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Year 12 *Trial Exam Paper*

2018

FURTHER MATHEMATICS

Written examination 1

Reading time: 15 minutes
Writing time: 1 hour 30 minutes

STUDENT NAME:

MULTIPLE-CHOICE QUESTION BOOK

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of modules*	*Number of modules to be answered*	*Number of marks*
A – Core	24	24			24
B – Modules	32	16	4	2	16
					Total 40

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, one bound reference, one approved technology (calculator or software) and, if desired, one scientific calculator. Calculator memory DOES NOT need to be cleared. For approved computer-based CAS, full functionality may be used.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.

Materials supplied

- Question book of 35 pages
- Formula sheet.
- Answer sheet for multiple-choice questions
- Working space is provided throughout the book.

Instructions

- Write your **name** in the space provided above and on the multiple-choice answer sheet.
- Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

At the end of the examination

- You may keep this question book.

Students are NOT permitted to bring mobile phones or any other unauthorised electronic devices into the examination.

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SECTION A – CORE

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

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.

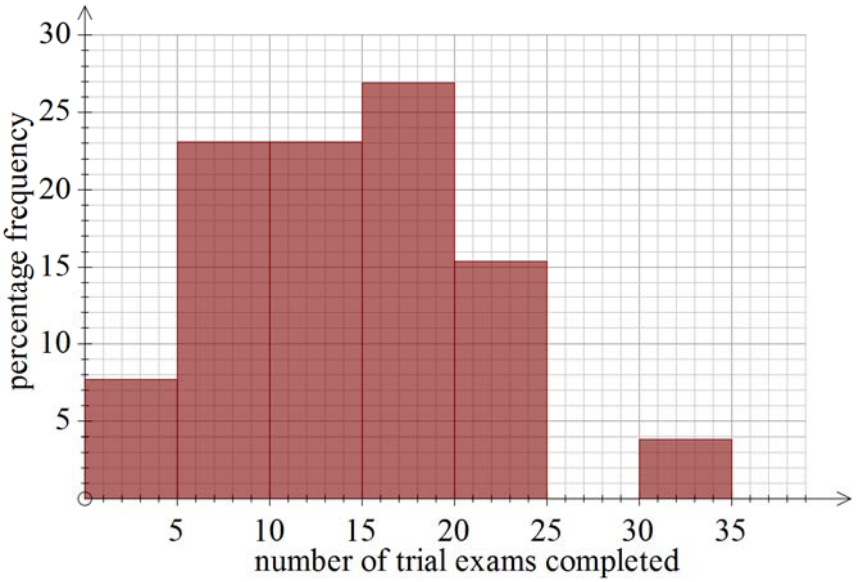
No marks will be given if more than one answer is completed for any question.

Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.

Data analysis

Question 1

The histogram below shows the *number of trial exams completed* by a class of Year 12 students in the final month before their Further Maths exam.



The median *number of trial exams* completed lies within the interval

A. 0–5

B. 5–10

C. 10–15

D. 15–20

E. 20–25

Question 2

The Year 12 teacher ran a revision session at lunchtime, once a week, leading up to the exams. The table below shows the number of students who attended the study session over an 8 week period.

Week	1	2	3	4	5	6	7	8
No. of students attending	13	15	7	12	x	16	17	21

If the mean number of students attending the study sessions is 14.0, the value of x is:

A. 3

B. 11

C. 12

D. 13

E. 14

Use the following information to answer Questions 3 and 4.

The teacher of the Year 12 students analysed the results, recorded as a total out of sixty, for the final extended-response trial exam completed by the students. He found the scores to be approximately symmetric with a mean of 43 and a standard deviation of 3.

Question 3

The percentage of students who achieved a result, out of sixty, between 37 and 52 is:

A. 2.65%

B. 68%

C. 95%

D. 97.35%

E. 99.7%

Question 4

One of the Year 12 students received a score on his final trial exam that resulted in a standardised score, z-score, of -1.3.

The score that this student achieved out of sixty, correct to the nearest whole number, was:

A. 33

B. 39

C. 41

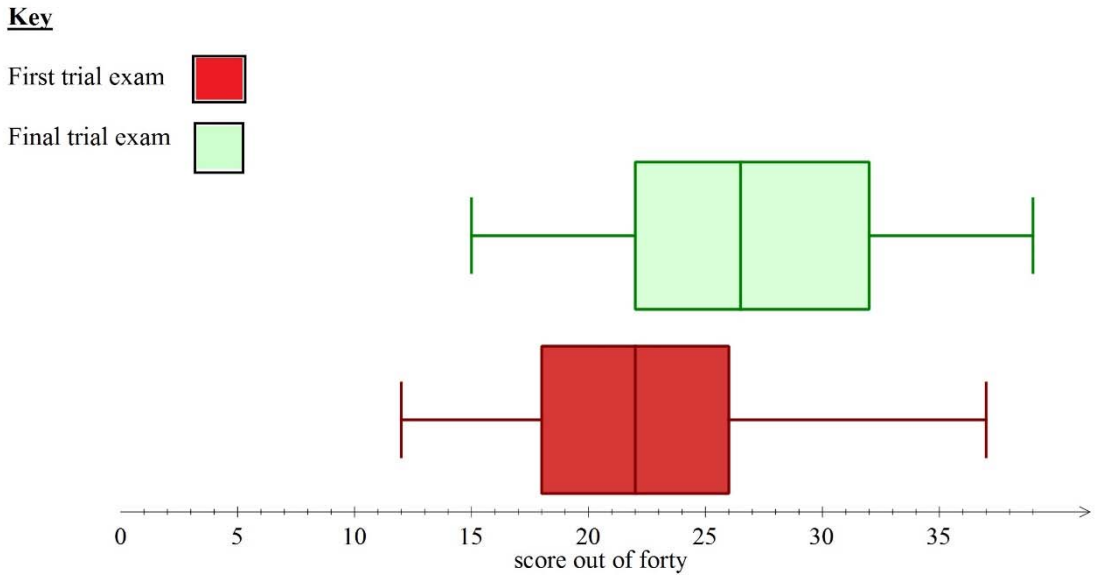
D. 47

E. 56

Use the following information to answer Questions 5–8.

The Year 12 teacher continued to perform statistical analysis on the scores of his Year 12 students. This time the teacher considered the score out of forty on the students' first multiple-choice trial exam and the score achieved on the final multiple-choice trial exam. The teacher does not give half marks for this exam.

These results are represented in the parallel boxplots below.



Question 5

The variable *score out of forty* can be classified as

A. categorical data.

B. numerical, continuous data.

C. categorical, nominal data.

D. numerical, discrete data.

E. numerical, ordinal data.

Question 6

The median *score out of forty* for the Year 12 students' first trial exam is

A. 12

B. 17

C. 22

D. 26

E. 37

Question 7

The IQR of the boxplot for the Year 12 students' final trial exam is

A. 4.5

B. 5

C. 10

D. 11.5

E. 25

Question 8

The data displayed in the parallel boxplots supports the contention that, on average, there is an improvement in the students' *score out of forty* between their first trial exam and their final trial exam because

A. the maximum score for the first trial exam is higher than the median score for the final trial exam.

B. the range of the distribution of *scores out of forty* increases from 20 for the first trial exam to 25 for the final trial exam.

C. the distribution of *scores out of forty* for the first trial exam is approximately symmetric, compared to the distribution for the final trial exam, which is positively skewed.

D. the interquartile range for the *scores out of forty* in the first trial exam is greater than that for the final trial exam.

E. the median *score out of forty* has increased from 22 in the first trial exam to 26.5 in the final trial exam.

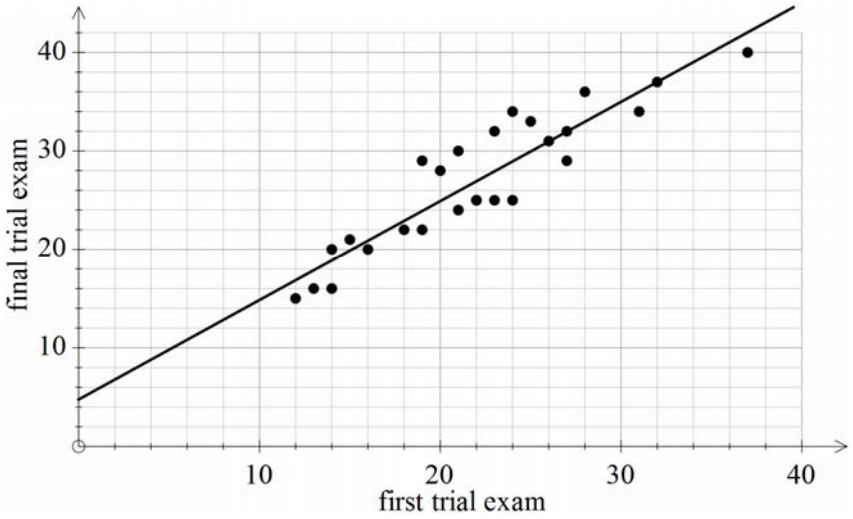
Use the following information to answer Questions 9–11.

The Year 12 teacher continued his analysis of the students' trial exams by considering whether an association exists between the students' *first trial exam* and their *final trial exam*.

In order to assist with this, the teacher recorded the data in a table as well as plotting this on a scatterplot. The value of Pearson's correlation coefficient, r, for the scatterplot is 0.916.

Both the table and scatterplot are shown below.

Student	Score on *first trial exam*	Score on *final trial exam*
1	18	22
2	12	15
3	22	25
4	13	16
5	22	25
6	14	16
7	14	20
8	21	30
9	26	31
10	20	28
11	23	25
12	37	40
13	19	22
14	19	29
15	23	32
16	15	21
17	27	32
18	24	34
19	21	24
20	27	29
21	16	20
22	28	36
23	32	37
24	24	25
25	31	34
26	25	33



Question 9

The least squares regression equation for the relationship between *first trial exam* and *final trial exam* is

A. $\textit{final trial exam} = 4.760 - 1.007 \times \textit{first trial exam}$

B. $\textit{first trial exam} = 4.760 + 1.007 \times \textit{final trial exam}$

C. $\textit{final trial exam} = 1.007 + 4.760 \times \textit{first trial exam}$

D. $\textit{final trial exam} = 4.760 + 1.007 \times \textit{first trial exam}$

E. $\textit{final trial exam} = -0.404 + 0.832 \times \textit{first trial exam}$

Question 10

Which of the following statements is **incorrect**?

A. On average, as *first trial exam* score increases by 1 mark, the *final trial exam* score decreases by 1.007 marks.

B. A student who achieved a score of 0 marks on their *first trial exam* would achieve a score of approximately 5 marks on their *final trial exam*.

C. 83.85% of the variation in *final trial exam* score can be explained by the variation in *first trial exam* score.

D. There is a strong, positive, linear relationship between *first trial exam* score and *final trial exam* score for this cohort of Year 12 students.

E. On average, as *first trial exam* score increases by 1 mark, the *final trial exam* score increases by 1.007 marks.

Question 11

The Year 12 teacher would like to draw a conclusion from the regression analysis, regarding the correlation between his students' *first trial exam* score and their *final trial exam* score.

Which of the following statements is **correct**?

A. If a student achieves a score over 20 marks for their *first trial exam*, they will always achieve a high score in their *final trial exam*.

B. A high score in the *first trial exam* will cause a student to get a high score in their *final trial exam*.

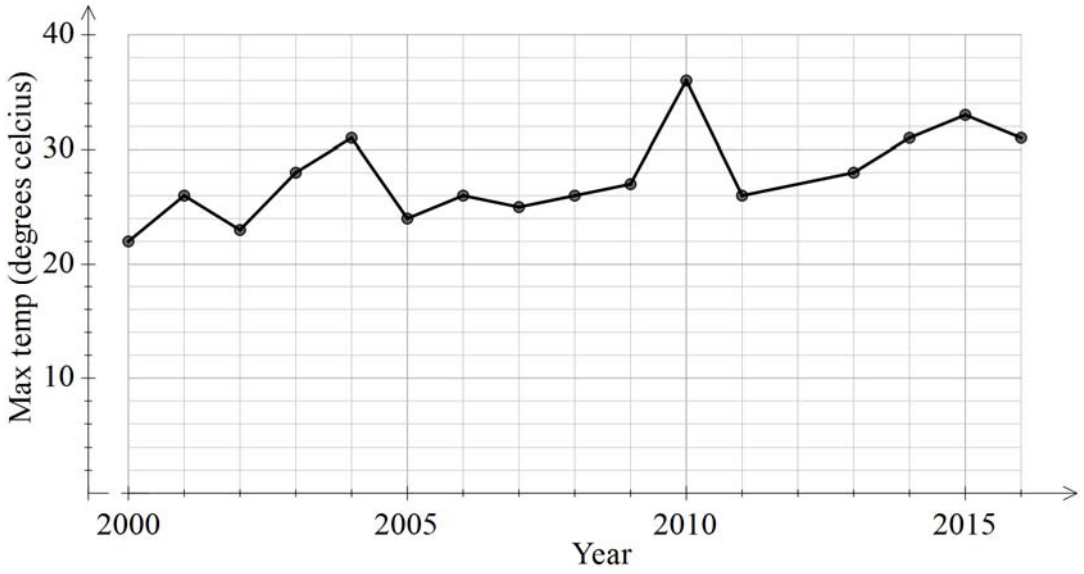
C. Students who studied a lot between exams improved their scores.

D. On average, there was always an increase in scores between *first trial exam* and *final trial exam*.

E. There is a correlation between *first trial exam* and *final trial exam*. On average, as the *first trial exam* score increased, so did the *final trial exam* score. This suggests that a student with a higher *first trial exam* score will also have a higher *final trial exam* score.

Use the following information to answer Questions 12 and 13.

The graph below shows the maximum daily temperature for October, the month leading up to the mathematics exam, between 2000 and 2016.



Question 12

The time series is best described as having

A. seasonality only.

B. irregular fluctuations only.

C. seasonality with irregular fluctuations.

D. a decreasing trend with irregular fluctuations.

E. an increasing trend with irregular fluctuations.

Question 13

The five-median smoothed value for 2011 is closest to

A. 26

B. 27

C. 28

D. 31

E. 36

Use the following information to answer Questions 14 and 15.

A student considered the average minimum temperature for each month within 2017. These are given in the table below:

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Min temp **(°C)**	28	31	26	22	18	16	15	17	23	27	30	32

Question 14

The seasonal index for the month of May, correct to two decimal places, is closest to

A. 1.80

B. 1.32

C. 1.00

D. 0.76

E. 0.69

Question 15

The four-point moving mean with centring is used to smooth the time series data. The smoothed value for August 2017 is closest to

A. 18

B. 19

C. 20

D. 21

E. 22

Question 16

The average minimum temperature was gathered for the first 10 months of 2018, in order to make predictions around the possible temperature for future Year 12 examinations.

The regression equation for the deseasonalised data for January to October 2018 is

$$\text{deseasonalised} = 25.558 - 0.027 \times \text{month}$$

where January 2018 is month 1.

The seasonal index for November is 1.26.

The average minimum temperature for November 2018 is

A. 24

B. 25

C. 30

D. 31

E. 32

Recursion and financial modelling

Question 17

Consider the following recurrence relation

$$R_0 = -1, \qquad R_{n+1} = 0.25R_n + 2$$

The first five terms of the sequence created by this relation, correct to two decimal places, are

A. 1.75, 2.44, 2.61, 2.65, 2.66

B. −1, 1.75, 2.43, 2.61, 2.65

C. −1, 1.75, 2.44, 2.60, 2.66

D. 1.75, 2.43, 2.60, 2.65, 2.66

E. −1, 1.75, 2.44, 2.61, 2.65

Question 18

A motorbike was purchased for $23 200.

After three years the motorbike has a value of $16 990.

On average, the motorbike travelled 22 500 kilometres every year during those three years.

The value of the motorbike was depreciated using a unit cost method of deprecation.

The value of the motorbike, in dollars, after n kilometres are travelled, V_n, can be modelled by the rule

A. $V_0 = 23\ 200, \qquad V_{n+1} = V_n - 0.092n$

B. $V_0 = 23\ 200, \qquad V_{n+1} = 23\ 200 - 0.092V_n$

C. $V_0 = 23\ 200, \qquad V_n = 23\ 200 - 0.092n$

D. $V_0 = 23\ 200, \qquad V_n = 23\ 200 - 6200n$

E. $V_0 = 23\ 200, \qquad V_{n+1} = 23\ 200 - 0.092n$

Use the following information for Questions 19 and 20.

Four lines of an amortisation table for a savings account with additional monthly payments of $230.00 are shown below.

The interest rate for this investment is 4.2% per annum, with interest calculated monthly.

Payment number	Payment	Interest	Principal addition	Balance of investment
32	230.00	273.83	503.83	78 740.33
33	230.00	275.59	505.59	79 245.92
34	230.00			79 753.28
35	230.00	279.14	509.14	80 262.42

Question 19

The balance of the investment after payment number 31 was closest to

A. 78 236.50

B. 78 510.33

C. 78 696.50

D. 78 740.33

E. 79 244.16

Question 20

Of the principal addition made in the line for payment 34, the percentage that was interest is closest to

A. 0.3%

B. 3%

C. 15%

D. 54%

E. 55%

Use the following information for Questions 21 and 22.

Callum borrows $425 000, in a reducing balance loan, to purchase a new home. Interest is charged at a rate of 5.85% per annum, calculated monthly, over 25 years.

Question 21

Assuming that Callum will repay his loan in 25 years, his monthly repayment will be

A. $1505.04

B. $2071.88

C. $2699.44

D. $18 098.33

E. $24 862.50

Question 22

Let V_n be the value of Callum's loan, in dollars, after *n* months.

If Callum changes his repayments to $2500 each month, a recurrence relation that models the value of V_n is

A. $V_0 = 425\,000, \quad V_{n+1} = 1.004875V_n + 2500$

B. $V_0 = 425\,000, \quad V_{n+1} = 1.0585V_n - 2500$

C. $V_0 = 425\,000, \quad V_{n+1} = 1.0585V_n + 2500$

D. $V_0 = 425\,000, \quad V_{n+1} = 0.004875V_n - 2500$

E. $V_0 = 425\,000, \quad V_{n+1} = 1.004875V_n - 2500$

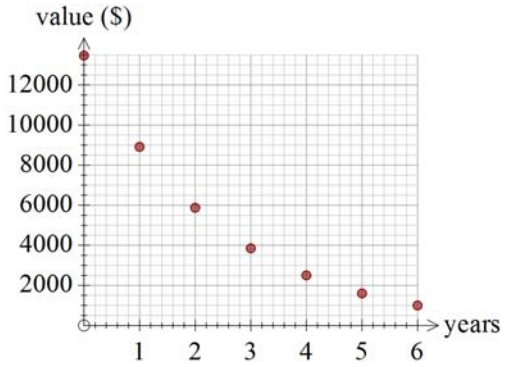
Question 23

Consider the recurrence relation

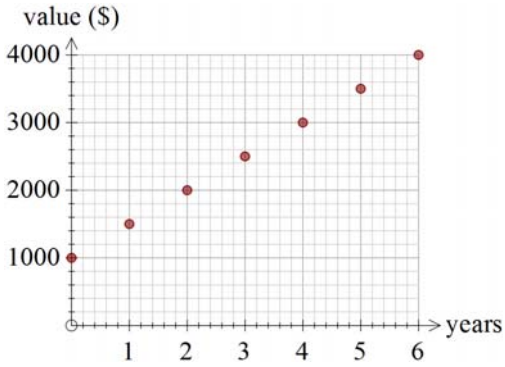
$$V_0 = 1000, \qquad V_{n+1} = 1.5V_0 + 100$$

A graph that represents the value, in dollars, after n years could be

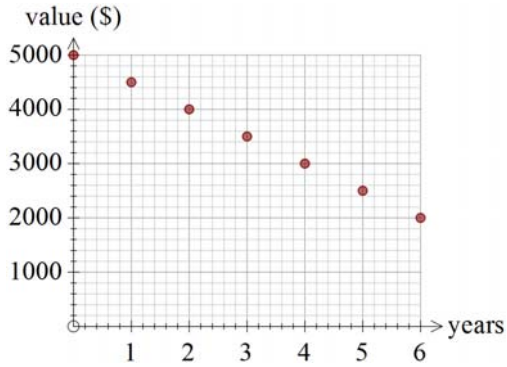
A.



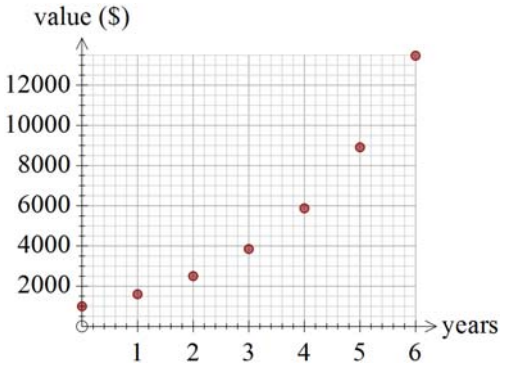
B.



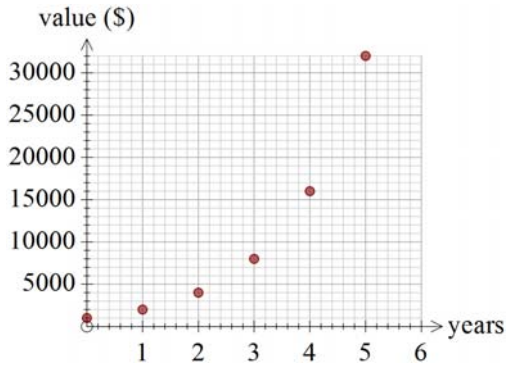
C.



D.



E.



Question 24

Jessica invested $75 000 into a bank account to save for a house. Her goal was to reach $175 000 within 10 years.

For the first 5 years of the investment, the interest rate was 2.6% per annum, compounding quarterly.

Jessica invested an additional $1000 quarterly.

After 5 years, Jessica re-evaluated her loan, and found a better savings account with an interest rate of 3.2%, compounding monthly.

For the final 5 years of Jessica's investment, in order to reach her goal of $175 000, her monthly investment will need to be

A. $4619.48

B. $1458.33

C. $1138.99

D. $1000.00

E. $767.38

END OF SECTION A

SECTION B – Modules

Instructions for Section B

Select **two** modules and answer **all** questions within the selected modules in pencil on the answer sheet provided for multiple-choice questions.

Show the modules you are answering by shading the matching boxes on your multiple-choice answer sheet **and** writing the name of the module in the box provided.

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.

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Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Contents **Page**

Module 1 – Matrices

Question 1

The matrix below shows the number of hours that a retail store is open each day (O), for a week of trading, as well as the number of customers (C) that attended the store each day. The store is closed on Sunday.

$$\begin{array}{r} \\ \text{Monday} \\ \text{Tuesday} \\ \text{Wednesday} \\ \text{Thursday} \\ \text{Friday} \\ \text{Saturday} \end{array} \begin{array}{c} \begin{array}{cc} O & C \end{array} \\ \begin{bmatrix} 8 & 2865 \\ 8 & 2254 \\ 8 & 3127 \\ 10 & 4210 \\ 10 & 4367 \\ 5 & 1789 \end{bmatrix} \end{array}$$

On Monday, assuming that the same number of customers entered the store each hour, the number of customers who entered the store in the first hour of trading was closest to

A. 8

B. 358

C. 359

D. 379

E. 380

Question 2

The following matrix represents the meat dish, beef (B), chicken (C), lamb (L), fish (F) or pork (P), that Abigail will cook on any given day for her family.

$$\begin{array}{c} \textit{tonight's meal} \\ \begin{array}{ccccc} B & C & L & F & P \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix} \end{array} \begin{array}{l} B \\ C \\ L \\ F \\ P \end{array} \quad \textit{tomorrow's meal}$$

The ‘1’ in row one, column two indicates that if Abigail has chicken one day, she will have beef the next day.

If Abigail wants to cook fish on Friday night for her family, the meat choice that she made on Monday night was

A. beef.

B. chicken.

C. lamb.

D. fish.

E. pork.

Question 3

Consider the following matrices

$$A=\begin{bmatrix}1 & 4\\ -2 & 7\end{bmatrix} \qquad B=\begin{bmatrix}2\\ -5\\ 7\end{bmatrix} \qquad C=\begin{bmatrix}-1 & 3 & 12\\ 2 & -2 & 5\\ 6 & 4 & 2\end{bmatrix} \qquad D=\begin{bmatrix}2 & 1\\ -4 & 7\end{bmatrix}$$

The number of matrices for which an inverse matrix exists is

A. 0

B. 1

C. 2

D. 3

E. 4

Question 4

The following matrix represents the prices of different sized towels for sale at a linen store.

$$\begin{bmatrix}11.95\\ 18.75\\ 22.45\\ 32.99\\ 38.25\end{bmatrix}\begin{matrix}\textit{face washer}\\ \textit{hand towel}\\ \textit{bath mat}\\ \textit{bath towel}\\ \textit{bath sheet}\end{matrix}$$

In the period leading up to Christmas, the linen store has a sale on towels.

The matrix equation below shows the discounts applied to each size of towel and the resulting 'sale price'.

$$\begin{bmatrix}a & 0 & 0 & 0 & 0\\ 0 & b & 0 & 0 & 0\\ 0 & 0 & c & 0 & 0\\ 0 & 0 & 0 & d & 0\\ 0 & 0 & 0 & 0 & e\end{bmatrix}\begin{bmatrix}11.95\\ 18.75\\ 22.45\\ 32.99\\ 38.25\end{bmatrix}=\begin{bmatrix}10.40\\ 16.50\\ 17.51\\ 24.74\\ 26.78\end{bmatrix}\begin{matrix}\textit{face washer}\\ \textit{hand towel}\\ \textit{bath mat}\\ \textit{bath towel}\\ \textit{bath sheet}\end{matrix}$$

The value of c in the matrix equation above is closest to

A. 0

B. 0.22

C. 0.78

D. 1.00

E. 1.28

Question 5

Matrix G is a 3×2 matrix.

The element in row i and column j of matrix G is $g_{i,j}$, where $g_{i,j} = -2i + j$

The matrix $2G$ is

A. $\begin{bmatrix} -1 & 0 \\ -3 & -2 \\ -5 & -4 \end{bmatrix}$

B. $\begin{bmatrix} -2 & 0 \\ -6 & -4 \\ -10 & -8 \end{bmatrix}$

C. $\begin{bmatrix} 11 & 12 \\ 21 & 22 \\ 31 & 32 \end{bmatrix}$

D. $\begin{bmatrix} -2 & -6 & -10 \\ 0 & -4 & -8 \end{bmatrix}$

E. $\begin{bmatrix} -4 & -6 \\ -6 & -8 \\ -8 & -10 \end{bmatrix}$

Use the following information to answer Questions 6 and 7.

A local veterinary clinic runs a dog training school. The school caters for four age groups – puppies (P), juniors (J), young adults (Y) and adults (A). Training school starts in August and concludes in November.

The number of dogs enrolled in each training group in August 2017 is shown in the matrix below.

$$A_{2017} = \begin{bmatrix} 25 \\ 17 \\ 21 \\ 14 \\ 0 \end{bmatrix} \begin{matrix} P \\ J \\ Y \\ A \\ L \end{matrix}$$

At the end of each November, the trainers decide whether the dog can proceed to the next level. Some dogs are required to repeat a class. Some owners decide not to continue with training and leave the program (L).

The transition matrix, T, representing the progression of dogs through the training program is shown below.

$$T = \begin{matrix} \\ P \\ J \\ Y \\ A \\ L \end{matrix} \begin{matrix} \begin{matrix} P & J & Y & A & L \end{matrix} \\ \begin{bmatrix} 0.16 & 0 & 0 & 0 & 0 \\ 0.68 & 0.09 & 0 & 0 & 0 \\ 0 & 0.76 & 0.21 & 0 & 0 \\ 0 & 0 & 0.68 & 0.12 & 0 \\ 0.16 & 0.15 & 0.11 & 0.88 & 1 \end{bmatrix} \end{matrix}$$

Question 6

The number of dogs who will be enrolled in the adult (A) class for August 2019 is closest to

A. 13

B. 14

C. 15

D. 16

E. 17

Question 7

In order to maintain the same number of dogs enrolled in each training program every year, the number of new puppy (P) enrolments required each year is

A. 0

B. 4

C. 21

D. 24

E. 25

Question 8

If $\begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix} + R \times \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 4 & 7 \\ -1 & 3 \end{bmatrix}$, then the matrix R will be

A. $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$

B. $\begin{bmatrix} 11 & 19 \\ 4 & 7 \end{bmatrix}$

C. $\begin{bmatrix} -1 & -4 \\ 1 & 3 \end{bmatrix}$

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

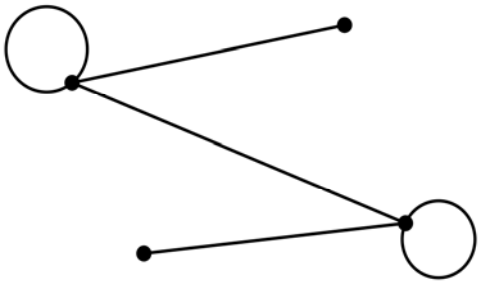
E. $\begin{bmatrix} 3 & 4 \\ -1 & -1 \end{bmatrix}$

Module 2 – Networks and decision mathematics

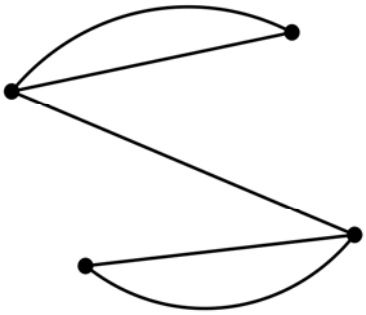
Question 1

Which of the following network diagrams represents a simple graph?

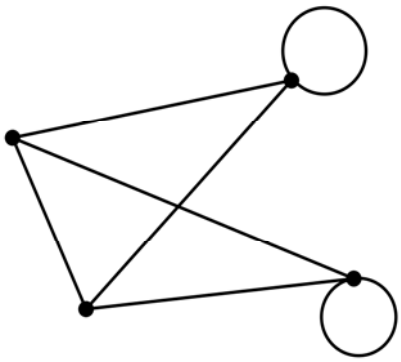
A.



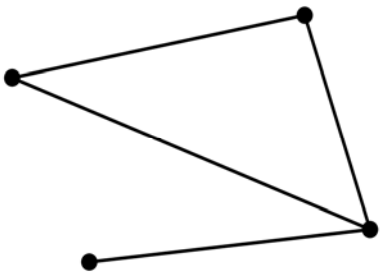
B.



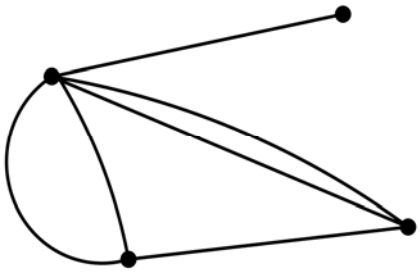
C.



D.

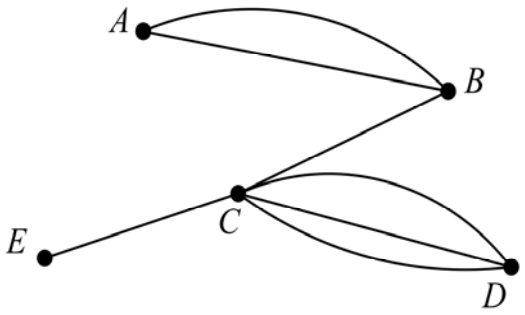


E.



Question 2

Consider the following graph



The adjacency matrix for this graph is

A.

	A	B	C	D	E
A	0	2	0	0	0
B	2	0	1	0	0
C	0	1	1	3	1
D	0	0	3	0	0
E	0	0	1	0	0

B.

	A	B	C	D	E
A	0	1	0	0	0
B	1	0	1	0	0
C	0	1	0	1	1
D	0	0	1	0	0
E	0	0	1	0	0

C.

	A	B	C	D	E
A	1	2	0	0	0
B	2	1	1	0	0
C	0	1	1	3	1
D	0	0	3	1	0
E	0	0	1	0	1

D.

	A	B	C	D	E
A	0	2	0	0	0
B	2	0	1	0	0
C	0	1	0	3	1
D	0	0	3	0	0
E	0	0	1	0	0

E.

	A	B	C	D	E
A	0	2	0	0	0
B	2	0	1	0	0
C	0	1	0	3	1
D	0	0	3	0	0
E	0	0	0	0	0

Question 3

For a planar graph with 21 edges and 17 faces the number of vertices will be

A. 21

B. 17

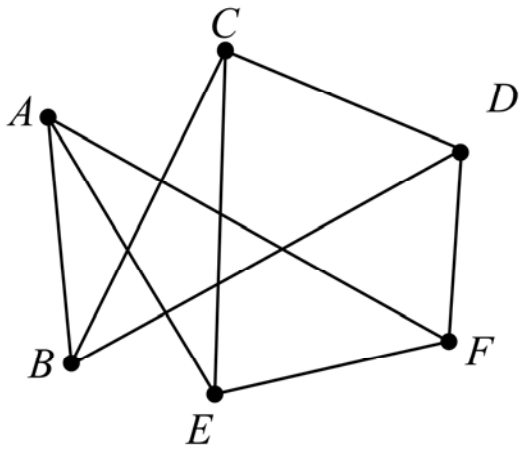
C. 6

D. 4

E. 2

Question 4

Consider the following graph



The Hamiltonian cycle for this graph is

A. $A - C - D - F - E - B - A$

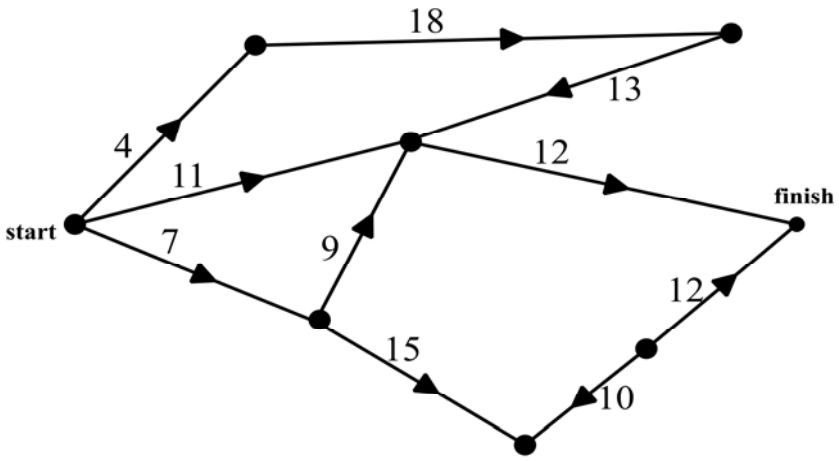
B. $A - B - C - D - E - F - A$

C. $A - F - D - C - E - B - A$

D. $A - F - E - C - D - B - A$

E. $A - E - F - D - B - C - A$

Question 5



The maximum flow through this network is

A. 12

B. 19

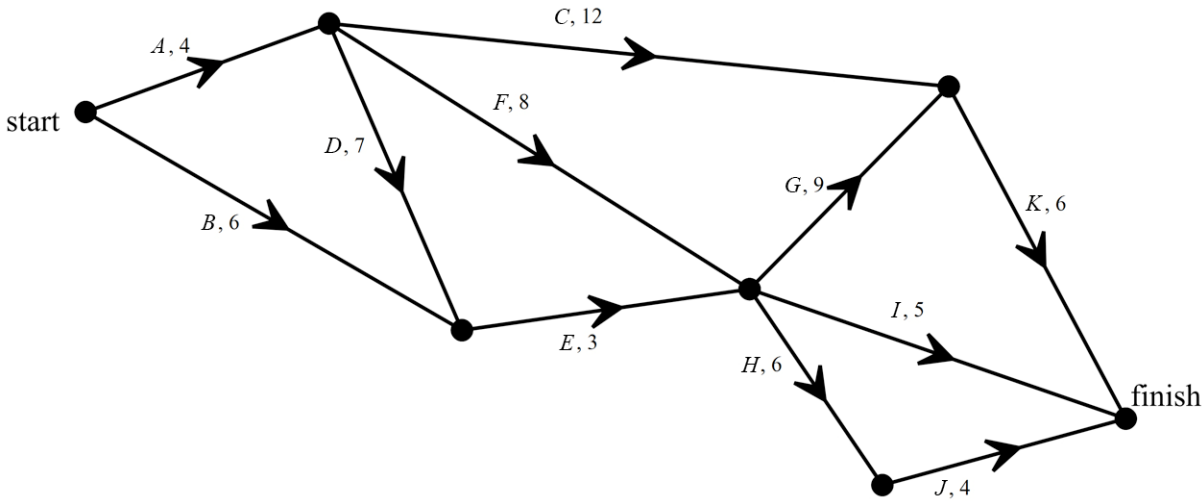
C. 22

D. 33

E. 34

Use the following information to answer Questions 6–8.

The directed graph below shows the sequence of activities required to complete a project. The time to complete each activity, in days, is also shown.



Question 6

The latest starting time, in days, for activity *G* is

A. 9

B. 12

C. 14

D. 19

E. 24

Question 7

The minimum completion time, in days, for the project is

A. 17

B. 19

C. 22

D. 27

E. 29

Question 8

The activity with the greatest float time is

A. Activity *B*

B. Activity *C*

C. Activity *H*

D. Activity *I*

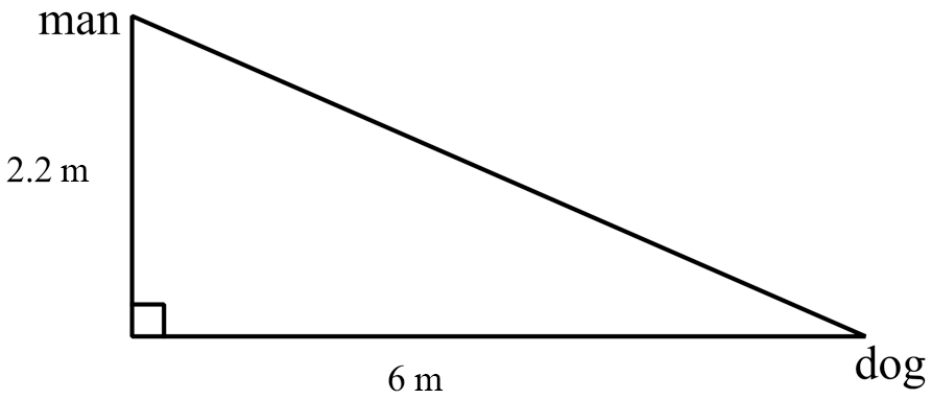
E. Activity *J*

Module 3 – Geometry and measurement

Question 1

A tradesman lying on the roof of a house, which stands 2.2 metres from the ground, looks down at his pet dog, positioned 6 metres away from where the man is lying.

This is represented by the triangle below.



The angle of depression from the man looking at his dog is

A. 20°

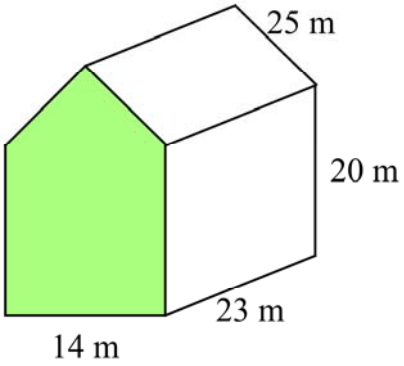
B. 21°

C. 68°

D. 69°

E. 70°

Question 2



The volume of the solid shown above is closest to

A. 2728 m^3

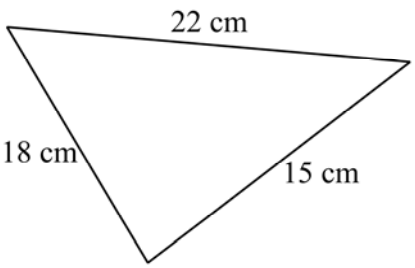
B. 10 304 m^3

C. 10 665 m^3

D. 11 514 m^3

E. 161 000 m^3

Question 3



The area of the triangle above, to the nearest square centimetre, is

A. 8 cm^2

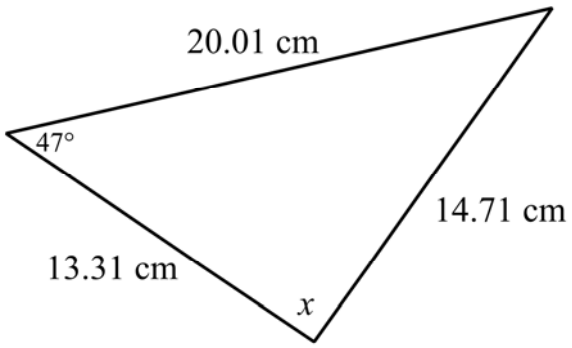
B. 60 cm^2

C. 61 cm^2

D. 134 cm^2

E. 135 cm^2

Question 4



The value of x, to the nearest degree, is

A. 86°

B. 84°

C. 41°

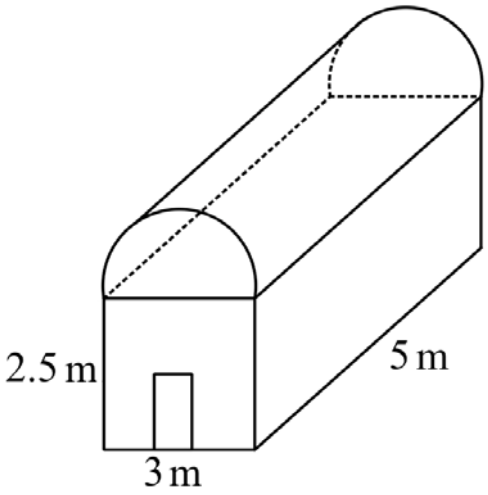
D. 33°

E. 29°

Question 5

The greenhouse shown below is to be built using shade cloth.

It has a rectangular wooden door of dimensions 1.2 m × 0.5 m.



The total area of shade cloth needed to complete the greenhouse is closest to

A. 82.25 m^2

B. 81.65 m^2

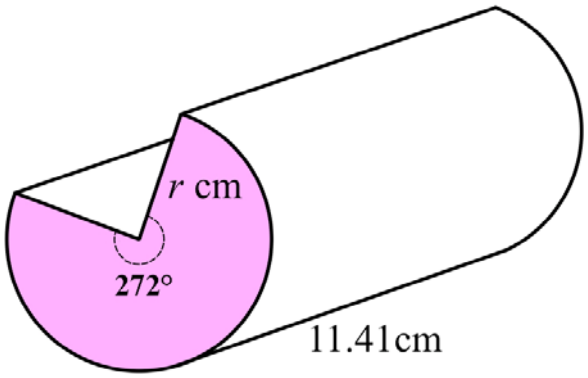
C. 101.26 m^2

D. 100.66 m^2

E. 70.03 m^2

Question 6

The volume of the following shape is 169 cm^3.



The value of r, the radius of the circle, is closest to

A. 8.4 cm

B. 5.3 cm

C. 4.4 cm

D. 4.3 cm

E. 2.5 cm

Question 7

All towns in the state of Victoria are in the same time zone.

Echuca (36°S,148°E) and Kerang (36°S,144°E) are two inland towns in the state.

One day in December, the sun sets in Kerang at 8:42 p.m.

Assuming that $15°$ of longitude equates to a one-hour time difference, the time that sun would be expected to set in Echuca is

A. 8:26 p.m.

B. 8:27 p.m.

C. 8:42 p.m.

D. 8:57 p.m.

E. 8:58 p.m.

Question 8

Bianca lives in Sydney, NSW (34°S,151°E) and her best friend lives in Gladstone, Qld (24°S,151°E).

The angle at the centre of the Earth between Sydney and Gladstone is

A. 0°

B. 10°

C. 58°

D. 90°

E. 122°

Module 4 – Graphs and relations

Question 1

The points (–2, 7) and (1, 6) lie on the same line.

The gradient of the line is

A. $\frac{1}{3}$

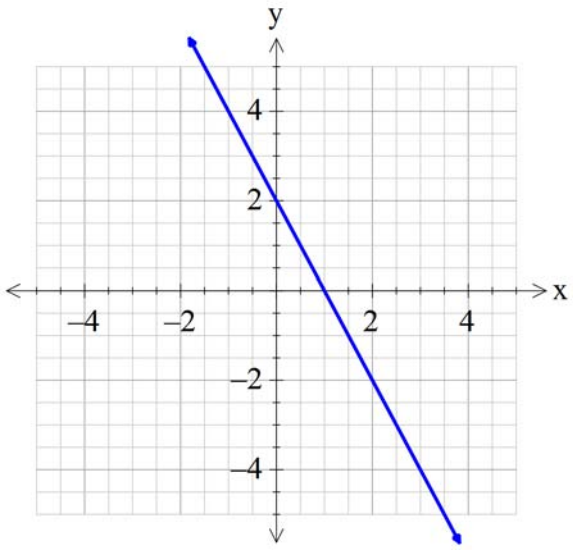
B. 3

C. –3

D. $-\frac{1}{3}$

E. –1

Question 2



The equation of the graph above is

A. $y = 2x + 2$

B. $y = -2x - 2$

C. $y = -2x$

D. $y = 2x - 2$

E. $y = -2x + 2$

Question 3

Which of the following points lies on the line $y = \frac{1}{2}x - 3$?

A. $(1, \frac{5}{2})$

B. $(2, -2)$

C. $(3, 2)$

D. $(4, 1)$

E. $(5, \frac{1}{2})$

Question 4

The Jones family take their children to a water park over summer. Their family consists of 2 adults and 3 children. The total cost of their entrance was $74.60.

The Baxter family also take their family to the water park. They had 3 adults and 4 children on the day. The entrance cost, in total, was $105.70.

The cost of entrance for a child was

A. $12.40

B. $14.92

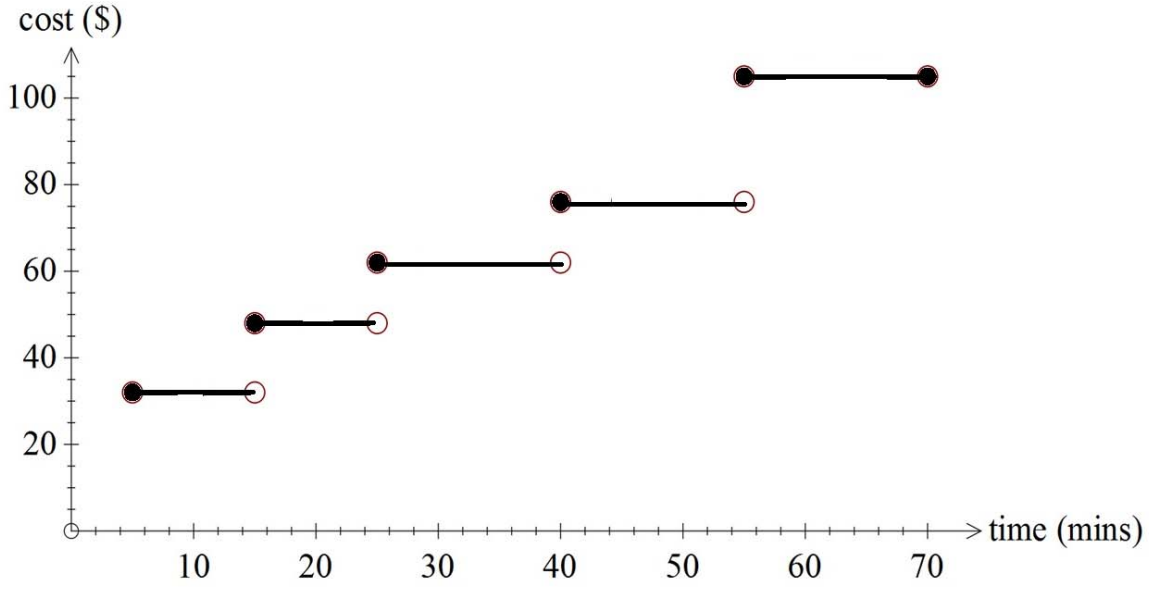
C. $15.55

D. $18.70

E. $24.85

Question 5

The following graph represents the charges for a doctor's consultation, based on the length of the visit



The cost of attending a doctor's consultation for 45 minutes is approximately

A. $32

B. $48

C. $62

D. $76

E. $105

Question 6

Consider the equality: $2x \leq y$

Which of the following statements is correct in relation to the inequality?

A. x is always twice y

B. x is greater than or equal to twice y

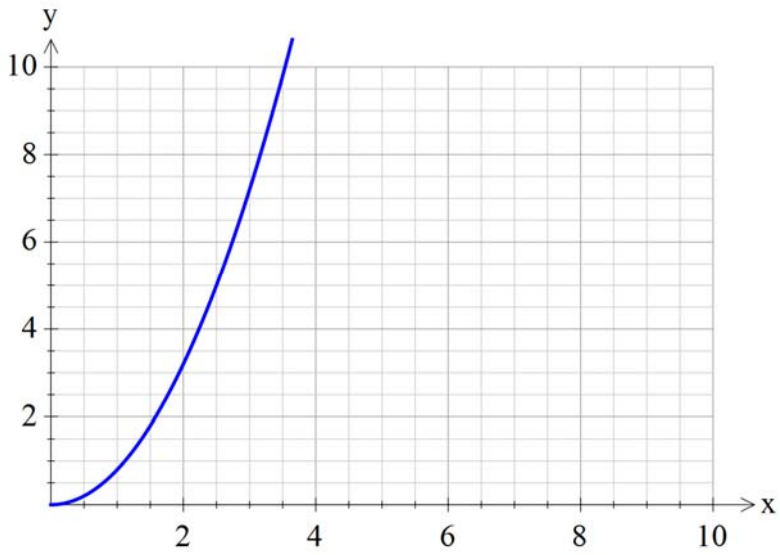
C. x is less than or equal to twice y

D. y is greater than or equal to twice x

E. y is less than or equal to twice x

Question 7

The graph of $y = kx^2$ is shown below.



The value of k in the equation is closest to

A. 0

B. 0.2

C. 0.4

D. 0.6

E. 0.8

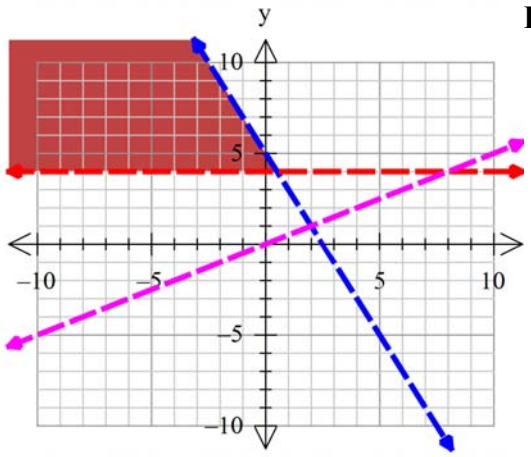
Question 8

For the inequalities

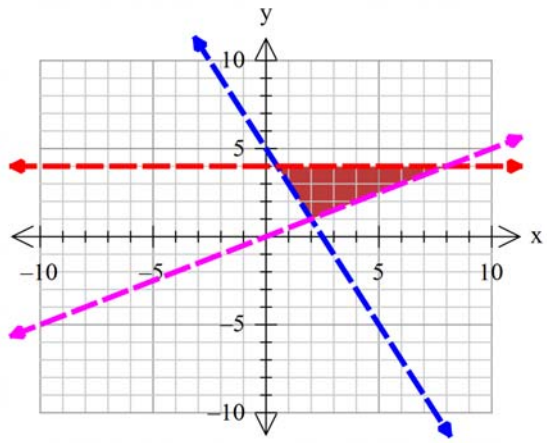
$$2x + y \leq 5$$
$$y > 4$$
$$x < 2y$$

the graph is

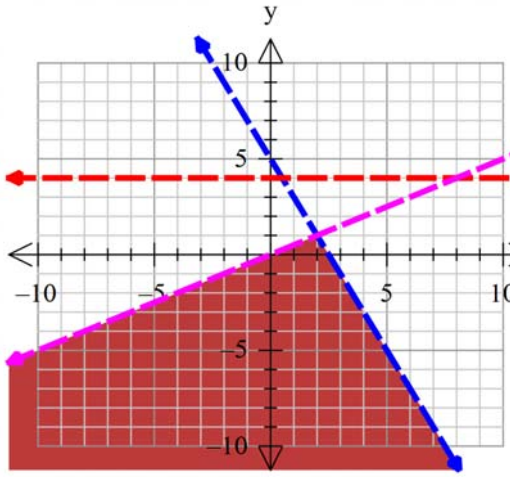
A.



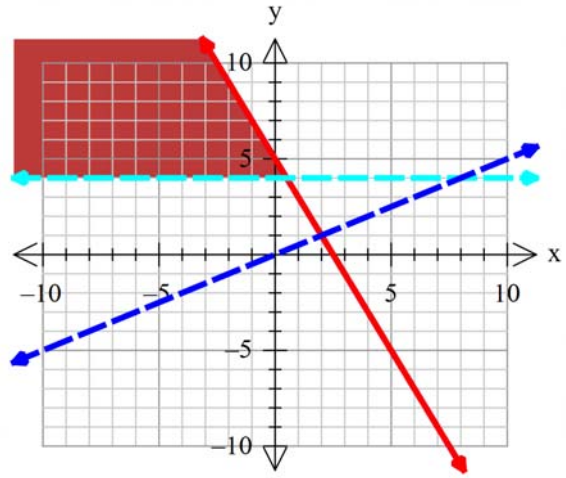
B.



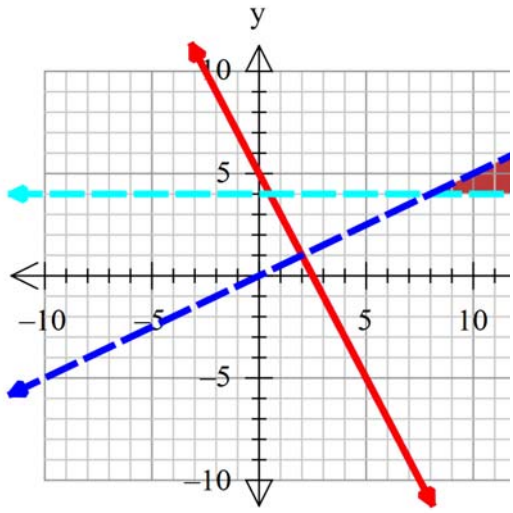
C.



D.



E.



END OF QUESTION AND ANSWER BOOK