National Course modification summary: Mathematics of Mechanics

Advanced Higher course assessment in session 2020–21

The Deputy First Minister has announced that National 5 exams will not take place in session 2020–21. SQA is working with stakeholders to develop an alternative certification model for National 5 that is based on teacher and lecturer estimates.

At present, Higher and Advanced Higher exams are still planned for 2021 and this will remain under review. We continue to work with stakeholders to put contingency plans in place to respond to any changes in public health advice, or local or national lockdowns, that may result in further changes to the 2021 exam diet — including changes to the timetable.

For up-to-date information on arrangements for National Courses in session 2020–21, including timetable information and guidance on estimates, please visit our website at www.sqa.org.uk/nq2021.

Modifications to assessment

Following our public consultation on proposed modifications to National 5 to Advanced Higher course assessment, which closed on 24 August 2020, we are making changes to course assessment for session 2020–21. The changes detailed on the following pages are intended to support the delivery of learning and teaching, while maintaining the validity, credibility and standard of the courses.

We have published a high-level report on the outcomes of the consultation, which is available from www.sqa.org.uk/nq2021. This includes details of the modifications to National 5 course assessment, which were planned prior to the 2021 National 5 exams being cancelled.

Advanced Higher course assessment 2020–21

Component	Marks	Duration
Question paper	90	2 hours and 50 minutes

To reduce the volume of learning and teaching required, the duration of the question paper will be reduced by 10 minutes and limited optionality will be introduced. There will be 10 marks fewer in the question paper.

Candidates will be assessed on either option A or option B as outlined below.

Option A

Skills	Explanation
Applying the concept of simple harmonic motion (SHM), including problems involving Hooke's Law	♦ using the equation for SHM, $\ddot{x} = -\omega^2 x$, and the following associated equations: $v^2 = \omega^2\left(a^2 - x^2\right)$, $T = \frac{2\pi}{\omega}$, $\lvert v\rvert_{\max} = a\omega$, $\lvert\ddot{x}\rvert_{\max} = a\omega^2$ and $x = a\sin\left(\omega t + \alpha\right)$ ♦ considering SHM starting from points other than the centre of oscillation ♦ applying Hooke's Law to SHM problems involving extensible strings and springs

Option B

Skills	Explanation
Determining the turning effect of force	♦ evaluating the turning effect of a single force or a set of forces acting on a body, considering clockwise and anticlockwise rotation using moment of force = magnitude of force × perpendicular distance ♦ applying the principle that, for a body in equilibrium, the sum of the moments of the forces about any point is zero ♦ considering the forces on a body or a rod on the point of tipping or turning
Using moments to find the centre of mass of a body	♦ equating the moments of individual masses that lie on a straight line to that of a single mass acting at a point on the line: $\sum m_i x_i = \bar{x}\sum m_i$ where $\left(\bar{x}, 0\right)$ is the centre of mass of the system ♦ extending this to two perpendicular directions to find the centre of mass of a set of particles arranged in a plane $\sum m_i x_i = \bar{x}\sum m_i$ and $\sum m_i y_i = \bar{y}\sum m_i$ where $\left(\bar{x}, \bar{y}\right)$ is the centre of mass of the system ♦ finding the positions of centres of mass of standard uniform plane laminas, including rectangle, triangle, circle, and semicircle: — For a triangle, the centre of mass will be $\frac{2}{3}$ along median from vertex. — For a semicircle, the centre of mass will be $\frac{4r}{3\pi}$ along the axis of symmetry from the diameter.

Skills	Explanation
	♦ applying integration to find the centre of mass of a uniform composite lamina of area A, bounded by a given curve $y = f(x)$ and the lines $x = a$, $x = b$ and the x-axis using $\overline{x} = \frac{1}{A}\int_a^b xy\,dx, \quad \overline{y} = \frac{1}{A}\int_a^b \frac{1}{2}y^2\,dx$

10 marks out of 90 will be available for each optional section.

Questions will be selected to ensure that whichever option a candidate chooses, the balance of the question paper overall will remain at 65% level C and 35% level A.

If you have any questions about these changes, please email NQ2020@sqa.org.uk.