

Guidance notes on writing examination questions

General.

1. The relevant Syllabus must be consulted before writing questions. Any guidance, such as “numerical questions must not use unit prefixes such as milli or kilo” must be adhered to or the question will be rejected.

A copy of the Syllabus can be found on the RCF website
<http://www.commsfoundation.org/rce/exams/>

2. Ensure the draft question relates clearly to only ONE item in the assessment objectives column of the syllabus. This is necessary because question papers are computer generated and any question from one item (e.g. 5.c5) must be compatible with and sufficiently different from questions written for another section (e.g. 5.d2) so that both questions are reasonable in the same paper.
3. The Assessment Objective number (3/4 characters) must be shown on the submission form.

Format of Questions.

4. All questions are multiple choice. The questions are in the form of a question (stem) and 4 possible answers consisting of the correct answer (the key) and 3 distracters.

The correct answer must be correct under all reasonable circumstances or interpretations of the question, and the distracters must be similarly incorrect. Nevertheless the distracters must appear plausible to an inadequately prepared candidate. The answer must not depend on un-stated external factors. The 4 answers will appear on separate lines and identified, in upper case, as A, B, C & D.

5. The text of each of the 4 answers should be broadly similar in length to avoid giving visual hints, even wrong ones. If this is not achievable, then the answers should be arranged in ascending order of length.
6. If a significant word appears in the stem of the question then it should not appear in the answer.

E.g. What part of the transmitter modulates the carrier with the audio signal.

- A Modulator
- B Audio amplifier

The stem should be re-phrased to omit the word ‘modulate’.

7. The question may be written in the form of a complete sentence or sentences ending in a question mark or as an incomplete question with a choice of 4 phrases to complete the sentence.

- 8a. If the stem is in the form of a complete sentence then the 4 possible answers can take 4 forms.
- 1) Complete sentences ending in a full stop.
 - 2) Numbers with any units shown by symbol, e.g. mA or V (not volt). Numbers must always be in ascending order and do not have a full stop. Proper (ie raised ·) decimal points are used. In Microsoft Word 2000, this is available in <Insert> <symbol>, <normal text> from the drop down menu and select the symbol at line 5 column 7.
 - 3) Lists e.g. Screwdriver, Pliers, Hammer, Saw, written with initial capitals and without full stops.
 - 4) Drawings.
- 8b. If the stem is in the form of an incomplete sentence, it must end without punctuation. The 4 answers will commence with a lower case letter and must be grammatically correct in completing the sentence. . Answers A, B & C have no punctuation at the end of the text and answer D ends with a full stop.
- This form of presentation is not used with numbers, lists or drawings.
9. Care should be taken to ensure all 4 locations for the key are used in numerical answers. The tendency is to avoid the A and D positions and candidates may realise this.

Drawings.

10. The stem of a question may contain a drawing which will appear below or to the right of the text of the stem and above the answers. Only black and white line drawings can be suitably reproduced, colour and photographs may not be sufficiently clear to be usable.

The text of the stem must draw attention to the drawing; typically “In the drawing/circuit diagram/chart...”

11. The answers may be 4 separate drawings and must be clearly labelled A, B, C and D.

If space permits these should be shown as a square block of 4 drawings labelled in order as shown below. Failing that, they should be in a vertical list.

A		B	
C		D	

If the drawings are similar, e.g. showing correct and incorrect assembly, the differences must be clearly visible to all candidates.

12. At Foundation level, if a question containing a drawing relates to a drawing in the syllabus or the training manual then that drawing itself should be used to avoid any difficulties arising from different artistic impressions of the same item. At Intermediate and Full level this is less important since it is reasonable to expect the candidates to recognise a clear drawing presented differently.

If a circuit diagram is used and those in the syllabus or training materials are not suitable, then the style must be similar and the correct circuit symbols used. New circuit components, not used in the Syllabus must not be used. See BS EN60617-2 (IEC 617-2) Graphical symbols for diagrams.

Lists.

13. Normally the candidate will be asked to select the correct item from the list of 4 given. Only one must be correct and the text of the stem should be “Which ONE of the items below...”. Note the use of capitals to draw the candidate’s attention to the fact that only one answer is required/correct.

At Foundation level candidates should only be asked to select one item and the list should be labelled ABCD vertically.

- A Screwdriver
- B Spanner
- C Hammer
- D Pliers

At Intermediate and Full level, it is acceptable to ask for two items to be selected. The Stem must say “Which TWO of the items below...” and the list numbered 1.

2. 3. 4 with the answers shown as

- A 1 and 2
- B 1 and 3
- C 2 and 3
- D 3 and 4

Note that the answers are in numerical order firstly on column 1 and then column 2.

Alternatively, give the two items in each of the 4 answers.

- A Spanner and pliers.
- B Spanner and screwdriver

Ordered Lists and Priority.

14. It is acceptable to use simple orders, for example, Which ONE of the items below shows the radio bands in ascending order.

- A MF HF VHF UHF
- B HF MF UHF VHF

In this example, the bands should NOT be correctly shown in descending order. The candidate is not being examined on the difference between “ascending” and “descending”.

15. Orders of priority. Candidates should NOT be asked to put items in priority order. This is frequently confusing and devalues the question. Lower down the list is often subjective.

16. Where the syllabus clearly states that something must come first then that may form an acceptable question.

E.g. "What is the FIRST action on finding a casualty who has received an electric shock?"

- A Go for help.
- B Switch off the power.
- C Pull the casualty clear.
- D Ask the casualty how he feels.

In this question it really is important what to do first since otherwise further injury may result either to the casualty or to the potential rescuer.

17. At Intermediate and Full level it is acceptable to have questions requesting the MOST appropriate answer.

E.g. Which action is the MOST likely to be effective in minimising interference conducted along the power supply leads?

- A Connect 0.1uF capacitors across the 12V supply leads.
- B Disconnect the mains earth from the power supply.
- C Fit ferrite rings of the 12V supply leads and the mains lead.
- D Use a screened 12V power and screened mains lead, earthing the screens.

The point here is that answer D and to a limited extent, depending on circumstances, answers A and B, may have some beneficial effect but a competent candidate will realise that C is the better answer. There does need to be adequate differentiation but not to the extent that the question becomes trivial. The distracters must at least be plausible.

Questions referring to supplied reference material.

18. The rubric on the front of the exam paper will advise candidates to use the supplied reference material.

Foundation candidates will be provided with the Frequency to Wavelength Conversion Chart, simplified Band Plans of the 14MHz and 144MHz bands as shown in the syllabus, a Frequency Allocation Table (showing the users of the frequency range 87.5MHz to 160.975MHz) and the Schedule to the appropriate amateur Licence. Copies are shown in the syllabus. Note: Check the validity dates of the syllabus for the applicable version of these documents. There will be a delay, possibly of several months, following changes to RSGB/IARU documents such as the Band Plan before exam questions are updated.

Intermediate candidates are provided with the parameters shown in Licence Terms and Provisions.

Advanced candidates will be supplied with a clean copy of Licence. Licensing questions at advanced level are 'open book' and the questions will be commensurate with the advanced level, requiring some checking in the Booklet.

Questions must be realistic and not '*lawyers questions*' which serve no useful purpose for the average radio amateur.

Devising Questions

Foundation

19. Many questions at Foundation level are factual recall or simple tests of understanding. Asking the candidate to calculate a current, given the voltage and resistance, is quite valid at this level since it will be new. However it is also valid to ask what will happen if the resistance (or voltage) is increased, that checks that the candidate understands what is happening, not just aware of a rather mechanical arithmetic process.

A formula sheet is not provided because there are few formulae to be remembered and the aim is to develop an understanding of the $W=V \times I$, and $V=I \times R$ relationships. With that understanding, knowing what to do becomes relatively straightforward and it is a moot point whether the candidate 'remembers' the formula or effectively works it out from understanding the processes each time it is required.

Intermediate

20. A higher level of understanding is expected and questions should address that. Factual recall questions are required in some syllabus areas but, overall, the number of understanding questions will balance the number of simple recall questions.

Resonance, for example, is in the syllabus and candidates are expected to know that the rate at which energy is transferred back and forth is dependent of the values of L and C and the effect of increasing or decreasing L or C. The formula is not required or provided. The candidate should have sufficient understanding to recognise that the behaviour is of the form $1/LC$ but not to know about 2π or the need for a square root.

Simple 'plug in the numbers' questions are not appropriate since they test arithmetic ability (which is not in the syllabus) and often fail to test understanding of the physics of the topic. That is not to outlaw numerical questions, but a two-stage question with straightforward arithmetic, for example, will test understanding because the student is required to reason out the two stages. Question 11 of the Intermediate sample paper shows such a two-stage question. (<http://www.rsgb.org/tutors/intermediate/pdf/sample.pdf>)

Advanced

21. Most questions will assess understanding of the material. As an example, transverters are included in the syllabus at this level. Rather than simply ask what one is (which could just as easily be asked at a lower level); ask what the oscillator frequency needs to be to allow transmission on, say, 70cms, given an HF transmitter, band limited on transmit to amateur bands only. It is then for the student to realise that 28.0 – 29.7MHz gives the widest frequency coverage and select an oscillator frequency accordingly. Some care must then be exercised in

the choice of distracters so other HF bands could be used, and to phrase the question in terms of the 'most suitable', rather than 'the only option'.

A formula sheet is provided at this level. Some of the formula are sufficiently complex that whilst students can be expected to remember the general form, remembering the exact form and the value of coefficients is of limited examination value. An example being the 7 in $(7\sqrt{ERP})/d$. The formula sheet does not give units, a student who understands the material will quickly insert those and the sheet will not readily give away whether it is field strength or pfd that obeys the inverse square law.

Submission of Draft questions

22. A submission form is available at <http://www.commsfoundation.org/rce/exams/>

It is a Word template (not a normal Word document) and may be submitted electronically or as a paper print. Other formats are acceptable but please ensure you give all the information required.

Submitted questions must be the original work of the author and not have been used elsewhere. Accepted questions become the property of the RCF who will own the copyright. The author shall destroy any copies of the question on receipt of notification of acceptance, and must not use the question for any other purposes.

New authors are advised to limit the first batch of question to no more than ten. This will avoid a large number of rejected questions for similar reasons and allow the Exam Group to offer style and similar comments.

Electronic Submission

23. Electronic submission of questions is encouraged. Ideally they should be password protected to preserve question security.
24. Please don't use auto numbered lists or bullet points – often the second question ends up being lettered EFGH rather than ABCD and is difficult to re-format to e-mail out to EC members. A multiple page document is preferred to multiple attachments – which tend to get lost.

Drawings

25. Ideally drawings should be in jpeg format at 600dpi with minimal or no compression to minimise the incidence of soft or fuzzy edges. WMF, windows metafile, will work in most documents, but not in the present examination software although conversion is possible. A freehand scanned drawing is acceptable if that is all that can be produced, although there will be delays while the drawing is sent out for artwork. Do take care on e-mail sizes, many ISPs have a 10MB limit and drawings often incur a 50% overhead for translation into e-mailable format (MIME).

Please send draft questions to draftquestions.rce@rsgb.org.uk

Vetting

26. Exam Committee (EC) meetings are held approximately 4 times per year and questions received 3 weeks prior to a meeting will normally be put on the agenda for that meeting. The decision of the Group is normally available 2 weeks after the meeting.

Receipt of submissions will be acknowledged, but there will be no further correspondence until after the EC meeting.

The outcome may be acceptance as is, slightly amended and accepted, returned for more substantial editing, or rejected. In the latter three cases an explanation will be given. Edited questions may be resubmitted in the normal way and will be seen by the next available meeting.

Useful references

The references below may offer additional useful guidance on multiple choice questions. Please note that some references propose styles of question (eg True/False questions) which are NOT used in our Radio Communications Examinations.

<http://www.cte.uiuc.edu/dme/exams/ITQ.html>

<http://www.caacentre.ac.uk/dldocs/otghdout.pdf>

http://www.caacentre.ac.uk/resources/objective_tests/

<http://www.fctel.uncc.edu/pedagogy/assessment/DevelopingLearningOutcomes.html>