

Year 2003

VCE

Further Mathematics

Trial Examination 1



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VICTORIAN CERTIFICATE OF EDUCATION 2003

FURTHER MATHEMATICS

Trial Written Examination 1 (Facts, skills and applications)

Reading time: 15 minutes
Total writing time: 1 hour 30 minutes

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
A	13	13		
B	45	27	5	3

Directions to students

Materials

Question book of 35 pages.

Answer sheet for multiple-choice questions.

There is a detachable sheet of miscellaneous formula supplied.

Working space is provided throughout the book.

You may bring to the examination up to four pages (two A4 sheets) of pre-written notes.

An approved scientific and/or graphics calculator may be used.

You should have at least one pencil and an eraser.

The task

Detach the formula sheet from the book during reading time.

Please ensure that your **name and student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.

Answer **all** questions from Section A

You should select three modules from Section B and answer **all** questions within the modules selected.

Indicate the modules selected on the answer sheet for multiple-choice questions by shading the corresponding boxes.

There is a total of 13 marks available for Section A and 9 marks for each module in Section B

There is a total of 40 marks available for this examination.

All questions should be answered on the answer sheet for multiple-choice questions provided.

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

At the end of the task

You may retain this question book.

VCE FURTHER MATHEMATICS 2003

Trial Written Examination 1

ANSWER SHEET

NAME: _____

STUDENT
NUMBER _____

SIGNATURE _____

Instructions

- Write your name in the space provided above.
- Write your student number in the space provided above. Sign your name.
- Use a **PENCIL** for **ALL** entries.
If you make a mistake, **ERASE** it - **DO NOT** cross it out.
- Marks will **NOT** be deducted for incorrect answers.
- **NO MARK** will be given if more than **ONE** answer is completed for any question.
- All answers must be completed like **THIS** example.

A	B	C	D	E
---	---	---	---	---

Section A

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	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

Please turn over . . .

Section B (Shade the boxes of the three modules selected)

	Module 1 Number patterns and applications	1	A	B	C	D	E
		2	A	B	C	D	E
		3	A	B	C	D	E
		4	A	B	C	D	E
		5	A	B	C	D	E
		6	A	B	C	D	E
		7	A	B	C	D	E
		8	A	B	C	D	E
		9	A	B	C	D	E
	Module 2 Geometry and trigonometry	1	A	B	C	D	E
		2	A	B	C	D	E
		3	A	B	C	D	E
		4	A	B	C	D	E
		5	A	B	C	D	E
		6	A	B	C	D	E
		7	A	B	C	D	E
		8	A	B	C	D	E
		9	A	B	C	D	E
	Module 3 Graphs and relations	1	A	B	C	D	E
		2	A	B	C	D	E
		3	A	B	C	D	E
		4	A	B	C	D	E
		5	A	B	C	D	E
		6	A	B	C	D	E
		7	A	B	C	D	E
		8	A	B	C	D	E
		9	A	B	C	D	E
	Module 4 Business-related mathematics	1	A	B	C	D	E
		2	A	B	C	D	E
		3	A	B	C	D	E
		4	A	B	C	D	E
		5	A	B	C	D	E
		6	A	B	C	D	E
		7	A	B	C	D	E
		8	A	B	C	D	E
		9	A	B	C	D	E
	Module 5 Networks and decision mathematics	1	A	B	C	D	E
		2	A	B	C	D	E
		3	A	B	C	D	E
		4	A	B	C	D	E
		5	A	B	C	D	E
		6	A	B	C	D	E
		7	A	B	C	D	E
		8	A	B	C	D	E
		9	A	B	C	D	E

Please DO NOT fold, bend or staple this form

FURTHER MATHEMATICS

Written examinations 1 and 2

FORMULA SHEET

Directions to students

Detach this formula sheet during reading time.

This formula sheet is provided for your reference.

Further Mathematics Formulas

Business-related mathematics

simple interest:
$$I = \frac{\text{Pr} T}{100}$$

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

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

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

Geometry and trigonometry

area of a triangle:
$$\frac{1}{2}bh$$

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

area of circle:
$$\pi r^2$$

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

volume of 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:
$$a + (a + d) + \dots + (a + (n - 1)d) = \frac{n}{2}[2a + (n - 1)d] = \frac{n}{2}(a + l)$$

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

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

linear difference equations:
$$\begin{aligned} t_n = at_{n-1} + b &= a^{n-1}t_1 + b \frac{(a^{n-1} - 1)}{a - 1}, a \neq 1 \\ &= a^n t_0 + b \frac{(a^n - 1)}{a - 1} \end{aligned}$$

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

Specific Instructions for Section A

Section A consists of 13 questions

Answer **all** questions in this section.

A correct answer scores 1 mark, an incorrect answer scores 0. No mark will be given for a question if two or more letters are shaded for that question. Marks will not be deducted for incorrect answers and you should attempt every question.

Core**Question 1**

An Australian ski shop owner buys skis, ski boots, stocks and “apres” ski wear from overseas and sells them to his Australian customers. He analyses his monthly profits over 5 years and observes a trend emerging. This trend is most likely to be

- A. Random
- B. Cyclic
- C. Secular
- D. Seasonal
- E. Regressive

The following information relates to questions 2 and 3

In a school election the following candidates for school captain gain the number of votes shown in the table below.

CANDIDATE	NUMBER OF VOTES
Atkins	204
Brown	313
Candor	90
DeJong	181

Candor and Brown are female candidates while Atkins and DeJong are male candidates.

Question 2

Candor's votes are split so that 30% of her votes go to Atkins, 30% of her votes go to Brown and the remainder of her votes go to DeJong. The total number of votes DeJong will have after these split votes have been distributed will be

- A. 198
- B. 208
- C. 217
- D. 235
- E. 244

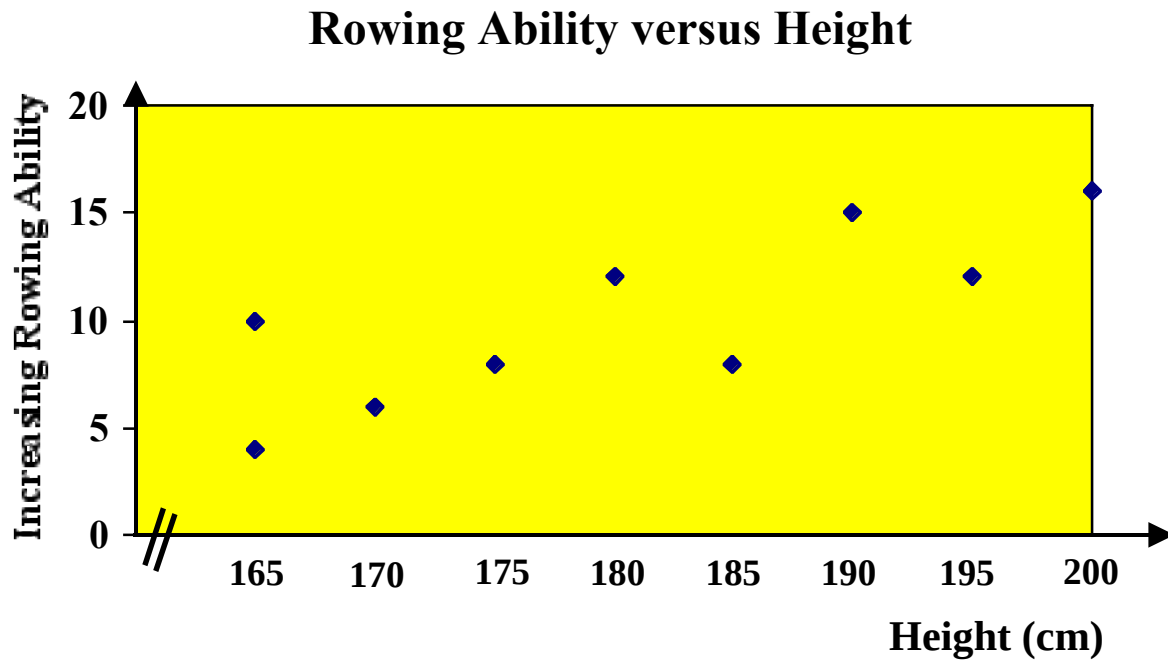
Question 3

Before Condor's votes were split, the percentage of votes received by females was closest to

- A. 30%
- B. 35%
- C. 40%
- D. 50%
- E. 55%

Question 4

The scatter graph below shows the relationship between a person's height and his rowing ability.



Which one of the following statements is true?

- A. People are good at rowing because they are tall.
- B. People are good at rowing because they are short.
- C. A negative correlation exists between rowing ability and height.
- D. A positive correlation exists between rowing ability and height.
- E. The correlation coefficient between rowing ability and height equals -1 .

The following information relates to questions 5 and 6

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

Question 5

The median of this set of data is

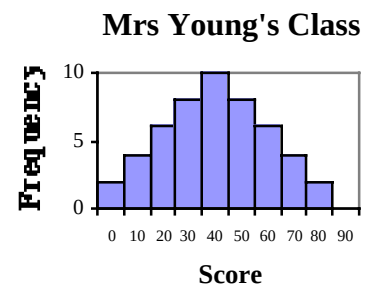
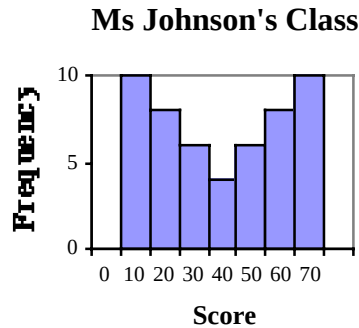
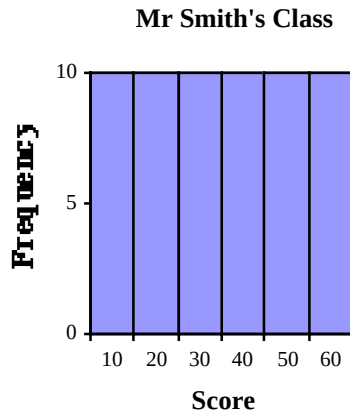
- A. 5
- B. 24
- C. 25
- D. 26
- E. 45

Question 6

The interquartile range is

- A. 14
- B. 24
- C. 38
- D. 45
- E. 48

The following three histograms show distributions for the results on a common maths test for three different classes.



Which one of the following statements is true?

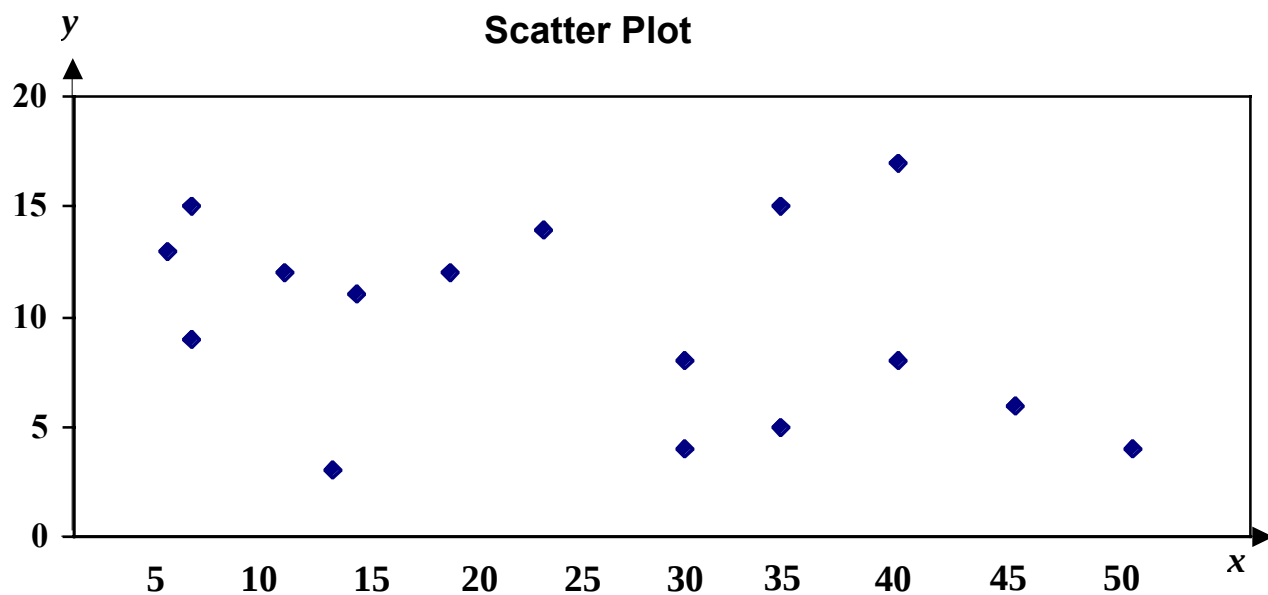
- A. Mrs. Young's class has the largest range and the largest standard deviation.
- B. Ms Johnson's class has the largest range and the largest standard deviation.
- C. Mrs. Young's class has the largest range and Ms Johnson's class has the largest standard deviation.
- D. Mrs. Young's class has the largest range and Mr. Smith's class has the largest standard deviation.
- E. Mr. Smith's class has the largest range and the largest standard deviation.

Question 8

Daily revenue for an airline company over a year can be graphed to give a bell shaped curve. If the mean daily revenue is \$70,000 with approximately 99.7% of the daily revenues lying between \$54,400 and \$85,600, then we would expect 95% of the daily revenues to lie between

- A. \$54,100 and \$85,500
- B. \$54,400 and \$85,600
- C. \$54,600 and \$85,400
- D. \$59,400 and \$80,600
- E. \$59,600 and \$80,400

Question 9



The q – correlation coefficient for the above scatter plot is closest to

- A. -0.17
- B. -0.5
- C. 0.17
- D. 0.6
- E. 0.7

Question 10

The actual commission paid to a salesperson for the March quarter 2003 was \$5,260. The seasonal index for sales has been calculated to be 78.57%. The deseasonalised commission is closest to

- A. \$67
- B. \$268
- C. \$2,678
- D. \$4,133
- E. \$6,695

Question 11

GAT Result	20	40	60	80	90	100
VCE Maths Result	20	60	40	60	80	90

For the data given above, the slope of the 3 median line in the equation
 $\text{VCE Maths Result} = m \times \text{GAT Result} + c$ is closest to

- A. 0.5
- B. 0.7
- C. 0.9
- D. 1.2
- E. 1.4

The following information relates to questions 12 and 13

Question 12

X	6	7	10	8	5	11	3	7	11	12
Y	2.2	2.0	3.0	2.4	1.8	3.2	1.5	2.1	3.8	4.0

For the above data the least squares regression equation would be closest to

- A. $y = 0.3x + 0.4$
- B. $y = 0.4x + 0.3$
- C. $y = 3x + 3$
- D. $y = 3x - 0.5$
- E. $y = -0.5x + 3$

Question 13

The value of the product moment correlation coefficient, r , for y against x is closest to

- A.** 0.30
- B.** 0.35
- C.** 0.60
- D.** 0.90
- E.** 0.95

END OF SECTION A

Specific Instructions for Section B

Section A consists of 5 modules

You should select 3 modules and answer **all** questions within the modules on the answer sheet for multiple-choice questions provided. Indicate the modules selected on the answer sheet for multiple-choice questions by shading the corresponding boxes.

A correct answer scores 1 mark, an incorrect answer scores 0. No mark will be given for a question if two or more letters are shaded for that question. Marks will not be deducted for incorrect answers and you should attempt every question within the modules selected.

Module		Page
Module 1:	Number patterns and applications	10
Module 2:	Geometry and trigonometry	14
Module 3:	Graphs and relations	19
Module 4:	Business-related mathematics	25
Module 5:	Networks and decision mathematics	29

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 sum of the first eight terms of the geometric sequence 0.025, 0.125, 0.625,..... is

- A. 409.6
- B. 488.275
- C. 1953.125
- D. 2441.4
- E. 9765.625

Question 2

For the sequence 6, – 12, 24, –48 the value of the twelfth term is

- A. – 24576
- B. – 12288
- C. – 2244
- D. 12288
- E. 24576

Question 3

Each year the rock band, “We Three”, produces seven more new singles than they produced the year before. If they produced twenty-eight singles in 1995 which was their first year of working together, then the total number of singles they would have produced by the end of 2003 would be

- A. 84
- B. 91
- C. 420
- D. 504
- E. 595

Question 4

The common difference for the sequence defined by the rule

$$t_n = 3n + 7 \text{ is}$$

- A. 3
- B. 4
- C. 7
- D. 10
- E. 17

Question 5

Gemma invests \$30,000 at 4.5% p.a. compound interest for 10 years. The value of her investment at the end of the ten years is closest to

- A. \$43,500
- B. \$44,800
- C. \$46,600
- D. \$48,400
- E. \$52,500

Question 6

If the second term of an arithmetic sequence is -1 and the fifth term is 17, then the seventh term is

- A. 19
- B. 20
- C. 26
- D. 29
- E. 30

Question 7

For a 5 day math-a-thon for charity, a team of students starts with the number $\frac{2}{5}$ and keeps adding a geometric sequence of numbers. They add one number every second and at the end of 5 days they find that the sum of their numbers is $\frac{4}{15}$. The common ratio of their geometric sequence was

A. $-\frac{1}{2}$

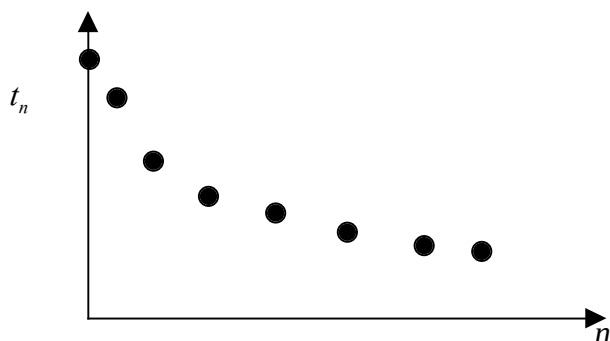
B. $-\frac{1}{3}$

C. $\frac{1}{2}$

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

E. $-2\frac{1}{2}$

Question 8



If the above graph represents the equation $t_n = t_0 a^n$ then

A. $a > 1$

B. $0 < a < 1$

C. $-1 < a < 0$

D. $-1 < a < 1$

E. $a < -1$

Question 9

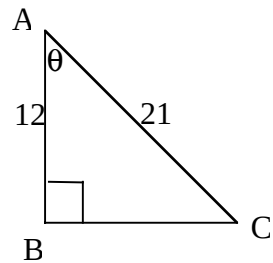
The number of cells of bacteria growing on an agar plate in a laboratory doubles every 20 minutes. If there were 8 cells on the plate at 2.00 p.m. on Monday, June 3rd, the number of cells on the plate at 2.00 p.m. the next day would be closest to

- A. 1.6×10^7
- B. 1.3×10^8
- C. 5.0×10^{21}
- D. 4.0×10^{22}
- E. 1.1×10^{65}

End of Module 1

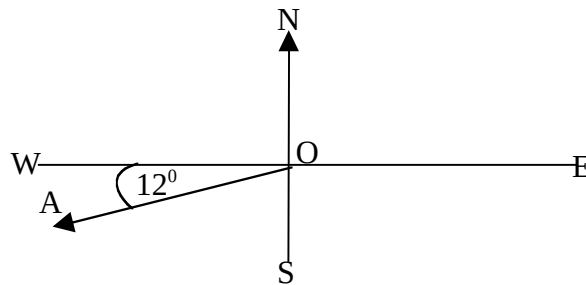
Module 2: Geometry and trigonometry

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

Question 1

For triangle ABC, the size of angle θ is closest to

- A. 10°
- B. 30°
- C. 35°
- D. 47°
- E. 55°

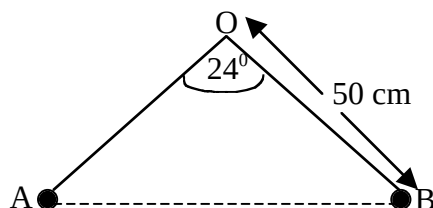
Question 2

The bearing of A from O is

- A. 12°T
- B. 102°T
- C. 258°T
- D. 282°T
- E. 348°T

The following information relates to questions 3 and 4

Question 3



A pendulum on a 50cm string swings through an angle of 24° . The horizontal distance, AB, between the limits of the swing for the pendulum is closest to

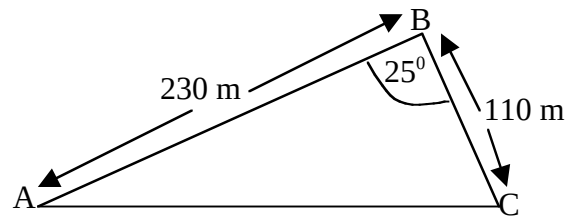
- A. 10cm
- B. 20cm
- C. 21cm
- D. 49cm
- E. 50cm

Question 4

Part of the area traversed by the pendulum is the triangular section AOB. This area is closest to

- A. 400cm^2
- B. 500cm^2
- C. 600cm^2
- D. 650cm^2
- E. 700cm^2

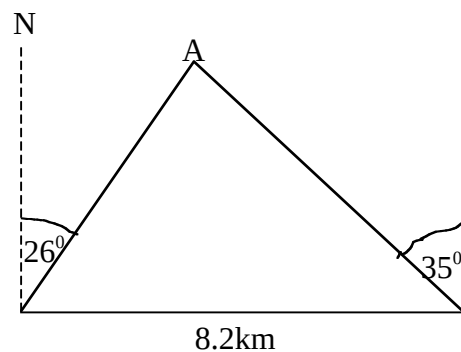
Question 5



Aroula is practising hitting a golf ball. She starts at A and hits the ball 230m to B. From B she hits the ball 110m to C. She then hits the ball so that it drops into the hole at A. If $\angle ABC$ is 25° then the distance the golf ball travels from C to A is closest to

- A. 122 m
- B. 125 m
- C. 132 m
- D. 138 m
- E. 141 m

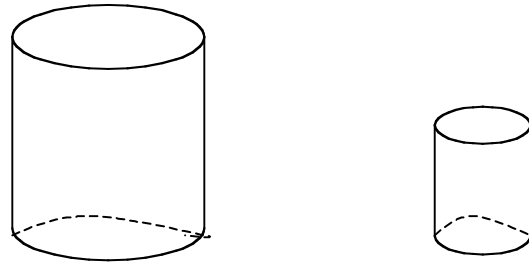
Question 6



A surveyor takes a compass bearing of $N35^\circ W$ for a block of units, A, from one position. She then moves 8.2km due west and from this position takes a second bearing of $N26^\circ E$ for the same block of units. The distance the surveyor is from the block of units when she takes the second reading is

- A. 6.8km
- B. 7.2km
- C. 7.7km
- D. 8.1km
- E. 8.3km

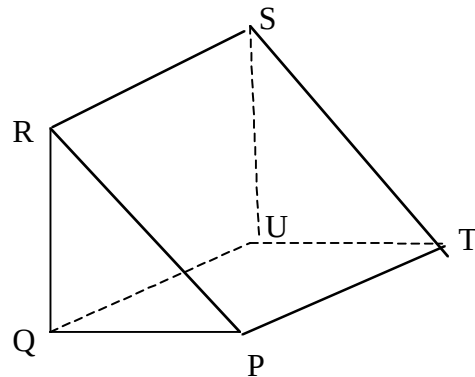
Question 7



The above two cylinders (not drawn to scale) are similar figures. The smaller cylinder has a volume of 10cm^3 and a total surface area of 26.4cm^2 . If the larger cylinder has a volume of 270cm^3 then the total surface area of this larger cylinder is closest to

- A. 80cm^2
- B. 230cm^2
- C. 240cm^2
- D. 700cm^2
- E. 800cm^2

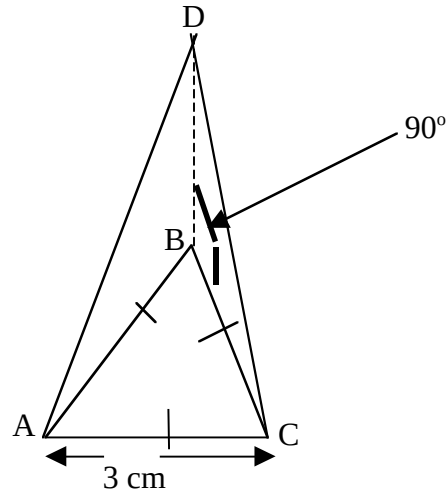
Question 8



A right triangular prism has $ST = 30\text{cm}$. If $\angle RPQ = 28^\circ$, then the area of the triangular face PRQ is closest to

- A. 187cm^2
- B. 210cm^2
- C. 280cm^2
- D. 360cm^2
- E. 390cm^2

Question 9



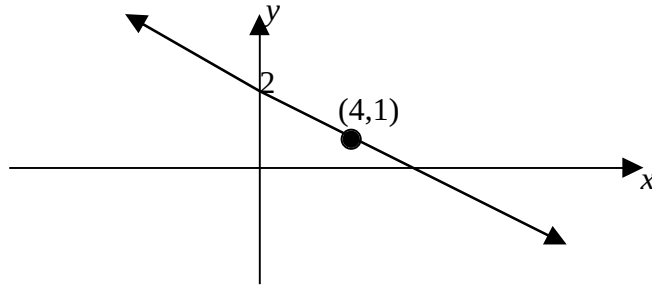
The tetrahedron above has an equilateral triangular base ABC of side 3cm. If D is vertically above B so that BD is 4cm, then $\angle DCA$ is closest to

- A. 37°
- B. 41°
- C. 49°
- D. 53°
- E. 72°

End of Module 2

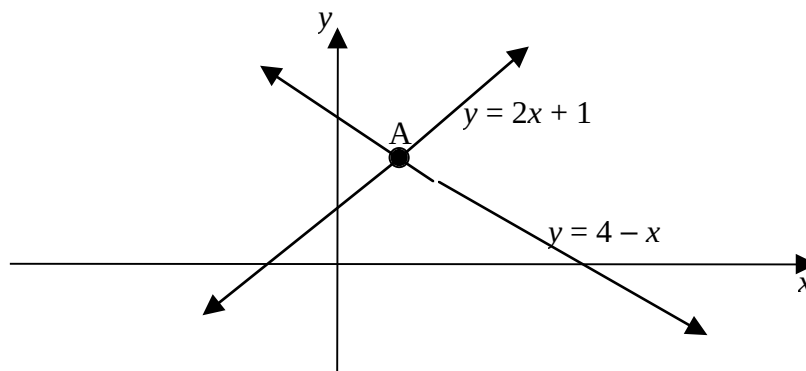
Module 3: Graphs and relations

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 straight line shown above is

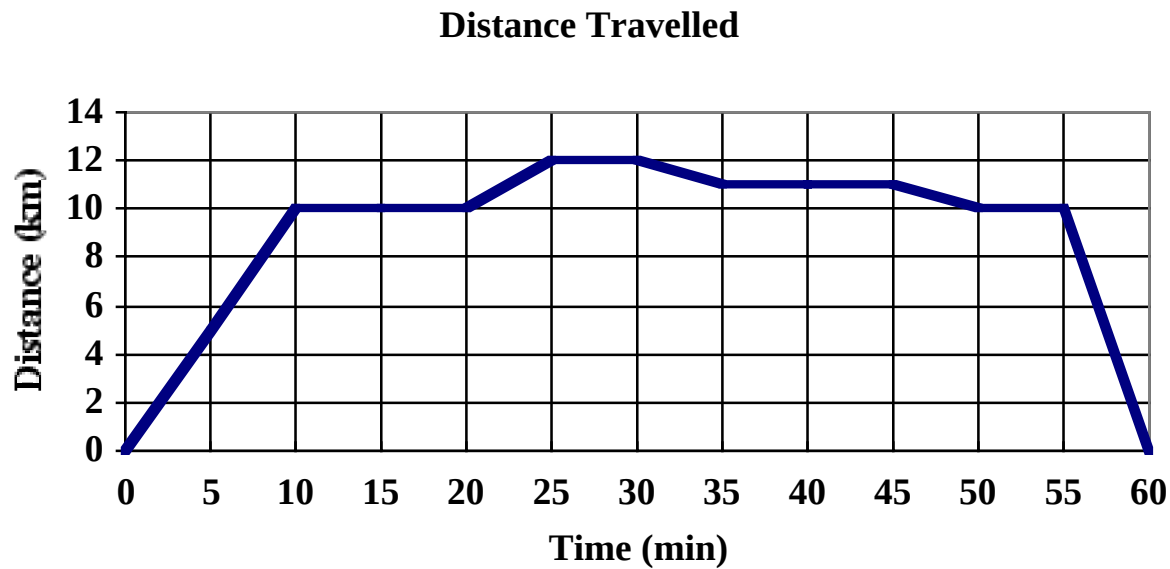
- A. $y + x - 2 = 0$
- B. $y - x + 2 = 0$
- C. $4y + x - 2 = 0$
- D. $4y - x + 8 = 0$
- E. $4y + x - 8 = 0$

Question 2

The two lines shown above cross at A. If the equations of the two lines are $y = 2x + 1$ and $y = 4 - x$, then the y coordinate of A is

- A. 1
- B. 2
- C. 3
- D. 3.5
- E. 3.75

Question 3



The graph above shows Janet's ride to the shop and back to her home.
Which one of the following statements is **FALSE**?

- A. Janet left for the shop from home.
- B. The total time for Janet to go to the shop and home again was one hour.
- C. The shop was 12 km. from her home
- D. The total length of the actual riding time to get home from the shop was greater than the total length of actual riding time to get to the shop.
- E. Janet stopped more frequently coming home from the shop than she did when going to the shop.

Question 4

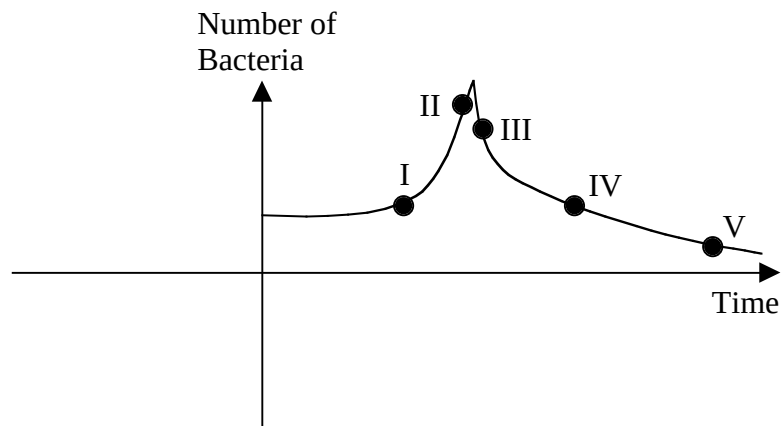
x	2	4	5	10
y	10	5	4	2

The table above shows points that lie on a curve. If y versus $\frac{1}{x}$ is plotted, a straight line is formed.

The gradient of this straight line is

- A. 0.2
- B. 0.8
- C. 1.25
- D. 5
- E. 20

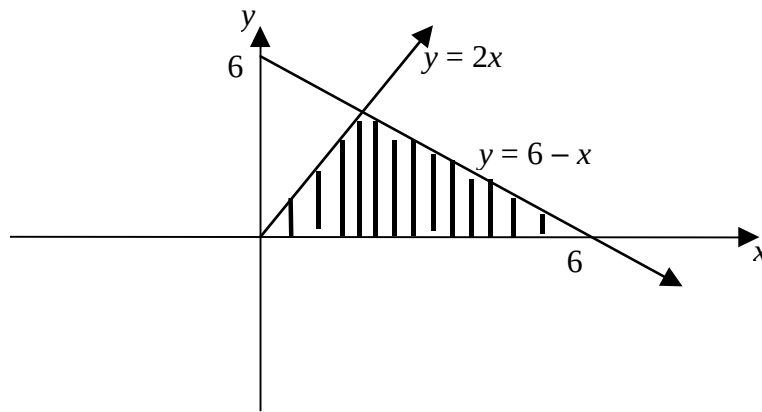
Question 5



The above graph shows the number of bacteria present on an agar plate over a period of time where the effect of a certain antibiotic on the bacteria is being tested. The point where the bacteria are decreasing most rapidly is

- A. I
- B. II
- C. III
- D. IV
- E. V

The following information relates to questions 6 and 7



The shaded region of the graph above, including the boundary lines, represents the feasible region of a linear programming problem.

Question 6

The set of constraints for this problem is

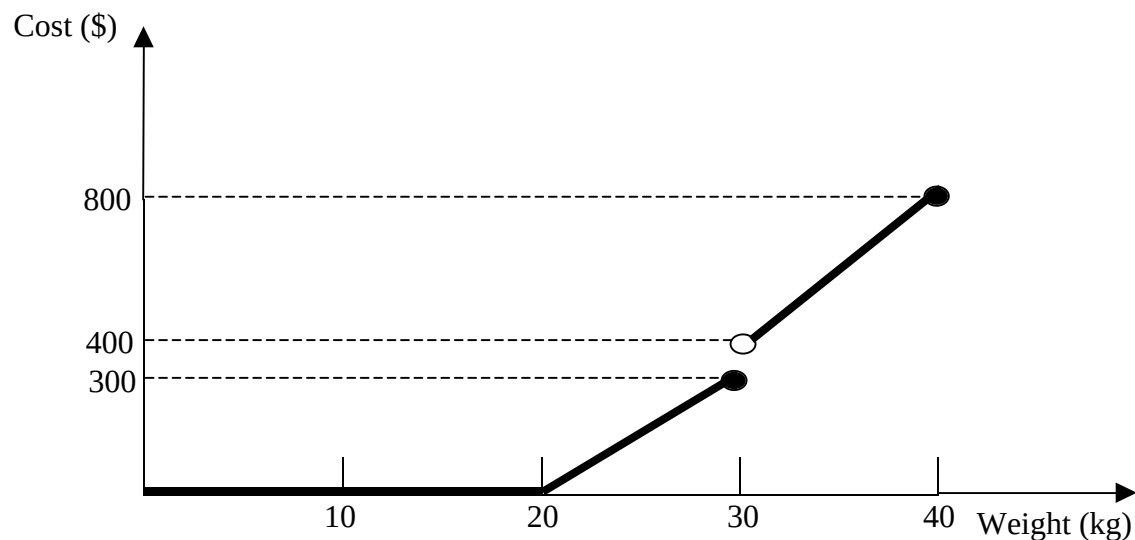
- A. $x \geq 0, y \geq 2x, y \leq 6 - x$
- B. $y \geq 0, y \leq 2x, y \geq 6 - x$
- C. $y \geq 0, y \leq 2x, y \leq 6 - x$
- D. $y \geq 0, y \leq 2x, y \geq 6 - x$
- E. $y \leq 2x, y \leq 6 - x$

Question 7

If $P = 100x + 150y$ where P is the profit in dollars associated with the given graph, then the maximum profit is

- A. \$500
- B. \$600
- C. \$750
- D. \$800
- E. \$1550

Question 8



The above graph shows the cost of accompanying baggage on an international flight.
Which one of the following rules could be used to describe this graph?

A. $C = \begin{cases} 20w & 20 < w < 30 \\ 30w & 30 < w < 40 \end{cases}$

B. $C = \begin{cases} 20w & 20 \leq w \leq 30 \\ 30w & 30 < w \leq 40 \end{cases}$

C. $C = \begin{cases} 0 & 0 \leq w \leq 20 \\ 30w - 600 & 20 < w \leq 30 \\ 40w - 800 & 30 < w \leq 40 \end{cases}$

D. $C = \begin{cases} 0 & 0 \leq w < 20 \\ 30w - 600 & 20 < w \leq 30 \\ 40w - 800 & 30 < w \leq 40 \end{cases}$

E. $C = \begin{cases} 0 & 0 \leq w \leq 20 \\ 20w - 300 & 20 < w \leq 30 \\ 30w - 400 & 30 < w \leq 40 \end{cases}$

Question 9

A glass company makes stained glass windows and double glazed windows. Each employee can only work on one window per week (either stained glass or double glazed). The maximum number of 10 m^2 windows the company can make in a week is 120. The cost of a stained glass window is $\$180 / \text{m}^2$ and the cost of a double glazed window is $\$45 / \text{m}^2$. It takes 6 people to make a 10 m^2 stained glass window and 2 people to make a 10 m^2 double glazed window. x is the number of 10 m^2 stained glass windows produced in a week and y is the number of 10 m^2 double glazed windows produced in a week. There is a maximum of 24 employees.

Which one of the following inequalities could be a constraint for the company?

- A. $3x + y \geq 12$
- B. $3x + y \leq 12$
- C. $x + y \geq 120$
- D. $x + y \leq 12$
- E. $x + y \leq 1200$

End of Module 3

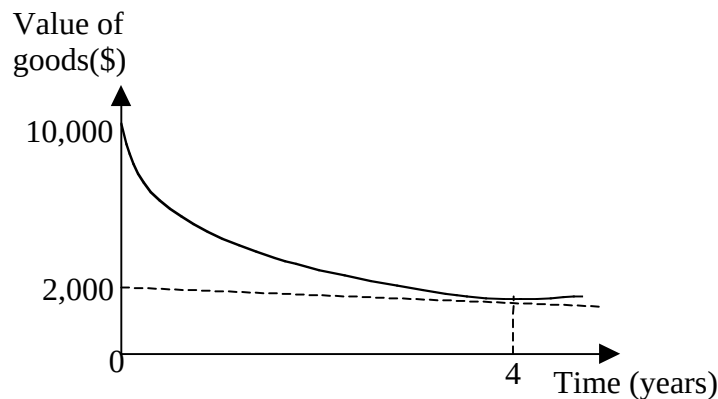
Module 4: Business-related mathematics

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

Question 1

Yin Wei borrows \$60,000 from the Care for You Bank to pay her university fees. If the interest rate is 5% compounding annually, and she repays nothing for the first three years while she is studying, then the amount she owes the bank at the end of 3 years is closest to

- A. \$69,000
- B. \$70,000
- C. \$71,000
- D. \$72,000
- E. \$73,000

Question 2

Which one of the following could be true with regard to the above graph?

- A. For the first four years the goods depreciated at a simple interest rate.
- B. For the first four years the goods depreciated by the reducing balance method at a constant annual percentage of the previous year's book value.
- C. For the first four years the goods depreciated by a constant annual percentage of the original value of the goods.
- D. The depreciation rate for each of the four years is 20%
- E. The goods have appreciated over the four years.

Module 4**Question 3**

Grant wishes to buy 3000 shares at \$10.30 each. He borrows all the money for this operation at a flat interest rate of 5.5% per annum. The amount of interest he pays over 4 years is closest to

- A. \$660
- B. \$1236
- C. \$1690
- D. \$1700
- E. \$6798

Question 4

The simple interest rate per annum at the Help For You Building Society, where \$3,000 earned \$20 over 3 months is closest to

- A. 1%
- B. 3%
- C. 7%
- D. 12%
- E. 15%

Question 5

A car advertised for \$16,800 is sold for 40% deposit with the balance repaid over 5 years at \$66 per week. The amount paid in interest is closest to

- A. \$6,720
- B. \$7,080
- C. \$7,410
- D. \$10,152
- E. \$17,160

Question 6

Finance can be arranged at a flat rate of 9% p.a. for customers buying furniture at the Hyer Emporium. Customers pay for their furniture with monthly instalments over 3 years. The effective interest rate is closest to

- A. 13.5%
- B. 16.5%
- C. 17.5%
- D. 18.5%
- E. 19.5%

Question 7

A home unit was valued at \$250,000 on January 1st 1998. On January 1st 2003 it was valued at \$502,840. If this home unit had increased at a constant rate, based on its value at the beginning of each year, then the rate of increase is closest to

- A. 11%
- B. 15%
- C. 18%
- D. 50%
- E. 72%

Question 8

Abdul invests \$30,000 at 4.2% per annum. If the interest is compounded quarterly, then the interest earned in 10 years will be closest to

- A.** \$2,100
- B.** \$15,600
- C.** \$33,300
- D.** \$35,000
- E.** \$45,500

Question 9

Agatha invests \$4,000 at 5.2% p.a. interest rate. The interest is compounded fortnightly. Agatha plans to take a holiday when this amount grows to \$5,000. The length of time she will have to wait for her holiday is closest to

- A.** 1 year
- B.** 3 years
- C.** 5 years
- D.** 7 years
- F.** 10 years

End of Module 4

Module 5: Networks and decision mathematics

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

Question 1

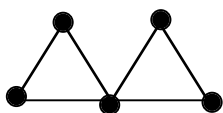
There are five people in a room. If every person shakes hands with every other person in the room, then the number of handshakes is

- A. 4
- B. 5
- C. 10
- D. 19
- E. 20

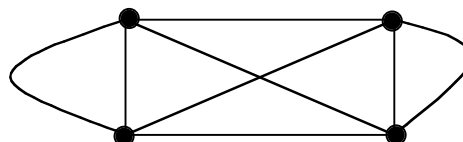
Question 2

Which one of the following is neither an Eulerian path nor an Eulerian circuit?

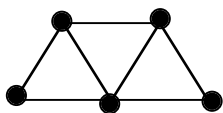
A.



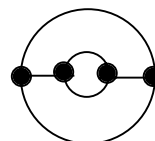
B.



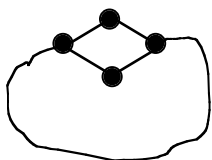
C.



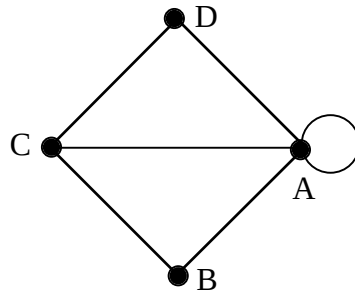
D.



E.



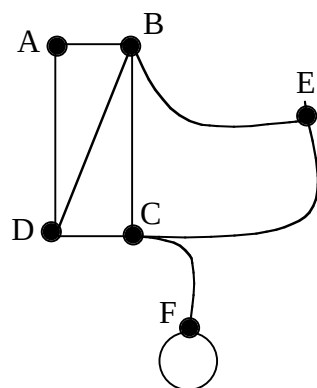
Question 3



The degree of vertex A is

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

Question 4



The matrix that represents the network shown above is

A.

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

B.

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

C.

$$\begin{bmatrix} 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 2 \end{bmatrix}$$

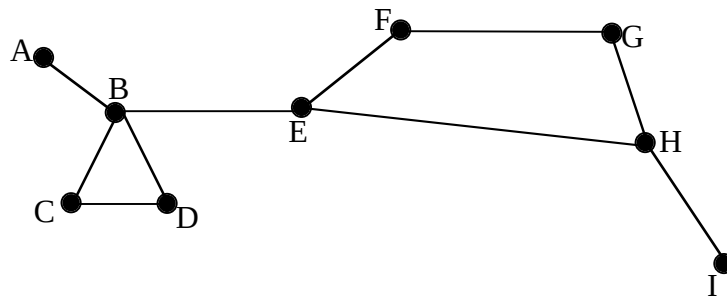
D.

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

E.

$$\begin{bmatrix} 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 & 2 \end{bmatrix}$$

Question 5

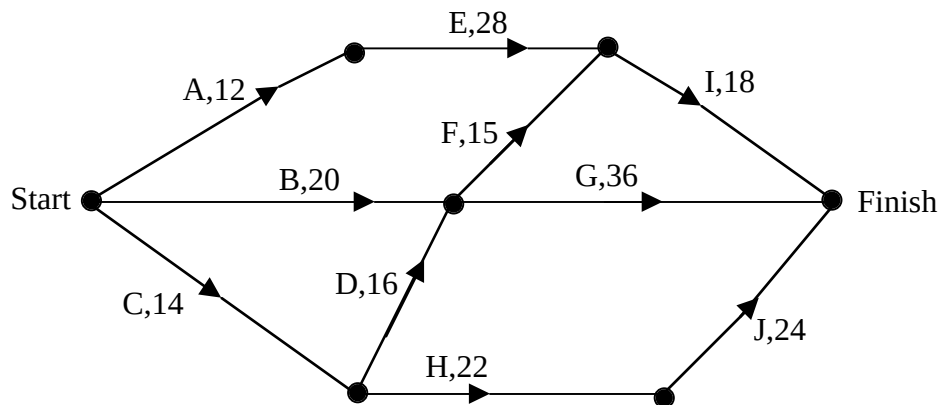


The towns A B C D E F G H I must be visited by a travelling salesperson. Which one of the following extra roads linking two of the towns would need to be built so as to enable the salesperson to visit each town once only?

- A. A road linking H to F
- B. A road linking G to E
- C. A road linking B to F
- D. A road linking G to I
- E. A road linking A to C

Question 6

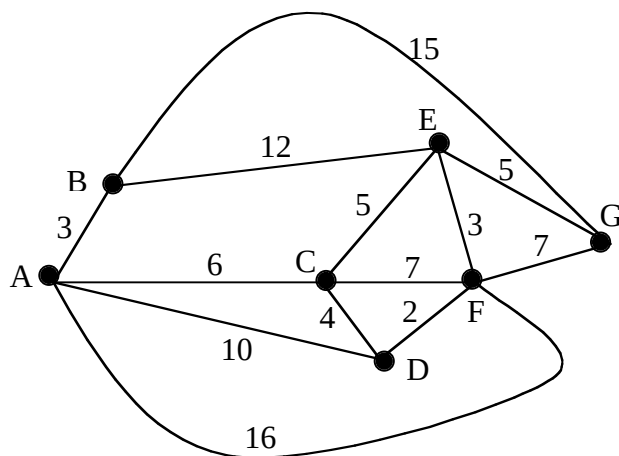
The following network gives the time in days to complete the various activities in preparation for a school fete.



The critical path is

- A. B — F — I
- B. B — G
- C. C — D — F — I
- D. C — D — G
- E. C — H — J

Question 7



The shortest Hamiltonian path in the above graph is

- A. 13
- B. 18
- C. 19
- D. 20
- E. 23

Question 8

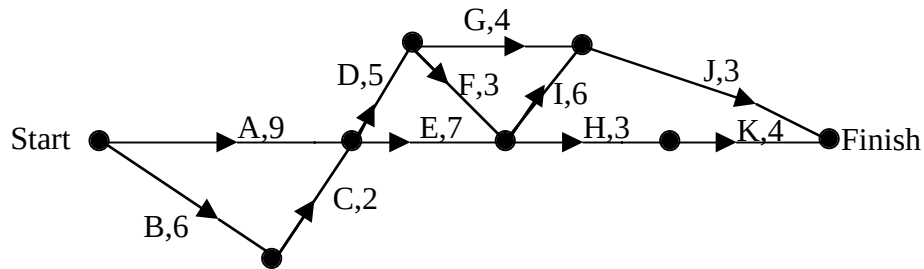
The table below shows the time in hours taken by four people to complete four tasks.

	Meg	Brian	Jo	Alan
Task 1	4	3	6	5
Task 2	2	7	3	4
Task 3	3	5	7	9
Task 4	5	2	4	3

The shortest time to complete all tasks, in hours, would be

- A. 10
- B. 11
- C. 12
- D. 13
- E. 14

Question 9



The network above shows the time in days required for the specific tasks A to K which must be completed in the order shown. The float time for task **D** in days is

- A. 0
- B. 1
- C. 3
- D. 4
- E. 5

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