C A R I B B E A N   E X A M I N A T I O N S   C O U N C I L

REPORT ON CANDIDATES' WORK IN THE SECONDARY EDUCATION CERTIFICATE EXAMINATION MAY/JUNE 2004

MATHEMATICS

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MAY/JUNE 2004

GENERAL COMMENTS

The General Proficiency Mathematics examination is offered in January and June each year, while the Basic Proficiency examination is offered in June only.

In June 2004, approximately 84 786 candidates registered for the General Proficiency examination, an increase of 1 340 over 2003. Candidate entry for the Basic Proficiency examination decreased from 11 208 in 2003 to 7 861 in 2004.

At the General Proficiency level, approximately 35 per cent of the candidates achieved Grades I – III. This represents a 5 per cent decrease over 2003. Twenty per cent of the candidates at the Basic Proficiency level achieved Grades I – III compared with 29 per cent in 2003.

DETAILED COMMENTS

General Proficiency

In general, candidates' work revealed lack of knowledge of certain areas of the syllabus. Poor performance was noted for algebra, graphs, geometry and trigonometry, vectors and matrices. Candidates continue to experience difficulty with questions which require the application of mathematical concepts. The general areas of strength were in computation and set theory.

Six candidates scored full marks on the overall examination compared with one candidate in 2003. In addition 115 candidates scored more than 95 per cent of the total marks.

Paper 01 – Multiple Choice

Paper 01 consisted of 60 multiple-choice items. This year, 145 candidates earned full marks compared with 58 in 2003. Approximately 71 per cent of the candidates scored at least half the total marks for this paper.

Paper 02 – Essay

Paper 02 consisted of two sections. Section I comprised eight compulsory questions that totalling 90 marks. Section II comprised six optional questions; two each in Relations, Functions and Graphs; Trigonometry and Geometry, Vectors and Matrices. Candidates were required to choose any two questions. Each question in this section was worth 15 marks.

This year 16 candidates earned full marks on Paper 02 compared with 9 in 2003. Approximately 16 per cent of the candidates earned at least half the total marks on this paper.

Compulsory Section

Question 1

Part (a) of the question was designed to test candidates' ability to perform the following operations

- addition of the squares of decimal numbers
- division and subtraction of decimal numbers, and
- subtraction and division of mixed fractions

Part (b) of the question tested the candidates' ability to

- approximate a value to a given number of significant figures
- write a rational number in standard form.

Part (c) of the question tested the candidate's ability to

- calculate simple interest and the amount due after a given period
- solve a problem involving compound interest.

This question was attempted by all candidates. The mean score was 6.44 out of 12.

Part (a) of the question was fairly well done, particularly the calculation of decimals and fractions. However, some candidates had problems working with mixed numbers.

Many candidates did not follow through to calculate the amount received by adding principal to interest in Section c (i). Many seemed not to have understood the term appreciation and used the depreciation formula in c (ii). Candidates were aware that they were required to invert when they were dividing the fraction in a(iii); however, they were unsure about which fraction was the divisor and which was the dividend.

In Section (b), many candidates had difficulty with approximation in standard form and significant figures. Answers such as 20.0 and 2 were given. In addition, a number of students made the mistake of writing $\frac{11}{15} \infty \frac{5}{11}$ as 3, instead of $\frac{1}{3}$.

Recommendation

The difference between depreciation and appreciation should be emphasised. Additionally, more practice should be given in approximation. Students must understand which fraction is the divisor and which is the dividend in the division of fractions.

Answer: (a) 22.1, 0.297, $-\frac{1}{3}$ (b) 20, 2.97×10^{-1} (c) \$45 600, \$45 796

Question 2

This question tested candidates' ability to

- simplify algebraic fractions
- solve quadratic equations
- factorize algebraic expression

The question was attempted by 98 per cent of the candidates. The mean score was 2.78 out of 10.

In Part (a) (i) many candidates did not recognise the difference of 2 squares. The factors given for $x^2 - 1$ were $x(x - 1)$ and $(x - 1)^2$.

More over, some candidates did not recognise that they had to factorise and attempted to cancel the variables (x) and the numbers (–1) in the numerator and denominator.

In 2a(ii) candidates had difficulty in factorising the numerator. Most candidates who attempted this question had difficulty with the fraction in which the numerator consisted of two terms. They cancelled "ad hoc" any term in the numerator with that of the denominator.

e.g. $\frac{4ab^2 + 2a^2 b}{ab} \Rightarrow 4b + 2a^2b$

$\frac{4ab^2 + 2a^2 b}{ab} \Rightarrow 4ab^2 + 2a$

In 2(b), candidates treated the expression as an equation and "cross multiplied" the numerator and denominator of the given fractions. Candidates also tried to further simplify their results.

e.g. $\frac{3p^2 + 2q}{2p} \Rightarrow \frac{5p^2q}{2p}$

$\frac{3p^2 + 2q}{2p} \Rightarrow 3p + q$

In 2(c), candidates had difficulty in factorising the *LHS* of the equation. Some who used the formula encountered problems in stating it properly. $x = -b \pm \frac{\sqrt{b^2 - 4ac}}{2a}$ was stated by many of the candidates who chose this method of solution. Substitution of values for *a*, *b* and *c* into the equation was not well done. This may be attributed to a lack of exposure to the formula or the candidates' inability to deal with 'directed numbers'. Many students attempted to find the square root of negative numbers. A few candidates attempted to use the completion of squares method; but most of them were unsuccessful.

Areas of good performance:

- Some candidates were able to combine the skills of factorisation (choosing common factor and difference of 2 squares) with those of reduction (cancelling the common factor) in numerator and denominator.
- Candidates were able to find the LCM of two terms (one of them non numeric) and use this result in combining two fractions.
- Candidates were able to solve quadratic equations using factorisation techniques and the formula method.

Recommendations to Teachers

Teachers need to expose students to a variety of problems, particularly problems that combine skills e.g. factorisation and reduction of terms, LCM of terms that are numeric and non-numeric. A distinction also needs to be made between an expression and an equation.

Answer: (a) (i) x + 1 (b) $\frac{3p^2 + 2q}{2p}$ (c) $\frac{1}{3}$, 2

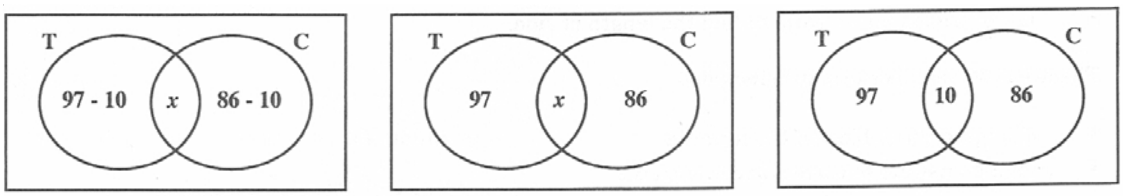
(ii) $4b + 2a$

Question 3

The question tested the candidate's ability to

- construct and use Venn diagrams to show subsets, complements and the intersection and union of sets
- determine and count the elements in the intersection and union of sets
- determine the mean, median and mode for a set of data

Approximately 99 per cent of candidates attempted this question. The mean score was 5.73 out of 11. Most candidates who attempted part (a) were able to draw two intersecting sets although many were unabe to correctly insert the given information. Common variations were:

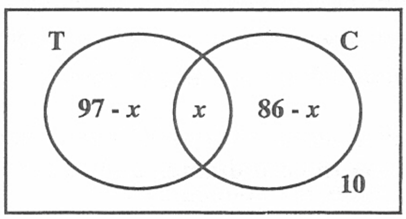


The concept of using an equation to find the intersection did not appear to be well known and many candidates who attempted to use the formula did not set it out correctly (e.g. $x + 97 + 86 + 10 = 160$).

Many candidates were able to score at least five of the six marks awarded in part (b). However, some candidates did not know the difference between mean, median and mode. The median was often incorrect because of candidates' poor use of the calculator. It was common to see $\frac{6.5 + 6.7}{2} = 9.85$.

Answer:

(a) (i)



(ii) 33 members play both tennis and cricket

(b) (i) (a) 6.65
(b) 6.6
(c) 6.7

(ii) Omit one from {5.9, 6.1, 6.3} and one from {6.7, 6.8, 8.2}

Question 4

The question tested

- substitution and operations of real numbers
- transposition
- knowledge and application of trigonometrical ratios
- properties of rectangle and right-angled triangle
- use of Pythagoras' theorem.

The question was attempted by approximately 96 per cent of the candidates. The mean score was 3.69 out of 12.

The students demonstrated competence in

- substitution
- recognizing property of a rectangle (i.e. opposite sides are equal)
- use of trigonometry ratio to find the length of side.

The areas of weak performance included

- changing the subject of the formula
- giving answers to correct decimal places.

Answer: (a) (i) $\frac{5}{12}$

(ii) $M = \frac{12nt^2}{5}$

(b) (i) 11.2 cm

(ii) 4.3 cm

(iii) 69.0·

Question 5

The question tested the candidates' ability to

- determine the co-ordinates of a given point
- recognize the gradient of a line as the ratio of the vertical rise to the horizontal shift
- identify and describe the single transformation which results from a combination of transformations
- locate the image of a quadrilateral under a reflection in a given mirror line.

This question was attempted by approximately 95 per cent of the candidates. The mean mark was 3.39 out of 10. The areas of good performance was in determining the coordinates and in performing the first reflection.

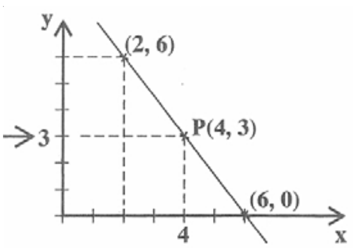
The areas of weak performance included the inability to

- plot a straight line given the point and a gradient
- reflect the first image in relation to the second mirror line
- describe fully the transformation (translation).

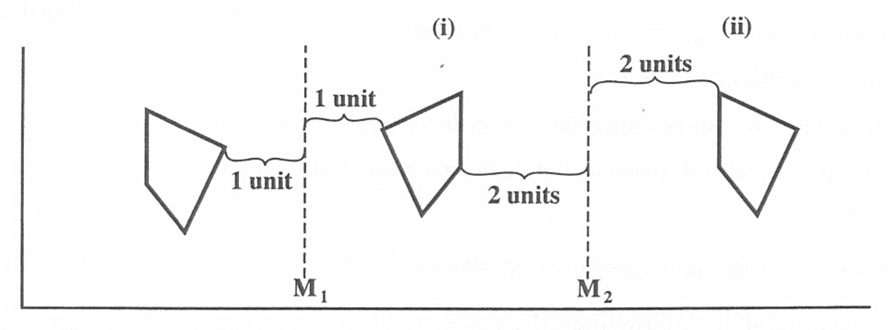
Answer:

(a) (i) $P(4,3)$

(ii) $y = \frac{3}{2}x + c$



(b)



(c) Translation by vector $\begin{pmatrix} 10 \\ 0 \end{pmatrix}$

Question 6

The question tested the candidates' ability to

- interpret data presented in line graph form
- recognize the gradient of the line as the ratio of the vertical rise to horizontal shift
- find by calculation, the gradient and intercept of the graph of linear functions
- determine the equation of a line given
  - (i) the graph of the line
  - (ii) the coordinates of two points on the line
- solve linear equation in one unknown
- substitute numbers for algebraic symbols in simple algebraic expressions.

The question was attempted by 97 per cent of the candidates. The mean mark was 3.43 out of 11.

The areas of good performance include students' ability to read and interpret graphs.

Most candidates were able to correctly calculate the gradient of the line. The areas of weak performance include candidates' inability to write down the equation of the line, change the subject of the formula, and perform operations with fractions.

Answer:

(a) \$30.00

(b) (i) 35 minutes
(ii) 0 minutes

(c) \$20

(d) gradient = \$0.50 per minute

(e) $d = 0.50t + 20$

(f) $t = 116$ minutes

Question 7

The question tested candidates' ability to

- find the radius of a circle given the area of the circle
- calculate the circumference of a circle
- calculate the area of a square using the circumference of the circle as the perimeter of the square
- use scales to find the actual distance between two points, on a grid
- perform conversions using a given scale
- measure or calculate the bearing of given positions.

The question was attempted by approximately 87 per cent of the candidates. The mean mark was 2.81 out of 12.

The areas of good performance were

– finding the circumference of the circle

– finding the distance between the two points, Rose Hall and South Port.

The areas of weak performances were

– transposing $154 = \pi r^2$ to find the radius of the circle

– recognising the circumference of the circle was equal to the perimeter of the square

– inaccuate use of the given scales

(iv) calculating the bearings required or measuring using the protractor to find the bearing.

Answer: (a) (i) a) 7 cm
b) 44 cm

(ii) 121 cm^2

(b) (i) 5 km
(ii) 166°

Question 8

The question tested candidates' ability to apply the concept of profit and loss to solve problems involving business transactions.

Approximately 89 per cent of the candidates attempted this question. The mean score was 4.52 out of 12.

In part (a) many candidates correctly calculated the percentage of chocolate in recipe A.

Part (b) was poorly done by most candidates. In part (c), the majority of candidates converted the required ratio to a proper fraction and calculated the percentage. Some candidates, however, were unable to find the correct ratio for the new mixture in part (c).

In part (d), most candidates found the cost of six bottles for $4.40 but were unable to find the cost of 150 bottles.

Answer: (a) 40%

(b) A has 40%
B has $33\frac{1}{3}$%
A richer

(c) $37\frac{1}{2}$ %

(d) (i) $110
(ii) $0.88

OPTIONAL SECTION

Question 9

The question tested the candidates' ability to

- interpret and use the concept of variation
- find the area of a rectangle
- expand and simplify an algebraic expression
- use factors to solve a quadratic equation
- find the value of an algebraic expression by substituting numerical values.

The question was attempted by about 26 per cent of the candidates. The mean mark was 2.57 out of 15.

The areas of good performance included finding the area of a rectangle, and the factors of a quadratic expression. In part (a), many candidates had difficulty with the variation; they omitted the constant. In part (ii) candidates produced the answer for part (iii) and could not show that $2x^2 + 7x - 15 = 0$, given that the area was 60.

In part (iii), though the candidates got the factors for the expression, they did not solve the equation. Some candidates tried to use the formula or the method of completing the square but did so incorrectly in many instances. In some cases, the values of x were found, but candidates were unable to transfer the results to obtain the values for *AK* and *AM*.

Answers:

(a) $M = 0.004$ $\quad n = 5$

(b) (i) Area = $(3x + 3)(5 + 2x)$

(ii) $6x^2 + 6x + 15x + 15 = 60$
$6x^2 + 21x - 45 = 0$
$2x^2 + 7x - 15 = 0$

(iii) $x = 1.5$ or -5
$AK = 7.5$ cm $\quad AM = 8$ cm

Question 10

The question tested candidates ability to:

- Translate algebraic statements into inequalities
- Draw the graphs of their functions
- Identify the region defined by their stated inequalities
- Determine conditions for the maximum profit

Approximately 24 per cent of candidates attempted this question. The mean score was 3.42 out of 15. Most candidates were able to translate the algebraic statements into the inequalities $x \geq 10$ and $y \geq 5$. They knew the relationship between $4x$, $8y$ and 200 but were unable to show the relationship as an inequality.

Most candidates were able to use the correct scale for the graph and more than 90 per cent of those who attempted the question were able to draw the lines $x = 10$ and $y = 5$ and $x + y = 60$. However, about 50 per cent of them encountered difficulty with plotting the line $4x + 5y = 200$.

Although most candidates were proficient in identifying the required region and writing the statements for the profit expressions, many did not show the test to select the maximum profit.

Answer:

(a) (i) $x \geq 10$ (ii) $x + y \leq 60$
$y \geq 5$ $4x + 8y \geq 200$

Profit statement

(c) (i) For Max. profit he must sell 10 kg of peanuts and 50 kg of cashew nuts
(ii) $2x + 5y$
Max profit $270

Question 11

This question consisted of two parts.

Part (a) required the candidates to calculate the unknown angles in a given diagram using the angle properties of circles.

Part (b) required candidates to solve a problem on bearing by drawing and calculation.

About 24 per cent of candidates attempted this question. The mean score was 3.33 out of 15.

It was obvious that students need to discover the properties of circles by practice in their classrooms as most students failed to score marks for this part of the question.

The majority of the candidates who attempted the question were able to score marks for drawing the diagram using the given information in part (b). However, quite a number of candidates displayed a lack of knowledge of direction; hence they were unable to correctly identify the bearing.

A large number of candidates were aware that they needed to use the Cosine rule to find the distance GH. A few attempted to use Pythagoras' Theorem to calculate the same distance, but were unsuccessful.

Answer:

(a) (i) a) $V\hat{Z}W = 51°$ ... (angles in the alternate segment are equal)

b) $XYZ = 78°$ ... (exterior angle of a cyclic quadrilateral = interior opposite angle)

(b) $GH = 104.4$ km
Bearing of H from $G = 62°$

Question 12

This question tested the candidates' ability to

- express a trigonomic ratio in fractional or 'surd form'
- use a trigonomic ratio to express the area of a triangle in surd form
- use a trigonomic ratio to find the length of a side of a triangle
- recognise positions on the globe
- calculate distance between two points on the globe.

The question was attempted by about 8 per cent of the candidates . The mean score was 1.68 out of 15.

The area of good performance was the candidates' ability to recognise the position of A east of B on the globe. Candidates chose the correct formula to calculate the radius as well as the length of the arc, but unfortunately, did not know which angle to use. An area of very weak performance was the candidates' inability to express the trigonomic ratio in fractional or surd form.

Answer:

(a) (i) $\text{Cos } \theta = \frac{1}{2}$

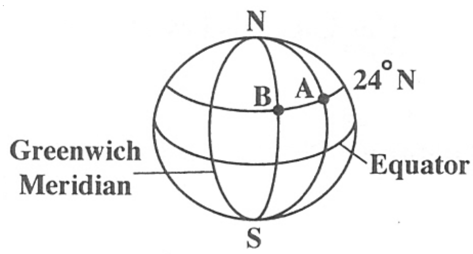
(ii) Area of Ð CDE $= \frac{1}{2} \text{ x } 20 \text{ x } 30 \sin\theta$

$= \frac{1}{2} \text{ x } 600 \text{ x} \frac{\sqrt{3}}{2}$

$= 150\sqrt{3}$ square units

(iii) (a) EC = 26.5 to 3 s.f.

(b) (i)



(ii) (a) r = 5819 km
(b) arc AB = 3350 km

Question 13

The question tested the candidates ability to

- add vectors using the triangle law
- combine vectors written as 2 x 1 column matrices
- associate a position vector with a given point P(a, b) where O is the origin (0, 0)
- determine the magnitude of a vector
- use vectors to represent and solve problems in Geometry.

Approximately 32 per cent of the candidates attempted this question. The mean mark was 2.77 out of 15.

The areas of good performance included writing the column vector representing the given position vector A(4, 2) and determining the magnitude of the column Vector $\overrightarrow{OA}$.

The area of weak performance was the candidates' inability to use a vector approach to find the position vector of N. Coordinate geometry was frequently used. Others failed to identify the vector $\overrightarrow{ON}$ as $\frac{1}{2}\overrightarrow{OA} + -\overrightarrow{AC}$ but instead wrote $\frac{1}{2}\overrightarrow{ON} = -\overrightarrow{AC}$.

Answer: (a) (i) $\overrightarrow{OA} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$

(ii) $\overrightarrow{CB} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$

(b) $|\overrightarrow{OA}| = \sqrt{20} = 4.47$

(c) (i) $\overrightarrow{OA}$ is parallel to $\overrightarrow{CB}$

and $|\overrightarrow{OA}| = |\overrightarrow{CB}|$

(ii) *OABC* is a parallelogram because one pair of opposite sides is equal and parallel.

(d) (i) $OM = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$

(ii) $ON = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$

M and N coincide <u>OR</u> the diagonals of the parallelogram bisect each other

OR

The diagonals have the same midpoint.

<u>Question 14</u>

The question tested candidates' ability to

- reflect a given object in the y–axis
- draw the line $y = x$
- reflect an object in the line $y = x$
- describe the result of 2 transformations as a single transformation
- reflect an object in the x-axis
- write the matrix of a transformation and
- write a matrix as the result of 2 transformations.

The question was attempted by 52 per cent of the candidates. The mean mark was 2.98 out of 15.

The majority of the candidates who scored marks were able to score for the reflection in the y-axis and the reflection in the x-axis. Many were able to write down the matrices for reflection in the y-axis and reflection in the line y = x. The responses to section b (i) and (ii) were written in response to section a (i) and (ii) although it was not required in that section. Only a few candidates were able to obtain a single matrix which represented the result of two transformations. The others did not write down the correct order for the multiplication.

Candidates' poor responses did not suggest misconceptions. They indicated a lack of knowledge of the concepts.

Answer: (a) (iii) Rotation about (0, 0) 90° clockwise

(v) $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$

(b) (ii) $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

DETAILED COMMENTS

Basic Proficiency

The Basic examination is designed to provide the average citizen with a working knowledge of the subject area. The range of topics tested at the Basic level is narrower than that tested at the General Proficiency level.

Candidates continue to demonstrate lack of knowledge of the fundamental concepts being tested at this level. The extent of their weakness is evident in their lack of ability to cope with questions requiring higher order skills.

Approximately 20 per cent of the candidates achieved Grades I - III. This reflected a 9 per cent decline in performance compared with 2003 where 29 per cent of the candidates achieved Grades I - III.

Paper 01 – Multiple Choice

Paper 01 consisted of 60 multiple-choice items. No candidate earned full marks on this paper. The highest mark was 57 out of 60, this was earned by one candidate. Approximately 35 per cent of the candidates scored at least half the total marks for this paper.

Paper 02 – Essay

Paper 02 consisted of 10 compulsory questions. Each question was worth 10 marks. The highest score earned was 98 out of 100. This was earned by one candidate. Seven candidates earned at least half the total marks on this paper.

Question 1

The question tested the candidates' ability to:

- Perform basic operations with rational numbers
- Approximate a value to a given number of significant figures and express any decimal to a given number of decimal places
- Divide a given quantity in a given ratio

The question was attempted by 98.5 per cent of the candidates, with 1.5 per cent scoring the full marks. The mean mark was 3.35.

Most candidates were able to complete the computation and round off as specified, although some candidates interpreted "exactly" to mean the the nearest whole number and "one significant figure" to be in standard form. In 1(b) although some candidates were able to determine the amount of one share, they did not use this information to calculate the required shares. Part 1 (c) was not well done since the candidates could not link the 30% to the 150 fish. Instead, many of them calculated 70% of 150. In part (d), candidates attempted to complete the division first before removing the brackets. Then, to perform the division, the candidates inverted the wrong fraction.

Answer: (a) (i) 4.93
(ii) 4.9
(iii) 5

(b) \$120: \$80

(c) 500 fish

(d) $1\frac{1}{2}$

Question 2

The question tested the candidates' ability to

- perform the four basic operations with algebraic expressions
- perform operations involving directed numbers
- substitute numbers for algebraic symbols
- apply the distributive law to remove brackets
- simplify algebraic fractions
- solve a simple linear inequality.

The question was attempted by 96.5 per cent of the candidates, 56 of whom scored full marks. The mean mark was 2.59.

Most candidates knew how to substitute numbers for the variables but could not simplify the directed numbers. In part (b), candidates were able to find the lowest common multiple but could not determine the equivalent fractions required. In part (c), candidates had difficulty transposing and using the distributive law correctly. In part (d), candidates were able to simplify at least one bracket and collect like terms, although the distributive law was used incorrectly in some cases.

Answer: (a) 2 (b) $\frac{5x-2}{6}$ (c) $x \geq -2$ (d) $5x - 5y$

Question 3

The question tested the candidates' ability to

- solve problems involving payments by instalments as in the case of hire purchase and mortgages
- solve problems involving salaries and wages

The question was attempted by 95.4 per cent of the candidates with 586 candidates scoring full marks. The mean mark was 3.81. Most candidates were able to find the interest, in dollars, in part (a), but could not express this interest as a percentage of the loan amount. Most candidates experiened difficulty calculating the hire purchase price in part (c) since they used 10% of the instalment as the deposit instead of 10% of the cash price. Part (c) was fairly well done with candidates correctly determining the amount earned at the basic rate and number of hours worked.

Answer: (a) (i) $300
(ii) 5%

(b) $48.60

(c) (i) $140
(ii) 25 hours

Question 4

The question tested the candidates' ability to

- use instruments to draw and measure angles and line segments
- use instruments (not necessarily ruler and compasses) to construct angles
- solve geometric problems using the properties of polygons, lines and angles and using the properties of circles.

The question was attempted by 83.5 of the candidates, 142 of whom scored full marks. The mean mark was 3.09.

Most candidates were able to determine the values of the angles in part (a). In part (b), candidates were unable to use the properties of the triangles to determine the unknown angle, including the fact that angle ABC was a right angle. Furthermore, candidates experienced difficulty identifying the angles correctly; hence they attempted to find the values of the wrong angles. In part (c), most candidates attempted to construct a full-scale diagram but there were some inaccuracies.

Answer: (a) (i) 56°
(ii) 124°

(b) 55°

(c) (i) 4 cm

Question 5

The question tested the candidates' ability to

- solve problems involving measures and money (including exchange rates)
- calculate compound interest as appreciation, depreciation and amount (for not more than three periods).

The question was attempted by approximately 85 per cent of the candidates, 53 of whom earned full marks. The mean mark was 1.87.

Most candidates were able to convert the US dollars to Eastern Caribbean dollars, but did not understand the concept of bank charges either as a fixed amount or as a percentage. In part (b), although a few candidates were able to find the value of the vase after one year, they were unable to complete the task for two or three years.

Answer: (a) (i) EC $19 190
(ii) Loss of EC $1 890

(b) (i) $441

Question 6

The question tested the candidates' ability to:

- Calculate the length of an arc of a circle using angles at the centre whose measures are factors of 360°
- Calculate the area of the region enclosed by a rectangle, a triangle, a parallelogram, a trapezium, a circle or any combination of them
- Calculate the areas of sectors of circles
- Convert from one set of units to another, given a conversion scale.

The question was attempted by 70 per cent of the candidates. Of these, 13 scored full marks. The mean mark was 1.18. Most candidates were able to write down the length of the line segment AD and to determine the perimeter of ABCDE. The areas of weak performance included finding the length of the sector CD, where at times the length of the arc was confused with the area of the sector. They also had difficulty recognising that the sector represented one-quarter of a circle. In addition, candidates failed to add the two correct measurements to find the area of the composite figure. Very few candidates were able to answer part (c) where they were required to find the actual area given the scale.

Answer: (a) 12 cm

(b) (i) 11 cm
(ii) 35 cm
(iii) 73.5 cm^2

(c) 35m^2

Question 7

The question tested the candidates' ability to

- translate verbal phrases into algebraic symbols and vice versa
- solve linear equations in one unknown
- solve simultaneous linear equations in two unknowns algebraically.

The question was attempted by 81 per cent of the candidates. Of these, 44 scored full marks. The mean mark was 1.64. In 7 (a), the candidates selected and attempted to use appropriate methods to solve the simultaneous equations. However, the candidates tried to eliminate variables with different coefficients. In addition, candidates recognised that two values were required; hence they attempted to substitute the first value found to find a second value. In 7(b), parts (i) and (ii) were fairly well done. Candidates showed some understanding of writing algebraic expressions, however, they did not use the expressions obtained to find the equation needed in parts (iii) to (v).

Answer: (a) $x = -2$ and $y = 3$ (b) (i) \$(12 + x)
(ii) \$(2 + x)
(iii) $12 + x = 3(2 + x)$
(iv) $x = 3$
(v) \$3.00

Question 8

The question tested the candidates' ability to

- use Pythagoras' Theorem to solve simple problems
- use simple trigonometrical ratios to solve problems based on measures in the physical world related to heights and distances.

The question was attempted by 62 per cent of the candidates. Of these, 55 scored full marks. The mean mark was 1.40. A few candidates were able to draw the position of the ladder and show the horizontal angle. Generally, students were unable to complete a number of processes including selecting the correct ratio to calculate the height and distance. In cases where the correct ratio was selected, candidates had difficulty evaluating the expression to find the unknown angle as in part (c). In fact, many candidates did not attempt part (c).

Answer: (b) (i) 2.6 m
(ii) 2.3 m

(c) 30°

Question 9

The question tested the candidates' ability to

- construct a simple frequency table for a given set of data
- draw and use a histogram
- determine the range for a set of data
- determine experimental probability of simple events

The question was attempted by 91 per cent of the candidates. Of these, 7 scored full marks. The mean mark was 3.53.

The candidates were able to complete the frequency table, identify the modal mark and draw the correct heights for the bars on the histogram, however, the histogram was sometimes drawn as a bar graph or a line graph and the boundaries were not used in constructing the histogram. Candidates also experienced difficulty calculating the median mark and the range, and did not express the probability as a fraction.

Answers: (b) (i) 5 marks
(ii) 4 marks
(iii) (7 – 1) or 6 marks

(d) $\frac{4}{25}$

Question 10

The question tested the candidates' ability to

- interpret data presented as in a line graph
- recognise the gradient of a line as the ratio of the vertical rise to the horizontal shift
- determine the equation of a line given the gradient and one point on the line

The question was attempted by 85 per cent of the candidates. Of these, 5 scored full marks. The mean mark was 2.47.

Candidates failed to read the values from the graph to determine the solutions to parts (a), (b) and (c), although a few candidates were able to answer (a)(i) and (b) correctly. Some candidates knew the basic form of an equation and substituted their values of the gradient and y intercept. Candidates expressed the gradient as a ratio of two numbers but without reference to the given scale. Candidates did not see the link between the equation and determining the cost in part (f). Instead, they used a variety of incorrect approaches.

Answer: (a) (i) \$70.00
(ii) \$51.00

(b) 100 km

(c) \$20.00

(d) $\frac{\$0.20}{\text{km}}$

(e) $y = 0.20x + 20$

(f) \$86.00