TEST CODE **01234020/SPEC**

FORM TP 01234020/SPEC

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

MATHEMATICS

SPECIMEN PAPER

Paper 02 – General Proficiency

2 hours and 40 minutes

INSTRUCTIONS TO CANDIDATES

1. This paper consists of **TWO** sections.
2. There are **EIGHT** questions in Section I and **THREE** questions in Section II.
3. Answer ALL questions in Section I, and any TWO from Section II.
4. Write your answers in the booklet provided.
5. All working must be clearly shown.
6. A list of formulae is provided on page 2 of this booklet.
7. The overall total for Paper 02 is **120 marks**.

Required Examination Materials

Electronic calculator
Mathematical Instruments
Graph paper (provided)

LIST OF FORMULAE

Volume of a prism $V = Ah$ where A is the area of a cross-section and h is the perpendicular length.

Volume of a right pyramid $V = \frac{1}{3}Ah$ where A is the area of the base and h is the perpendicular height.

Circumference $C = 2\pi r$ where r is the radius of the circle.

Area of a circle $A = \pi r^2$ where r is the radius of the circle.

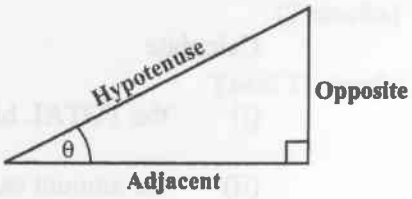
Area of trapezium $A = \frac{1}{2}(a + b)\,h$ where a and b are the lengths of the parallel sides and h is the perpendicular distance between the parallel sides.

Roots of quadratic equations If $ax^2 + bx + c = 0$,

then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Trigonometric ratios

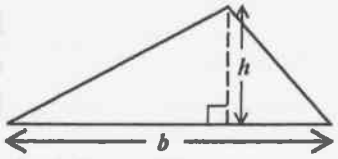
$$\sin\theta = \frac{\text{opposite side}}{\text{hypotenuse}}$$



$$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

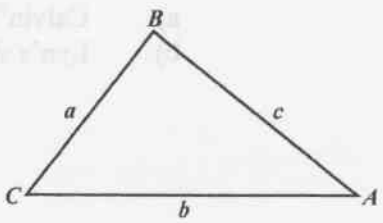
Area of triangle Area of $\Delta = \frac{1}{2}bh$ where b is the length of the base and h is the perpendicular height



Area of $\Delta ABC = \frac{1}{2}ab\sin C$

Area of $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

where $s = \dfrac{a+b+c}{2}$



Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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SECTION I

Answer ALL the questions in this section.

All working must be clearly shown.

1. (a) Calculate the exact value of:

$$\frac{1\frac{1}{3} + \frac{5}{6}}{1\frac{1}{3} \times \frac{5}{6}}$$

(3 marks)

(b) The cash price on a camera is $450.00. It can be bought on hire purchase by making a deposit of $90.00 and 12 monthly installments of $34.50 EACH.

Calculate

(i) the TOTAL hire purchase price of the camera **(2 marks)**

(ii) the amount saved by buying the camera at the cash price. **(1 mark)**

(c) Brent exchanged BD $200.00 for EC currency, using the exchange rate BD $1.00 = EC $1.35

(i) Calculate the amount he received in EC dollars. **(1 mark)**

Brent shared the amount of money he received among Pat, Calvin and Lyn.

Pat received $\frac{1}{3}$ of the amount.
Calvin received EC $108.00.
Lyn received the remainder.

(ii) Calculate

a) Calvin's share as a percentage of the total amount shared
b) Lyn's share as a fraction of the total amount shared.

(4 marks)

Total 11 marks

2. (a) Express as a single fraction:

$$\frac{5}{q} - \frac{p}{3}$$ **(2 marks)**

(b) If $a \blacklozenge b = 2p - 5q$, calculate the value of:

(i) $3 \blacklozenge 2$ **(1 mark)**

(ii) $(3 \blacklozenge 2) \blacklozenge 1$ **(2 marks)**

(c) Factorise completely:

(i) $4x^2 - 9$ **(2 marks)**

(ii) $mp + mq - np - nq$ **(2 marks)**

(iii) $2x^2 + 3xy + y^2$ **(2 marks)**

Total 11 marks

3. (a) Given the formula

$$V = \pi r^2 h$$

rearrange the formula to make r the subject of the formula. **(2 marks)**

(b) Solve the equation:

$$2x^2 + 3x - 2 = 0$$ **(3 marks)**

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(c) In a group of 35 students,

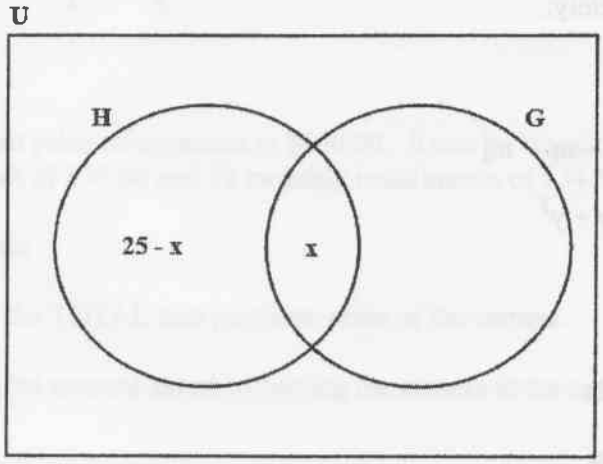
25 students passed History

15 students passed Geography

x students passed BOTH History and Geography

6 students passed neither History nor Geography.

(i) Copy and complete the Venn diagram below to illustrate this information.



(2 marks)

(ii) Write, in terms of x, an expression that represents the total number of students.

(1 mark)

(iii) Determine the number of students who passed BOTH subjects.

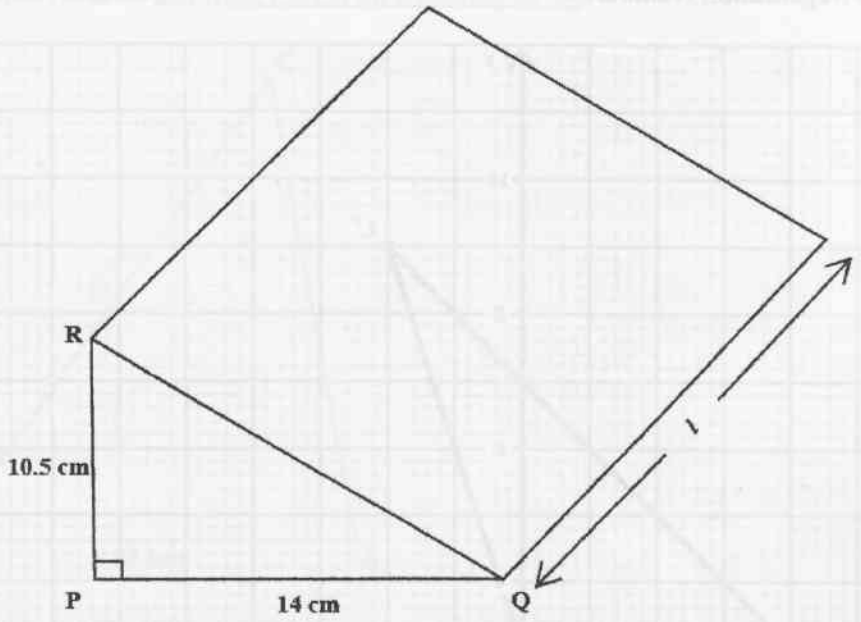
(2 marks)

Total 10 marks

4. (a) A map is drawn to a scale of 1:180 000. The actual distance between two towns shown on the map is 11.7 km. Calculate the distance between these two towns **as shown on the map.**

(3 marks)

(b) The diagram below, **not drawn to scale**, shows a wooden prism. The cross-section PQR, is a triangle with PQ = 14 cm, PR = 10.5 cm and < QPR = 90°.



(i) Calculate the area, in cm^2, of the cross-section PQR. **(2 marks)**

The volume of the prism is 1 470 cm^3.

(ii) Calculate the length of the prism *l*, in cm. **(1 mark)**

(c) (i) Using **a ruler, a pencil and a pair of compasses**, construct a trapezium ABCD in which AB = 8.0 cm, AD = 6.0 cm, CD = 5.0 cm, < BAD = 90° and < ADC = 90°.

(5 marks)

(ii) Measure and state the length of the side BC. **(1 mark)**

Total 12 marks

5. (a) **An answer sheet is provided for this question.**

The answer sheet shows triangle JKL and its image J′K′L′.

(i) Describe FULLY the transformation which maps triangle JKL onto its image J′K′L′.

(3 marks)

(ii) Show **on your answer sheet**, triangle J″K″L″, the image of J′K′L′ after a reflection in the line x = 3.

(3 marks)

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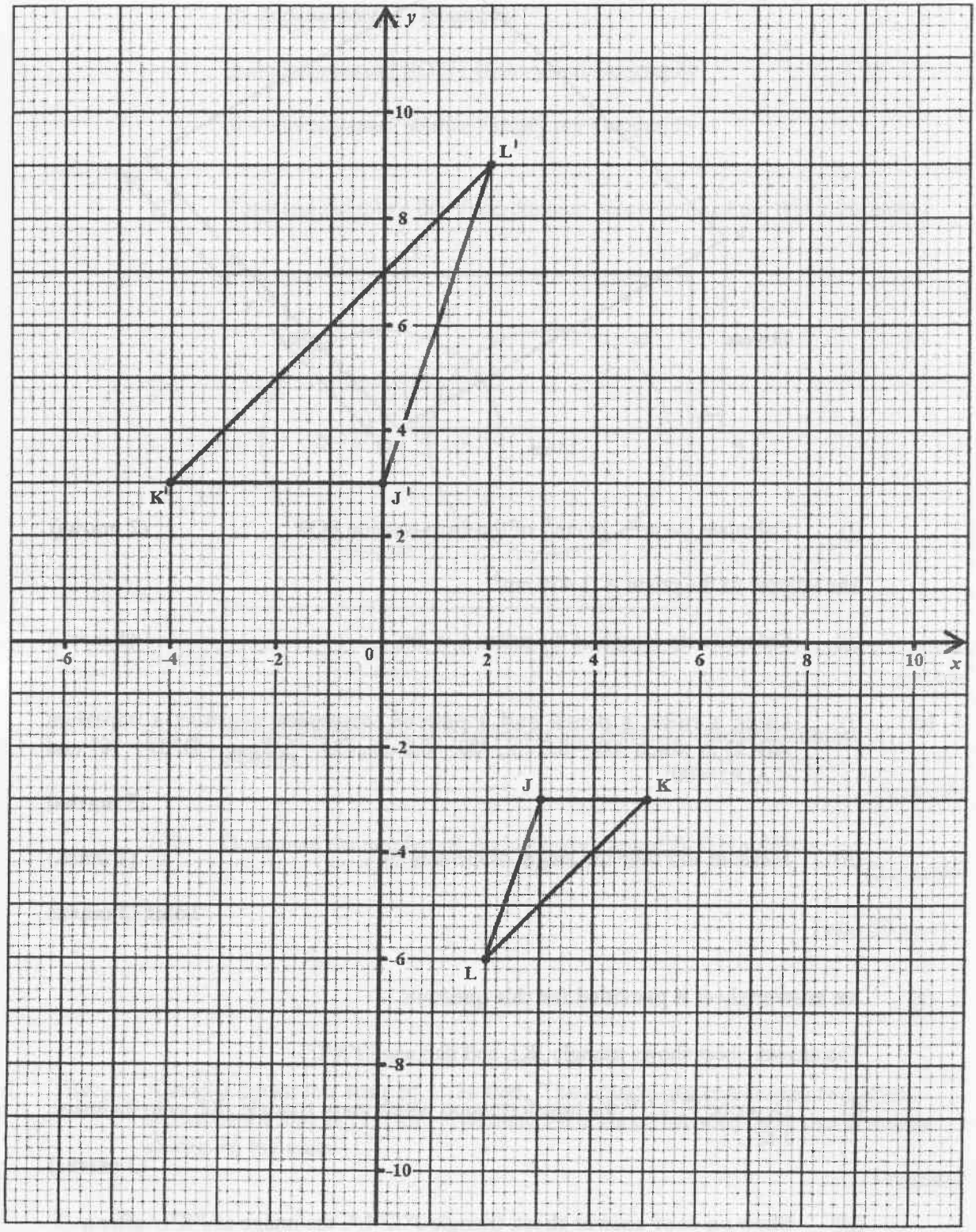
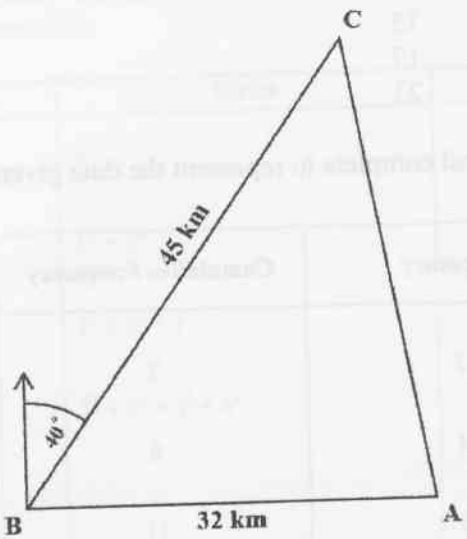
(To be attached in booklet with your other answers)

Candidates Registration Number: _____ Question Number:_____



The diagram below, **not drawn to scale**, shows the journey of a ship which sailed from Port A to Port B and then to Port C. Port B is located 32 km due West of Port A and Port C is 45 km from Port B on a bearing of 040°.



Calculate, giving your answers correct to 3 significant figures

(i) the distance AC **(3 marks)**

(ii) the bearing of Port C from Port A. **(3 marks)**

Total 12 marks

6. (a) The line segment BC passes through the point A(–5,3) and has a gradient of $\frac{2}{5}$.

(i) Express the equation of the line segment BC in the form $y = mx + c$. **(3 marks)**

(ii) Show that BC is parallel to the line $2x - 5y = 1$. **(2 marks)**

(b) The functions f and g are defined as:

$$f(x) = \frac{2x-1}{x+3} \qquad g(x) = 4x - 5$$

(i) Determine:

a) $g(3)$

b) $fg(2)$

c) $f^{-1}(x)$ **(7 marks)**

Total 12 marks

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7. The data below shows the time spent, to the nearest minute, by 25 students at a bookstore.

20	6	22	16	13
22	26	18	22	28
11	21	27	24	15
25	28	33	9	17
12	25	18	21	23

(a) Copy the frequency table below and complete to represent the data given above.

Time spent at the bookstore (minutes)	Frequency	Cumulative Frequency
6 – 10	2	2
11 – 15	4	6
_____	5	11
21 – 25	_____	20
26 – 30	4	_____
31 – 35	1	25

(4 marks)

(b) Using a scale of 2 cm on the x-axis to represent 5 minutes and 2 cm on the y-axis to represent 5 students, draw a cumulative frequency curve of the time spent at the bookstore.

(4 marks)

(c) **Use your graph** to estimate

(i) the median time spent at the bookstore

(1 mark)

(ii) the number of students who spent LESS than 24 minutes at the bookstore

(1 mark)

(iii) the probability that a student, selected at random, spent LESS than 24 minutes at the bookstore.

(2 marks)

Total 12 marks

8. The table below shows an attempt at calculating the sum of the cubes of the first **n** natural numbers. Information is missing from some rows of the table.

(a) Study the pattern and complete, **in your answer booklet**, the rows marked (i), (ii) and (iii).

	n	Series	Sum	Formula
	1	1^3	1	$\frac{1^2}{4}(1+1)^2$
	2	1^3+2^3	9	$\frac{2^2}{4}(1+2)^2$
	3	$1^3+2^3+3^3$	36	$\frac{3^2}{4}(1+3)^2$
	4	$1^3+2^3+3^3+4^3$	100	$\frac{4^2}{4}(1+4)^2$
(i)	5	_____	_____	_____
	6	$1^3+2^3+3^3+4^3+5^3+6^3$	441	$\frac{6^2}{4}(1+6)^2$
(ii)	_____		_____	$\frac{8^2}{4}(1+8)^2$
(iii)	n			_____

(6 marks)

(b) It was further noted that:

$1+2=\sqrt{9}=3$, $1+2+3=\sqrt{36}=6$ and $1+2+3+4=\sqrt{100}=10$.

Using information from the table above and the pattern in the three statements above, determine

(i) the value of x for which $1+2+3+4+5+6=\sqrt{x}$ **(1 mark)**

(ii) a formula in terms of **n** for the series: $1+2+3+4+\ldots+\mathbf{n}$ **(1 mark)**

(iii) the value of: $1+2+3+4+\ldots+30$. **(2 marks)**

Total 10 marks

SECTION II

Answer TWO Questions in this Section.

9. (a) Solve the pair of simultaneous equations:

$$x^2 = 4 - y$$

$$x = y + 2$$ **(5 marks)**

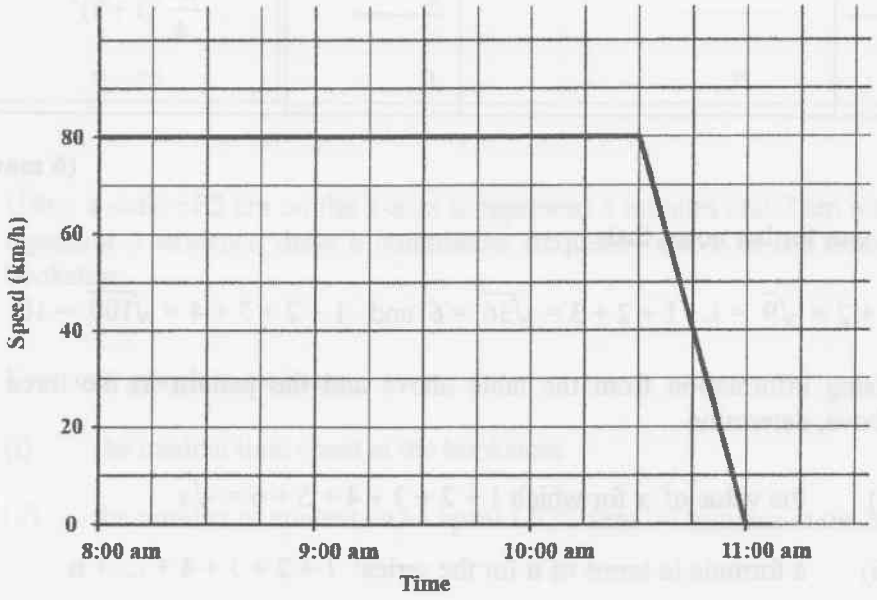
(b) (i) Express $3x^2 + 2x + 1$ in the form $a(x + p)^2 + q$ where a, p and q are real numbers. **(3 marks)**

(ii) Hence, determine for $f(x) = 3x^2 + 2x + 1$

a) the minimum value for $f(x)$

b) the equation of the axis of symmetry. **(2 marks)**

(c) The speed-time graph below shows the journey of a car from 8:00 am to 11:00 am.



Using the graph, determine

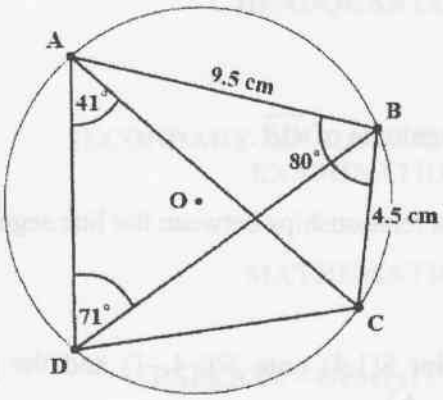
(i) the time at which the speed of the car was 40 km/h **(1 mark)**

(ii) the distance the car travelled for the entire journey **(2 marks)**

(iii) the average speed of the car for the entire journey. **(2 marks)**

Total 15 marks

10. (a) The diagram below, **not drawn to scale**, shows a quadrilateral ABCD with AB = 9.5 cm, BC = 4.5 cm, < ABC = 80°, <ADB = 71° and <DAC = 41°. The vertices of ABCD are on the circumference of a circle, center O, of radius 5 cm.



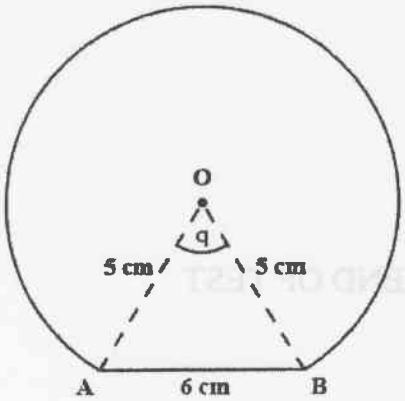
Determine, **giving reasons for each step** of your answer

(i) < CBD **(2 marks)**

(ii) <CAB **(2 marks)**

(iii) the length of the chord BD **(3 marks)**

(b) A machine produces circular discs of diameter 10 cm. The machine malfunctions and cuts a disc to produce the shape in the figure below, **not drawn to scale**, with center, O.



Use $\pi = 3.14$

Determine, **correct to three significant figures,**

(i) the measure of angle θ **(3 marks)**

(ii) the area of triangle AOB **(2 marks)**

(iii) the area of the disc that was cut off **(3 marks)**

Total 15 marks

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11. (a) The vertices of a quadrilateral, OPQR are (0,0), (4,2), (6, 10) and (2,8) respectively.

(i) **Using a vector method**, express in the form $\begin{pmatrix} x \\ y \end{pmatrix}$, the vector

a) $\overrightarrow{OP}$

b) $\overrightarrow{RQ}$ **(3 marks)**

(ii) Calculate $\left|\overrightarrow{OP}\right|$, the magnitude of $\overrightarrow{OP}$. **(2 marks)**

(iii) State TWO geometrical relationships between the line segments OP and RQ. **(2 marks)**

(b) The matrix, K, maps the point S(1,4) onto S′(−4,−1) and the point T(3,5) onto T′(−5,−3). Given that $K = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$,

(i) Express as a matrix equation, the relationship between

a) K, S and S′

b) K, T and T′. **(2 marks)**

(ii) Hence, determine the values of a, b, c and d. **(4 marks)**

(iii) Describe COMPLETELY the geometric transformation which is represented by the matrix K. **(2 marks)**

Total 15 marks

END OF TEST

MATHEMATICS
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KEY AND MARK SCHEME

Question 1

					A	B	C
(a)	$\dfrac{1\frac{1}{3}+\frac{5}{6}}{1\frac{1}{3}\times\frac{5}{6}}=\dfrac{\frac{13}{6}}{\frac{10}{9}}=1\frac{19}{20}$			(A1: CAO)	1	2	
					1	**2**	**--**
(b)	Cash price	=	\$450.00				
	Deposit	=	\$90.00				
	Installments	=	\$34.50 x 12			1	
		=	\$414.00				
(i)	Total hire purchase price	=	\$90 + \$414	FT			
		=	\$504				1
(ii)	Amount saved by buying cash:						
	\$504 – \$450 = \$54.00			FT			1
					--	**1**	**2**
(c) (i)	Brent received					1	
	EC \$(200.00 × 1.35)						
	=	EC\$270.00				1	
(ii) (a)	Calvin's share $= \dfrac{108}{270}\times 100$			FT	1		
	$= 40\%$						1
(b)	Lyn's share $= 1-\left(\dfrac{1}{3}+\dfrac{40}{100}\right)$			FT			
	$= \dfrac{4}{15}$			FT	1		
					2	**2**	**1**
					3	**5**	**3**

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KEY AND MARK SCHEME

Question 2

					A	B	C
(a)		$\frac{5}{q} - \frac{p}{3}$				1	
		$= \frac{15 - pq}{3q}$		**(A1: CAO)**	1		
					1	**1**	**--**
(b)	(i)	$3 \blacklozenge 2$	$= 2(3) - 5(2)$			1	
			$= -4$				
	(ii)	$(3 \blacklozenge 2) \blacklozenge 1$					
		$= -4 \blacklozenge 1$		**FT**			1
		$= 2(-4) - 5(1)$					
		$= -13$			1		
					1	**1**	**1**
(c)	(i)	$4x^2 - 9$					
		$= (2x-3)(2x+3)$		**(A1: CAO)**	1		1
	(ii)	$mp + mq - np - nq$					
		$m(p+q) - n(p+q)$					
		$(m-n)(p+q)$			1	1	
	(iii)	$2x^2 + 3xy + y^2$					
		$2x^2 + 2xy + xy + y^2$					
		$2x\ (x+y) + y(x+y)$					
		$(2x+y)(x+y)$				1	1
					2	**2**	**2**
					4	**4**	**3**

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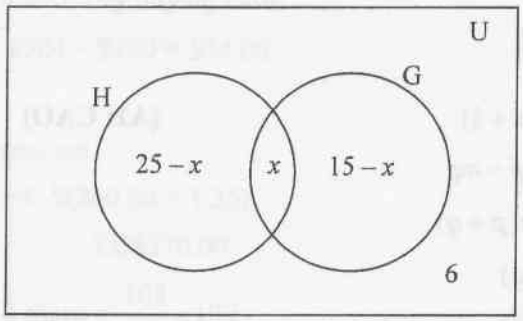
Question 3

			A	B	C
(a)	$V = \pi r^2 h$				
	$\frac{V}{\pi h} = r^2$			1	
	$r = \sqrt{\frac{V}{\pi h}}$			1	
			--	2	--
(b)	$2x^2 + 3x - 2 = 0$				1
	$(2x-1)(x+2) = 0$			1	
	$x = \frac{1}{2}$ or -2		1		
			1	1	1
(c)	(i)				1
			1		
(c)	(ii)	$25 - x + x + 15 - x + 6$	FT	1	
	(iii)	$46 - x = 35$			
		$x = 11$	FT		1
		11 students passed both subjects	1		
			2	1	2
			3	4	3

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KEY AND MARK SCHEME

Question 4

				A	B	C
(a)		1:180 000				
		$11.7\,km = 1\,170\,000\,cm$			1	
		$\frac{1\,170\,000}{180\,000}\,cm$ on the map				1
		$= 6.5\,cm$ on the map	CAO	1		
				1	**1**	**1**
(b)	(i)	Area of PQR $= \frac{14\,cm \times 10.5\,cm}{2}$			1	
		$= 73.5\,cm^2$		1		
		Volume = Area × length				
	(ii)	Length = $1470 \div 73.5$				
		= $20cm$	FT		1	
				1	**2**	**--**
(c)	(i)	Line segment AB		1		
		Line segment AD		1		
		Any right angle				2
		Completed shape		1		
	(ii)		BC = $6.7cm$ FT	1		
				4	**--**	**2**
				6	**3**	**3**

MATHEMATICS
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KEY AND MARK SCHEME

Question 5

				A	B	C
(a)	(i)	Transformation:				
		Enlargement			1	
		Scale factor – 2				1
		Centre: (2, –1)		1		
	(ii)	See graph paper		1	1	1
				2	**2**	**2**
(b)	(i)	$AC^2 = AB^2 + BC^2 - 2(AB)(BC)\cos\hat{B}$				1
		$= (32)^2 + (45)^2 - 2(32)(45)\cos 50°$			1	
		$= 1197.77$				
		$AC = 34.6km$	**FT**	1		
	(ii)	$\frac{45}{\sin\hat{A}} = \frac{34.6}{\sin 50°}$	**FT**			1
		or 85.1°			1	
		Bearing of C from A is				
		270° + 85.1° = 355.1°				1
				1	**2**	**3**
				3	**4**	**5**

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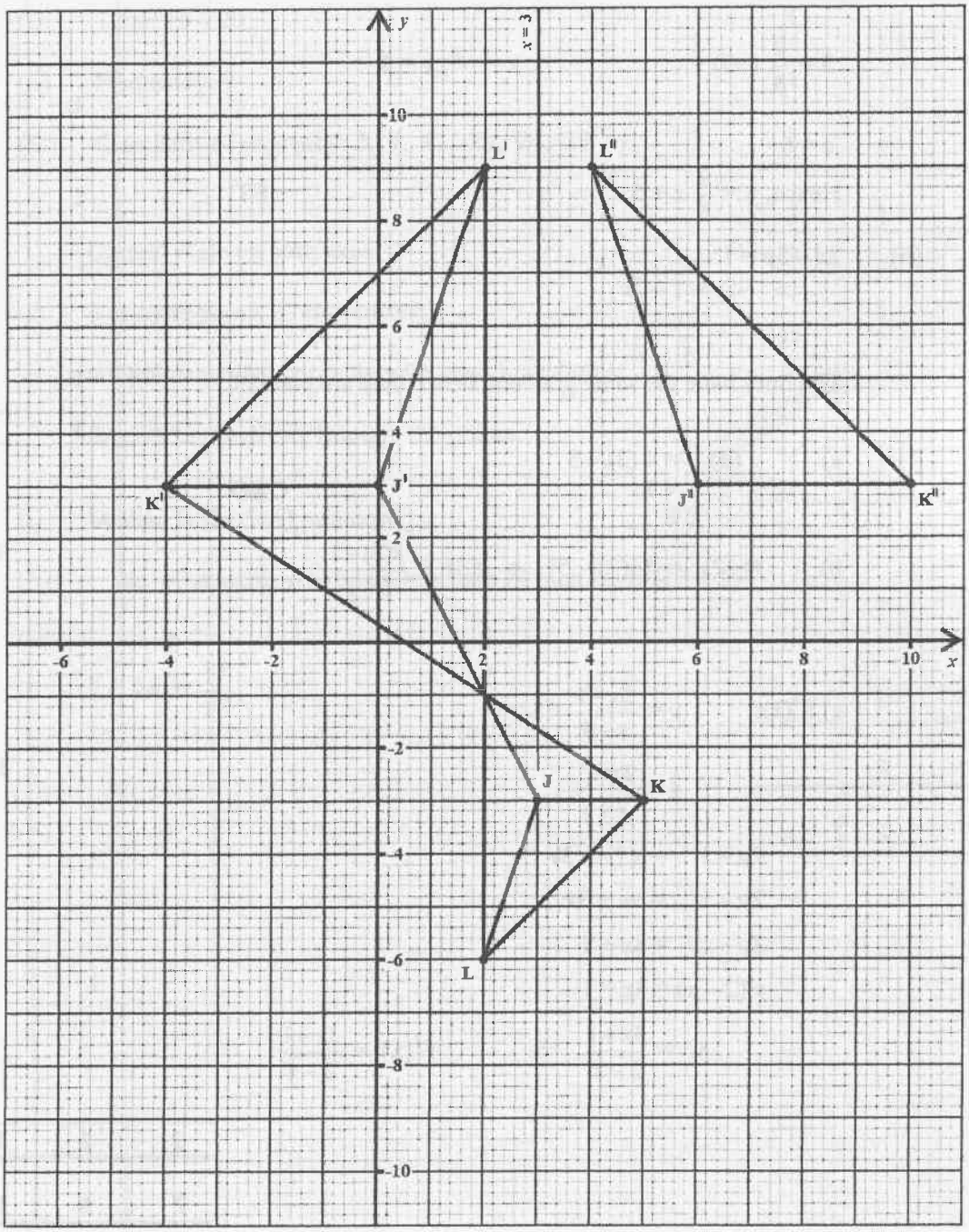
KEY AND MARK SCHEME

(To be attached in booklet with your other answers)

Candidates Registration Number: _____ Question Number: 5



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KEY AND MARK SCHEME

Question 6

				A	B	C
(a)	(i)	$y = mx + c$ $\quad A(-5, 3)$				
		$3 = \frac{2}{5}(-5) + c$ $\quad x = -5; y = 3$				1
					1	
		$c = 5$				
		Hence, $y = \frac{2}{5}x + 5$	FT		1	
	(ii)	$2x - 5y = 1$				
		$\Rightarrow -5y = 1 - 2x$				
		$\Rightarrow y = \frac{2x}{5} - \frac{1}{5}$				1
		The lines have the same gradient, hence they are parallel.			1	
				--	3	2
(b)	(i)	a) $g(3) = 4(3) - 5$				
		$= 7$	CAO	1		
		b) $fg(2) = f[4(2) - 5] = f(3) = \frac{2(3)-1}{3+3}$				1
		$= \frac{5}{6}$		1		
		c) $f^{-1}(x)$: $\quad y = \frac{2x-1}{x+3}$				
		$x = \frac{2y-1}{y+3}$				1
		$2y - 1 = x(y + 3)$			1	
		$2y - 1 = xy + 3x$				
		$2y - xy = 3x + 1$				
		$y(2 - x) = 3x + 1$			1	
		$y = \frac{3x+1}{2-x} \Rightarrow f^{-1}(x) = \frac{3x+1}{2-x}$				1
				2	2	3
				2	5	5

MATHEMATICS
PAPER 02 – GENERAL PROFICIENCY
KEY AND MARK SCHEME

Question 7

			A	B	C
(a)	(i)	Time: 16 – 20	1		
	(ii)	Frequency: 9	1		
	(iii)	Cumulative Frequency: 2, 6, 11, 20, 24, 25	1	1	
			3	**1**	**--**
(b)		Correct scale on both axes	1		
		3 or more points plotted correctly		1	
		All points plotted correctly with class boundaries			1
		Smooth curve drawn through the points			1
			1	**1**	**2**
(c)	(i)	Median is (21.5±1) minutes **FT**		1	
	(ii)	No. of students who spent less than 24 minutes is (17 ± 1) **FT**		1	
	(iii)	$P(<24) = \frac{17}{25}$		1	1
			--	**3**	**1**
			4	**5**	**3**

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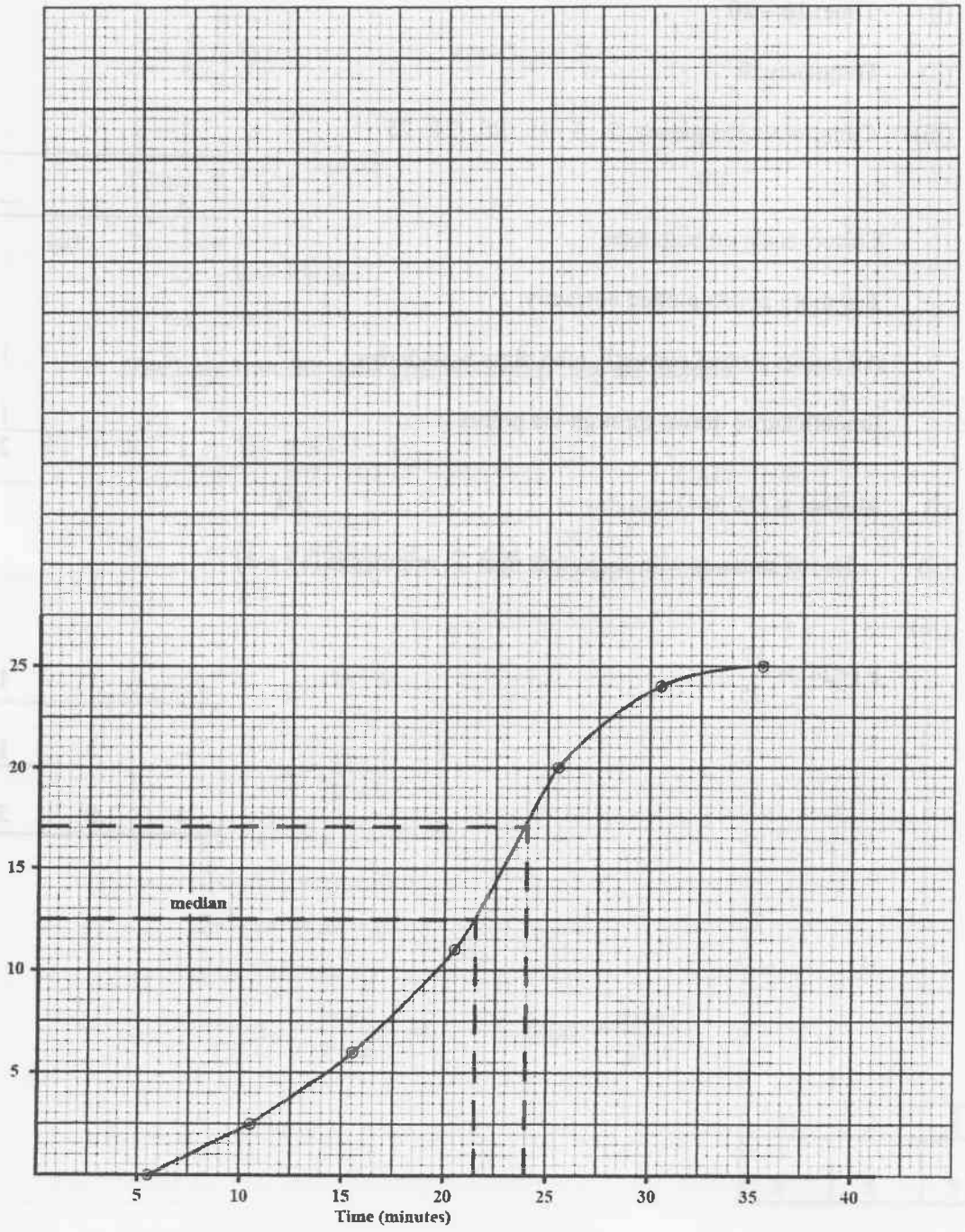
KEY AND MARK SCHEME

(To be attached in booklet with your other answers)

Candidates Registration Number: _____ Question Number: 7



MATHEMATICS
PAPER 02 – GENERAL PROFICIENCY
KEY AND MARK SCHEME

Question 8

						A	B	C
(a)		n	Series	Sum	Formula			
	(i)	5	$1^3+2^3+3^3+4^3+5^3$	225	$\frac{5^2}{4}(1+5)^2$	1	2	
			[A1]	**[B1]**	**[B1]**			
	(ii)	8		1296	$\frac{8^2}{4}(1+8)^2$	1	1	
		[A1]		**[B1]**				
	(iii)	n			$\frac{n^2}{4}(1+n)^2$			1
					[C1]			
						2	**3**	**1**
(b)	(i)	$1+2+3+4+5+6=\sqrt{441}$			**CAO**		1	
		$=21$						
	(ii)	$1+2+3+\ldots+n=\sqrt{\frac{n^2}{4}(1+n)^2}$			**FT**			1
		$=\frac{n}{2}(1+n)$						
	(iii)	$1+2+3+4+\ldots+30=\frac{30}{2}(1+30)$			**FT**			1
		$=465$				1		
						1	**1**	**2**
						3	**4**	**3**

MATHEMATICS
PAPER 02 – GENERAL PROFICIENCY
KEY AND MARK SCHEME

Question 9

	A	B	C
(a) $x^2 = 4 - y$ $x = y + 2$ $y = x - 2$ $x^2 = 4 - (x - 2)$ $x^2 = 4 - x + 2$ $\Rightarrow x^2 + x - 6 = 0$ $\Rightarrow (x + 3)(x - 2)$ $x = -3$ or $x = 2$ **CAO** When $x = -3$, $y = -5$ $x = 2$, $y = 0$ **FT**	1	1 1 1	1
	1	**3**	**1**
(b) (i) $3x^2 + 2x + 1 = 3\left[x^2 + \frac{2}{3}x\right] + 1$ $= 3\left[x + \frac{1}{3}\right]^2 - 3\left(\frac{1}{3}\right)^2 + 1$ $= 3\left(x + \frac{1}{3}\right)^2 + \frac{2}{3}$ **FT**	1	1	1
(ii) a) Minimum value for f(x) is $\frac{2}{3}$ **FT**	1		
b) the equation of the axis of symmetry is $x = \frac{-1}{3}$ **FT**			1
	2	**1**	**2**
(c) (i) Speed was 40 km/h at 10:45		1	
(ii) Distance traveled is the area under the graph, which is the area of a trapezium $\frac{1}{2}(3 + 2.5)\,80 = 220$ km		1	1
(iii) Average speed $= \frac{\text{Total Distance}}{\text{Total time}}$ $= \frac{220}{3} = 73\frac{1}{3}$ km/h **FT**	1	1	
	1	**3**	**1**
	4	**7**	**4**

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Question 10

			A	B	C
(a)	(i)	$\angle CBD = \angle DAC = 41^\circ$ Angles in the same segment of a circle are equal	1		1
	(ii)	$\angle CAB = \angle CDB$ (same segment) and $\angle CDB = 180 - (80 + 71)$ $= 29^\circ$ opposite angles in a cyclic quadrilateral	1	1	
	(iii)	By the sine rule: $\frac{AB}{\sin 71} = \frac{BD}{\sin 70^\circ}$ $\Rightarrow \quad \frac{9.5}{\sin 71} = \frac{BD}{\sin 70^\circ}$ BD = 9.44 cm	1	1	1 1
			3	**2**	**2**
(b)	(i)	By the cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ $\Rightarrow \quad 6^2 = 5^2 + 5^2 - 2(5)(5)\cos\theta$ $\cos\theta = 0.28$ $\theta = 73.7^\circ$ **FT**	1	1	1
	(ii)	Area of triangle $= \frac{1}{2} ab \sin\theta$ $= \frac{1}{2}(5)(5)\sin(73.7)$ **FT** $= 12.0 \text{ cm}^2 \approx$		1 1	
	(iii)	Area of the sector $= \frac{73.7}{360} \times \pi r^2$ $= \frac{73.7}{360} \times 25 \times 3.14$ $= 16.07 \text{ cm}^2$		1 1	
		Area cut off $= (16.07 - 12.0) \text{ cm}^2$ $= 4.07 \text{ cm}^2$			1
			1	**5**	**2**
			4	**7**	**4**

MATHEMATICS
PAPER 02 – GENERAL PROFICIENCY
KEY AND MARK SCHEME

Question 11

	A	B	C
(a) (i) a) $\overrightarrow{OP}=\begin{pmatrix}4\\2\end{pmatrix}$	1		
b) $\overrightarrow{RQ}=\begin{pmatrix}6\\10\end{pmatrix}-\begin{pmatrix}2\\8\end{pmatrix}=\begin{pmatrix}4\\2\end{pmatrix}$ (A1: CAO)	1	1	
(ii) $\left\lvert\overrightarrow{OP}\right\rvert=\sqrt{4^2+2^2}$ FT		1	
$=\sqrt{20}$	1		
(iii) *OP* and *RQ*			
- have the same length/magnitude		1	
- are parallel			1
	3	**3**	**1**
(b) (i) $\begin{pmatrix}a & b\\c & d\end{pmatrix}\begin{pmatrix}1\\4\end{pmatrix}=\begin{pmatrix}-4\\-1\end{pmatrix}$			1
$\begin{pmatrix}a & b\\c & d\end{pmatrix}\begin{pmatrix}3\\5\end{pmatrix}=\begin{pmatrix}-5\\-3\end{pmatrix}$		1	
(ii) $a+4b=-4$ $\quad c+4d=-1$			1
$3a+5b=-5$ $\quad 3c+5d=-3$		1	
$3a+12b=-12$ $\quad 3c+12d=-12$			
$7b=-7$ $\quad c=-1$			
$b=-1$ $\quad d=0$	1	1	
$a=0$			
(iii) The matrix $K_1\begin{pmatrix}0 & -1\\-1 & 0\end{pmatrix}$ represents a reflection in the line			1
$y=-x$		1	
	1	**4**	**3**
	4	**7**	**4**

APPENDIX I

Profile Dimensions

The questions in each paper are classified according to the cognitive levels defined as follows:

Profile	Cognitive Level	Description
A	Knowledge	Items that require the recall of rules, procedures, definitions and facts, that is, items characterized by rote memory as well as simple computations, computation in measurements, constructions and drawings.
B	Comprehension	Items that require algorithmic thinking that involves translation from one mathematical mode to another. Use of algorithms and the application of these algorithms to familiar problem situations.
C	Reasoning	Items that require translation of non-routine problems into mathematical symbols and then choosing suitable algorithms to solve the problems; combination of two or more algorithms to solve problems; use of an algorithm or part of an algorithm, in a reverse order, to solve a problem; the making of inferences and generalizations from given data; justification of results or statement; analyzing and synthesizing.

The Paper 02 is weighted as follows:

PROFILES	Section I	Section II	TOTAL
Knowledge	28	8	36
Comprehension	34	14	48
Reasoning	28	8	36
Total	90	30	120

Explanation of codes

CAO: Correct Answer Only – only the correct answer will be accepted for the award of the mark.

FT: Accept the answer given by the candidate, which was obtained using the correct methods and procedures.

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

SPECIMEN MULTIPLE CHOICE QUESTIONS FOR

MATHEMATICS

READ THE FOLLOWING DIRECTIONS CAREFULLY

Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.

Sample Item

$2a + 6a =$

(A) $8a$
(B) $8a^2$
(C) $12a$
(D) $12a^2$

Sample Answer

● Ⓑ Ⓒ Ⓓ

The best answer to this item is "8a", so answer space (A) has been shaded.

There are 30 items in this specimen paper. However, the Paper 01 test consists of 60 items. You will have 90 minutes to answer them.

1. The number 2 747 written to 3 significant figures is

(A) 2 740
(B) 2 750
(C) 274
(D) 275

2. The number 3 754 expressed to the nearest hundred is

(A) 3 700
(B) 3 750
(C) 3 800
(D) 4 000

3. 0.045×10^{-3} in scientific notation is

(A) 4.5×10^{-6}
(B) 4.5×10^{-5}
(C) 4.5×10^{-4}
(D) 4.5×10^{-1}

4. $(0.1 + 0.01)(0.1 - 0.01) =$

(A) 0.0001
(B) 0.001
(C) 0.009
(D) 0.0099

5. What is the value of $\frac{(5+2)^3}{5^2 - 2^2}$ in its simplest form?

(A) $\frac{8}{21}$

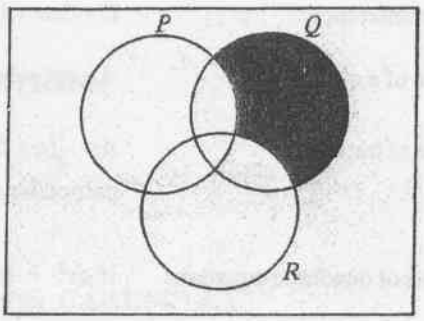
(B) $\frac{7}{3}$

(C) $\frac{7}{2}$

(D) $\frac{49}{3}$

6. Which of the following sets has an infinite number of members?

(A) {factors of 20}
(B) {multiples of 20}
(C) {odd numbers between 10 and 20}
(D) {prime numbers less than 20}

7. 

The shaded area in the Venn diagram above represents

(A) $(P \cup Q)'$
(B) $(Q \cup R)'$
(C) $(P \cap Q)' \cup R$
(D) $(P \cup R)' \cap Q$

8. How much simple interest is due on a loan of $1 200 for two years if the annual rate of interest is $5\frac{1}{2}$ per cent?

(A) $120.00
(B) $132.00
(C) $264.00
(D) $330.00

Item 9 refers to the chart shown below.

Rate on Fixed Deposits	
2008	7.8%
2009	7.5%

9. How much more interest would a fixed deposit of $10 000 earn in 2008 than in 2009?

(A) $ 0.30
(B) $ 3.00
(C) $30.00
(D) $33.00

10. Consumption tax and customs duty are calculated as follows:

Consumption tax	20% of value
Custom's duty	50% of value

What is the total tax paid on an article which is valued at $150.00?

(A) $ 45.00
(B) $ 90.00
(C) $105.00
(D) $120.00

11. The water authority charges $10.00 per month for the meter rent, $25.00 for the first 100 litres and $1.00 for each additional 10 litres. What is the total bill for 250 litres used in one month?

(A) $25.00
(B) $35.00
(C) $40.00
(D) $50.00

12. Seven times the product of two numbers, a and b, may be written as

(A) $7ab$
(B) $7a+b$
(C) $7a+7b$
(D) $49ab$

13. If $2(x-1)-3x=6$, then $x=$

(A) - 8
(B) - 4
(C) 4
(D) 8

14. $3m^2n^3 \times 4mn^2 =$

(A) $7m^3n^5$
(B) $12m^3n^5$
(C) $12m^2n^5$
(D) $7m^2n^5$

15. $\frac{3x+1}{2}-\frac{x+1}{4}=$

(A) $\frac{5x+1}{4}$

(B) $\frac{5x+3}{4}$

(C) $\frac{7x+3}{4}$

(D) $\frac{7x+1}{4}$

16. How many litres of water would a container whose volume is 36 cm^3 hold?

(A) 0.036
(B) 0.36
(C) 36
(D) 3600

GO ON TO THE NEXT PAGE

17. The width of a block of wood with rectangular cross-section is x cm. Its height is $\frac{2}{3}$ its width and its length is 4 times its height. What is its volume in cm^3?

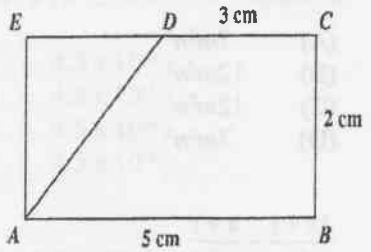
(A) $\frac{8x}{9}$

(B) $\frac{8x^3}{3}$

(C) $\frac{16x^3}{9}$

(D) $\frac{17x}{3}$

Item 18 refers to the following trapezium.



18. $ABCD$ is a trapezium and ADE is a triangle. Angles B, C and E are right angles.

The area of the trapezium $ABCD$ is

(A) 8 cm^2
(B) 16 cm^2
(C) 30 cm^2
(D) 32 cm^2

19. A circular hole with diameter 6 cm is cut out of a circular piece of card with a diameter of 12 cm. The area of the remaining card, in cm^2, is

(A) 6π
(B) 27π
(C) 36π
(D) 108π

20. The mean of ten numbers is 58. If one of the numbers is 40, what is the mean of the other nine?

(A) 18
(B) 60
(C) 162
(D) 540

Items 21 - 22 refer to the table below which shows the distribution of the ages of 25 children in a choir.

Age	11	12	13	14	15	16
No. of children	6	3	5	4	4	3

21. What is the probability that a child chosen at random is AT LEAST 13 years old?

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

(B) $\frac{9}{25}$

(C) $\frac{14}{25}$

(D) $\frac{16}{25}$

22. What is the mode of this distribution?

(A) 4
(B) 6
(C) 11
(D) 16

23. The equation of the line which passes through the point $(0, 2)$ and has a gradient of $\frac{1}{3}$ is

(A) $y = 3x$

(B) $y = 3x + 2$

(C) $y = \frac{1}{3}x$

(D) $y = \frac{1}{3}x + 2$

24. If g is a function such that $g(x) = 2x + 1$, which of the following pairs satisfies the function?

(A) $(-3, -5)$
(B) $(-6, 11)$
(C) $(5, 2)$
(D) $(13, 6)$

25. What is the gradient of a line which passes through the points $(-4, 3)$ and $(-2, 5)$?

(A) -4

(B) $\frac{-1}{3}$

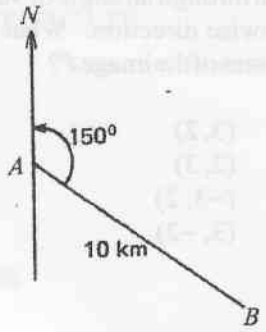
(C) $\frac{1}{3}$

(D) 1

26. The sizes of the interior angles of a polygon are $x°$, $2x°$, $60°$, $3x°$ and $36°$. What is the value of x?

(A) 14
(B) 16
(C) 44
(D) 74

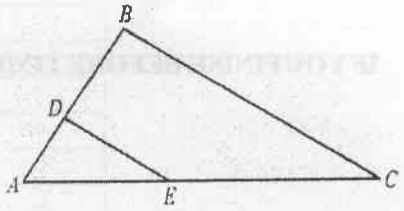
Item **27** refers to the diagram below.



27. A plane travels from point A on a bearing $150°$ to a point B 10 km from A. How far east of A is B?

(A) $10 \cos 30°$
(B) $10 \cos 60°$
(C) $10 \sin 60°$
(D) $10 \tan 30°$

Item **28** refers to the diagram below.



28. Triangle ABC is an enlargement of triangle ADE such that

$$\frac{AD}{DB} = \frac{AE}{EC} = \frac{1}{2}$$

If the area $ABC = 36$ cm^2

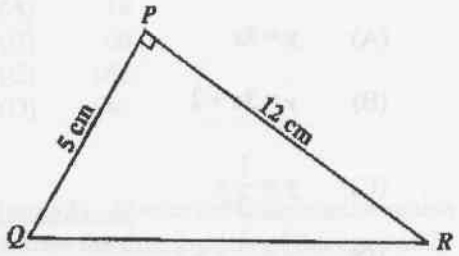
Then the area of $DECB$ in cm^2 is

(A) 18
(B) 24
(C) 27
(D) 32

29. The point $P(2, -3)$ is rotated about the origin through an angle of 90° in an anti-clockwise direction. What are the co-ordinates of the image P?

(A) (3, 2)
(B) (2, 3)
(C) (−3, 2)
(D) (3, −2)

Item **30** refers to the triangle PQR, in which angle $QPR = 90°$, $PR = 12$ cm and $PQ = 5$ cm.



30. The length of QR, in cm, is

(A) 7
(B) 11
(C) 13
(D) 17

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

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SECONDARY EDUCATION CERTIFICATE EXAMINATION

MATHEMATICS

SPECIMEN PAPER 2008

Item Number	Key
1	B
2	C
3	B
4	D
5	D
6	B
7	D
8	B
9	C
10	C
11	D
12	A
13	A
14	B
15	A
16	A
17	C
18	A
19	B
20	B
21	D
22	C
23	D
24	A
25	D
26	D
27	B
28	D
29	A
30	C

CARIBBEAN EXAMINATIONS COUNCIL

Caribbean Secondary Education Certificate (CSEC)

MATHEMATICS

Specimen Papers and Mark Schemes/Key

Specimen Papers:
- Paper 01 (Multiple Choice)
- Paper 02

Mark Schemes and Key:
- Paper 01 (Multiple Choice)
- Paper 02

Table of Specifications
Specimen Paper

Question	Specific Objectives	A	B	C	Total
1	Computation: 1,2, 10 Consumer Arithmetic: 4, 7	3	5	3	11
2	Algebra: 6, 8, 14	4	4	3	11
3	Sets: 5, 6, 7 Algebra: 13, 15	3	4	3	10
4	Measurement: 3, 9, 14 Geometry: 2, 3	6	3	3	12
5	Geometry: 6, 7, 9, 16, 18	3	4	5	12
6	Relations, Functions & Graphs: 9, 10, 18, 19	2	5	5	12
7	Statistics: 2, 3, 10, 11, 14	4	5	3	12
8	Problem Solving Number Theory: 10	3	4	3	10
	Sub Total	**28**	**34**	**28**	**90**
9	Algebra: 17 R, F, G: 22, 25	4	7	4	15
10	Measurement: 5, 6 Geometry& Trigonometry: 16, 21	4	7	4	15
11	Vectors: 3, 4 Matrices: 7, 11, 13	4	7	4	15
	Sub Total	**8**	**14**	**8**	**30**
	TOTAL	**36**	**48**	**36**	**120**