

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ describe how a transistor works as a switch (about 0.7 V base-emitter)
- ☐ explain the purpose of a relay and a protection diode
- ☐ choose a transistor to switch a high-current output such as a lamp or motor

I DO**Worked example** Read how a full-mark answer is built*A microcontroller output pin cannot supply enough current to light a 12 V lamp.***1 Name the component that should be added to switch on the lamp.** (1 mark)**Points that earn marks** from the marking instructions: one ✓ per point

✓ Transistor

Why marks are not awarded

✗ Resistor, relay on its own

WE DO**Guided practice** Use the starters and word bank to help you*A transistor drives a relay coil. A diode is connected across the coil.***2 Explain the purpose of the diode.** (2 marks)**Sentence starters**

One reason is ... because ...

Another reason is ... so ...

Word banksafely · transistor · damage · produces ·
conducts · protecting · voltage · switches

Tip: 2 marks = 2 separate, developed points.

YOU DO**On your own** No notes. Check your answers afterwards.**3 Quick check: tick one box for each.****a)** Which component lets a 5 V circuit switch a 230 V heater?☐ LDR ☐ Buzzer ☐ Diode ☐ Relay**b)** Why is a diode placed across a relay coil?☐ To light up when the relay is on ☐ To increase the current through the coil ☐ To protect the transistor from reverse voltage ☐ To switch the relay on and off faster**c)** An NPN transistor switches on at a base voltage of about...☐ 0.07 V ☐ 0.7 V ☐ 7 V ☐ 70 V

4 Key terms: write the letter of the matching description next to each term.

- | | | |
|--|-----|---|
| 1. Transistor switch-on voltage | ___ | A Lets a low-current circuit switch a separate high-current circuit. |
| 2. Base resistor | ___ | B Limits base current to protect the transistor. |
| 3. Relay | ___ | C About 0.7 V at the base. |

A relay is used between a transistor and a mains lamp.

5 Explain why a relay is used. (2 marks)

6 Explain what is meant by 'Protection diode'. (2 marks)

Check and reflect

Mark your answers with the answer sheet. Go back to the checklist on the site and re-rate each "I can" statement above. Which one still needs work?
