Course Report 2018

Subject	Engineering Science
Level	National 5

This report provides information on the performance of candidates. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published assessment documents and marking instructions.

The statistics used in this report have been compiled before the completion of any Post Results Services.

Section 1: comments on the assessment

Summary of the course assessment

Component 1: question paper

The question paper performed as intended. The course content was sampled as outlined in the course specification and the balance of A-demand to C-demand questions was appropriate.

All questions functioned. Marker feedback and item analysis confirmed that the full range of marks was awarded in each item. Nothing in the performance of the question paper necessitated any adjustment to the grade boundaries and so these were set at the notional levels.

Component 2: assignment

The structure of the assignment was similar to that of the specimen assignment. The assignment functioned as intended and the full range of marks were awarded for all tasks.

The assignment largely performed as expected. Feedback suggested that the level of demand was fair and that it successfully sampled candidates' ability to apply engineering skills and knowledge across the course.

Feedback indicated that centres received the revised assignment positively, and that candidates could complete it within the set eight hours.

Section 2: comments on candidate performance

Areas in which candidates performed well

Component 1: question paper

Questions where candidates performed well include the following:

Question 1(a)	Most candidates were able to state the type of engineer.
Question 6	Candidates could identify the nature of the given forces.
Question 9	Most candidates attempted the logic diagram well.
Question 10(a)	Performance in the flowchart question was better than that seen in previous years; most candidates included pin numbers, delay units, and arrows on feedback loops in their responses.
Question 10(b)	Most candidates attempted calculating the change in length well.
Question 11(d)	Most candidates performed strongly in selecting and justifying the most suitable material for the given application.
Question 12(a)	Candidates frequently answered the Boolean equation and completion of the truth table correctly.
Question 15(a) (ii)	Most candidates attempted the velocity ratio calculation well.
Question 16(a) (i)	Candidates were able to describe a positive environmental advantage in this given context.
Question 16(c) (i)	Most candidates attempted calculating the voltage well.
Question 17(b)	The efficiency of the system calculation was well answered.
Question 17(c) (i)	Most candidates were able to correctly identify ‘closed loop’.

Component 2: assignment

Task 1(a)
The majority of candidates demonstrated good skills in simulating the logic circuit.

Task 2(a)
Candidates were generally very good at simulating the given circuit and flowchart. However, many candidates renamed microcontroller pins rather than selecting an appropriate microcontroller. Renaming pins to labels such as LED meant that pin numbers did not match, as per the requirements of the task.

Task 3(a)
Candidates generally demonstrated a good knowledge and understanding of pneumatic circuit design.

Task 4(a)
Although most candidates made a good attempt at the compound gear train design, it should be noted for future assignments that a large number did not label the input and output gears and include the gear sizes asked for in the task.

Task 5(a)
Candidates generally performed well in this task. However, it should be noted for future assignments that many candidates incorrectly drew the thermistor symbol, or omitted the '¬t' from the symbol.

Areas which candidates found demanding

Component 1: question paper

Questions that candidates found demanding include:

Question 8	Some candidates were unable to identify two faults with the gear drive symbol.
Question 12(b) (i)	Some candidates failed to describe a functional advantage of the use of a microcontroller in the given context.
Question 13(b)	Some candidates were unable to describe the specific roles of a structural engineer in the development of the catamaran.
Question 15(d)	A number of candidates failed to explain the appropriateness of the named actuator in the given context.
Question 16(a) (ii)	Some candidates were unable to describe a negative economic impact in the given context.

Component 2: assignment

Task 2(d)
Candidates that had renamed pins in Task 2(a) – for example from output 5 to output 7 – mostly generated the incorrect code. The code referred to the original pin numbers.

Task 2(e)
A number of candidates failed to provide evaluative comments which related to the given specification and context. As part of their response, candidates should describe whether each individual specification point was met or not, with justification.

Task 3(b)
As this was an 'Explain' task, candidates were expected to select one of the characteristics given and justify its suitability in the context of the car wash. Some candidates failed to provide both characteristics and reasons.

Task 4(d)
A number of candidates failed to provide evaluative comments that related to both the specification and context.

Task 6(a)
A number of candidates failed to include the correct input or outputs, and/or include arrows in the correct position in the system diagram.

Task 6(b)
A number of candidates failed to correctly include the limit switch and red lamp and green lamps as sub-systems.

Section 3: advice for the preparation of future candidates

Component 1: question paper

Centres should encourage candidates to show their working clearly to maximise their chances of obtaining partial marks in all calculation-based questions. While candidates generally gave units correctly, a small but significant number used Pa or Nm^{-2} for pressure without first converting the area from mm^2 into m^2.

In general, most candidates consistently and correctly used significant figures to express their final answer. However, some candidates rounded too early in their calculation.

Centres should make candidates aware of the difference between the role of an electronic engineer and that of an electrical engineer.

Centres should ensure that candidates always use a question's context when responding to a 'Describe' or 'Explain' type question, and avoid using generic statements.

Component 2: assignment

The majority of centres appear to have prepared candidates well in the breadth of skills required in the assignment.

Centres could spend more time preparing candidates to write evaluations and complete system and sub-system diagrams.

Centres must strictly adhere to the assessment conditions of the assignment as outlined in the course specification.

Centres need only submit pages of work that include candidate responses. These pages must be single-sided, not stapled and submitted in task order. Each page must have the candidate's details on the back. Each submission must also have a completed signed flyleaf at the front.

Grade boundary and statistical information:

Statistical information: update on courses

Number of resulted entries in 2017	1744

Number of resulted entries in 2018	1808

Statistical information: performance of candidates

Distribution of course awards including grade boundaries

Distribution of course awards	Percentage	Cumulative %	Number of candidates	Lowest mark
Maximum mark				
A	40.5%	40.5%	733	112
B	21.3%	61.8%	385	96
C	16.0%	77.8%	289	80
D	10.4%	88.2%	188	64
No award	11.8%	-	213	-

General commentary on grade boundaries

SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.

SQA aims to set examinations and create marking instructions which allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary).

It is very challenging to get the standard on target every year, in every subject at every level.

Therefore SQA holds a grade boundary meeting every year for each subject at each level to bring together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of SQA's management team.

- Grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- Grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- Where standards are comparable to previous years, similar grade boundaries are maintained.

Grade boundaries from exam papers in the same subject at the same level tend to be marginally different year to year. This is because the particular questions, and the mix of questions, are different. This is also the case for exams set by centres. If SQA alters a boundary, this does not mean that centres should necessarily alter their boundary in the corresponding practice exam paper.