

# GCSE Combined Science: Trilogy

## Worksheet: Direct and alternating potential difference

|                       |                          |                              |                                   |
|-----------------------|--------------------------|------------------------------|-----------------------------------|
| TIME<br><b>30 min</b> | TOTAL<br><b>30 marks</b> | CALCULATOR<br><b>Allowed</b> | DIFFICULTY<br><b>Easy, Medium</b> |
|-----------------------|--------------------------|------------------------------|-----------------------------------|

**Topics:** Direct and alternating potential difference

|             |              |             |
|-------------|--------------|-------------|
| <b>NAME</b> | <b>CLASS</b> | <b>DATE</b> |
|-------------|--------------|-------------|

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Electrical appliances can be powered by batteries or by the mains supply.

0 1 . 1

What type of potential difference does a battery provide?

Tick (✓) **one** box.

alternating

☐

direct

☐

mains

☐

[1 mark]

0 1 . 2

State the frequency of the mains electricity supply in the UK.

.....

.....

.....

Frequency = ..... Hz

[1 mark]

0 1 . 3

State the potential difference of the mains electricity supply in the UK.

---

---

---

Potential difference = ..... V

[1 mark]

0 1 . 4

Describe the difference between a direct potential difference and an alternating potential difference.

---

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---

---

[2 marks]

0 2

0 2 . 1

State whether a torch battery provides a direct or an alternating potential difference.

---

---

---

[1 mark]

0 2 . 2

A supply's potential difference reverses direction many times each second.

What type of supply is this?

Tick (✓) **one** box.

Direct

☐

Alternating

☐

[1 mark]

0 3

0 3 . 1

What is the frequency of the mains electricity supply in the UK?

Tick (✓) **one** box.

5 Hz

☐

50 Hz

☐

60 Hz

☐

230 Hz

☐

[1 mark]

0 3 . 2

A graph of potential difference against time for a supply is a horizontal straight line above the time axis.

What does this show about the supply?

Tick (✓) **one** box.

It is a constant, direct potential difference

☐

It is an alternating potential difference

☐

No potential difference is being supplied

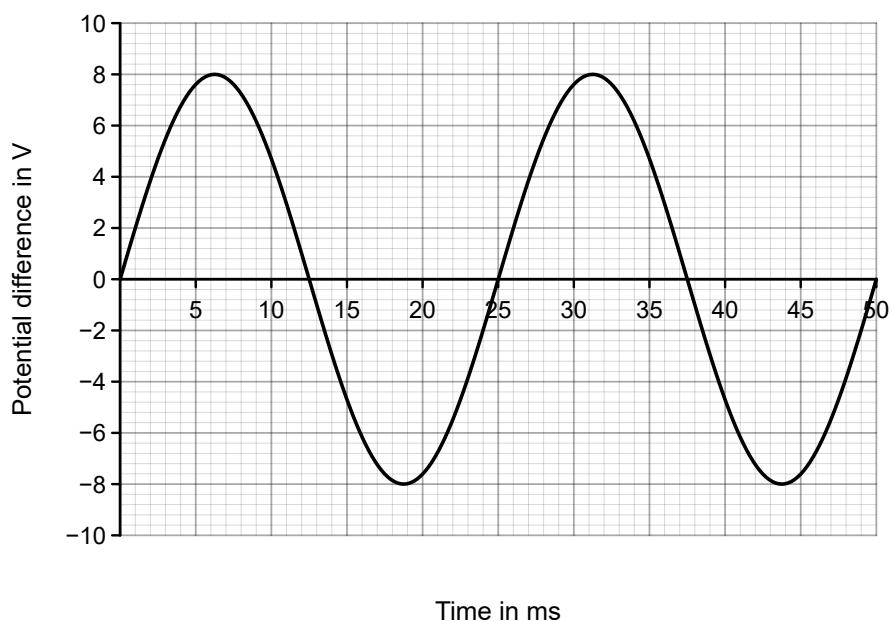
☐

[1 mark]

0 4

Figure 1 shows how the potential difference of an alternating supply changes with time.

**Figure 1**



0 4 . 1

Determine the peak potential difference of the supply.

.....

.....

.....

Peak potential difference = ..... V

**[1 mark]**

0 4 . 2

Determine the time taken for one complete cycle (the period) of the supply.

.....

.....

.....

Period = ..... ms

**[1 mark]**

0 4 . 3

Calculate the frequency of the supply.  
Use the Physics Equations Sheet.

.....

.....

.....

.....

Frequency = ..... Hz

[2 marks]

0 5

The mains electricity supply in the UK is an alternating supply with a frequency of 50 Hz.

0 5 . 1

Explain what is meant by an alternating potential difference with a frequency of 50 Hz.

.....

.....

.....

.....

[2 marks]

0 5 . 2

Calculate the time taken for one complete cycle of the mains supply.  
Give your answer in milliseconds.  
Use the Physics Equations Sheet.

.....

.....

.....

.....

Time = ..... ms

[2 marks]

0 5 . 3

Which **two** of these provide a direct potential difference?

Tick (✓) **two** boxes.

a battery

☐

a mains socket

☐

a solar cell

☐

the National Grid

☐

[2 marks]

0 6

The UK mains electricity supply is an alternating supply with a frequency of 50 Hz.

0 6 . 1

State what is meant by a frequency of 50 Hz for the mains supply.

.....

.....

[1 mark]

0 6 . 2

Calculate the time for one complete cycle of the mains supply.  
Use the Physics Equations Sheet.

.....

.....

.....

.....

Time = ..... s

[2 marks]

0 6 . 3

How many times each second does the direction of the current from the mains supply reverse?

Tick (✓) **one** box.

25

☐

50

☐

100

☐

230

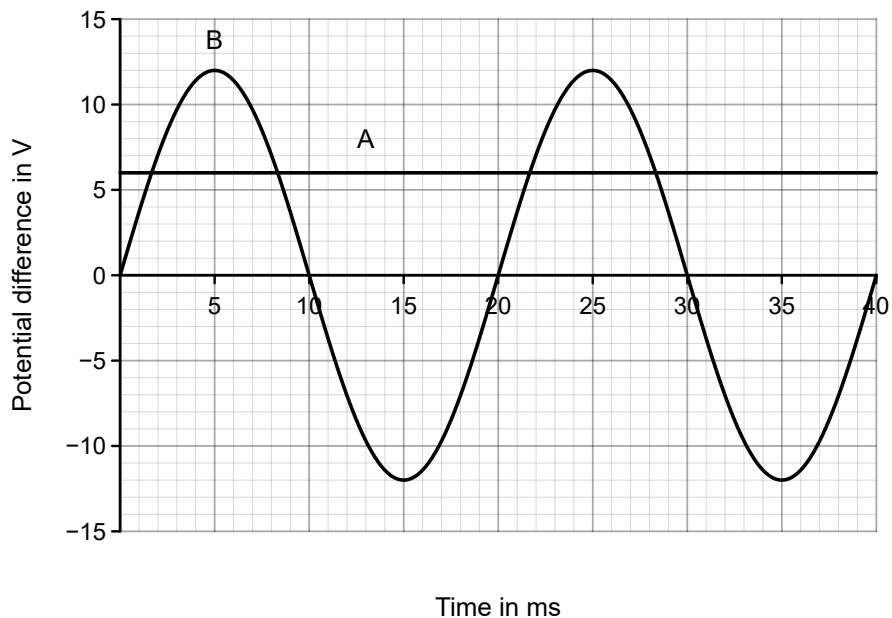
☐

[1 mark]

0 7

Figure 2 shows two oscilloscope traces, A and B. Each trace shows how the potential difference of a supply changes with time.

**Figure 2**



0 7 . 1

Which trace shows an alternating potential difference?  
Give a reason for your answer.

.....

.....

.....

.....

**[2 marks]**

0 7 . 2

Determine the peak potential difference of trace B.

.....

.....

.....

Peak potential difference = ..... V

**[1 mark]**

0 7 . 3

Determine the period of trace B.  
Then calculate the frequency of supply B.  
Use the Physics Equations Sheet.

.....

.....

.....

.....

.....

Frequency = ..... Hz

[3 marks]

0 7 . 4

Suggest what type of supply produced trace A.

.....

.....

[1 mark]

**END OF QUESTIONS**

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

# Mark scheme

## GCSE Combined Science: Trilogy · Worksheet: Direct and alternating potential difference · 30 marks

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### Question 1 (5 marks)

01.1 [1 mark]

**Correct:** direct

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01.2 [1 mark]

**Answer:** 50 Hz

- 50 (Hz) (1)
- 

01.3 [1 mark]

**Answer:** 230 V

- (about) 230 (V) (1)
- 

01.4 [2 marks]

**Answer:** A direct pd is always in the same direction, so the current flows in one direction only; an alternating pd keeps reversing direction, so the current keeps changing direction.

- direct: (the pd / current is) in one direction only (1)
  - alternating: (the pd / current) changes direction / reverses repeatedly (1)
- 
- 

### Question 2 (2 marks)

02.1 [1 mark]

**Answer:** Direct

- direct (1)
- 

02.2 [1 mark]

**Correct:** Alternating

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### Question 3 (2 marks)

03.1 [1 mark]

**Correct:** 50 Hz

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03.2 [1 mark]

**Correct:** It is a constant, direct potential difference

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### Question 4 (4 marks)

04.1 [1 mark]

**Answer:** 8.0 V

- 8.0 (V) (1)

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04.2 [1 mark]

**Answer:** 25 ms

- 25 (ms) (1)

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04.3 [2 marks]

**Answer:** 40 Hz

- $f = 1 \div 0.025$  (1)
- $f = 40$  (Hz) (1)

**Notes:** An answer of 0.04 (Hz) (period used in ms) scores 1 mark. Allow ECF from the previous part.

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### Question 5 (6 marks)

05.1 [2 marks]

**Answer:** The potential difference goes through 50 complete cycles every second, reversing direction twice in each cycle (100 times per second).

- the potential difference completes 50 cycles every second (1)
- the potential difference / current reverses direction (twice every cycle / 100 times per second) (1)

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05.2 [2 marks]

**Answer:** 20 ms

- $T = 1 \div 50$  ( $= 0.020$  s) (1)
- $T = 20$  (ms) (1)

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05.3 [2 marks]

**Correct:** a battery; a solar cell

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## Question 6 (4 marks)

### 06.1 [1 mark]

**Answer:** The potential difference goes through 50 complete cycles every second.

- 50 complete cycles (of the alternating potential difference / current) every second (1)

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### 06.2 [2 marks]

**Answer:** 0.020 s

- $T = 1 \div 50$  (1)
- $T = 0.020$  (s) (1)

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### 06.3 [1 mark]

**Correct:** 100

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## Question 7 (7 marks)

### 07.1 [2 marks]

**Answer:** B — the potential difference keeps changing direction (from positive to negative).

- B (1)
- the potential difference changes direction / is positive then negative / reverses (repeatedly) (1)

**Notes:** The reason mark depends on B being chosen.

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### 07.2 [1 mark]

**Answer:** 12 V

- 12 (V) (1)

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### 07.3 [3 marks]

**Answer:** Period 20 ms; frequency 50 Hz

- period = 20 ms (1)
- $f = 1 \div 0.020$  (1)
- $f = 50$  (Hz) (1)

**Notes:** An answer of 0.05 (Hz) (period in ms) scores 2 marks.

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### 07.4 [1 mark]

**Answer:** A battery (or cell).

- battery / cell / direct current (dc) supply (1)
-