2018 VCE Further Mathematics 2 (NHT) examination report

Specific information

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

Section A – Core

Data analysis

Question 1a.

30.8

Question 1b.

Upper fence = 31.6 + 1.5 × 1.3 = 33.55

As 33.5 < 33.55, therefore 33.5 is not an outlier.

The answer needed to correctly calculate the upper fence value and then provide a conclusion based on comparing the 33.5 data value and the lower fence.

Question 2a.

–0.8

Question 2bi.

16%

Question 2bii.

163

Question 3a.

Positively skewed with 3 (or at least 3) possible outliers

Question 3b.

71.3%

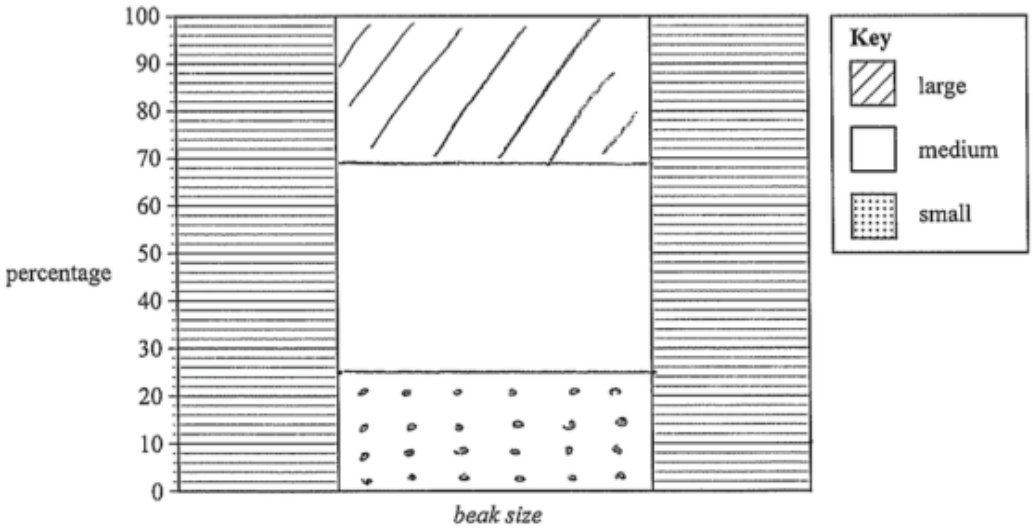
Question 3c.

37

Question 4a.

24

Question 4b.



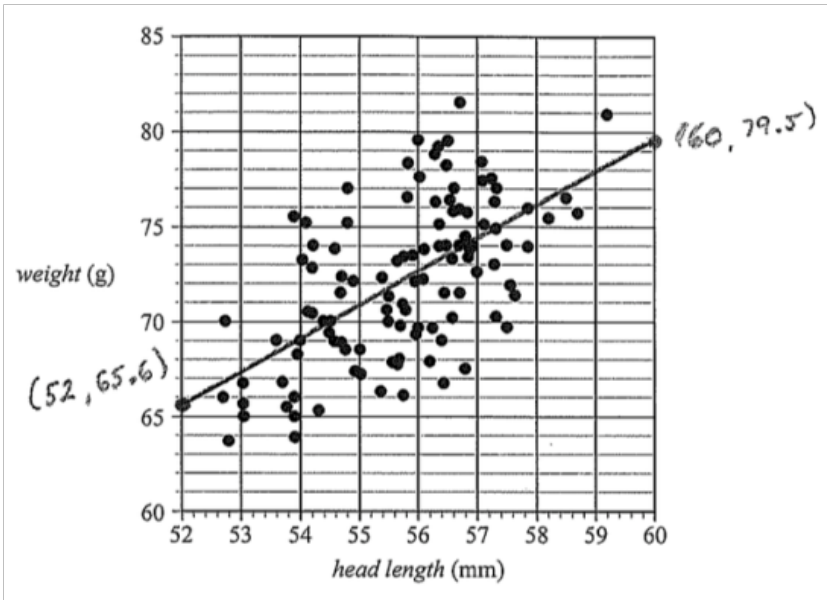
The three sections could be in any order.

Question 4c.

Students needed to give a statement that clearly indicated the contention is supported with a change or difference in one beak size considered and then give a statement similar to one of the following. Approximate percentages were acceptable.

- 50% of males had large beaks, which was higher than females, with 7%.
- 48% of males had medium beaks, which was higher than females, with 38%.
- 2% of males had small beaks, which was lower than females, with 55%.

Question 5a.



End points at (52, M) and (60, N), where $65 \leq M \leq 66$ and $79 \leq N \leq 80$ were accepted.

Question 5b.

60.4 g

Question 5c.

Extrapolation, as 49.0 is outside the data range.

Question 5d.

80.9 g

A mark was available to students who correctly used their predicted value with the residual of 2.78.

Question 5e.

64.5%

Question 5f.

There is a linear association

Question 6a.

$\log_{10}(\text{power}) =$ [4.287] + [0.09902] × *year number*

Both numbers needed to be correctly rounded to four significant figures.

Question 6b.

1 851 000

The answer needed to firstly use the year number of 20 to make a prediction and then raise 10 to that power before rounding to the nearest thousand.

Recursion and financial modelling

Question 7a.

$5000

Question 7b.

$512.50

Question 7c.

$V_0 = 5000 \quad V_{n+1} = 1.05\, V_n$

Question 7d.

9.5%

An answer of 9.6% was also accepted, as this generates over $6000.

Question 8ai.

$5032

Question 8aii.

10.2%

Question 8b.

$6089.34

Question 8c.

14.7%

Question 9a.

$107.50

Question 9b.

$250

Question 9c.

$420.40

A finance solver approach could have been:

N =	12
I% =	12.9
PV =	3776.15
PMT =	–330
FV =	**–90.40065597**
P/Y = C/Y =	12

Hence the last payment of $330 must be increased by $90.40 to fully repay the loan.

Module 1 – Matrices

Question 1a.

4 × 1

Question 1b.

56

Question 1c.

$$\begin{bmatrix} 25 & 20 & 45 & 35 \end{bmatrix}$$

Question 1d.

F_{2018} = [1.25] × F_{2017}

Question 2a.

A and E

Question 2b.

Farmer D had attended one earlier conference with all others in this group.

Question 3a.

Nitro (*N*) and Phate (*P*) are the same price.

Question 3b.

A 3 × 3 matrix is required to find the inverse.

Other acceptable answers described the need for a square matrix to find the inverse or that three equations were needed to solve for three unknowns.

Question 3ci.

–2 1 3

Question 3cii.

$1500

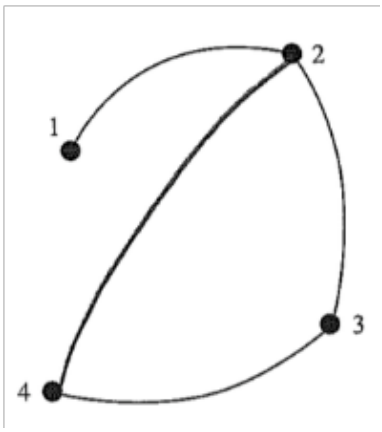
Question 4

$$\begin{bmatrix} 2160 \\ 2430 \\ 1410 \end{bmatrix}$$

A mark was available for finding matrix $Q = \begin{bmatrix} 300 \\ 300 \\ -600 \end{bmatrix}$

Module 2 – Networks and decision mathematics

Question 1a.



Question 1b.

8

Question 2a.

Not all vertices are of even degree.

Question 2b.

One of:

- Start at C and Finish at D (or vice versa).
- Start at D and Finish at H (or vice versa).

- Start at G and Finish at H (or vice versa).

Question 2c.

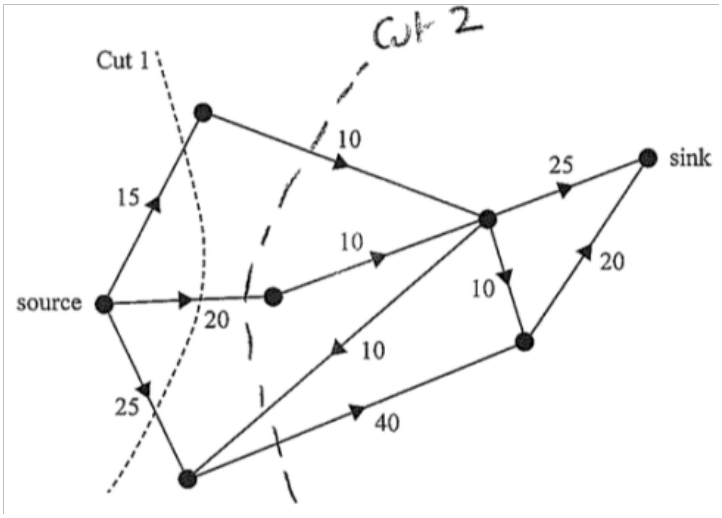
335

310 + 25 (repeated edge *EF*)

Question 3a.

60

Question 3b.



Question 3c.

40

Question 4a.

18

Question 4b.

1

Question 4c.

7

EST of *H* is 7 and the LST of *H* is 14.

Question 4d.

Both *C* and *G* are immediate predecessors of *K*.

Module 3 – Geometry and measurement

Question 1a.

2800 cm^3

28 × 20 × 5 = 2800

Question 1b.

1055.6 cm^2

$\pi \times 12^2 + 2\pi \times 12 \times 8$

Question 1c.

$\frac{360°}{10}$

Question 1d.

361.9 cm^3

$\frac{1}{2} \times 12^2 \times 36 \times \frac{\pi}{180} \times 8$

Question 2a.

Beijing	2
Brasilia	3
Vancouver	1

Question 2b.

1.15 am Thursday

$10.50 + 22.25 - 8.00$

Question 2c.

8 hours and 20 minutes

Difference in longitude 125°

$\frac{125}{15} = 8\frac{1}{3}$ h

Question 2d.

335 km

$\frac{3}{360} \times 2\pi \times 6400$

Question 3a.

$w = \sqrt{16^2 - 8^2}$

Question 3b.

9.2 cm

To find radius r

$(\sqrt{16^2 - 8^2} - r)^2 = r^2 + 8^2$

diameter $= 2r = 2 \times 4.6188...$

An answer of 9.3 cm was accepted when students correctly calculated using the rounded value of *w*.

Module 4 – Graphs and relations

Question 1a.

10

Question 1b.

5

Question 2a.

$200

Question 2b.

60

Question 2c.

$5.50

Profit = revenue – cost

$160 = 100 \times \textit{selling price} - (1.5 \times 100 + 240)$

Question 3a.

Correct substitution of $(80, 800)$ or $(100, 960)$ into $R = 8n + c$

Question 3b.

$1200

Question 4a.

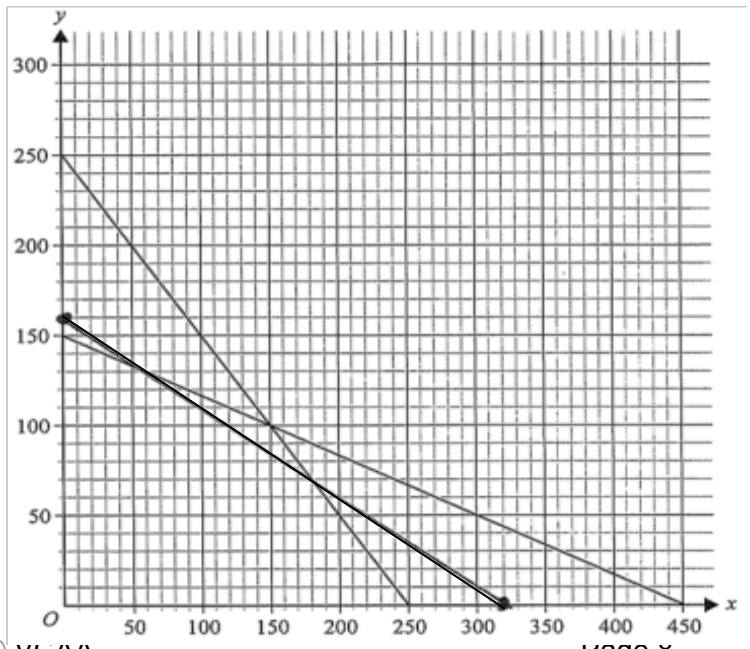
116

The maximum integer value of y when $x = 100$. Substitute $x = 100$ in $x + 3y = 450$

Question 4b.

150 single cheeseburgers and 100 triple cheeseburgers

Question 4c.



It needed to be clear that the *y* intercept was 160 and the *x* intercept was 320.

Question 4d.

190

Profit equation $P = 1.5x + 3y$ is parallel to $x + 2y = 320$.

Maximum profit of $480 can occur at all integer points from $(60,130)$ to $(180,70)$.