



## Course Report 2018

|         |                             |
|---------|-----------------------------|
| Subject | Applications of Mathematics |
| 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**

The course assessment was accessible to the majority of candidates. Feedback suggests that it gave candidates a good opportunity to demonstrate the spread and depth of their knowledge of the subject at this level.

The examination largely performed as expected, but the overall level of demand was slightly higher than intended.

The grade boundaries were amended to take account of this.

## **Component 1: question paper — paper 1 (non-calculator)**

This question paper performed as expected, except for question 13, which proved more challenging than expected. The majority of candidates made a good attempt at all questions apart from questions 11 and 13.

Poor basic number skills resulted in some candidates losing marks in several questions.

The feedback from the marking team suggested that the question paper was fair in terms of course coverage and overall level of demand.

## **Component 2: question paper — paper 2**

This question paper performed as expected, except for question 11(c), which proved more challenging than expected.

The majority of candidates made a good attempt at all questions apart from questions 5(a), 8(d) and 11(c).

The feedback from the marking team suggested that the question paper was fair in terms of course coverage and overall level of demand.

## Section 2: comments on candidate performance

### Areas in which candidates performed well

#### Component 1: question paper — paper 1 (non-calculator)

Candidates performed well in the following areas of the question paper.

- Question 1:     **Tolerance**  
Most candidates were able to calculate the percentage of an amount and then knew to add or subtract from the original amount.
- Question 2:     **Money calculations**  
Candidates used a variety of techniques to divide by 50.
- Question 3:     **Scatter graph**  
Most candidates successfully plotted the correct points and were able to use their line of best fit to estimate a height.
- Question 4:     **Marking a result onto a scale**  
Most candidates were able to calculate the outside temperature and mark it correctly on the gauge.
- Question 7:     **Foreign exchange**  
Most candidates successfully answered this question.
- Question 9:     **Time difference including time zones**  
Most candidates knew the correct strategy to use for this question.
- Question 12(a): **Scale drawing**  
Most candidates were able to use the scale to convert km to cm and were able to accurately draw scaled lengths on the diagram.

#### Component 2: question paper — paper 2

Candidates performed well in the following areas of the question paper.

- Question 1(a): **Compound percentages**  
Most candidates attempted to calculate a compound percentage.
- Question 2:     **Constructing a boxplot from a 5 figure summary**  
Most candidates correctly identified the median and quartiles and used them to construct a boxplot.
- Question 3:     **Extracting data from a table**  
Most candidates successfully extracted the data from the table to identify the best option.

- Question 5(b): **Calculation of a simple volume**  
Almost all candidates knew how to calculate the volume of the cylinder.
- Question 6: **Ratio**  
Most candidates attempted to find the total money paid by the restaurant using the ratio given.
- Question 8(a): **Extracting data from a table**  
Most candidates correctly extracted data from the table and attempted to find the minimum cost of the frame and cycle parts. Some failed to take into account the need for 2 wheels and 2 tyres in their calculations.
- Question 8(b): **Calculating the cost of a finance package**  
Almost all candidates knew how to calculate the extra cost of the finance package.
- Question 8(c): **Mean and standard deviation**  
Almost all candidates knew how to calculate the mean and standard deviation of a data set.
- Question 9(a): **Precedence table**  
Almost all candidates completed the precedence table accurately.

## Areas which candidates found demanding

### Component 1: question paper — paper 1 (non-calculator)

The following questions proved challenging for many candidates.

- Question 5: **Adding and subtracting simple fractions**  
A common error was the inability of candidates to find a common denominator with a significant number of candidates simply adding the numerators and denominators of the given fractions, eg
- $$\frac{3}{7} + \frac{1}{3} = \frac{4}{10}$$
- Question 6: **Applying the correct order of operations to a numerical calculation**  
Many candidates did not use the correct order of operations. Of those who did use the correct order, many made numerical errors in their calculations leading to an incorrect answer.
- Question 11: **Calculating the perimeter of a composite shape, including semi circles**  
Most candidates struggled to multiply by 3·14 correctly without a calculator and hence could not calculate the circumference of the circle.
- Many candidates also failed to add on the extra 2·8cm.

- Question 13: **Using Pythagoras' Theorem to solve a problem**  
Most candidates were unable to select the correct strategy.
- Of those candidates who did select the correct strategy many then made a mistake in the calculation of  $\sqrt{10^2 - 6^2}$ . Many candidates calculated  $10^2 = 20$  instead of 100 and  $6^2 = 12$  instead of 36.
- Question 14: **Calculating the probability of a given event**  
Many candidates failed to identify the total number of outcomes, with many simply attempting the question as if two dice had been used. This led to 36 being given as the total number of outcomes by many candidates.
- Question 15: **Calculating the gradient where a unit conversion was needed**  
Many candidates either failed to successfully convert to consistent units. In many cases there was no attempt to convert the fractions to have common denominators or common numerators.
- Simply stating that  $\frac{25}{100} < \frac{1}{14}$  was insufficient to gain the mark for the conclusion as there was no working to justify the conclusion given. In these cases no conclusion could be made as the working did not justify the answer given.

## Component 2: question paper — paper 2

The following questions proved challenging for many candidates.

- Question 5(a): **Inverse proportion**  
Few candidates attempted to use inverse proportion. Many attempted to use the weight of feed available in their calculation rather than just the numbers of sheep and the number of days.
- Question 8(d): **Making valid comments comparing the mean and standard deviation of two data sets**  
Many of the comments comparing the means and standard deviations were lacking the detail required. Many candidates did not answer in context or use phrases such as 'on average' or 'more/less consistent'.
- Question 9(b): **Selecting the critical path in the precedence table**  
Many candidates simply added up all the times given so therefore did not select a critical path. A common mistake was changing the time into minutes and seconds incorrectly eg, changing 20·15 minutes to 20 minutes and 15 seconds.
- Candidates did not need to do a time conversion to answer this question. However, any time conversion that was attempted had to be done correctly.

Question 9(c): **Efficient container packing**

Many candidates only attempted to find one arrangement of the boxes in the container.

Many candidates did not use appropriate rounding when calculating the number of boxes that would fit the length, width and height of the container.

A significant number knew how to find the correct number in each row and the correct number of rows, but then added the answers instead of multiplying to find the total number of boxes. A number of candidates simply divided the volume of the container by the volume of an individual box, failing to realise that the boxes did not completely fill the container.

Question 11(c): **Composite volume with a non-standard cross section**

Few candidates used an appropriate strategy to find the volume of the composite volume. Those attempting to find the area of the cross section did not split the shape appropriately and simply attempted to find the area of the 4m by 0.5m rectangle and a triangle with base 12m and height 2m.

These candidates then did not realise that they were to multiply the total area by 8m to find the volume.

Those attempting to split the volume also failed to realise that the part of the pool with the sloping floor was not a triangular prism. Very few candidates attempted to change the volume that they had calculated into litres. Of those who did, many divided the volume in cubic metres by 1000 instead of multiplying it by 1000.

## Section 3: advice for the preparation of future candidates

Most candidates were appropriately presented and better prepared in dealing with most questions, and working was also usually displayed clearly.

The following advice may help prepare candidates for the demands of the National 5 Applications of Mathematics examination:

- ◆ In question paper 1, performance in basic number skills was disappointing, and cost many candidates valuable marks. Candidates should continue to practise working with fractions, decimal fractions and order of operations.
- ◆ Teachers and lecturers should consider how best to practise questions involving Pythagoras' Theorem. A question similar to question 13 has been asked previously but the majority of candidates were unable to answer this question correctly.
- ◆ Teachers and lecturers should encourage candidates to round to at least 3 decimal places within a question.
- ◆ Teachers and lecturers should consider how to best practise National Insurance questions and remind candidates the correct process for this type of question.
- ◆ Teachers and lecturers are reminded that **inverse proportion** is a mandatory skill for the National 5 Applications of Mathematics course. In question paper 2, question 5(a), most candidates could not identify an appropriate strategy for this question.
- ◆ The SQA website contains the marking instructions for the 2018 course assessment (as well as previous years). All those teaching National 5 Applications of Mathematics and candidates undertaking the course, will find further advice and guidance in these detailed marking instructions.

## Grade boundary and statistical information:

### Statistical information: update on courses

|                                    |      |
|------------------------------------|------|
| Number of resulted entries in 2017 | 2599 |
|------------------------------------|------|

|                                    |      |
|------------------------------------|------|
| Number of resulted entries in 2018 | 2482 |
|------------------------------------|------|

### 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                             | 18.5%      | 18.5%        | 460                  | 77          |
| B                             | 19.6%      | 38.1%        | 485                  | 65          |
| C                             | 19.7%      | 57.8%        | 489                  | 54          |
| D                             | 19.6%      | 77.4%        | 487                  | 42          |
| No award                      | 22.6%      | -            | 561                  | -           |



## **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 the management team at SQA.

- ◆ The 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.
- ◆ The 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.