



## Course Report 2015

Subject	Mathematics
Level	National 5

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

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It 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 question papers and marking instructions for the examination.

## Section 1: Comments on the Assessment

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

The course assessment performed as expected except for Question 14(a)(ii) in Paper 2 which candidates found more difficult than was intended. This affected all but the stronger candidates. As a result of this the Grade Boundaries for grades B, C and D were adjusted down by one mark.

## Section 2: Comments on candidate performance

The mean mark for Paper 1 was 22.0 out of 40. The mean mark for Paper 2 was 27.8 out of 50. The mean mark overall was 49.8 out of 90 (55.3%) compared to 53.0 (58.9%) in 2014. The majority of candidates made a good attempt at all questions apart from questions 9, 13 and 14 in Paper 1 and question 14 in Paper 2.

Some candidates scored very high marks; however others scored very low marks, and were perhaps inappropriately presented at this level.

Most candidates wrote clearly, showed all appropriate working and stated correct units for their answers where required. However where questions required a reason or explanation, the level of written explanation was often disappointing.

## Section 3: Areas in which candidates performed well

### Paper 1

Question 4: **Expand brackets.** Most candidates scored full marks.

Question 6: **Trigonometric graph.** Most candidates scored full marks, but some gave an incorrect value for  $b$ ;  $b = 120$  was common in these cases. Some candidates gave the 'correct' answers for  $a$  and  $b$  in reverse order.

Question 11: **Simultaneous Equations.** Most candidates scored full marks; any lost marks were usually due to calculation errors.

### Paper 2

Question 1: **Appreciation.** Most candidates scored full marks. Most were using a multiplier method rather than working through each year separately.

Question 3: **Cosine Rule.** Most candidates scored full marks; any lost marks were usually due to either stopping after finding  $AB^2$  or calculating errors caused by evaluating the cosine rule a bit at a time.

Question 6(a): **Volume of a Sphere in Scientific Notation.** Most candidates calculated the correct volume, but many lost the rounding mark as they added 8 or 9 to the power of 10 because of the number of decimal places they were taking off their unrounded answer.

Question 8: **Reverse use of Percentage.** Performance in this type of question continues to improve, but there were still a significant number of candidates who simply worked out 85% or 115% of £297.50.

## Section 4: Areas which candidates found demanding

### Paper 1

Question 2: **Inequality**. Most candidates had difficulty with one or more aspects of this question. Common errors included:

- ◆ incorrect expansion of the brackets eg  $11 - 2 + 6x < 39$  and  $9(1 + 3x) < 39$
- ◆ omission of the negative when collecting like terms eg  $11 - 2 - 6x < 39 \Rightarrow 6x < 30$
- ◆ incorrect division of the inequality eg  $-6x < 30 \Rightarrow x < -5$

Question 7a(i): **Equation of Parabola**. Many candidates gave an answer of 2 instead of  $-2$ . Some candidates gave the 'correct' answers for 7a(i) and 7a(ii) in reverse order.

Question 7b: **Equation of Axis of Symmetry of Parabola**. This question was poorly attempted. Many candidates gave an answer of 2 instead of  $x = 2$ , many stated the equation of the parabola, and some gave no response.

Question 9: **Cosine of Angles  $0^\circ - 360^\circ$** . This question was poorly answered by the majority of candidates. Common answers which displayed a lack of understanding of the cosine function included:

- ◆  $\cos 90, \cos 100, \cos 300$ . The cosine increases as the angle increases.
- ◆  $\cos 300, \cos 100, \cos 90$ . The cosine decreases as the angle increases.
- ◆  $\cos 300, \cos 100, \cos 90$ . When you multiply by  $\cos$  the answers get smaller.

Many candidates who did give the correct order couldn't justify their answer. Those who achieved both marks mostly justified their answer by indicating the relevant points on a cosine curve.

Question 10a: **Median and Semi-Interquartile Range**. Most candidates found the median, although some found the mean. Many candidates found the interquartile range instead of the semi-interquartile range, or simply found the lower and upper quartiles and proceeded no further.

Question 10b: **Interpret Calculated Statistics**. Although responses in this type of question are improving, many candidates are still finding it difficult to make valid comparisons of data. Some candidates incorrectly stated or implied that a larger median showed that **all** dancers performed better in round 2.

Question 12: **Simplify Algebraic Fraction**. Many candidates did not attempt to factorise the numerator or the denominator and simply cancelled individual terms.

Question 13: **Manipulate Surds**. Many candidates either rationalised the denominator or simplified the surd but few did both. The most common answers were

$$\frac{4\sqrt{8}}{8} \text{ or } \frac{4}{2\sqrt{2}}.$$

Question 14: **Evaluate Fractional Index**. This question was poorly answered by the majority of candidates. Common answers which displayed a lack of understanding of fractional indices included

$$8^{\frac{5}{3}} = 8 \frac{5}{3} = \frac{29}{3} \text{ and } 8^{\frac{5}{3}} = 8 \times \frac{5}{3} = \frac{40}{3}.$$

Many of the candidates who did interpret the index correctly were unable to complete the evaluation correctly.

## Paper 2

Question 2: **Functional Notation.** Many candidates simply evaluated  $f(23)$ . Many solved the equation for  $x$  instead of  $a$ .

Question 5: **Components of 2 Dimensional Vectors.** Many candidates were unable to find the correct components for one or both of the vectors. The most common error was for positive values to be given for every component.

Question 6(b): **Scientific Notation Calculation.** Common errors included:

- ◆ subtracting instead of dividing
- ◆ dividing the wrong way round
- ◆ incorrect use of a calculator leading to an answer of  $5 \times 10^{21}$

Question 7: **Divide Algebraic Fractions.** Most candidates knew to multiply by the reciprocal of the second fraction but many were unable to proceed correctly after that. Some confused this with adding or subtracting fractions and started by looking for a common denominator.

Question 9: **Areas of similar shapes.** Common errors included:

- ◆ not squaring the linear scale factor
- ◆ not subtracting 400 to obtain the area of PQTS.

Question 10: **Reverse use of Length of Arc of a Circle.** Most candidates achieved the first mark for using  $\frac{65}{360}$ , but after that common errors included:

- ◆ not constructing a valid equation eg simply calculating the length of the arc with a diameter of 28.4cm
- ◆ constructing an invalid equation eg using  $\pi r^2$  instead of  $\pi d$
- ◆ constructing an equation but then being unable to solve it correctly

Question 11: **Area of a Hexagon.** Common errors included:

- ◆ using 40 cm instead of 20 cm for the length of the side of the triangle
- ◆ using  $72^\circ$  instead of  $60^\circ$  for the angle at the centre
- ◆ using 5 triangles instead of 6 triangles (some candidates used a combination of 6 triangles and  $72^\circ$ )

Question 12: **Perpendicular Bisector of a Chord.** Many candidates failed to identify a valid right-angled triangle but most could then follow through to use Pythagoras' Theorem appropriately.

Question 13: **Bearings and Sine Rule.** Many candidates could not deal with the bearing and the angles in the triangle but most could then follow through to use the sine rule appropriately. Common errors included:

- ◆ using angle  $PQR = 128^\circ$  and angle  $QRP = 160^\circ$  on the assumption that the sum of the angles in the triangle is  $360^\circ$
- ◆ ignoring the bearing completely and using angle  $PQR = \text{angle } QRP = 54^\circ$  on the assumption that the triangle is isosceles

Question 14(a)(ii): **Constructing a Quadratic Equation.** The majority of candidates either did this question badly or did not attempt it at all. Many candidates attempted to solve the given equation in this part instead of in part (b).

Question 14(b): **Quadratic Equation Problem.** Many candidates tried to solve the equation by factorising, not realising that since rounding was required that the quadratic formula should be used. Some candidates tried to solve the equation by other invalid methods. Many who did use a correct method did not achieve full credit for a number of reasons including:

- ◆ incorrect substitution into the quadratic formula

- ◆ incorrect evaluation of the discriminant
- ◆ not rejecting the negative root
- ◆ not rounding the final answer to one decimal place

## Section 5: Advice to centres for preparation of future candidates

Centres deserve credit for the preparation of candidates for the National 5 Mathematics course assessment. The majority of candidates were well-schooled in dealing with most questions, working was usually displayed clearly and correct units were stated where appropriate.

- In questions which involve **angles in a diagram**, candidates must make it clear which angles their calculations relate to. This should be done by writing the sizes of calculated angles in the appropriate place in the diagram or by clearly naming the calculated angles in the working space. This allows markers to follow candidates' working, and increases the opportunity for marks to be awarded. Markers commented that they were often unable to award marks in Paper 1 Question 3 as many candidates wrote down calculations without any indication of which angles the calculations were related to.
- Centres are reminded that calculating the **semi-interquartile range** of a data set is a mandatory skill for the National 5 Mathematics course.
- Centres should consider how best to practise questions which require a reason or explanation to be given. For example many candidates are still unable to make valid comments when comparing sets of data.
- In **Paper 2**, a significant number of candidates lost marks through incorrect or inefficient use of their calculators. For example, in Question 3 calculation errors occurred because the cosine rule was evaluated a bit at a time; in Question 4,  $(-13)^2 = -169$  was common; in Question 6b,  $1.1 \times 10^{12} \div 2.2 \times 10^{10} = 5 \times 10^{21}$  was common. Centres should consider how best to promote appropriate use of calculators.
- Centres should encourage candidates to avoid inappropriate premature rounding which leads to inaccurate answers. For example, in Paper 2 Question 9, a number of candidates lost a mark for rounding  $1.25^2$  to 1.6 which lead to an area of  $640\text{cm}^2$  instead of  $625\text{cm}^2$ .
- Centres should consider how best to practise problem solving skills which candidates require in order to tackle questions which involve some **reasoning** in the course assessment.
- The SQA website contains the Marking Instructions for the 2015 course assessment. All those teaching National 5 Mathematics, and candidates undertaking the course, will find further advice and guidance in these detailed Marking Instructions.

## Statistical information: update on Courses

Number of resulted entries in 2014	22536
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Number of resulted entries in 2015	36475
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## Statistical information: Performance of candidates

### Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark - 90				
A	30.3%	30.3%	11041	63
B	16.6%	46.9%	6073	53
C	14.9%	61.8%	5422	44
D	7.5%	69.3%	2731	39
No award	30.7%	-	11208	-

For this course, the intention was to set an assessment with grade boundaries as close to the notional values of 50% for a Grade C and 70% for a Grade A. There was a 1 mark adjustment at the C boundary to take account of the Qu 14 a(ii) in paper 2 - did not perform as expected.