IGCSE Physics

Common Mistakes · 常见错误

Most of these come from marking our own students' papers, so they are the mistakes made in this classroom, not only the ones examiners report worldwide. The × line is what was written; the ✓ line is what would have scored. 下列多数来自本班试卷的批改记录。× 是写过的答案,✓ 是能得分的写法。

Across every paper

✗ Writing the final number with no unit, or with the wrong one.

✓ **Every answer carries its unit – N, J, W, m/s^2 – and the unit tells you if the working was right.**

A correct number with no unit loses the final mark, and a wrong unit usually means a wrong formula.

答案必须带单位 ER Jun25 P4

✗ Writing only the answer to a calculation.

✓ **Formula, then substitution, then answer. Credit is given for correct working even when the number is wrong.**

Examiners state this directly, and it is the difference between zero and most of the marks when one step slips.

公式、代入、结果三步都写 ER Jun25 P4

✗ Rounding at each step of a multi-step calculation.

✓ **Keep the full value until the last line.**

Examiners warn that rounding too soon in a question with several steps produces an incorrect final answer.

中途不要四舍五入 ER Jun25 P4

✗ Using $g = 10$ N/kg when the front page says 9.8.

✓ **Use the value printed on the front of the paper.**

Examiners raise this twice in one report – the instruction is on the cover of every paper.

用试卷上给的 g 值 ER Jun25 P4

✗ Recalling the answer to a similar question you have seen before.

✓ **Read this question, underline the command word and the key words, and answer what it actually asks.**

Examiners advise reading the question through very carefully to avoid answering a different one.

看清本题问的是什么 ER Jun25 P4

■ Look at the marks and the space given. Examiners state that both indicate the type and length of answer expected.

分值和行数提示答案长度 ER Jun25 P4

1 · Motion, forces and energy 运动、力与能量

✗ Using $s = vt$ for an object accelerating from rest.

✓ **$s = \frac{1}{2}at^2$, or use the average velocity.**

Marked in our own class: $s = vt$ applies only at constant velocity, and a balloon released from rest is not.

加速运动不能用 s = vt class

✗ Saying weight decreases as an object falls faster.

✓ **Weight is constant near the surface; it is AIR RESISTANCE that increases with speed.**

A class answer confused which force changes – this is what terminal velocity depends on.

重力不变, 空气阻力增大 class

✗ Calculating impulse from the speeds without signs.

✓ **Take one direction as positive: a change from -12 to $+16$ m/s is a change of 28 m/s.**

Marked in class. Momentum is a vector, so a rebound doubles the change rather than cancelling it.

动量变化要考虑方向 class

✗ Calculating the cost of electricity for one hour when the question said two.

✓ **Read the time in the question, and convert W to kW before using the cost per kWh.**

A class script did both conversions correctly and then used the wrong time.

看清用电时长 class

2 · Thermal physics 热学

✗ Defining specific heat capacity as energy absorbed over time.

✓ **The energy needed to raise the temperature of 1 kg of a substance by 1 °C.**

Marked in class: energy over time is POWER, which is a different quantity entirely.

比热容是每千克每度所需能量 class

✗ Describing solid particles as having 'fixed motion'.

✓ **They VIBRATE about fixed positions in a regular arrangement.**

A class answer showed partial understanding; the mark needs both the vibration and the regular arrangement.

固体粒子在固定位置振动 class

✗ Answering 'what readings does the student take' by describing what happens to them.

✓ **List the readings: temperature, time, mass.**

Marked in class – the answer discussed thermal expansion, which was not what was asked.

问读数就列出测量的量 class

3 · Waves 波

✗ Saying ultraviolet is used in optical fibres.

✓ **Infrared – it has low attenuation in glass.**

Marked in class. The reason matters as much as the name: high frequency for data rate, low attenuation for distance.

光纤用红外线 class

✗ Describing an image as diminished when it is magnified.

✓ **Check all three properties: enlarged or diminished, upright or inverted, real or virtual.**

A class script identified the image as enlarged and virtual, then circled 'diminished' as well.

像的三个性质都要判断 class

✗ Explaining a converging lens for long sight by saying it 'helps the eye see'.

✓ **It converges the rays BEFORE they enter the eye, so the image forms on the retina instead of behind it.**

Marked in class: the mark is for where the image forms, not for the lens being helpful.

凸透镜使像落在视网膜上 class

✗ Naming the eye defect by its symptom – 'cannot see near objects'.

✓ **Name it: hypermetropia, or long sight.**

A class answer described the symptom; examiners want the name of the defect.

要写出缺陷的名称 class

✗ Saying total internal reflection happens when light hits the boundary at any angle.

✓ **The angle of incidence must be GREATER than the critical angle.**

Stated as a mark-scheme requirement – the condition is the mark.

入射角要大于临界角 MS

4 · Electricity and magnetism 电与磁

✗ Saying a thick wire has more resistance because there is more metal.

✓ **Resistance falls as the cross-sectional area rises:** $R \propto l/A$**.**

Marked in class – short and thick means least resistance, and the relationship is what the question tests.

越粗电阻越小 class

✗ Quoting $R = \rho l/A$ and giving a number with no substitution shown.

✓ **Show how** ρ **was found from the first wire before using it on the second.**

A class script stated the right formula and lost the marks because the intermediate value never appeared.

中间量也要写出来 class

✗ Using $V_p/I_p = V_s/I_s$ for a transformer.

✓ **For a 100% efficient transformer, $V_pI_p = V_sI_s$ – the POWERS are equal.**

Marked in class: the wrong relationship gives a plausible current and a wrong answer.

变压器功率相等 class

✗ Using iron for a permanent magnet, or steel for an electromagnet core.

✓ **Soft iron loses its magnetism quickly, so it is the electromagnet core; steel keeps it, so it is the permanent magnet.**

Marked in class – the property required is the opposite in each case.

软铁做电磁铁, 钢做永磁体 class

✗ Confusing the split-ring commutator with slip rings.

✓ **A d.c. motor uses a split-ring commutator to reverse the current each half turn; an a.c. generator uses slip rings.**

Marked in class. Both involve coils, brushes and magnets, which is why the parts get swapped.

换向器 vs 滑环 class

✗ Showing a stronger magnetic field by drawing longer field lines.

✓ **Draw the lines CLOSER TOGETHER.**

Marked in class – spacing shows strength, and lines are always closer near the wire.

磁场越强, 磁感线越密 class

5 · Nuclear physics 核物理

✗ Explaining beta decay as the nucleus 'losing an electron'.

✓ **A neutron becomes a proton and an electron; the proton stays and the electron is emitted.**

Marked in class: the mark is for what happens inside the nucleus, not for what leaves it.

中子变质子并放出电子 class

✗ Explaining charge conservation by describing nucleon number.

✓ **Charge: a neutron is 0, a proton is $+1$ and a beta particle is -1, so the totals balance.**

A class script described mass-number conservation when the question asked about charge.

电荷守恒要用电荷数说明 class

✗ Halving the total count rate without subtracting the background first.

✓ **Subtract background, halve the source count for each half-life, then add background back.**

Marked in class: $200 - 20$ gives 180, which halves to 90, and the reading is 110.

先减本底再算半衰期 class

✗ Reading the top number of a nuclide symbol as the number of protons.

✓ **The top number is the NUCLEON number – protons plus neutrons.**

Marked in class on a chlorine-35 question.

上标是核子数 class

6 · Space physics 空间物理

✗ Saying stars shine forever, or that the Solar System has several stars.

✓ **A star fuses hydrogen into helium and its supply is finite; the Solar System has one star.**

Both were marked wrong in class in the same topic.

恒星燃料有限; 太阳系只有一颗恒星 class

✗ Answering 'another way to measure distance' by restating Hubble's law.

✓ **Name a different method – standard candles, such as Cepheid variables.**

Marked in class: the answer described the relationship again instead of an alternative.

要写出另一种测距方法 class

■ Giving a reason for reclassifying Pluto: it is small and has not cleared its orbit. Examiners expect the property, not just the label 'dwarf planet'.

要说明重新分类的原因 class

The practical paper – Paper 5 and Paper 6

✗ Recording readings to different numbers of decimal places from the same instrument.

✓ **Record every reading to the precision the instrument allows.**

Examiners name this ability directly, along with quoting a derived result to an appropriate number of significant figures.

读数精度要一致 ER Jun25 P6

✗ Labelling a results-table column with a quantity and no unit.

✓ **Both, every time: 'time / s'.**

Stated as a mark-scheme requirement: each column must be labelled with both quantity and unit.

表头要有量和单位 MS

✗ Choosing a scale that puts the points in one corner, or drawing the best-fit line through the first and last point.

✓ **Spread the points across the grid, and balance the line between them.**

Examiners record difficulty with both scale choice and best-fit lines in the same report.

刻度铺开, 拟合线要平衡 ER Jun25 P6

■ Describe apparatus you have actually used. Examiners state that successful candidates showed evidence of having performed a wide range of practical work and could describe the apparatus and its use.

要写真正做过的实验 ER Jun25 P6