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 EXAMINATIONS MAY/JUNE 2009

MATHEMATICS

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GENERAL AND BASIC PROFICIENCY EXAMINATIONS

MAY/JUNE 2009

GENERAL COMMENTS

The General Proficiency Mathematics examination is offered in January and May/June each year, while the Basic Proficiency examination is offered in May/June only. This is the last year that Mathematics would be offered at the Basic Proficiency level.

In May/June 2009 approximately 91 370 candidates registered for the General Proficiency examination. The candidate entry for the Basic Proficiency examination was approximately 2 600.

At the General Proficiency level, approximately 41 per cent of the candidates achieved Grades I – III. Thirty-seven per cent of the candidates at the Basic Proficiency level achieved Grades I – III.

DETAILED COMMENTS

General Proficiency

There was an overall improvement in the performance of the candidates in the 2009 examination with 8.8 per cent of the candidates achieving Grade I compared with 7.8 per cent in 2008 and 5.3 per cent in 2007. In 2009, six candidates scored the maximum mark on the overall examination and 32 per cent scored at least half the available marks.

Paper 01- Multiple Choice

Paper 01 consisted of 60 multiple-choice items. This year, 110 candidates each earned the maximum available score of 60 and approximately 55 per cent of the candidates scored 30 marks or more.

Paper 02 - Essay

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

This year, eighteen candidates each earned the maximum available mark of 120 on Paper 02 and approximately 23 per cent of the candidates earned at least 60 marks on this paper.

Compulsory Section

Question 1

This question tested the candidates' ability to:

- perform the basic operations with fractions
- evaluate simple square roots
- express a number in standard form
- solve problems associated with wages and overtime

The question was attempted by 91 per cent of the candidates, 8 per cent of whom earned the maximum available mark. The mean mark was 6.2 out of 12.

In part (a), the majority of the candidates correctly obtained the common denominator for adding the fractions, but were unable to convert the fractions to equivalent fractions. In addition, the mixed numbers were correctly converted to improper fractions but problems were experienced completing the division. Candidates also experienced challenges determining the square root.

Most of the candidates correctly calculated the hourly rate paid in part (b). However, they could not use this hourly rate to determine the overtime time wage since most candidates did not translate "time and a half" to mean multiplication by $1\frac{1}{2}$.

Solutions**:**

(a) (i) $\frac{29}{48}$ (ii) 3.2×10^{-2}

(b) (i) \$14.00 (ii) \$210.00 (iii) \$875.00

Recommendations

Teachers should allow for more practice with the basic operations involving fractions, incorporating the use of the calculator as a tool. Further practice is also needed in problems involving wages, salaries and overtime.

Question 2

This question tested candidates' ability to:

- factorize algebraic expressions
- solve worded problems using two simultaneous equations

The question was attempted by 91 per cent of the candidates, 3 per cent of whom earned the maximum available mark. The mean mark was 5.1 out of 12.
For the factorizations in part (a), the candidates were able to identify the common factors after grouping and to choose the common factor when factorizing the binomial. However,

many candidates were unable to work with the directed numbers and to factorize the quadratic expression.

In part (b), the majority of candidates correctly formulated the pair of simultaneous equations from the worded statement and selected an appropriate strategy for solving the equations, but could not follow through to obtain the final solutions.

Solutions:

(a) (i) $(a - b)(2x + 3y)$ (ii) $5(x - 2)(x + 2)$ (iii) $(3x - 5)(x + 3)$

(b) (i) $x + 2y = 8$ and $3x + y = 9$

(ii) A pack of biscuits costs \$2.00
A cup of ice cream costs \$3.00

Recommendations

Teachers are advised to constantly review the basic operations on directed numbers, encouraging problem solving at all stages.

Question 3

Recommendations

Greater attention should be given to writing and simplifying expressions for phrases associated with subsets and intersecting sets of Venn diagrams.

When constructing polygons, students are reminded to use large arcs and pencils with well-sharpened points to reduce construction errors. Adequate knowledge of the properties of shapes is also essential.

Question 4

This question tested candidates' ability to:

- calculate the distance travelled in a given time period
- determine elapsed time
- determine average speed
- measure the distance between two points
- convert between actual and scale measurements

The question was attempted by 83 per cent of the candidates, 2 per cent of whom earned the maximum available mark. The mean mark was 3.5 out of 11.

The responses to this question were generally unsatisfactory. In part (a), the candidates had difficulty calculating the distance travelled and the time elapsed, using the values given in the table. Consequently, very few candidates correctly calculated the average speed.

The majority of the candidates were able to correctly measure the distance on the map in part (b). However, challenges were experienced converting between units, using the given scale to determine the actual distance and calculating a distance on the map given the actual distance.

Solutions:

(a) (i) 126 km	(ii) 630 km/hr	
(b) (i) LM = 7 cm	(ii) 3.5 km	(iii) 9 cm

Recommendations

Teachers should ensure that students know how to take accurate measurements using a ruler. Further practice in scale drawing should be gained by using scales to represent actual measurements in the environment. Charts and other relevant classroom resources that may assist with measurement skills should also be prominently displayed in the classroom.

Question 5

This question tested candidates' ability to:

- interpret and make use of functional notation
- complete a table of values for a quadratic function
- draw the graph of a quadratic function

The question was attempted by 86 per cent of the candidates, 10 per cent of whom earned the maximum available mark. The mean mark was 5.8 out of 12.

In part (a), the majority of the candidates were able to determine the value of the simple function by substituting correctly. However, the majority of the candidates could not determine the inverse of the function or compute the composite function. Composite was misinterpreted to mean a combination of two functions hence for $f(x) = 2x - 5$ and $g(x) = x^2 - 31$, the composite *gf* was written as $2x - 5 + x^2 - 31$, $(2x - 5)(x^2 - 31)$ or some other combination. Some candidates knew the concept of a composite, but performed the operations in the incorrect order, calculating *fg(1)* instead of *gf(1)*.

In part (b), some candidates had difficulty determining the unknown values in the table although, in some cases, the known value was correctly substituted into the equation. However, most of the candidates were able to plot the points correctly, resulting in a parabola with a minimum. The following challenges were noted and are not expected of candidates at this level:

- Inconsistent labelling of the scale
- Incorrect placement of the positive and negative axes
- Plotting both negative and positive coordinates in the same quadrant

Solutions**:**

(a) (i) –9 (ii) –22 (iii) 4

(b)

x	–3	1
y	0	0

Recommendations

Teachers are reminded that the basic knowledge of directed numbers, substitution, transposing of equations as well as scaling and drawing of axes is essential for work in functions and graphs. These areas should therefore be covered before graphical work commences.

The concept of what is a composite function and how to form such a function needs to be addressed. With respect to the inverse of functions, students need more practice in changing the subject of the formula.

Question 6

This question tested candidates’ ability to:

- describe fully a given transformation
- reflect a given triangle in a mirror line

The question was attempted by 65 per cent of the candidates, 3 per cent of whom earned the maximum available mark. The mean mark was 2.5 out of 10.

The performance on this question was unsatisfactory. While many candidates correctly described the transformation in (a) (i) as a translation or a slide, they were unable to state the column vector for the translation. Similarly, they recognized that the transformation in (a) (ii) was a rotation but specifying the angle, centre and degree of rotation proved problematic.

In part (b), there were instances where the candidates did not use the specified mirror line, y = x, but instead reflected the triangle in the y-axis.

Solutions:

(a) (i) Translation, Column vector $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$

(ii) Rotation, centre (0, 0), 90 clockwise.

(b) (1,2), (1,5), (3,5)

Recommendations

Teachers need to employ practical means of teaching transformations and to provide sufficient avenues for practice in both performing the transformations as well as recognizing them.

The correct use of mathematical terms must be encouraged when descriptions of transformations are required.

Question 7

This question tested candidates' ability to:

- complete a cumulative frequency table for grouped data
- draw a cumulative frequency curve
- use a cumulative frequency graph to estimate the median
- determine the proportion of a sample below a given value
- determine the probability of an event

The question was attempted by 80 per cent of the candidates, 3 per cent of whom earned the maximum available mark. The mean mark was 4.9 out of 12.

Candidates were generally able to complete the cumulative frequency table and construct the cumulative frequency curve. There were a few instances where candidates plotted the time versus the frequency instead of the cumulative frequency. In a number of cases, the candidates did not use the graph to determine the estimates as instructed, but attempted to calculate the values using other means.

Solutions:

(a) Cumulative frequencies: 4, 11, 22, 40, 62, 72, 77, 80

(c) (i) 20.5 minutes (ii) 70 (iii) $\frac{26}{80}$

Recommendations

Opportunities should be given for students to compare different types of graphs and to read and interpret information from drawn graphs.

Students should be exposed to the different ways of calculating statistical averages for both group and discrete data.

Teachers are encouraged to include a variety of stimulus material on classroom tests, to better prepare students for the formats used in external examinations.

Question 8

This question tested candidates' ability to:

- draw the fourth pattern in a sequence of shapes
- use the investigative approach to make inferences and generalizations

The question was attempted by 80 per cent of the candidates, 22 per cent of whom earned the maximum available mark. The mean mark was 5.4 out of 10.

Most of the candidates correctly drew the next diagram in the sequence and completed the corresponding row in the table. However, failure to recognize the pattern resulted in an inability to complete the additional rows correctly.

Solutions:

Diagram Number	**Number of Unit Squares**	**Pattern**
4	25	$4^2 + 3^2$
10	181	$10^2 + 9^2$
15	421	$15^2 + 14^2$

Recommendations

Teachers should provide students with more opportunities to practice investigative problems. In addition, students should be taught how to recognize patterns and relationships.

Question 10

This question tested candidates' ability to:

- translate verbal statements into algebraic inequalities
- draw graphs of linear inequalities in one or two variables
- use linear programming techniques to solve problems involving two variables

The question was attempted by 33 per cent of the candidates, 3 per cent of whom earned the maximum available mark. The mean mark was 3.2 out of 15.

Candidates were generally able to write the inequalities with one variable such as $y \leq x$ and $y \geq 5$. The correct scales were used on the graph and the horizontal line $y = 5$ drawn, but there were challenges drawing the lines representing the other inequalities. Candidates had difficulty locating the correct region representing the solution set but were able to state the coordinates of the vertices of *their* enclosed region and to test the coordinates with *their* profit function. Very few candidates correctly stated the maximum profit gained.

Solutions:

(a) (i) $y \leq x$ (ii) $150x + 300y \leq 4500$ (iii) $y \geq 5$

(b) (iii) (5, 5), (10, 10), (20, 5)

(c) (i) $P = 60x + 100y$ (ii) \$1700.00

Recommendations

Students need more practice translating from everyday statements to algebraic statements, with an emphasis on inequalities. In addition, more practice is recommended in drawing the lines of a region, identifying the region represented by an inequality and testing points to ensure that they satisfy the given inequality.

Question 11

This question tested candidates' ability to:

- solve problems using the angle theorems related to the properties of a circle
- use simple trigonometric ratios to solve problems based on measures in the physical world
- solve problems involving bearings

The question was attempted by 25 per cent of the candidates, 1 per cent of whom earned the maximum available mark. The mean mark was 2.9 out of 15.

Most of the candidates had a good knowledge of the circle theorems but made computational errors, resulting in incorrect answers. Two of the theorems which candidates did not apply correctly were:

Recommendations

In teaching this topic, teachers should emphasize the difference between latitude and longitude and review the cardinal points. Also, whenever possible, use three-dimensional objects such as globes and other spheres to help students understand the concepts.

Question 13

This question tested candidates' ability to:

- add vectors
- combine vectors written as 2 × 1 column matrices
- use vectors to represent and solve problems in geometry

The question was attempted by 14 per cent of the candidates, 1 per cent of whom earned the maximum available mark. The mean mark was 3.8 out of 11.

Some of the candidates had great difficulty expressing a vector using position vectors. A few candidates drew the given position vectors on graph paper and read the required vectors from the diagram. The main challenge with expressing AB as a vector was recognizing that **OA** = □ **AO**.

In part (b), writing $\overrightarrow{AB}$ and $\overrightarrow{AC}$ in terms of **a** and **b** was fairly well done. However, the route for $\overrightarrow{DC}$ and $\overrightarrow{DX}$ proved challenging for some candidates and hence the geometrical relationships between *DX* and *DC* or between the points *D*, *C* and *X* could not be determined.

Solutions:

(a) (i) $\begin{pmatrix}6\\-3\end{pmatrix}$; $\begin{pmatrix}2\\-1\end{pmatrix}$ (ii) $\begin{pmatrix}0\\4\end{pmatrix}$

(b) (i) a) -3**a** + **b** b) $\frac{1}{2}$ (-3**a** + **b**)

c)) $\frac{1}{2}$ (-**a** + **b**) d) 2(-**a** + **b**)

(ii) |**DX**| = 4|**DC**|; DX is parallel to DC

(iii) D, C and X lie on a straight line.

Recommendations

Teachers need to place greater emphasis on practical situations involving vectors. The use of the correct notation and the terminology specific to vectors is also important.

Question 14

This question tested candidates' ability to:

- determine the 2 × 2matrix associated with given transformations
- determine the 2 × 2 matrix representation of the single transformation which is the equivalent of two transformations
- obtain the inverse of a non-singular 2 × 2 matrix
- use matrices to solve simple problems in algebra

The question was attempted by 33 per cent of the candidates, less that 1 per cent of whom earned the maximum available mark. The mean mark was 3.8 out of 15.

In part (a), a number of candidates expressed $x \times x$ as $2x$ instead of x^2**.** Where the equation was set up correctly to determine the values of x, the majority of the candidates omitted the negative root of the quadratic equation.

Candidates generally knew the procedure for finding the single matrix to represent the combined transformation. However, errors made included adding the matrices instead of multiplying and expressing the image point as a column vector instead of a coordinate.

In part (c), although the candidates knew how to find the inverse of the matrix and express the simultaneous equations in matrix form, some proceeded to solve the simultaneous equations using non-matrix methods.

Solutions:

(a) x = ± 5

(b) (i) $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ (ii) (2, -5)

(c) (i) $\frac{1}{17}\begin{pmatrix} 5 & 1 \\ -2 & 3 \end{pmatrix}$ (ii) x = 2, y = 1

Recommendations

Students need more practice in computations involving matrices and the order of multiplying matrices. It is also important to recognize the matrices associated with various transformations.

DETAILED COMMENTS

Basic Proficiency

Paper 01- Multiple Choice

Paper 01 consisted of 60 multiple-choice items. This year, no candidate earned the maximum available score of 60. The highest score of 57 was earned by 2 candidates and approximately 53 per cent of the candidates scored 30 marks or more.

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. Thirteen per cent of the candidates earned at least half the total marks on this paper.

Question 1

This question tested candidates' ability to:

- perform the basic operations with rational numbers
- convert between currencies
- solve problems involving the averages

The question was attempted by 97 per cent of the candidates, 4 per cent of whom scored the maximum available mark. The mean mark was 3.4 out of 10.

In part (a), candidates were able to convert the mixed numbers to improper fractions and knew that the divisor had to be inverted and then multiplied when dividing two fractions. A significant number of candidates, having found the lowest common multiple were unable to find the corresponding numerator.

In part (b), candidates knew that they had to divide JM$2000 by US$70.50. However, most of the candidates did not give their answer correct to 2 decimal places. Some responses included 0.2836, 28.4 and 28.368.

In part (c), candidates were unable to find the total mass given the average mass and number of men. Although the candidates demonstrated that they knew how to find the average mass, they were unable to find the mass of the 10 men as they did not recognize that they first had to subtract the captain's mass from the total mass of the 11 men.

Solutions:

(a) $\frac{2}{3}$

(b) US $28.37

(c) (i) 770 kg (ii) 68 kg

Recommendations

Teachers need to pay greater attention to the following content:

- The conversion of mixed numbers into fractions
- Calculating equivalent fractions
- Approximating decimal numbers
- Problem solving involving the mean

Question 2

This question tested candidates' ability to:

- use the laws of indices to simplify expressions with integral powers
- substitute numbers for algebraic symbols in simple algebraic expressions
- perform arithmetic operations on integers
- solve a simple linear equation in one unknown

The question was attempted by 95 per cent of the candidates, 2 per cent of whom scored the maximum available mark. The mean mark was 3.4 out of 10.

Most candidates were able to evaluate the value of the coefficients (8×3)/12. They were, however, unable to manipulate or apply the laws associated with indices. For example, quite a few interpreted $x^5 \times x^2$ as x^{10} or $\frac{x^7}{x^4}$ as x^{11}.

Several candidates were able to make an accurate substitution in the formula at part (b) for m=3, n= – 4, but evaluated 3 × (– 4) as 3 – 4 = –1 and $(-4)^2$ as –16.

In part (c), a number of candidates were unable to transpose correctly while trying to solve the equation. For example, a large number wrote $\frac{2}{3}x + \frac{1}{2}x$. Of those who were able to simplify the equation before solving, they gave incomplete results such as $\frac{4-3}{6} = \frac{1}{6}$, instead of $\frac{4x-3x}{6} = 1$.

Solutions:

(a) $2x^3$

(b) 4

(c) 6

Recommendations

Students need to be exposed to more practice exercises in basic algebra, including developing algebraic expressions based on situations taken from authentic scenarios.

Question 3

This question tested candidates' ability to:

- calculate the profit given the selling price and the cost price
- calculate the discount and sale price of an item
- solve simple problems involving payments by installments as in the case of hire purchase.

The question was attempted by 97 per cent of the candidates, 7 per cent of whom scored the maximum available mark. The mean mark was 4.4 out of 10.

The majority of candidates showed a fairly good understanding of profit although many failed to go further and express the profit as a percentage of the cost price. The candidates also demonstrated a good knowledge of discount and sale price but did not express their answers using the accepted convention for money. For example, some responses frequently written were $19.8, and $90.2.

In part (b), candidates demonstrated limited knowledge of hire purchase. Many candidates did not subtract the deposit from the total hire purchase cost to find the total to be paid by monthly installments. Instead, they divided the total hire purchase cost of $4064.00 by 24.

Solutions:

(a) (i) $40 (ii) 57.1% (iii) a) $19.80 b) $90.20

(b) $148.50

Recommendations

Students should be constantly reminded that although money is a decimal quantity, it must be expressed using two decimal places.

Consumer Arithmetic should be taught using problem solving and investigation, developing problems based on the experiences of the students.

Question 4

This question tested candidates' ability to:

- solve simultaneous linear equations in two unknowns algebraically
- translate verbal phrases into algebraic symbols
- solve word problem using linear equations in one unknown

The question was attempted by 92 per cent of the candidates, 5 per cent of whom scored the maximum available mark. The mean mark was 2.7 out of 10.

A number of candidates attempted to solve part (a) by the method of elimination and thus they knew they had to equate the co-efficients of one of the variables. They, however, had difficulties adding or subtracting the two equations to eliminate one of the variables.

To solve part (b), candidates frequently employed the method of trial and error and were often able to obtain the correct solution. Those candidates who attempted to solve the problem algebraically generally experienced difficulties forming the algebraic expressions and formulating the equation needed to solve the problem.

Solutions:

(a) x =2, y =1

(b) (i) $(x + 24) (ii) a) 2x + 24 = 84 b) x = 30

Recommendations

Teachers are encouraged to give students more practice writing algebraic expressions from verbal phrases and vice versa. In addition, students should be exposed to more than one strategy for solving simultaneous equations, highlighting which strategy is most appropriate in a given situation.

Question 5

This question tested candidates' ability to:

- calculate the simple interest and time taken to earn interest
- solve problems involving utility bills

The question was attempted by 88 per cent of the candidates, 3 per cent of whom scored the maximum available mark. The mean mark was 3.2 out of 10.

The majority of the candidates showed limited knowledge of simple interest. Most of the candidates used the time period as 18 (months) in the simple interest equation instead of converting the months to years. Similarly, in part (a) (ii), the time required to earn the interest was recorded as 5 months instead of 5 years.

In part (b), while most of the candidates were able to determine the previous reading on the meter, it was not recognized that the fuel and energy charges were *per kWh* and so the candidates did not multiply by the number of kWh used. Further, the fixed charge was not included in the total bill.

Solutions:

(a) (i) $600 (ii) 5 years

(b) (i) 5 913 kWh (ii) $226.80 (iii) $118.80 (iv) $370.60

(v) $18.53 (vi) $352.07

Recommendations

The teaching of the concepts Simple Interest and Utility Bills should be enhanced with the inclusion of resources such as actual utility bills, bank and credit union statements. This would provide the students with additional practice as well as authentic scenarios where knowledge of the content would be an asset.

Question 6

This question tested candidates' ability to:

- use instruments to draw and measure angles and line segments
- use instruments to draw a quadrilateral
- solve geometric problems using the properties of polygons, lines and angles

The question was attempted by 82 per cent of the candidates, less than 1 per cent of whom scored the maximum available mark. The mean mark was 5.1 out of 10.

Most of the candidates demonstrated the ability to draw accurate line segments. They were also able to use the protractor to measure 90˚ angles. Nevertheless, many candidates experienced difficulty in arriving at an obtuse value for angle NML. Many of them gave the value as 56˚ instead of 124˚. The candidates were also unable to give an appropriate reason to explain why KL and NL were parallel and not many were able to accurately identify quadrilateral KLMN as a trapezium.

Solutions:

(b) (i) LM= 7.2 ± 0.1 cm (ii) angle NML = 124^{O}

(c) KL is parallel to MN because co-interior angles are supplementary

(d) Trapezium

Recommendations

Students need more practice in constructing accurate diagrams of polygons using the geometrical tools. In addition, this should be complemented with a basic knowledge of the properties of angles and simple polygons.

Question 7

This question tested candidates' ability to:

- calculate the circumference of a circle
- calculate the length of an arc of a circle
- calculate the perimeter of a polygon
- solve problems involving time, distance and speed

The question was attempted by 75 per cent of the candidates, 2 per cent of whom scored the maximum available mark. The mean mark was 1.8 out of 10.

Candidates were generally able to identify and state the correct formulae for finding the circumference of a circle and the length of the minor arc. However, errors were made in substituting the values into the formulae, resulting in incorrect answers. Some candidates incorrectly determined the perimeter of the closed field as the circumference minus the length of minor arc, thereby excluding two sides of the field.

In part (b), candidates generally knew that Speed = $\frac{Distance}{Time}$, that 1 minute and 30 sec was equivalent to 90 seconds and were able to calculate the speed of the athlete.

Solutions:

(a) (i) 396 m (ii) 99 m (iii) 423 m
(b) 4.7 ms^{-1}

Recommendations

Teachers must place more emphasis on the correct use of mathematical symbols, terms and formulae. More practice is required in the correct substitution into formulae to achieve the desired results.

Question 8

This question tested candidates' ability to:

- state the co-ordinates of two points in the Cartesian plane
- define translations in a plane and recognize them when applied
- locate the image of an object under a reflection

The question was attempted by 83 per cent of the candidates, 1 per cent of whom scored the maximum available mark. The mean mark was 2.0 out of 10.

Most of the candidates were able to write down the coordinates of the points A and A' although some wrote these as column vectors. In addition, some candidates did not recognize the transformation in part (b) as a translation nor could they fully describe the translation.

Some candidates experienced difficulty reflecting the image in the given mirror. Challenges encountered included indentifying the correct mirror line and ensuring that the object and the image were equidistant from the mirror line.

Solutions:

(a) A (-3, -2); A' (2, 4)

(b) Translation by the vector $\binom{5}{6}$

Recommendations

Students should be given more practice in identifying and describing transformations when the object and the image are given.

Question 9

This question tested candidates' ability to:

- read and interpret graphs of simple non-linear functions
- find by drawing and/or calculation, the gradient and intercepts of a graph of a linear function
- determine the equation of a line

The question was attempted by 61 per cent of the candidates, less than 1 per cent of whom scored the maximum available mark. The mean mark was 3.4 out of 10.

In part (a), although the majority of candidates correctly stated the y-value for a given x-value, they were not able to state the x-value given the y-value.

Some candidates calculated the gradient of the line as $\frac{change\ in\ x}{change\ in\ y}$ instead of $\frac{chnage\ in\ y}{change\ in\ x}$.

Although some candidates correctly stated the general equation of a straight line as 'y = mx + c', most of the candidates could not determine the gradient or y-intercept to complete the equation.

In parts (b) (iii) and (iv), candidates could not relate the gradient to the line AB to the gradient of a line perpendicular to it. As a result, the equation of the perpendicular line could not be determined.

Solutions:

(a) (i) y = 0.5 (ii) x = 2.3

(b) (i) -1 (ii) y = -x + 3 (iii) (3,0) (iv) y = x

Recommendations

Teachers are advised that exponential and other types of non-linear graphs are not be taught in an abstract context, but as they relate to real-life experiences.

Question 10

This question tested candidates' ability to:

- construct a simple frequency table
- draw and use histograms
- calculate the mean for a set of data
- determine experimental and theoretical probability of simple events

The question was attempted by 94 per cent of the candidates, 1 per cent of whom scored the maximum available mark. The mean mark was 3.4 out of 10.

Candidates demonstrated competence completing the frequency table and determining the total number of students in the Computer Club.

Challenges were experienced finding the mean age of the students and calculating the probability of a student being twelve years old or younger. Some candidates attempted to find the probability that a student would be exactly twelve years old.

Solutions:

(a)

Age (years)	10	12
Frequency	4	15

(b) 55 students

(c) 12.5 years

(d) Javed is 13 years old

(e) $\frac{31}{55}$

Recommendations

Teachers need to expose students to more exercises involving the mean of a grouped frequency distribution. Teachers must also ensure that students are familiar with the terms used in probability and statistics.