2026
NHT

General Mathematics Examination 1

Multiple-Choice Question Book

VCE (NHT) Examination – Thursday 21 May 2026

- Reading time is **15 minutes**: 2.00 pm to 2.15 pm
- Writing time is **1 hour 30 minutes**: 2.15 pm to 3.45 pm

Approved materials

- One bound reference that may be annotated
- One approved CAS calculator or CAS software, and one scientific calculator

Materials supplied

- Multiple-Choice Question Book of 28 pages
- Formula Sheet
- Multiple-Choice Answer Sheet

Instructions

- Follow the instructions on your Multiple-Choice Answer Sheet.
- You may keep this Multiple-Choice Question Book.

Students are **not** permitted to bring mobile phones and/or any unauthorised electronic devices into the examination room.

Contents

Instructions

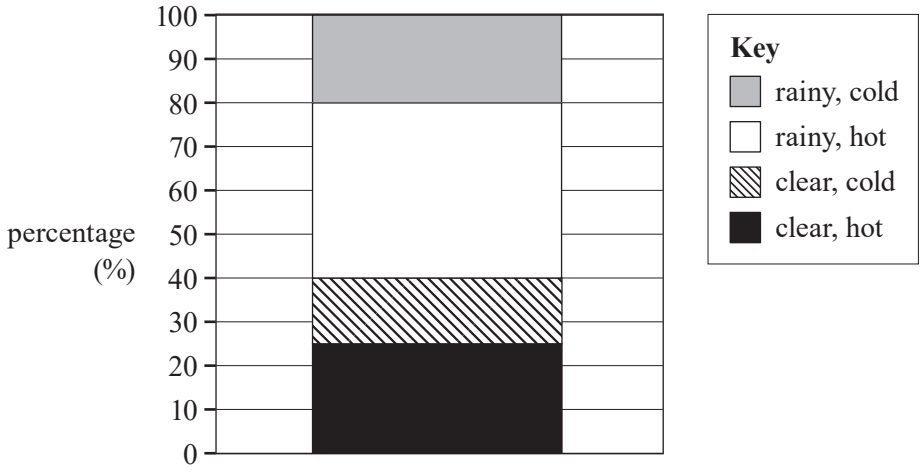
- Answer **all** questions in pencil on your Multiple-Choice Answer Sheet.
- Choose the response that is **correct** for the question.
- A correct answer scores 1; an incorrect answer scores 0.
- Marks will **not** be deducted for incorrect answers.
- No marks will be given if more than one answer is completed for any question.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Data analysis

Question 1

The weather for 300 days in a particular city was classified into four categories.

The results are displayed in the percentage segmented bar chart below.



The number of days when the weather was rainy is

A. 20

B. 60

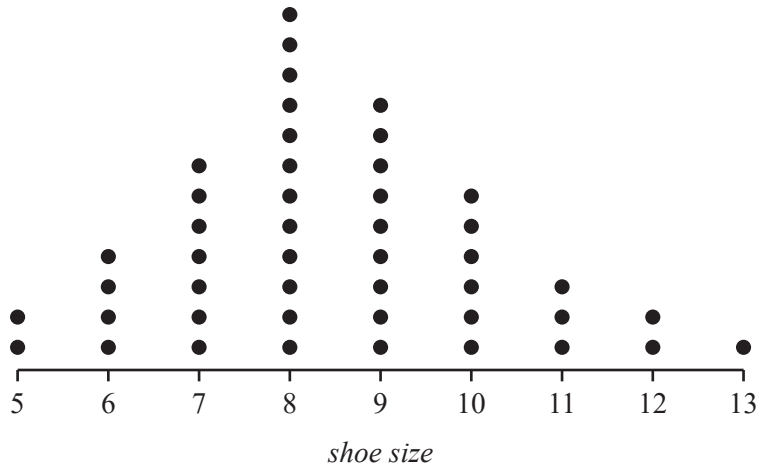
C. 120

D. 180

Use the following information to answer Questions 2 and 3.

The *shoe size* of a group of 46 adults was recorded.

The results are shown in the dot plot below.



Question 2

The range of the variable *shoe size* is

A. 5

B. 8

C. 11

D. 13

Question 3

The person with a *shoe size* of 13 is removed from the data set.

For the variable *shoe size*, this would cause

A. the mean to increase and the standard deviation to increase.

B. the mean to increase and the standard deviation to decrease.

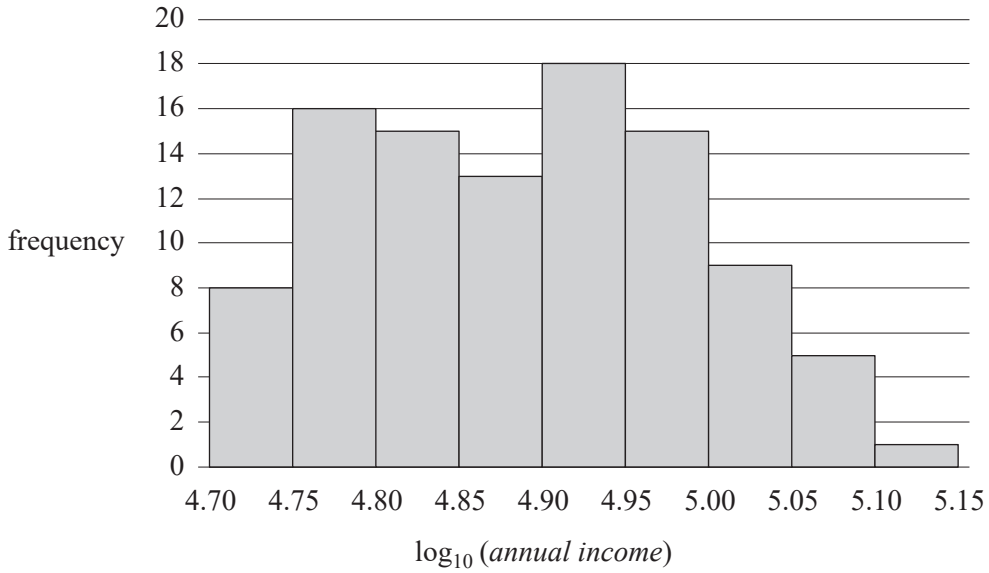
C. the mean to decrease and the standard deviation to increase.

D. the mean to decrease and the standard deviation to decrease.

Question 4

The histogram below displays *annual income*, in dollars, for a sample of 100 adults.

The histogram has a logarithmic (base 10) scale.



The third quartile of the *annual income* data, in dollars, could be

A. 92 000

B. 102 000

C. 105 000

D. 112 000

Question 5

In a survey, 70 adults were asked their opinions about cats and dogs.

The results are shown in the table below.

Gender	Likes only cats	Likes only dogs	Likes both cats and dogs	Likes neither cats nor dogs	Total
male	5	8	15	4	32
female	11	9	14	4	38

Based on the survey, which one of the following is correct?

A. Of the females surveyed, 78.125% like cats.

B. Of those adults who like only cats, 15.625% are male.

C. Of those adults who like neither cats nor dogs, 12.5% are male.

D. Of the males surveyed, 71.875% like dogs.

Question 6

Students sat two different tests.

The scores received by the students on each test are both normally distributed.

Both tests have a mean score of 70 marks.

On the first test, 2.5% of the students scored above 86 marks.

On the second test, 34% of the students scored between 54 and 70 marks.

Using the 68−95−99.7% rule, what is the **sum** of the standard deviations of the marks on the two tests?

A. 8

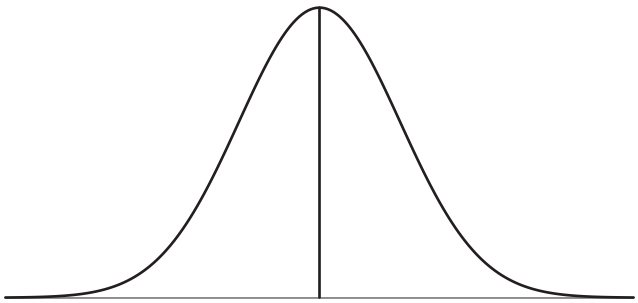
B. 16

C. 24

D. 32

Question 7

Investment returns, as a percentage, earned by fund managers over a one-year period are modelled by a normal distribution, as shown below.



5.0%

one-year investment return

A fund manager with a one-year investment return of exactly zero had an associated z-score of $z = -1.5$

The standard deviation of one-year investment returns for fund managers is closest to

A. 3.3%

B. 5.0%

C. 6.5%

D. 7.5%

Question 8

A cafe owner uses a least squares line to predict the number of *coffees sold* in a day based on the day's average *outdoor temperature*, in degrees Celsius.

This least squares line has the equation

$$coffees\ sold = 350 - 6 \times outdoor\ temperature$$

On a day when the *outdoor temperature* is 30 °C, the predicted number of *coffees sold* is

A. 530

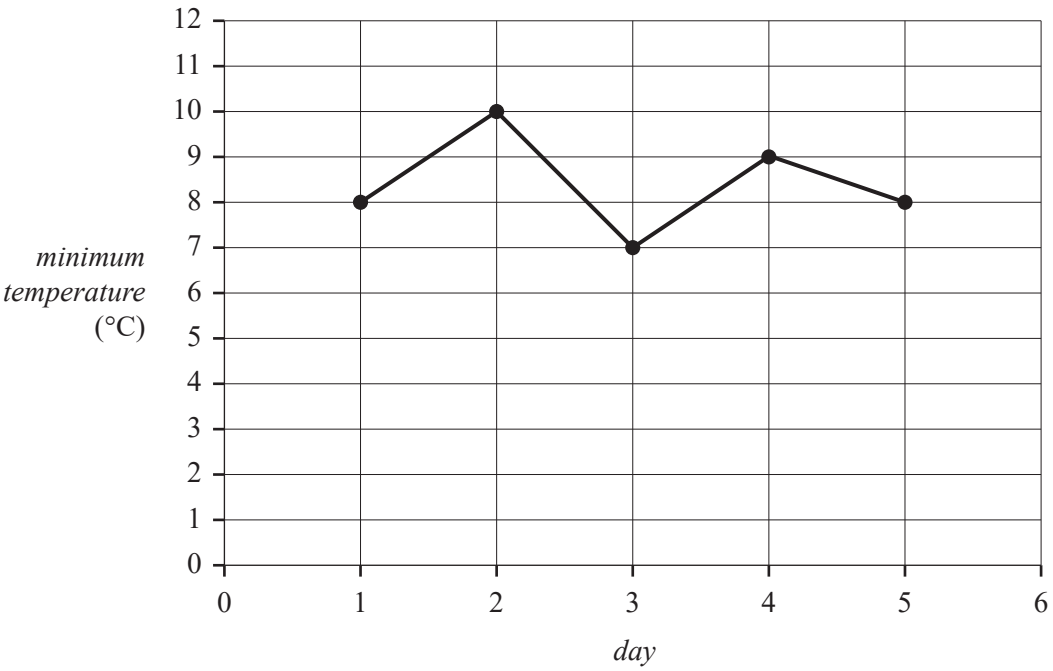
B. 350

C. 320

D. 170

Question 9

The *minimum temperature*, in degrees Celsius, is recorded as a whole number for five consecutive days. The data is shown in the graph below.



The value of Pearson's correlation coefficient, r, between *minimum temperature* and *day*, is closest to

A. –0.019

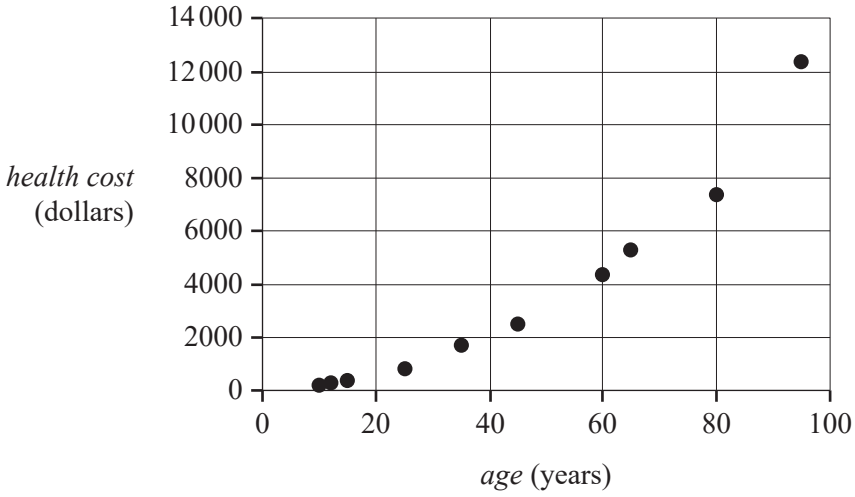
B. –0.139

C. 0.019

D. 0.039

Question 10

A graph of annual health expenditure, *health cost*, in dollars, against *age*, in years, is given below.



Which one of the following transformations would be most suitable for achieving linearity in the data?

A. $(age)^2$

B. $\log_{10}(age)$

C. $\frac{1}{age}$

D. $(health\ cost)^2$

Use the following information to answer Questions 11 and 12.

The equation of the least squares line for the relationship between the reciprocal of *completion time* for a task, in hours, and the *training time* spent in workplace training, in hours, is

$$\frac{1}{completion\ time} = 0.2 - 0.01 \times training\ time$$

Question 11

The least squares line suggests that

A. an increase in *training time* is associated with an increase in *completion time*.

B. an increase in *training time* is associated with a decrease in *completion time*.

C. an increase in *training time* causes an increase in *completion time*.

D. an increase in *training time* causes a decrease in *completion time*.

Question 12

Based on the prediction for the reciprocal of *completion time* in the least squares line above, a data point relating to a person who has spent 11.5 hours in training has an associated residual of −0.005

The *completion time*, in hours, for this person is

A. 9.5

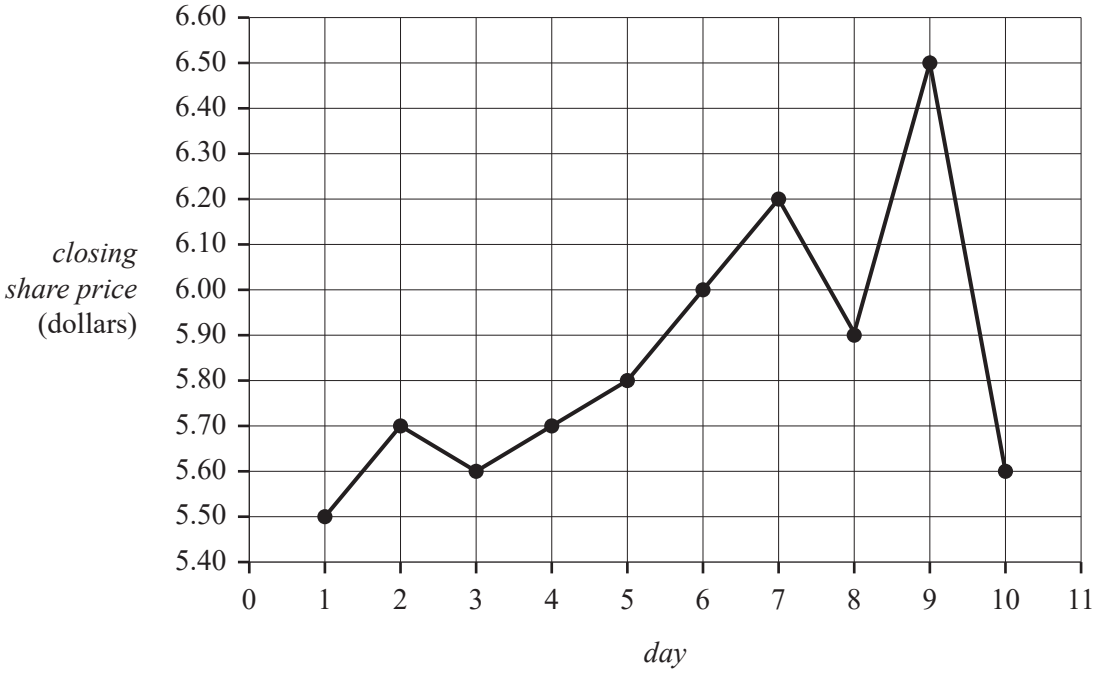
B. 10.5

C. 11.5

D. 12.5

Use the following information to answer Questions 13 and 14.

The daily *closing share price*, in dollars, for a sports clothing company over a 10-day period is shown in the graph below.



Question 13

The five-median smoothed value for *closing share price*, in dollars, on day 6 is

A. 5.80

B. 5.90

C. 6.00

D. 6.20

Question 14

The daily *closing share price* data for this company, given above, can also be smoothed using three-mean smoothing.

On which *day* is the largest smoothed value obtained?

A. 6

B. 7

C. 8

D. 9

Question 15

Deseasonalised quarterly sales, in dollars, of ice cream over a three-year period are given in the table below.

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1	141	139	146	124
2	155	163	162	161
3	196	191	182	215

Quarterly seasonal indices for the sales of ice cream are given in the table below.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Seasonal index	1.58	0.43	0.50	1.49

A least squares line is fitted to the deseasonalised quarterly sales data and is used, along with the quarterly seasonal indices, to predict the actual sales, in dollars, of ice cream in quarter 4 of year 5.

This prediction is closest to

A. 299

B. 339

C. 378

D. 401

Question 16

Seasonal indices for umbrella sales, based on five years of data, are given in the table below. The value for quarter 1 is not provided.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Seasonal index		1.05	1.20	1.25

In the first year, the actual sales of umbrellas in quarter 4 were exactly double the actual sales in quarter 1.

In the first year, what is the value of the deseasonalised umbrella sales in quarter 4 divided by the deseasonalised umbrella sales in quarter 1?

A. 0.4

B. 0.8

C. 1.25

D. 2.5

Recursion and financial modelling

Question 17

The following recurrence relation can generate a sequence of numbers.

$$T_0 = a, \qquad T_{n+1} = 2T_n + 1$$

Given that $T_2 = 15$, what is the value of a?

A. 3

B. 7

C. 31

D. 63

Question 18

Nerida invests $360 000 in a perpetuity.

The perpetuity earns interest at the rate of 6% per annum, compounding monthly.

Interest is calculated and paid monthly.

The payment received by Nerida from this investment in the fifth month is

A. $1500

B. $1800

C. $9000

D. $21 600

Question 19

Alfonso invests $2500 at an interest rate of 4% per annum, compounding annually.

How many years will it take until Alfonso has first earned a total of at least $1000 in interest?

A. 8

B. 9

C. 10

D. 12

Question 20

Vinita depreciates the value of her $10 000 home office for taxation purposes.

She uses the reducing balance method and finds that the value has exactly halved after five years.

The annual reducing balance depreciation rate used by Vinita is closest to

A. 12.5%

B. 12.7%

C. 13.0%

D. 50.0%

Question 21

Josh invests $50 000 in an investment account.

This account earns interest at the rate of 4.5% per annum, compounding quarterly.

The effective rate of interest for Josh's investment account is equal to

A. $\left[\left(1+\frac{4.5}{100}\right)^4-1\right]\times 100\%$

B. $\left[\left(1+\frac{4.5}{400}\right)^4-1\right]\times 100\%$

C. $\left[\left(1+\frac{4.5}{100}\right)^3-1\right]\times 100\%$

D. $\left[\left(1+\frac{4.5}{300}\right)^3-1\right]\times 100\%$

Question 22

Cath invests $400 000 in an annuity from which she receives a regular monthly payment of $4021.35
The interest rate for this annuity is 3.85% per annum, compounding monthly.

Within the first five months, which one of the following is **not** a monthly balance of the annuity, rounded to the nearest dollar?

A. $397 262

B. $394 515

C. $391 762

D. $388 995

Question 23

Mel invests $10 000 and earns 8% per annum simple interest.

Teresa invests $9900 and earns 10% per annum simple interest.

Both Mel and Teresa invest for n years, where n is a positive whole number.

The amount by which Teresa's balance exceeds Mel's balance after n years, D_n, is given by

A. $D_n = 9900 \times 1.1^n - 10\,000 \times 1.08^n$

B. $D_n = 9900 \times 1.1^n - 10\,000 \times 1.08^n - 100$

C. $D_n = 190n$

D. $D_n = 190n - 100$

Question 24

Pauline has a reducing balance loan with a per annum interest rate, compounding quarterly.

She makes quarterly repayments.

Let P_n be the balance of Pauline's loan after n quarters.

A recurrence relation that can model this balance from quarter to quarter is

$$P_0 = 360\,000, \qquad P_{n+1} = 1.011P_n - 6789.90$$

After five years, Pauline restructures her loan.

The new repayments are $3077.53 per month.

The new interest rate is 4.2% per annum, compounding monthly.

After the restructure, the number of monthly repayments required to fully repay the loan is

A. 97

B. 118

C. 150

D. 151

Matrices

Question 25

A restaurant is open from Wednesday to Sunday for lunch (L) and dinner (D).

Matrix A shows the number of meals served for lunch and dinner on each day last week.

$$A = \begin{array}{r} \\ W \\ Th \\ F \\ Sa \\ Su \end{array} \begin{array}{c} \begin{array}{cc} L & D \end{array} \\ \begin{bmatrix} 67 & 86 \\ 65 & 94 \\ 72 & 108 \\ 83 & 119 \\ 78 & 105 \end{bmatrix} \end{array}$$

How many meals were served for lunch on Thursday last week?

A. 65

B. 67

C. 86

D. 94

Question 26

Consider the calculation below containing matrix G.

$$\begin{bmatrix} 3 & -2 & 1 \\ 5 & 4 & 2 \end{bmatrix} + G \begin{bmatrix} -3 & 2 & 0 \\ 5 & 6 & 4 \end{bmatrix}$$

This calculation will be defined if the order of G is

A. 2×3

B. 2×2

C. 3×2

D. 3×3

Question 27

Consider matrix F below.

$$F = \begin{bmatrix} -2 & 0 & 0 \\ 1 & 0 & 2 \\ 0 & 1 & -2 \end{bmatrix}$$

T is a matrix such that FT is an identity matrix.

Which one of the following is T?

A. $\begin{bmatrix} -2 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 2 & -2 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 0 & 0 \\ -1 & 0 & -2 \\ 0 & -1 & 2 \end{bmatrix}$

C. $\begin{bmatrix} -\frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 1 & 1 \\ \frac{1}{4} & \frac{1}{2} & 0 \end{bmatrix}$

D. $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & -1 & 1 \\ -\frac{1}{4} & \frac{1}{2} & 0 \end{bmatrix}$

Question 28

Soft drinks are sold in four different sizes at a service station.

Each size has a different volume.

The table below shows the number of each size of soft drink sold in a day.

Volume (mL)	250	375	600	1250
Number	35	15	42	12

The matrix product that displays the total volume, in millilitres, and the total number of soft drinks sold, respectively, is

A. $\begin{bmatrix}35 & 15 & 42 & 12\end{bmatrix}\begin{bmatrix}250\\375\\600\\1250\end{bmatrix}$

B. $\begin{bmatrix}250\\375\\600\\1250\end{bmatrix}\begin{bmatrix}250 & 375 & 600 & 1250\\1 & 1 & 1 & 1\end{bmatrix}$

C. $\begin{bmatrix}250 & 1\\375 & 1\\600 & 1\\1250 & 1\end{bmatrix}\begin{bmatrix}35 & 15 & 42 & 12\end{bmatrix}$

D. $\begin{bmatrix}35 & 15 & 42 & 12\end{bmatrix}\begin{bmatrix}250 & 1\\375 & 1\\600 & 1\\1250 & 1\end{bmatrix}$

Question 29

A permutation matrix, P, can be used to reorder $\begin{bmatrix} L \\ I \\ S \\ T \\ E \\ N \end{bmatrix}$ to $\begin{bmatrix} S \\ I \\ L \\ E \\ N \\ T \end{bmatrix}$ with one calculation.

Matrix P is

A. $\begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$

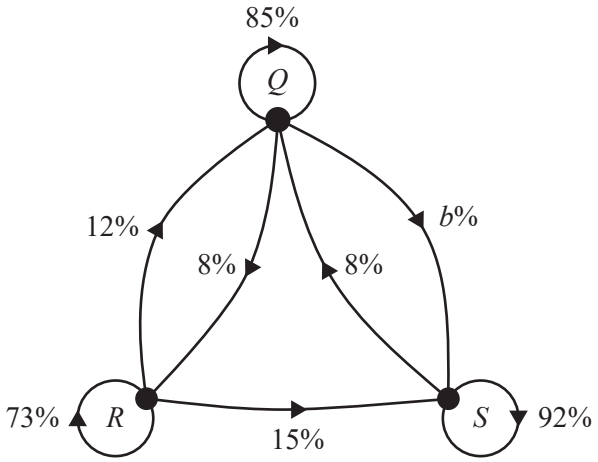
D. $\begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 \end{bmatrix}$

Question 30

Shoppers can move between three different stores, Q, R and S, from one week to the next.

The transition diagram below shows the expected percentage of shoppers who move between the stores each week.

The expected percentage of shoppers who will move from Q to S is represented by b.



There are 50 shoppers at each of the stores Q, R and S on Sunday.

How many shoppers are expected to be at store S in two weeks' time on Sunday, rounded to the nearest whole number?

A. 50

B. 57

C. 62

D. 65

Question 31

A population of birds' nests are in two different locations: the treetops (T) and the rocky area (R).

The transition matrix showing the expected movement between nesting locations from one year to the next is given below.

$$\begin{matrix} & \textit{this year} \\ & \begin{matrix} T & R \end{matrix} \\ \begin{matrix} \\ \\ \textit{next year} \end{matrix} & \begin{bmatrix} 0.18 & 0.73 \\ 0.82 & 0.27 \end{bmatrix} \begin{matrix} T \\ R \end{matrix} \end{matrix}$$

In the long run, as a percentage to the nearest whole number, which one of the following statements is true?

A. 47% of the birds are expected to nest in the rocky area.

B. 47% of the birds are expected to nest in the treetops.

C. 51% of the birds are expected to nest in the rocky area.

D. 51% of the birds are expected to nest in the treetops.

Question 32

Eight teams take part in a round-robin netball tournament.

Each team plays each of the other teams once only, and each match results in a winner and a loser.

Matrix D below shows the results of this tournament. The match results for team H have not been recorded.

$$D = winner \begin{array}{c} \\ G \\ H \\ I \\ J \\ K \\ L \\ M \\ N \end{array} \begin{array}{c} \begin{array}{cccccccc} & & & & loser & & & \\ G & H & I & J & K & L & M & N \end{array} \\ \begin{bmatrix} 0 & \_ & 1 & 1 & 0 & 1 & 0 & 0 \\ \_ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\ 0 & \_ & 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & \_ & 0 & 0 & 1 & 1 & 0 & 1 \\ 1 & \_ & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & \_ & 1 & 0 & 0 & 0 & 0 & 1 \\ 1 & \_ & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & \_ & 1 & 0 & 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

A ‘1’ in matrix D shows that the team named in that row won against the team named in that column.

For example, the ‘1’ in row G, column L shows that team G won against team L.

The one-step dominance totals, based on the results of all matches, are shown in the table below.

Team	One-step dominance total
G	4
H	5
I	3
J	3
K	2
L	2
M	5
N	4

In order to break the tie between teams H and M, a new score, equal to the sum of the one-step and two-step dominance totals, is calculated for each team.

Which one of the following statements is true?

A. Team H wins overall with a score of 18.

B. Team H wins overall with a score of 19.

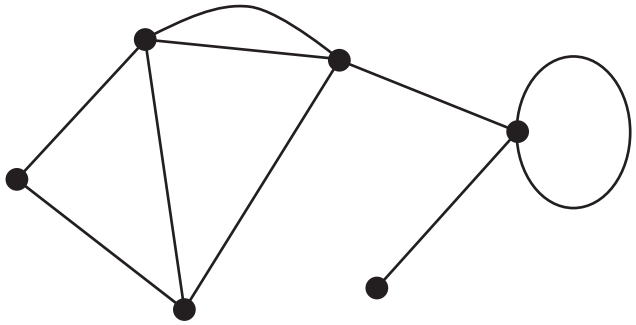
C. There is still a tie between teams H and M.

D. Team M wins overall with a score of 21.

Networks and decision mathematics

Question 33

Consider the graph below.



The number of vertices with an even degree is

A. 2

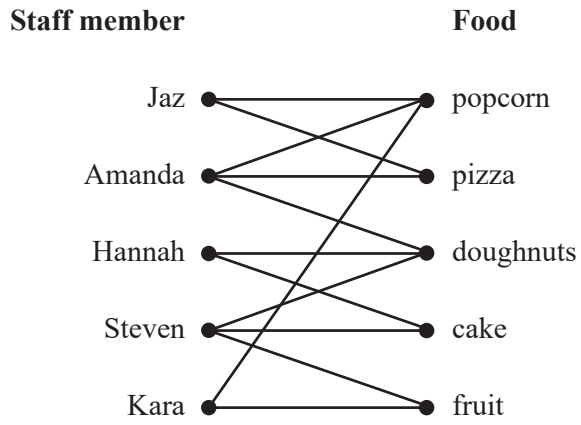
B. 3

C. 4

D. 5

Question 34

Five staff members are responsible for providing food for a morning tea. Each staff member can bring only certain foods, as indicated in the bipartite graph below.



Each staff member is to bring exactly one item. All five food items must be available at the morning tea.

Which one of the following allocations is **not** possible?

A.

Staff member	Food
Jaz	pizza
Amanda	cake
Hannah	doughnuts
Steven	fruit
Kara	popcorn

B.

Staff member	Food
Jaz	popcorn
Amanda	pizza
Hannah	cake
Steven	doughnuts
Kara	fruit

C.

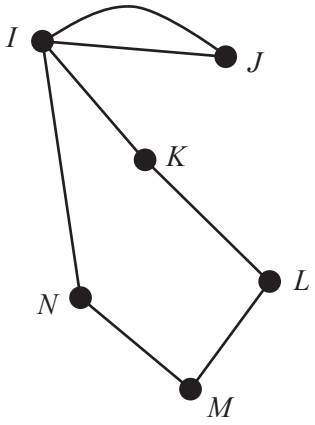
Staff member	Food
Jaz	pizza
Amanda	doughnuts
Hannah	cake
Steven	fruit
Kara	popcorn

D.

Staff member	Food
Jaz	popcorn
Amanda	pizza
Hannah	doughnuts
Steven	cake
Kara	fruit

Question 35

Consider the graph below.



Starting at vertex *J*, how many different Eulerian circuits are possible?

A. 0

B. 1

C. 3

D. 4

Question 36

A tree contains 11 vertices.

One edge is added to the tree to make a new graph.

How many faces does the resulting planar graph have?

A. 0

B. 1

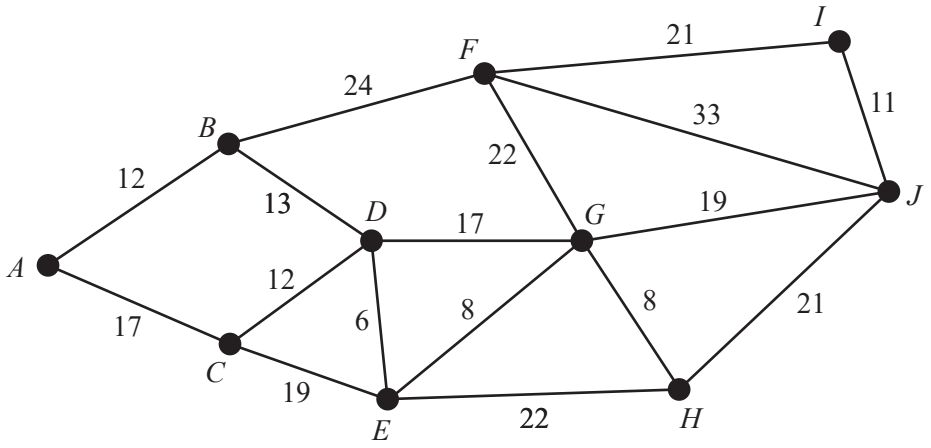
C. 2

D. 3

Question 37

The network below shows 10 towns, labelled *A* to *J*, and the roads connecting them.

The vertices represent the towns and the numbers on the edges give the travel times between the towns, in minutes.



What is the minimum travel time, in minutes, from town *C* to town *J*?

A. 42

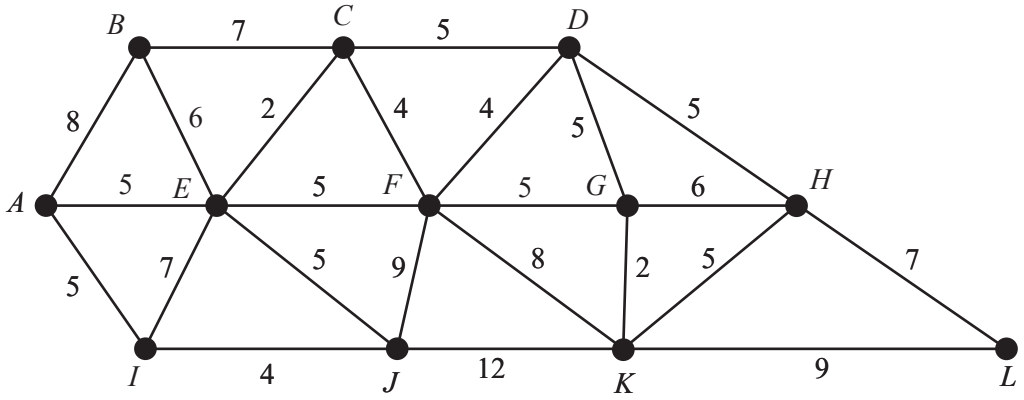
B. 45

C. 48

D. 54

Question 38

Consider the weighted graph below.



A minimum spanning tree is created for this weighted graph.

How many edges with weight 5 are **not** included in the minimum spanning tree?

A. 5

B. 6

C. 7

D. 8

Question 39

A graph consists of five vertices: Q, R, S, T and U.

An adjacency matrix for the graph is shown below.

$$\begin{array}{c} \\ Q \\ R \\ S \\ T \\ U \end{array} \begin{array}{c} \begin{array}{ccccc} Q & R & S & T & U \end{array} \\ \begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 2 & 1 & 1 \\ 1 & 2 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 2 \\ 0 & 1 & 1 & 2 & 0 \end{bmatrix} \end{array}$$

For this graph, which one of the following statements is **not** true?

A. The graph contains a Hamiltonian cycle.

B. The graph contains an Eulerian circuit.

C. The graph contains a spanning tree with four edges.

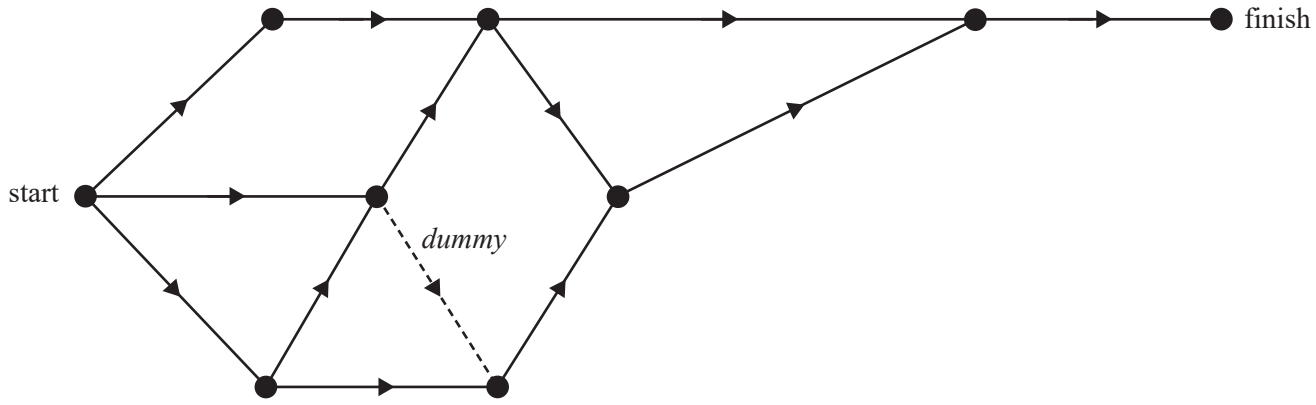
D. The graph has a loop.

Question 40

A project has 12 activities, A to L, that need to be completed.

The directed network that represents the sequence of activities required to complete this project is shown below.

The activities are not labelled.



Do not write in this area.

The activity table that could represent this project is

A.

Activity	Immediate predecessors
A	–
B	–
C	–
D	*B*
E	*A*, *F*
F	*C*
G	*C*
H	*A*, *F*, *G*
I	*D*, *F*
J	*D*, *F*
K	*H*, *I*
L	*J*, *K*

B.

Activity	Immediate predecessors
A	–
B	–
C	–
D	*A*
E	*C*, *D*
F	*B*
G	*C*
H	*B*, *E*, *G*
I	*D*, *F*
J	*D*, *F*
K	*H*, *I*
L	*J*, *K*

C.

Activity	Immediate predecessors
A	–
B	–
C	–
D	*C*
E	*B*, *D*
F	*A*
G	*C*
H	*B*, *D*, *F*
I	*F*, *G*
J	*F*, *G*
K	*H*, *I*
L	*J*, *K*

D.

Activity	Immediate predecessors
A	–
B	–
C	–
D	*A*
E	*B*, *F*
F	*C*
G	*C*
H	*B*, *F*, *G*
I	*D*, *E*
J	*D*, *E*
K	*H*, *I*
L	*J*, *K*

End of examination questions

End of examination. There are no more questions.

End of examination. There are no more questions.

2026
NHT

General Mathematics Examination 1

2026 Formula Sheet

You may keep this Formula Sheet.

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Data analysis

standardised score	$z = \frac{x - \bar{x}}{s_x}$
lower and upper fence in a boxplot	lower $\text{Q1} - 1.5 \times \text{IQR}$ upper $\text{Q3} + 1.5 \times \text{IQR}$
least squares line of best fit	$y = a + bx$, where $b = r\frac{s_y}{s_x}$ and $a = \bar{y} - b\bar{x}$
residual value	residual value = actual value – predicted value
seasonal index	$\text{seasonal index} = \frac{\text{actual figure}}{\text{deseasonalised figure}}$

Recursion and financial modelling

first-order linear recurrence relation	$u_0 = a$, $u_{n+1} = Ru_n + d$
effective rate of interest for a compound interest loan or investment	$r_{\text{effective}} = \left[\left(1 + \frac{r}{100n}\right)^n - 1\right] \times 100\%$

Matrices

determinant of a 2×2 matrix	$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}, \quad \det A = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$
inverse of a 2×2 matrix	$A^{-1} = \frac{1}{\det A} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}, \quad \text{where} \quad \det A \neq 0$
recurrence relation	$S_0 = \text{initial state}, \quad S_{n+1} = T S_n + B$
Leslie matrix recurrence relation	$S_0 = \text{initial state}, \quad S_{n+1} = L S_n$

Networks and decision mathematics

Euler's formula	$v + f = e + 2$

End of Formula Sheet