The Mathematical Association of Victoria

FURTHER MATHEMATICS

Trial written examination 1
(Facts, skills and applications)

2005

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

Student's 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	13	13			13
B	45	27	5	3	27
					Total 40

Students are NOT permitted to bring mobile phones and/or any other electronic communication devices into the examination room.

These questions have been written and published to assist students in their preparations for the 2005 Further Mathematics Examination 1. The questions and associated answers and solutions do not necessarily reflect the views of the Victorian Curriculum and Assessment Authority. The Association gratefully acknowledges the permission of the Authority to reproduce the formula sheet.

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MULTIPLE CHOICE ANSWER SHEET

Student Name: _____

Circle the letter that corresponds to each correct answer.

Section A	Section B		
Compulsory	Answer three different modules. Show each module selected by ticking the appropriate box.		
	Module: ❑ Number patterns ❑ Geometry and trigonometry ❑ Graphs and relations ❑ Business related mathematics ❑ Networks and decision mathematics	Module: ❑ Number patterns ❑ Geometry and trigonometry ❑ Graphs and relations ❑ Business related mathematics ❑ Networks and decision mathematics	Module: ❑ Number patterns ❑ Geometry and trigonometry ❑ Graphs and relations ❑ Business related mathematics ❑ Networks and decision mathematics
1. A B C D E	1. A B C D E	1. A B C D E	1. A B C D E
2. A B C D E	2. A B C D E	2. A B C D E	2. A B C D E
3. A B C D E	3. A B C D E	3. A B C D E	3. A B C D E
4. A B C D E	4. A B C D E	4. A B C D E	4. A B C D E
5. A B C D E	5. A B C D E	5. A B C D E	5. A B C D E
6. A B C D E	6. A B C D E	6. A B C D E	6. A B C D E
7. A B C D E	7. A B C D E	7. A B C D E	7. A B C D E
8. A B C D E	8. A B C D E	8. A B C D E	8. A B C D E
9. A B C D E	9. A B C D E	9. A B C D E	9. A B C D E
10. A B C D E			
11. A B C D E			
12. A B C D E			
13. A B C D E			

Working Space

SECTION A

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.

Core

Question 1

The results of a mathematics test marked out of 60 are represented by this stem-and-leaf plot.

Stem	Leaf						
0	8						
1	8	9					
2	2	7	8				
3	0	1	3	6	9		
4	2	4	5	5	6	7	9
5	4	7	8	8	9	9	
6	0	0	0				

4.3 = 43 out of 60 marks

The mean, median and mode, respectively, are

A 60, 42, 49
B 40, 45, 60
C 46, 60, 40
D 42, 45, 60
E 60, 45, 42

Question 2

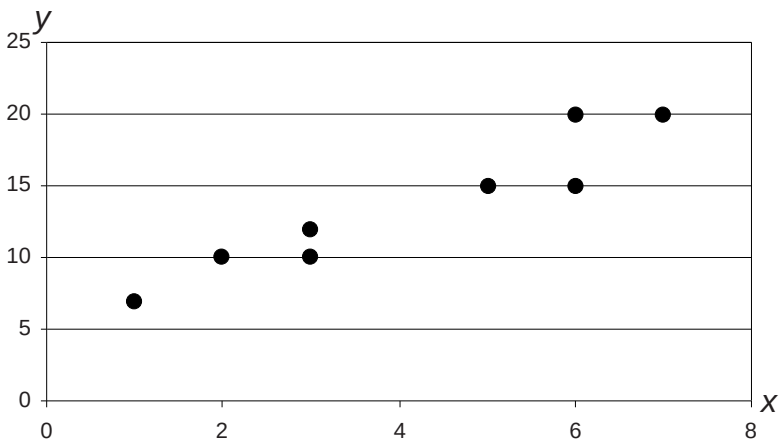
The standard deviation for the following set of data is (to one decimal place)

52, 67, 43, 52, 67, 42, 58, 59, 55, 65

A 8.6
B 9.0
C 9.03
D 10.0
E 25.0

Question 3

Consider the graph at the right.



The gradient of the 3-median regression line is

A 3.0
B 2.5
C 5
D 4.5
E 4.0

Question 4

The lifetime (in hours) of particular bacteria is known to have a bell-shaped distribution. A large sample was found to have a mean lifetime of 12 hours and a standard deviation of 0.1 hours. We would expect that about 95% of the bacteria in the sample would have a lifetime (in hours) between

A 0.1 and 12

B 11.7 and 12.3

C 11.8 and 12.2

D 12 and 12.1

E 11.9 and 12.1

Question 5

Which one of the following pairs of variables **could not** be displayed on a back-to-back stem plot?

A Number of countries visited and whether you're an Australian citizen or not.

B Best bench press weight and sex of gymnast.

C Intelligence quotient and dexterity of university students (left handed or right handed).

D Golf score and sex of golfer.

E Best bench press weight and age of gymnast..

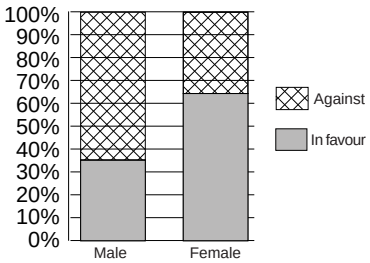
Question 6

Data showing the opinions of male and female students on the new school uniform are given in the following two-way frequency table.

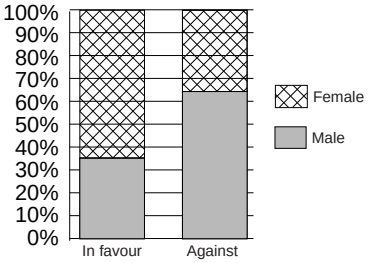
	Male	Female
In favour of change	123	230
Against change	452	255
Total	575	485

The correct stacked bar chart for the above table is

A



B



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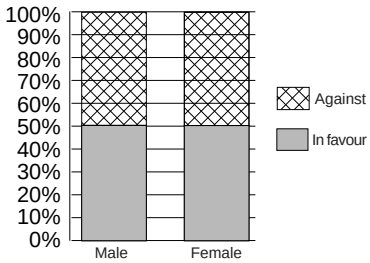
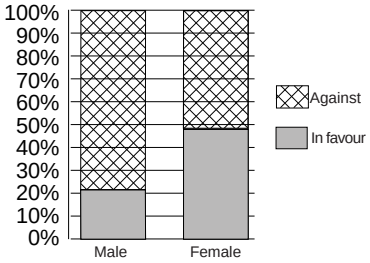
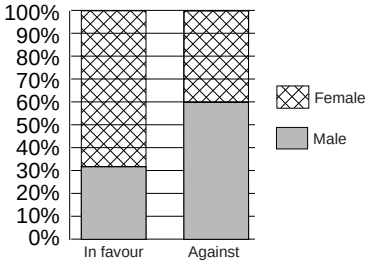


D



E



Question 7

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

A Mean and median cannot be used on categorical data.

B Mean is the best measure of central tendency for normal distributions.

C Median is a good measure of central tendency for skewed distributions.

D Median is affected by outliers.

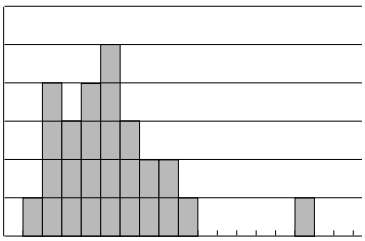
E Mean is affected by outliers.

Question 8

For the data provided the most likely histogram would be

2 5 4 2 7 8 3 2 5 3 6 5 4 6 15 7 8 9 3 1 2 5 4 4 6 5

A



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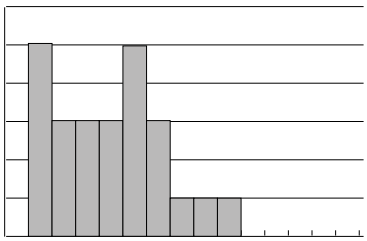

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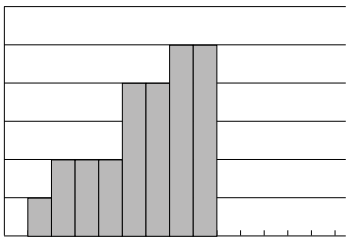
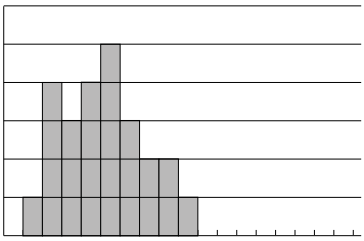
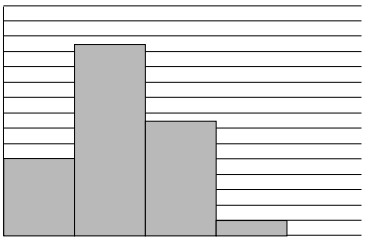


D



E



Question 9

The following incomplete list of seasonal indices was obtained from a time series.

Season	Spring	Summer	Autumn	Winter
Index		0.78		0.92

If the value of the spring and autumn seasonal indices are the same then the value of the spring index is:

A 0.85 **B** 1.15 **C** 1.30 **D** 2.30 **E** not known from information given.

Question 10

The temperature in a green house is measured daily (see figure at right).

This is probably a …… trend.

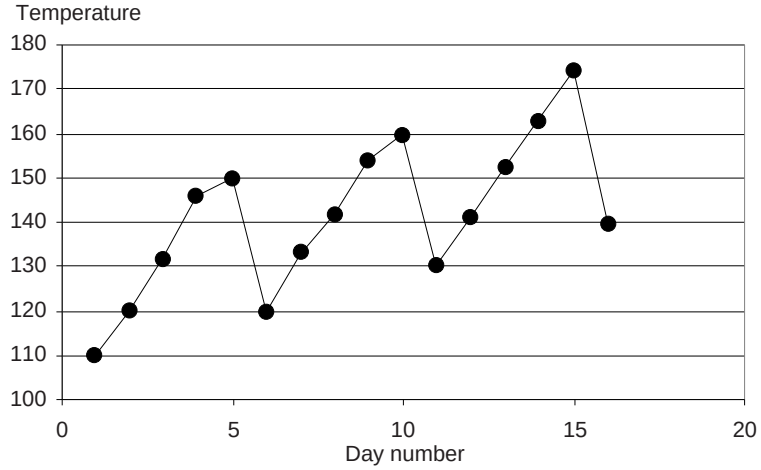
A cyclic

B seasonal

C random

D increasing

E seasonal and increasing



Question 11

Consider the table.

t	2	4	6	8	10	12	14	16
Temperature	36.5	37.2	36.9	37.1	37.0	37.5	37.5	37.8

The 3-point median smooth prediction for $t = 10$ is

A 37.0
B 37.1
C 37.2
D 37.3
E 37.5

Question 12

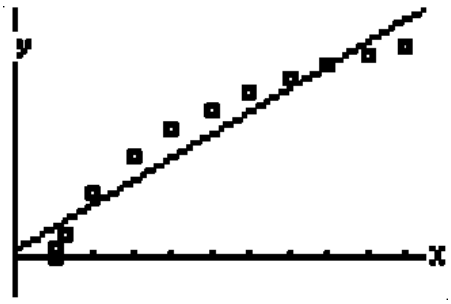
A line of best fit for deseasonalised data was given as

Deseasonalised Monthly sales = 1200 × *timecode* + 10000 where for June 2005, $t = 1$

Predict the actual expected sales figures for June 2006 if the June seasonal index is 0.8.

A. $11 200 **B**. $19 520 **C**. $20 480 **D**. $25 600 **E**. $32 000

Question 13



The most appropriate transformation for the above data displayed as a scatterplot on a graphics calculator is

A y vs x^2 or y^2 vs x
B y vs $\log x$ or y^2 vs x
C $\frac{1}{y}$ vs x or y^2 vs x
D $\log y$ vs x or y^2 vs x
E y vs $\log x$ or y vs x^2

END OF SECTION A
TURN OVER

Working Space

SECTION B

Instructions for Section B

Select **three** modules and answer **all** questions within the modules selected with 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.

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.

Module 1: Number patterns and applications

Before answering these questions, you must **shade** the Number patterns and applications box on the answer sheet for multiple-choice questions.

Question 1

The first three terms of a geometric sequence are 1, 1.5 and 2.25. The fourth term in this sequence is

A. 2.75
B. 3
C. 3.375
D. 3.75
E. 4.5

Question 2

The sum of the first ten terms of the sequence 5, 10, 15, 20,……is

A. 95
B. 275
C. 300
D. 550
E. 600

Question 3

For the sequence 41, 38, 35, 32, ……. The first term that will be negative will be term

A. 11
B. 12
C. 13
D. 14
E. 15

Question 4

For an arithmetic sequence the fourth term is 9 and the eighth term is –11.

The first term of this sequence is

A. –5
B. –6
C. 5
D. 24
E. 29

The following information relates to Questions 5 and 6.

A sequence of terms is defined by the difference equation: $t_{n+1} = 2t_n - 1; t_1 = 3$

Question 5

The fourth term of the sequence will be

A. 2
B. 9
C. 17
D. 25
E. 31

Question 6

The n^{th} term of this sequence, in terms of n, is given by

A. $t_n = 3 + (n - 1) \times 2$

B. $t_n = 3 \times 2^{n-1}$

C. $t_n = 2n + 1$

D. $t_n = 2^n + 1$

E. $t_n = 2n^2 + 1$

Question 7

In an aerobics class the ratio of males to females is 2 : 3. If two more males join the class then the ratio of males to females changes to 3 : 4.

The number of people in the class before the addition of the two new males could be

A. 25

B. 30

C. 35

D. 40

E. 45

Question 8

The sum to infinity of the sequence whose terms are defined by the rule

$t_n = 4.5 \times (0.4)^n$ is

A. 3

B. 4.5

C. 6.75

D. 7.5

E. 11.25

Question 9

Which one of the following rules will produce a geometric sequence with **positive**, **increasing** terms?

A. $t_n = 2n + 3$; $n = 1,\ 2,\ 3. \ldots$

B. $t_{n+1} = 0.9t_n$; $t_1 = 100$

C. $t_n = 1 - \left(\frac{1}{2}\right)^n$; $n = 1,\ 2,\ 3,\ \ldots$

D. $t_n = 3 \times (-2)^{n-1}$; $n = 1,\ 2,\ 3,\ \ldots$

E. $t_n = \left(\frac{3}{2}\right)^2$; $n = 1,\ 2,\ 3,\ \ldots$

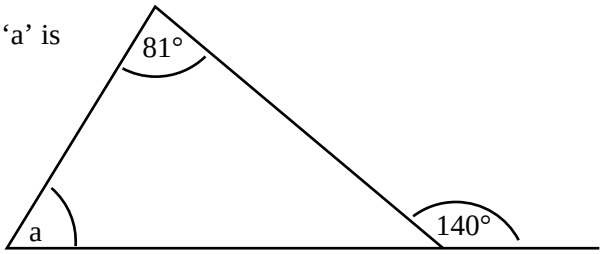
Module 2: Geometry & trigonometry

Before answering these questions, you must **shade** the Geometry and trigonometry box on the answer sheet for multiple-choice questions.

Question 1

From the above figure, angle 'a' is

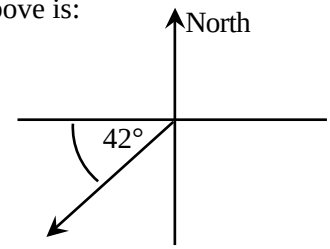
A 99°
B 40°
C 139°
D 39°
E 59°



Question 2

The true and compass bearing shown in the figure above is:

A 228°T and S 42°W
B 222°T and S 42°W
C 228°T and S 48°W
D 222°T and S 48°W
E 222°T and W 42°S



Question 3

The angle of elevation from the ground to the top of a mobile phone transmitter tower is 28.4° when a person is standing 500 m from the base of the tower. The height of the tower is closest to

A 270 m
B 238 m
C 440 m
D 568 m
E 925 m

Question 4

A surveyor's note of a traverse survey is shown below where A is directly North of C and distances are in given kilometres (km).

The direct distance from A to B is closest to

A 10.0 km
B 12.0 km
C 15.0 km
D 15.6 km
E 22.0 km

	A	
	0	
B12	10	
	15	12E
	25	10D
	40	
	C	

Question 5

In the figure at right, the value of side x can be found by using the formula

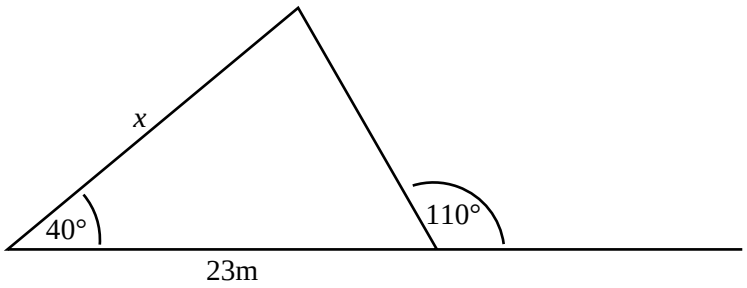
A $\frac{x}{\sin(40°)} = \frac{23}{\sin(110°)}$

B $\frac{x}{\sin(40°)} = \frac{23}{\sin(70°)}$

C $\frac{x}{\sin(70°)} = \frac{23}{\sin(70°)}$

D $\frac{x}{\sin(70°)} = \frac{23}{\sin(40°)}$

E $\frac{x}{\sin(70°)} = \frac{23}{\sin(110°)}$



Question 6

Examine the pyramid diagram at right.

If the volume of the square pyramid shown is 4 500 m^3, then the perimeter of the base is closest to

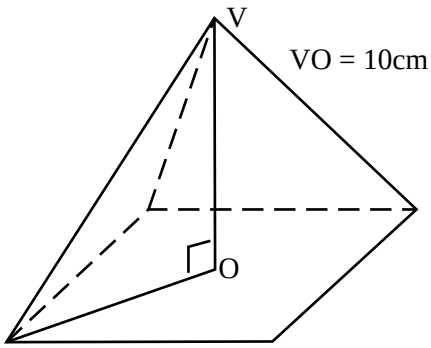
A 37 m

B 1350 m

C 60 m

D 123 m

E 147 m



Question 7

Find the area of the figure at right.

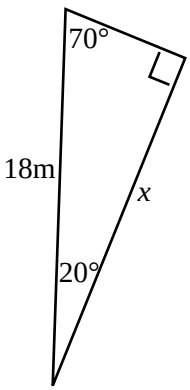
A 52.1 cm^2

B 55.4 m^2

C 104.2 cm^2

D 110.8 m^2

E 152.2 m^2



Question 8

A 1: 50 scale model of a refrigerated container is a cube with sides of 25 mm lengths. The volume of the real refrigerator is closest to

A 390 litres

B 780 litres

C 1170 litres

D 1950 litres

E 2 litres

Question 9

For the 1:250 000 contour map, the gradient of the line joining points A and B is closest to

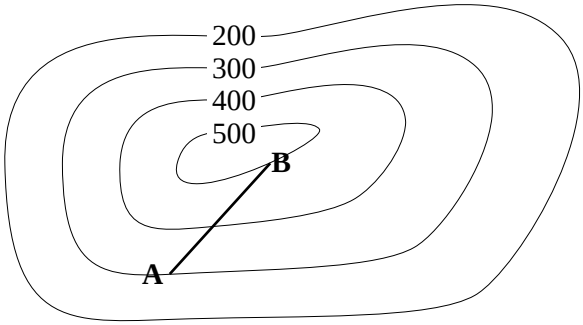
A 100

B 25

C 0.16

D 0.04

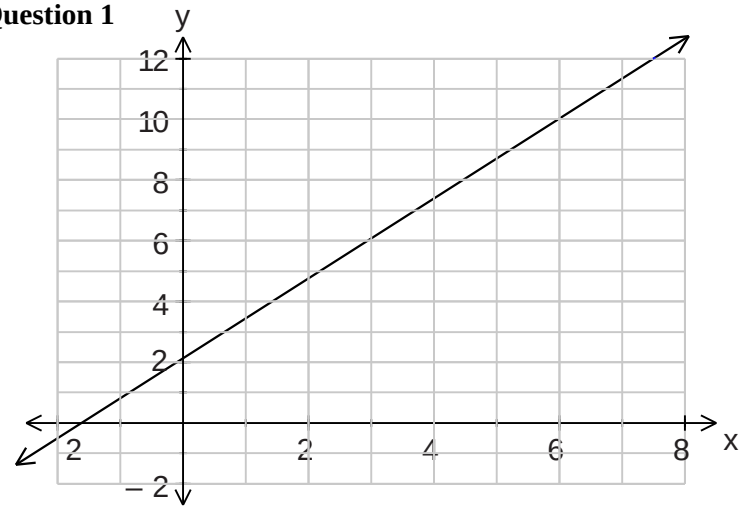
E 0.06



Module 3: Graphs and relations

Before answering these questions, you must **shade** the Graphs and relations box on the answer sheet for multiple-choice questions.

Question 1



The equation of the line shown on the graph above is

A. $y = 4x + 6$

B. $4y – 3x = 8$

C. $3y – 4x = 6$

D. $4y = 3x + 2$

E. $3y = 4x + 2$

Question 2

The solution of the system of equations

$3y – 5x = 6$

$3y = x + 2$

is

A. $x = –1,\ y = 3$

B. $x = 3,\ y = –1$

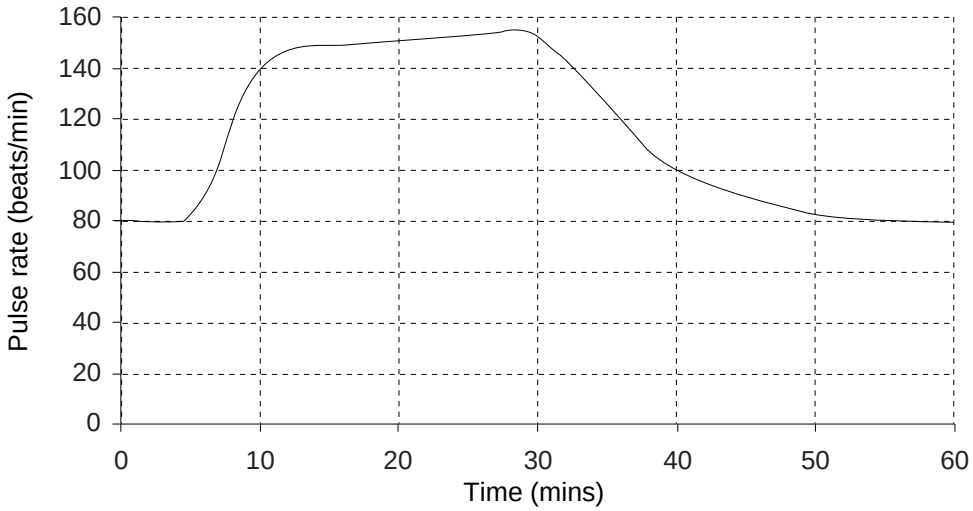
C. $x = -\frac{2}{3}, y = \frac{4}{9}$

D. $x = \frac{1}{3}, y = –1$

E. $x = – 1, y = \frac{1}{3}$

The following information relates to questions 3 and 4.

The graph below shows the variation in the pulse rate of a person during a one hour gymnasium session.



Question 3

The total length of time that the pulse rate was between 100 and 140 beats per minute was closest to

A. 4 minutes

B. 7 minutes

C. 11 minutes

D. 23 minutes

E. 34 minutes

Question 4

The average rate of change in pulse rate, in beats/ minute^2 correct to two decimal places, during the time interval 10 to 40 minutes is

A. – 0.67

B. – 0.75

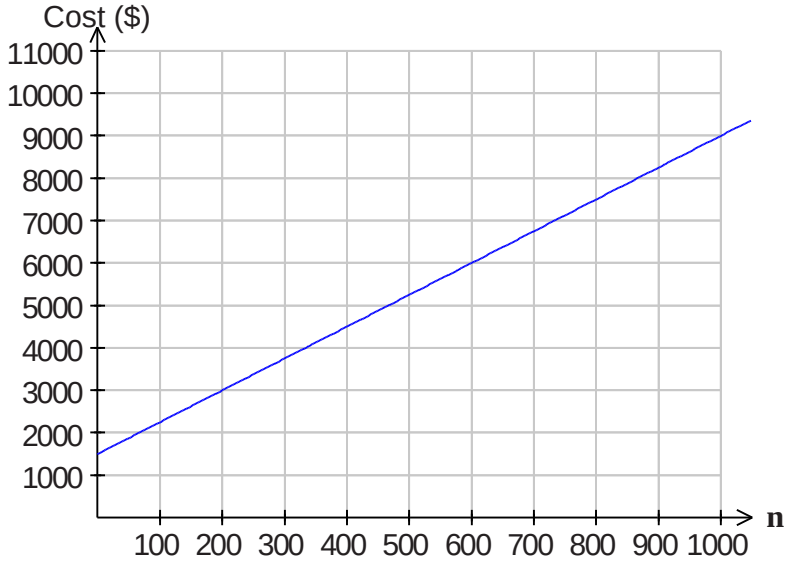
C. – 1

D. – 1.33

E. – 13.3

Question 5

The cost equation for the production of *n* articles by a company is graphed at right.

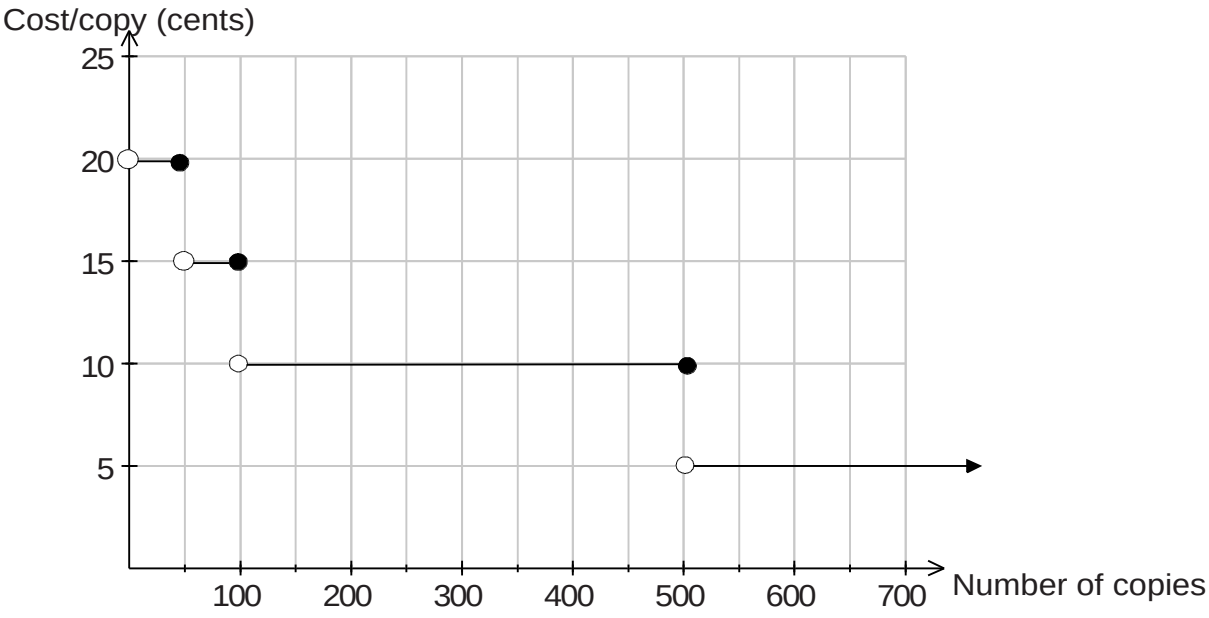


If the revenue equation for the sale of n articles is **R = 10.5***n* then the number of articles needed to be produced, and sold, to break-even is

A. 400
B. 450
C. 500
D. 550
E. 600

Question 6

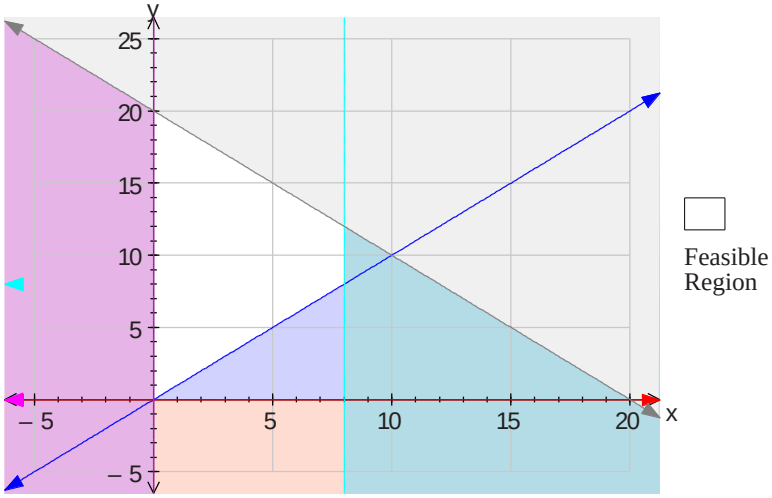
The cost per copy (cents) of photocopying is defined by the graph below.



A company photocopies a document in separate lots of 50, 250 and 500. If they copied this document in one lot of 800 the amount that they would have saved would be

A. $17.50
B. $20
C. $40
D. $42.50
E. $45

The following information relates to questions 7 and 8.



'Shading-out' has been used to define the feasible (unshaded) region on the set of axes above.

Question 7

The set of constraints that define the feasible (unshaded) region on the set of axes above is

A. $x \geq 0,\ y \geq 0,\ y \geq x,\ x + y \geq 20, x \leq 8$

B. $x \geq 0,\ y \geq x,\ x + y \geq 20, x \geq 8$

C. $x \geq 0,\ y \geq 0,\ y \geq x,\ x + y \leq 20, x \geq 8$

D. $0 \leq x \leq 8,\ y \geq 0, y \leq x, x + y \leq 20$

E. $0 \leq x \leq 8,\ y \geq x, x + y \leq 20$

Question 8

The maximum value of $V = 3x + 4y$ for the points in the feasible region is

A. 56

B. 60

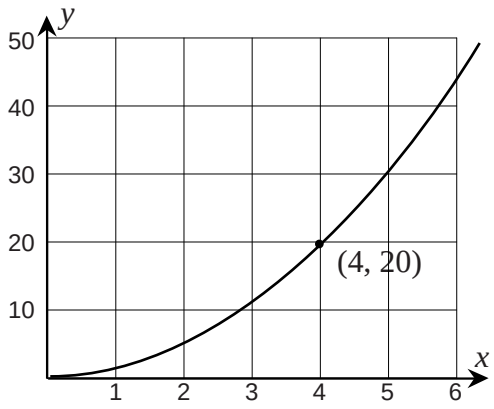
C. 72

D. 80

E. 96

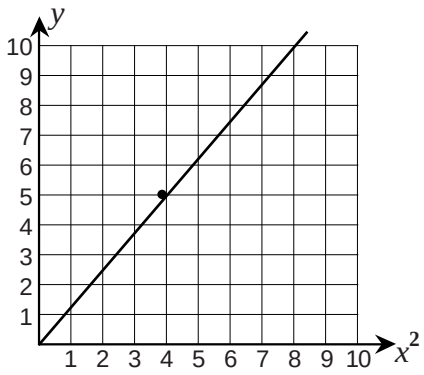
Question 9

A function of the form $y = kx^n$ is graphed on the set of axes at right.

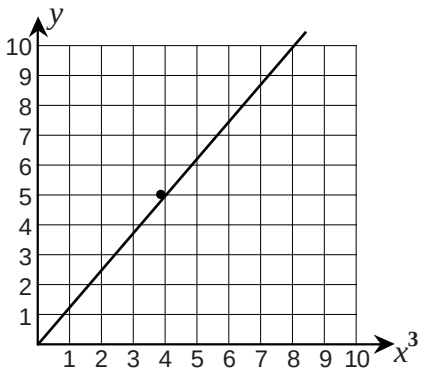


Which one of the following would be a graph of the same function?

A.



B.



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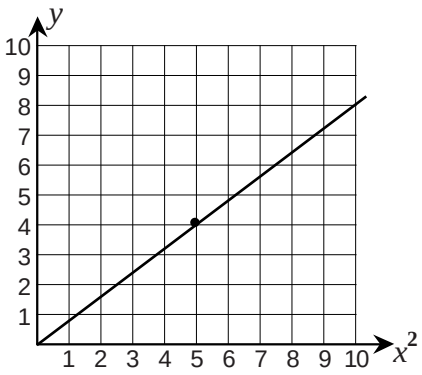

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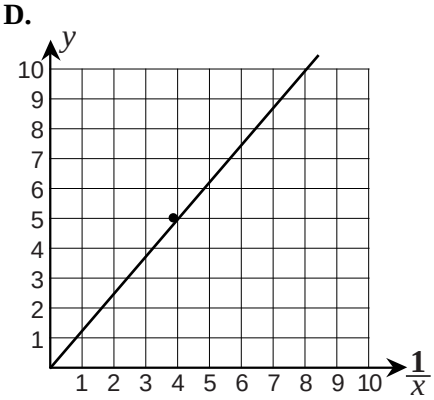
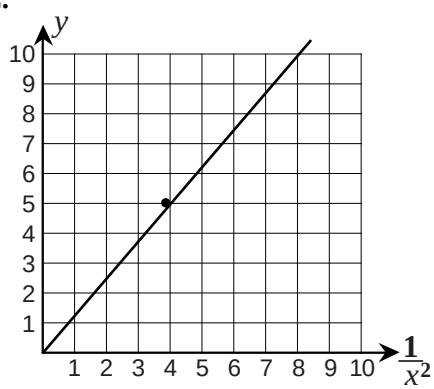


E.



Module 4: Business-related mathematics

Before answering these questions, you must **shade** the Business related mathematics box on the answer sheet for multiple-choice questions.

Question 1

A dinner set is sold for $59.95, a price which includes the 10% goods and services tax (GST). The amount, to the nearest cent, that the retailer will retain, after the GST is paid, will be

A. $6.00
B. $53.96
C. $54.50
D. $65.95
E. $66.61

Question 2

$15 000 is left in a term deposit account for three months. If 5.4% p.a. interest is earned by this investment, payable at the end of the three month term, then the amount of interest earned, to the nearest cent, will be

A. $197.50
B. $202.50
C. $203.41
D. $270
E. $2430

Question 3

A loan of $12 500 is accumulating interest at the rate of 6.72% p.a., compounding monthly. After 6 months the total amount owing, to the nearest cent, will be

A. $420
B. $425.92
C. 12640
D. $12 920
E. $12 925.92

The following information relates to questions 4 and 5

Melissa has opened a savings account with an initial deposit of $1000 and to this amount she will add $100 each month. The account will earn 4.8% p.a. interest, compounding at the end of each month.

Question 4

Which one of the following will give the amount accumulated in the account after 4 years?

A. $1000 \times 1{\cdot}004^{48} - \frac{100(1{\cdot}004^{48} - 1)}{1{\cdot}004 - 1}$

B. $1000 \times 1{\cdot}004^{4} + \frac{100(1{\cdot}004^{4} - 1)}{1{\cdot}004 - 1}$

C. $1000 \times 1{\cdot}048^{48} + \frac{100(1{\cdot}048^{48} - 1)}{1{\cdot}048 - 1}$

D. $1000 \times 1{\cdot}004^{48} + \frac{100(1{\cdot}004^{48} - 1)}{1{\cdot}004 - 1}$

E. $1000 \times 1{\cdot}048^{4} + \frac{100(1{\cdot}048^{4} - 1)}{1{\cdot}048 - 1}$

Question 5

The account will first show a balance greater than $10 000 after

A. 75 months

B. 85 months

C. 89 months

D. 95 months

E. 117 months

Question 6

The transactions in Justin's bank account for the period 1st January to the 30th June are given in the statement below

Date	Transaction	Deposit	Withdrawal	Balance
January 1	Balance carried forward			4280.00
March 5	Withdrawal		860.00	3420.00
June 30	Balance			3420.00

If bank interest is 1.5% p.a. calculated monthly on the minimum monthly balance then the amount of interest, to the nearest cent, earned for the period 1st January to the 30th June will be

A. $27.80

B. $28.88

C. $29.95

D. $33.36

E. $34.65

Question 7

Beverly has organized a hire purchase agreement for the purchase of a new television. The television is priced at $5500 and she is paying a deposit of $1100 and the remainder in 12 equal monthly installments of $402.60.

The annual flat– rate of interest that Beverly will be paying is

A. 7.32%

B. 7.84%

C. 9.15%

D. 9.8%

E. 18.09%

Question 8.

Fixtures on a rental property are bought new at the beginning of the year 1999 and they depreciate by 12% each year. At the beginning of which year will the value of the fixtures first be below half their purchase price?

A. 2004

B. 2005

C. 2006

D. 2007

E. 2008

Question 9

Jan and Robert are considering taking out a 25 year loan of $270 000 to buy a home. At an interest rate of 6% p.a., compounding monthly, the repayments on the loan would be $1739.61 per month. If the interest rate was to increase to 7%p.a., compounding monthly, then which one of the following would *not* be a possible consequence of this increase?

A. They will need to make repayments of $1908.30 per month to repay the loan in 25 years.

B. If they do not change the repayments or the length of the loan then they will still owe $136 651.03 after 25 years.

C. The repayment could stay the same but the term of the loan would increase by 106 months.

D. They will pay an extra $50 607.01 in interest over 25 years

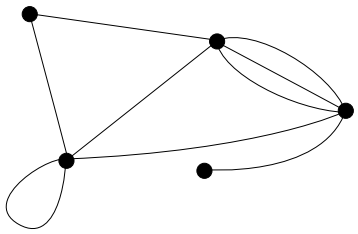
E. If they increased the term of the loan to 30 years then they would be paying less than $1739.61 per month.

5: Networks and decision mathematics

Before answering these questions, you must **shade** the Networks & decision mathematics box on the answer sheet for multiple-choice questions.

Question 1

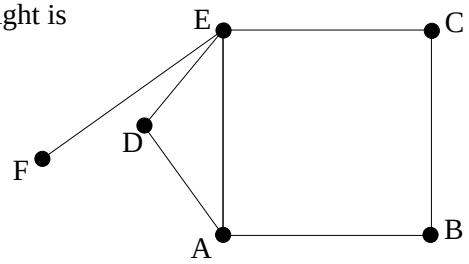
The number of vertices and edges is respectively



A 5 and 9
B 9 and 5
C 5 and 10
D 5 and 17
E 17 and 5

Question 2

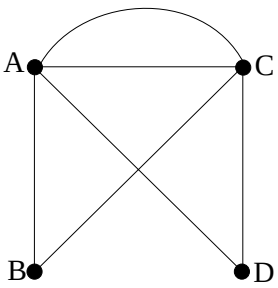
A suitable Euler Path for the planar graph at right is



A D– E– F– E– C– B– A– D– E
B E– D– A– B– C– E– F
C A– E– C– B– A– D– E– F
D C– B– A– D– E– F
E F– E– D– A– B– C

Question 3

The matrix that represents the network shown at right is



A

	A	*B*	*C*	*D*
A	0	1	2	1
B	1	1	1	0
C	2	1	1	2
D	1	0	2	1

B

	A	*B*	*C*	*D*
A	0	1	2	1
B	1	0	1	0
C	2	1	0	1
D	1	0	1	0

C

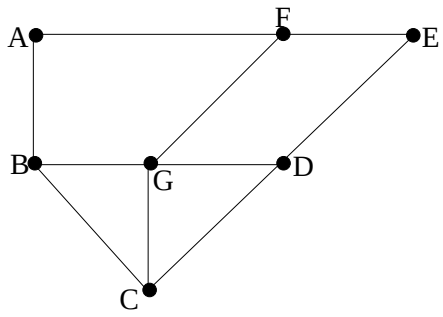
	A	*B*	*C*	*D*
A	1	1	2	0
B	1	1	0	0
C	2	0	1	2
D	0	0	2	1

D

	A	*B*	*C*	*D*
A	0	1	2	1
B	1	0	1	0
C	2	1	0	2
D	1	0	2	0

E

	A	*B*	*C*	*D*
A	0	1	1	1
B	1	0	1	0
C	1	1	0	1
D	1	0	1	0



Question 4

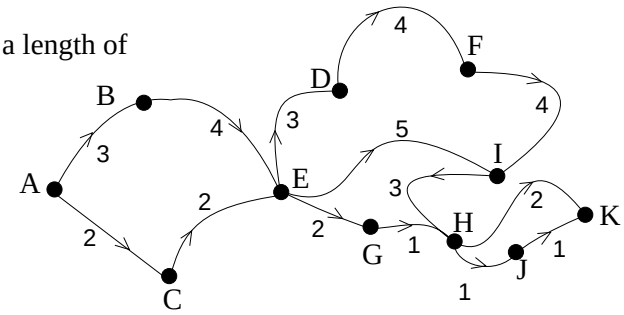
Consider the network shown in the figure above and select the statement that is true.

A The planar graph has a Hamiltonian path and circuit, but no Euler path or circuit.
B The planar graph has a Hamiltonian path and circuit and an Euler path.
C The planar graph has an Euler path and circuit, but no Hamiltonian path or circuit.
D The planar graph has both Euler and Hamiltonian paths but neither circuit.
E The planar graph has both Euler and Hamiltonian paths and circuits.

Question 5

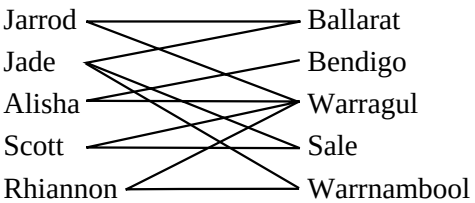
The length of the critical path from Vertex A to Vertex K has a length of

A 9
B 14
C 17
D 23
E 37



Question 6

The bipartite graph below shows five people and five cities. The edges indicate which towns the people have lived in at some time in their lives.



Which of the following statements is true?

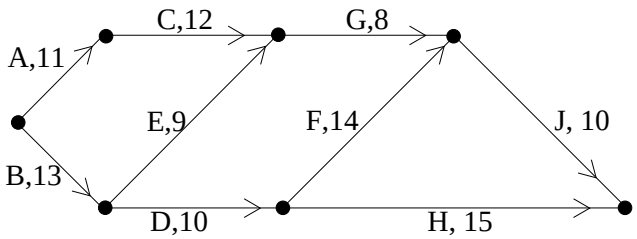
A Alisha has lived in more cities than Scott.
B Between them Alisha and Scott have lived in all five cities.
C Between them Jade and Rhiannon have lived in more cities than Alisha and Scott.
D Alisha has lived in the fewest cities.
E Alisha has lived in Ballarat.

Question 7

The network diagram shown below gives the times for each activity in hours.

The immediate predecessors of Activity G are

A F
B D and F
C C and E
D C, E and F
E A, B, C and E



Question 8

A district map can be modelled as a planar graph with 6 towns (vertices) that are all linked by 10 roads (edges). How many different colours are needed to identify uniquely the regions (or faces) for the district map?

A 3

B 4

C 5

D 6

E 7

Question 9

The following matrix shows the time (in minutes) quoted by four pizza delivery drivers in delivering four orders between a pizza shop and local customers.

	Cust 1	Cust 2	Cust 3	Cust 4
Driver A	15	13	11	14
Driver B	12	14	13	15
Driver C	14	13	15	12
Driver D	12	12	15	14

The allocation that minimises the total time required, if each driver gets exactly 1 job is

A Driver A gets Customer 3, Driver B gets Customer 2, Driver C gets Customer 4, Driver D gets Customer 1

B Driver A gets Customer 3, Driver B gets Customer 1, Driver C gets Customer 4, Driver D gets Customer 2

C Driver A gets Customer 1, Driver B gets Customer 2, Driver C gets Customer 3, Driver D gets Customer 4

D Driver A gets Customer 2, Driver B gets Customer 3, Driver C gets Customer 4, Driver D gets Customer 1

E Driver A gets Customer 3, Driver B gets Customer 2, Driver C gets Customer 1, Driver D gets Customer 4

END OF QUESTION BOOK

FURTHER MATHEMATICS

Written examinations 1 and 2

FORMULA SHEET

Directions to students

This formula sheet is provided for your reference.

Further Mathematics Formulas

Business-related mathematics

simple interest: $I = \frac{PrT}{100}$

compound interest: $A = PR^n$ where $R = 1 + \frac{r}{100}$

hire purchase: effective rate of interest $\approx \frac{2n}{n+1} \times$ flat rate

annuities: $A = PR^n - \frac{Q(R^n - 1)}{R - 1}$, *where* $R = 1 + \frac{r}{100}$

Geometry and trigonometry

area of a triangle: $\frac{1}{2}bc\sin A$

area of a circle: πr^2

volume of a sphere: $\frac{4}{3}\pi r^3$

volume of a cone: $\frac{1}{3}\pi r^2 h$

Pythagoras' theorem: $c^2 = a^2 + b^2$

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

cosine rule: $c^2 = a^2 + b^2 - 2ab\cos C$

Graphs and relations

Straight line graphs

gradient: $m = \frac{y_2 - y_1}{x_2 - x_1}$

equation:

$y - y_1 = m(x - x_1)$	gradient-point form
$y = mx + c$	gradient-intercept form
$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$	two-point form

Number patterns and applications

arithmetic series: $a + (a + d) + \ldots + (a + (n - 1)d) = \frac{n}{2}\left[2a + (n-1)d\right] = \frac{n}{2}(a + l)$

geometric series: $a + ar + ar^2 + \ldots + ar^{n-1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$

infinite geometric series: $a + ar + ar^2 + ar^3 + \ldots = \frac{a}{1 - r}, |r| < 1$

linear difference equations: $t_n = at_{n-1} + b = a^{n-1}t_1 + b\frac{(a^{n-1} - 1)}{a - 1}, a \neq 1$

$= a^n t_0 + b\frac{(a^n - 1)}{a - 1}$

Networks and decision mathematics

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

Statistics

seasonal index: $\text{seasonal index} = \frac{\text{actual figure}}{\text{deseasonalised figure}}$

END OF FORMULA SHEET