
- ☐ The mass is 70 kg
- ☐ kg
- ☐ It is quite heavy

10. Using base units, which equation is **not** homogeneous (so must be wrong)?

- ☐ $v = u + at$
- ☐ $v^2 = u^2 + 2as$
- ☐ $v = u + a$
- ☐ $s = ut$

A-Level Physics

1. **magnitude**

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

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

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. **True**

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

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. **displacement; velocity; force; 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. **The mass is 70 kg**

A physical quantity needs **both** a magnitude (the number, 70) **and** a unit (kg). A number alone, or a unit alone, is not enough.

10. $v = u + a$

In $v = u + a$, a is $\frac{\text{m}}{\text{s}^2}$ but u is $\frac{\text{m}}{\text{s}}$ — the units do not match, so it cannot be right. The other three are homogeneous.