

Marking notes

B	basic mark	
A	answer mark	if answer is seen with no working then full marks
C	compensation mark	awarded if answer wrong but evidence of point seen
M	method mark	this must be awarded for marks after it to be given.

Error carried forward:

A candidate who uses an incorrect, numerical answer which has already been penalised, to obtain a subsequent answer, should not be penalised twice for the same error. To obtain full credit in the subsequent calculation, the incorrect answer must be used as the correct one should have been. Even if this is not done, the candidate may still gain compensation marks in the second calculation.

- (i) This procedure only applies automatically within a single section of a question – **(a)** or **(b)** and so on – and not from one section to another.
- (ii) It should only be applied to numerical answers.
- (iii) It is not applied when accurate calculations follow inaccurate formulae or substitutions.
- (iv) It is not applied when an answer is labelled cao – correct answer only.
- (v) It may not be applied to impossible answers: $T = -750\text{ }^{\circ}\text{C}$, $v = 1.9 \times 10^{13}\text{ m/s}$ or $R = -2.4\ \Omega$.
- (vi) Sometimes it will be applied in other circumstances: an accurate description of an inaccurately drawn diagram, a correct use of an incorrectly name piece of equipment or an accurate description of the change in an incorrectly named force. In these cases the mark scheme will indicate what to do.

Consider this question:

Two $4.0\ \Omega$ resistors are connected in series to a 12 V battery. Calculate:

- (i) the total resistance of the circuit,
- (ii) the current supplied by the battery.

Mark scheme:

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|------|-------------------------------|----|
| (i) | $R_1 + R_2$ or $4.0 + 4.0$ | C1 |
| | $8.0\ \Omega$ | A1 |
| (ii) | $V = IR$ in any symbolic form | C1 |
| | $12/8$ | C1 |
| | 1.5 A | A1 |

A candidate uses the parallel rule in (i) and obtains 2.0Ω , no marks are scored.

In part (ii) there are many possibilities:

Answer given	C1	C1	A1	Explanation
$I = V/R$ $= 12/8$ $= 1.5 \text{ A}$	1	1	1	This is the correct answer and so the candidate is awarded full marks. In the third case the candidate is awarded 3 marks whilst in the following example the same answer scores 0.
$= 12/8$ $= 1.5 \text{ A}$	1	1	1	
1.5 A	1	1	1	
$I = VR$ $= 12 \times 2$ $= 1.5 \text{ A}$	0	0	0	The correct answer but the candidate shows that this is good luck.
$I = V/R$ $= 12 \times 2$ $= 1.5 \text{ A}$	1	0	0	The formula is correct but the correct answer is only obtained through good luck.
$I = V/R$ $= 12/2$ $= 1.5 \text{ A}$	1	1	0	The formula and substitution (ecf) are correct but the answer – though absolutely correct – does not follow from the working.
$I = V/R$ $= 12/2$ $= 2.5 \text{ A}$	1	1	0	The formula and substitution (ecf) are correct but the answer does not follow from the working.
$I = VR$ $= 12/2$ $= 6.0 \text{ A}$	0	0	0	The formula is wrong but the substitution (ecf) is correct and so is the answer. This is good luck.
$I = V/R$ $= 12/2$ $= 6.0 \text{ A}$	1	1	1	The A mark is awarded (ecf), both C marks awarded automatically
$= 12/2$ $= 6.0 \text{ A}$	1	1	1	
6.0 A	1	1	1	
$I = VR$ $= 12 \times 2$ $= 24 \text{ A}$	0	0	0	The formula is wrong and so the substitution and calculation score 0.
$I = V/R$ $= 12 \times 2$ $= 24 \text{ A}$	1	0	0	The formula is correct but the substitution is wrong. The calculation does not score.
$I = V/R$ $= 12/2$ $= 24 \text{ A}$	1	1	0	This is an arithmetic error and so the answer mark is lost.
$= 12/2$ $= 24 \text{ A}$	1	1	0	The substitution (ecf) is correct and so the first C mark is awarded automatically.

Arithmetic error:

A candidate whose answer is wrong because of one arithmetic mistake will lose one mark – the final A mark. This could mean that a substitution mark is scored even though a wrong number has been substituted into the formula.

This applies in cases where the answer is wrong by a factor of ten because of an error in manipulating indices or through misunderstanding SI prefixes. It would not apply where a factor of ten error arises for another reason: $W = m/g$ or $m = 20 \text{ N}$.

When an answer is wrong by a factor of 60 or 3600 because of a confusion of time units – min for h etc. the -1 rule will not normally apply unless specifically mentioned on the mark scheme.

Significant figures:

All answers should be given to at least two significant figures unless specifically stated on the mark scheme. One significant figure might be appropriate, however, where a question gives a time as 6 min. rather than 6.0 min.

Where a candidate shows the correct working and the correct answer and then rounds to one significant figure for the answer full credit should be given. This remains the case if the correct answer has no unit but the 1 sig. fig. final answer has the correct unit.

The resistance of 8, 1.1 Ω resistors in series, however, is 8.8 Ω not 9 Ω as the figure 8 is exact.

There is no penalty for too many significant figures unless specifically mentioned in the mark scheme. This is only likely to occur where an answer is clearly obtained from some experimental procedure or from reading a graph.

Answers:

The final answer mark is awarded for the correct answer or the correct (ecf) answer with the correct unit and it may only be lost once. A candidate answering part (ii) of the question above might write:

$$\begin{aligned} I &= V/R \\ &= 12/8 \\ &= 2 \text{ C or } 1.5 \text{ mJ or } 0.7 \text{ A} \end{aligned}$$

In all three answers there are two errors of: units or significant figures or prefixes or arithmetic. Each answer still scores: C1, C1, A0. The last mark is only lost once.

Suppose, however, that the two correct answers in a section are: 4.0 N and 4.0 N – B1, B1. A candidate who gives 25 kg and 4.0 kg will score 0 not 1 – the first answer is wrong and so the unit penalty is not applied. The second answer is numerically correct but it incurs the unit penalty.

Expressions used in the mark scheme:

The mark scheme might use an expression such as: line of action outside the box, max 2. The question is marked normally but a candidate who scores more than 2 and makes the error referred to will have his score reduced to 2. A candidate who scores 2, 1 or 0 incurs no further penalty.

This is not the same as an instruction such as: positive electrons –1. A candidate who refers to positive electrons will have the score reduced by 1 mark except that a negative score cannot be achieved.