

A-Level Physics

Name: _____ Score: _____

1. An alternating current:

- ☐ reverses direction periodically
- ☐ flows one way only
- ☐ never changes
- ☐ has no frequency

2. A diode conducts current:

- ☐ in one direction only
- ☐ in both directions
- ☐ never
- ☐ only at very high voltage

3. Mains supply is 50 Hz. What is its period?

_____ s

4. Half-wave rectification uses _____ diode.

5. The average power of a.c. in a resistor is _____ the peak power.

- ☐ half
- ☐ equal to
- ☐ double
- ☐ a quarter of

6. How many diodes are in a bridge (full-wave) rectifier?

7. An a.c. has a peak current of 2.0 A. What is the r.m.s. current?

_____ A

8. A full-wave rectified output repeats at twice the frequency of the a.c. input.

- ☐ True
- ☐ False

9. A 230 V (r.m.s.) mains supply has a peak voltage of about 325 V.

- ☐ True
- ☐ False

10. To smooth a rectified output, you connect a capacitor:

- ☐ in parallel with the load
- ☐ in series with the load
- ☐ in place of the load
- ☐ before the first diode

A-Level Physics

1. **reverses direction periodically**

a.c. keeps swapping direction — mains does so 50 (or 60) times a second.

2. **in one direction only**

This one-way behaviour is what lets diodes rectify a.c. into d.c.

3. **0.02 s**

$$T = \frac{1}{f} = \frac{1}{50} = 0.020 \text{ s.}$$

4. **one**

A single diode passes the positive half-cycles and blocks the negative ones (leaving gaps).

5. **half**

The mean of $\sin^2$ over a cycle is $\frac{1}{2}$, so $\langle P \rangle = \frac{1}{2} P_{\text{peak}}$.

6. **4**

Four diodes, arranged so the load current always flows the same way whichever input terminal is positive.

7. **1.41 A**

$$I_{\text{rms}} = \frac{I_0}{\sqrt{2}} = \frac{2.0}{\sqrt{2}} \approx 1.41 \text{ A.}$$

8. **True**

Both half-cycles become positive humps, so the output ripples at double the input frequency.

9. **True**

$V_0 = V_{\text{rms}}\sqrt{2} = 230 \times \sqrt{2} \approx 325 \text{ V}$ — components must be rated for the peak.

10. **in parallel with the load**

In parallel, it charges to the peak and then discharges through the load between peaks, holding the voltage up.