

## Grading guidelines

1. First and foremost, each grader should fully internalise the idea of **avoiding double penalty**. This is source of maximum disagreements at the moderation stage. If a student has made a simple mistake due to carelessness or otherwise, it is perfectly fair to penalise him/her at the place where the mistake is actually committed. However, if the student carries the wrong answer to subsequent parts and that is the only source of discrepancy between his/her answer and model answer, then the student cannot be penalised again. He/she should get full credit for these parts.
2. One easy way to track carryover of such errors is to create a step by step spreadsheet of the solution. If the student has made mistake in one value, grader can replace that value in the spreadsheet with the value student has taken and see how the subsequent values will change. This will speed up the work of the graders.
3. Graders will be fully justified to penalise students in later parts if the original mistake is not merely numerical but also signifies a **conceptual error**, such as dimensionally wrong equation or unrealistic values of quantities.
4. Graders should be sensitive to **alternate solutions** of the question. If a student uses novel method to reach the answer and the grader is unfamiliar with the method, they should bring it to the attention of AC.
5. It is possible that some students may **not write every intermediate step** explicitly. The detailed solution may have shown these steps omitted by students and may have also explicitly awarded marks for such steps. But if it is clear that student has implicitly understood and used the intermediate steps in the solution, all such marks should be given.
6. In general, if the student has reached correct answer using any method which is physically and mathematically correct, then full marks should be awarded irrespective of the number of intermediate steps which student has omitted.
7. In case the final answer is incorrect, the grader may go backward to trace the source of the mistake and deduct points accordingly.
8. If student has not made much progress in the solution but written some equation which may be used as a starting point of the solution, appropriate marks should be given for realising that this equation is relevant to the solution.
9. Graders should make detailed notes of where the student has made a mistake and how the deductions in marks were calculated. These notes are useful at the time of moderation.

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|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Using incorrect physical concepts (despite correct answers)                                                                  | No points given                              |
| Giving correct answer without explanation (except for yes/no and multichoice questions)                                      | Deduct 50% of the marks for that part        |
| Minor mistakes in the calculations e.g. wrong signs, numerical constants                                                     | Deduct 20% of the marks for that part        |
| Missing or incorrect units in final answers                                                                                  | No points given for final answer             |
| Less than or more than 1 significant digit in the final answer                                                               | Deduct 50% of the marks for the final answer |
| Error resulting from an earlier part error, for which the student already lost marks, if the answer is physically reasonable | Full points (i.e. no deductions)             |
| Error resulting from an earlier part error, if the answer is physically unreasonable                                         | No points given for that step                |

For example, if due to an error in an earlier part, the student calculates the mass of a star as  $2.5 \times 10^{30}$  kg instead of  $2 \times 10^{30}$  kg, they will only lose marks for the earlier part. However, if, for the same reason, a student calculates the mass as  $2 \times 10^{25}$  kg, they should realize this is wrong (a few times the Earth's mass) and thus should lose some marks for this part as well.