**Guidance for Setting SQA Style Physics Questions**

**Style of Questions**

The aim is to write questions where the physics is accessible to the candidates and that the language used does not complicate the question for the candidates.

Questions are written in the present tense. Conditional clauses should be avoided, for example:

“What will happen to the current in the circuit if the resistance is increased?”

should read

“The resistance of the circuit is increased. What happens to the current in the circuit?”

Long sentences should be avoided. As a general rule, the more complex the information the simpler the sentence structure should be. All relevant information should be given before the question to be answered is asked. In long questions the final question instruction should start on a new line. In questions where a number of tasks or procedures are described the correct temporal sequence should be maintained, for example:

“A spacecraft of mass 4·0 × 103 kg is to dock with a space station of mass 2·0 × 104 kg and they have to then move off with a constant speed. The initial speed of the spacecraft is 1·0 m s-1 and the initial speed of the space station is 2·0 m s-1 in the opposite direction. Calculate the speed of the spacecraft and space station after they have docked.”

should read

“A spacecraft of mass 4·0 × 103 kg travels with an initial speed of 1·0 m s-1. A space station of mass 2·0 × 104 kg travels with a speed of 2·0 m s-1 in the opposite direction to the spacecraft. The spacecraft docks with the space station and they then move off at constant speed.

Calculate the speed of the spacecraft and space station after they have docked.”

Double negatives should never be used. Negative statements should not generally be used, but if this is unavoidable the negative should be emphasised. For example:

“A student selects the following electronic components.

 loudspeaker motor microphone lamp

Which of these components is **not** an output device?”

Text should not be discriminatory – gender, race, culture, religion, age etc. If gender is referred to, then there should be an equal number of males and females across the paper. Terms such as police officer should be used rather than policeman. If two people of different gender are referred to in a question the female should not always be subservient to the male or vice versa. The term student should be used rather than pupil.

Data values should be realistic, e.g. buses do not travel at 200 m s-1. Data should be given as close as possible to the point where it is required. Data should never be given after the point it is required, for example:

“Ice of mass 2 kg melts into water. Calculate the energy required to melt the ice.

(Assume that the specific latent heat of fusion of water is 3·34 × 105 J kg-1.)

should read

“Ice of mass 2·00 kg melts into water. The specific latent heat of fusion of water is 3·34 × 105 J kg-1. Calculate the energy required to melt the ice.”

Significant figures should be consistent within a question, e.g. all given to 2 significant figures, or all given to 3 significant figures. At Intermediate 1 and General levels values should be chosen so that awkward rounding is not required.

Standard multiples of SI units should be used, i.e. do **not** use centimetres.

Where a term is to be defined or explained the term should be italicised in the question, for example:

“In a laser, light is produced by stimulated emission of radiation.

Explain the term *stimulated emission of radiation*.”

Ensure you do not ask questions that allow valid answers which are not the ones intended. Two example are:

“Can you explain why the trolley now has a greater speed?” - a valid answer could be either “yes” or “no”.

the question should read

“Explain why the trolley now has a greater speed.”

“What is the current in the resistor?” - could be answered correctly either by “The rate of flow of charge” or a calculation of *V*/*R* to give a numerical value. Candidates should not be left to guess what was in the mind of the setter. Depending on which answer is desired the question should read

“State the meaning of the term *current*.”

or

“Calculate the current in the resistor.”

Questions involving double tasks, for example: “*State and explain …”* should be avoided*.* Candidates are likely to overlook the second part of the question. Where a question requires an answer to be given and then a justification of this answer, the following two forms of wording should be used:

*“State … . Justify your answer.”* In this case a mark can we awarded for the correct statement independently of whether a justification is given.

*“State … . You must justify your answer.”* In this case the mark for the statement is dependent on an attempt at a justification being made.

The most commonly used question types are:

*“State …”* - for questions requiring statements of knowledge or simple numerical values.

*“Calculate …”* - for questions involving numerical calculations.

*“Show that …”* - for questions that would otherwise be a “calculate” but where the answer is required in a subsequent part of the question. This has the advantage of allowing candidates to do subsequent parts without completing the previous part and allows easier marking as an incorrect value is not carried forward from the previous part.

*“Determine …”* - normally for questions requiring a numerical answer but one not requiring a calculation, e.g. obtaining a value from a graph.

*“Describe …”* - for questions requiring the description of a procedure, principle or model.

*“Explain …”* - for questions requiring the explanation of a concept.

*“Sketch a graph …”* - for questions requiring a graph to be sketched. The answers to these do not need to be done on graph paper but normally require labelled axes, the origin shown with a “0”, a line and any significant numerical values, e.g. the supply voltage on a voltage against time graph of a capacitor being charged.

Graphs in questions should have the variables in italics, units in normal type and the origin shown with a “0”. For example:

*current*/mA

0

*frequency*/Hz

At General, Access 3 and Intermediate 1 levels quantities and units were given fully in words. At Credit and Intermediate 2 levels symbols were used for variable and the solidus notation for units, e.g. m/s. At National 5, Higher and Advanced Higher symbols may be used for variables and negative indices for units, e.g. m s-1.

The labels on diagrams should be consistent with the text of the question.

Symbols for variables, in text or diagrams, should be in italics, for example: a resistance which is a variable in a circuit should be labelled *R* but a resistor with a fixed value and labelled R for identification purposes only should be in normal type.

In multiple choice questions where the answer and distractors are numerical or single words these should be listed in numerical or alphabetical order.

**Format of SQA Examination Papers**

SQA examination papers now use the Trebuchet font, 11 point. Older papers used Imprint which is a non-standard font and is of similar shape but characters are slightly wider than those of Times New Roman.

Questions should be subdivided using the hierarchy of (a), (i) and (A). A suitable tab and indent structure is:

**1.** Question number (in bold) is at 0 cm and indent to 0.75 cm to text.

 (a) Tab (left justified) to 0.75 cm for (a) and indent to 1.5 cm for text.

 (i) Tab (right justified) to 2.0 cm for (i) and indent to 2.25 cm for text.

 (A) Tab (left justified) to 2.25 cm for (A) and indent to 3.0 cm for text.

 *Marks*

**2.** (a) Text in questions is full page width justified. **1**

 (b) In question papers without spaces for answers, a marks column can be formed by indenting at the right by 1.5 cm. This then wraps text around before the edge of the page. **1**

 (c) (i) Placing a centre justified tab at 0.75 cm from the edge of the page allows the marks to be added in a column. The word *Marks*, in italics, should be placed at the top of the page and individual marks for each part of a question made in bold. The question totals should be given at the end of the question in brackets. **2**

 (ii) A similar arrangement can be set-up for write-on papers and for two mark columns for K&U and PS. **1**

 **(5)**

It is possible to set up Styles in a Word template for each different question type.

Half-spaces should be typed between parts of units, for example: *metre per second* (m s-1) is different to *per millisecond* (ms-1). A full space in a reduced font size or in superscript has the same effect. To avoid a unit or a number in scientific notation splitting over the end of a line *non-breaking spaces* can be used. In Word these can be typed by pressing shift + control + spacebar.

**Checklist for Vetting SQA Style Physics Questions**

* the physics content is correct
* the physics content is relevant and appropriate to the course
* there is sufficient information for the candidates to answer the question
* the mark allocated to each question is appropriate to the level
* the mark allocated to each question is consistent with previous papers for the course
* the question does **not** ask for the opinion of the candidate, i.e. all responses would be correct
* the question does **not** include inappropriate clues, i.e. anything that lets the candidate get the answer without using physics
* the questions are written in the present tense
* the sentences are short and the wording clear, concise and unambiguous
* punctuation, grammar and spelling is correct
* the temporal sequence is correct, i.e. the sequence in which information is given follows the sequence of events
* the questions do **not** contain superfluous information or text
* the text of questions does **not** include avoidable conditional clauses
* the question does **not** include a negative statement or if it does the negative statement is emphasised
* the question does **not** include a double negative
* the text is **not** discriminatory in terms of gender, age, race, culture, religion etc
* the term ‘student’ is used rather than ‘pupil’
* data values are realistic
* significant figures are consistent
* units quoted are stated in/subsumed by the Content Statements
* multiples of units are standard SI multiples
* diagrams, graphs and tables are in the sequence with the surrounding text
* diagrams, graphs and tables are consistent with the text
* where candidates are asked to draw or sketch a graph, the data given ensures the shape of the line of best fit is clear from correctly plotted points
* the mark allocations in the marking instructions are consistent with the question paper, both for individual questions and for the total
* labelling of questions in the marking instructions is consistent with the question paper