



TEST CODE 01234020/SPEC

**FORM TP 01234020/SPEC**

**CARIBBEAN EXAMINATIONS COUNCIL  
CARIBBEAN SECONDARY EDUCATION CERTIFICATE®  
EXAMINATION**

**MATHEMATICS**

**SPECIMEN PAPER**

**Paper 02 – General Proficiency**

*2 hours 40 minutes*

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This paper consists of TWO sections: I and II.
2. Section I has SEVEN questions and Section II has THREE questions.
3. Answer ALL questions from the TWO sections.
4. Write your answers in the booklet provided.
5. Do NOT write in the margins.
6. All working must be clearly shown.
7. Unless otherwise stated in the question, any numerical answer that is not exact MUST be written to THREE significant figures.
8. A list of formulae is provided on page 4 of this booklet.
9. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra page(s) provided at the back of this booklet. **Remember to draw a line through your original answer.**
10. **If you use the extra page(s) you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

**Examination Materials Permitted**

Silent, non-programmable electronic calculator  
Mathematical instruments

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.**

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01234020/SPEC 2015

## SECTION I

Answer ALL questions in this section.

All working must be clearly shown.

1. (a) Using a calculator, determine the value of

$$\frac{(3.29)^2 - 5.5}{\sqrt{1.5 \times 0.06}}$$

giving your answer to 1 decimal place.

**(3 marks)**

- (b) The table below shows rates of exchange.

US\$1.00 = TT\$6.45
BBD\$1.00 = TT\$3.00

- (i) Using the table, calculate the amount in BBD dollars equivalent to US\$1.00. **(2 marks)**
- (ii) Gail exchanged BBD\$1806.00 for US dollars. Calculate the amount she received in US dollars. **(1 mark)**
- (c) The cash price of a laptop is \$4799.00. It can be bought on hire purchase by making a deposit of \$540.00 and 12 monthly instalments of \$374.98 EACH.
- (iii) Calculate the TOTAL hire purchase price of the laptop. **(2 marks)**
- (iv) Calculate the amount saved by purchasing the laptop at the cash price. **(1 mark)**

**Total 9 marks**

2. (a) Simplify:  $p^3 q^2 \times pq^5$  (1 mark)
- (b) If  $a * b = 2a - 5b$ , calculate the value of
- (i)  $3 * 4$  (1 mark)
- (ii)  $(3 * 4) * 1$  (1 mark)
- (c) Factorize completely:  $3x + 6y - x^2 - 2xy$  (2 marks)
- (d) A string of length 14 cm is cut into two pieces. The length of the first piece is  $x$  cm. The second piece is 5 cm longer than half the length of the first piece.
- (i) State in terms of  $x$ , the length of the second piece of string. (1 mark)
- (ii) Write an expression, in terms of  $x$ , to represent the TOTAL length of the two pieces of string. (1 mark)
- (iii) Hence, calculate the length of the first piece of string. (2 marks)

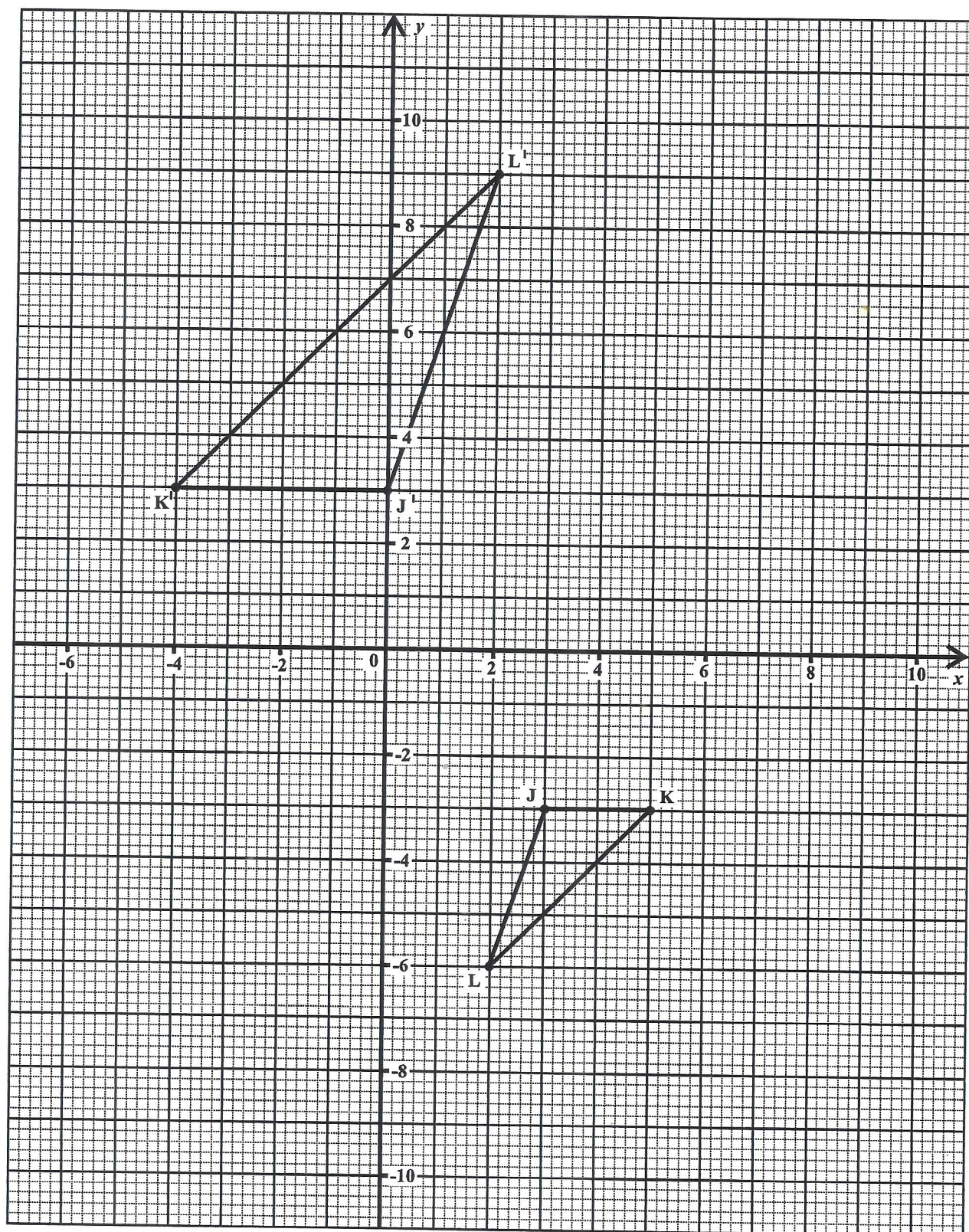
**Total 9 marks**

3. (a) Using a ruler, a pencil and a pair of compasses, construct a rhombus, PQRS, in which  $PR = 6$  cm and  $\angle RPQ = 60^\circ$ . (4 marks)
- (b) Use the graph on page 5 to answer this question.

The diagram shows triangle JKL and its image J'K'L' after an enlargement.

- (i) Draw lines on your diagram to locate the point G, the centre of the enlargement. (1 mark)
- (ii) State the coordinates of the point G. (1 mark)
- (iii) State the scale factor of the enlargement. (1 mark)
- (iv) On your diagram, show the point J'', the image of the point J', after a reflection in the line  $x = 4$ . (2 marks)

**Total 9 marks**



4. (a) The line BC passes through the point A(-5, 3) and has a gradient of  $\frac{2}{5}$ .
- (i) Write the equation of the line BC in the form  $y = mx + c$ . (2 marks)
- (ii) Determine the equation of the line which passes through the origin and is perpendicular to the line BC. (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  $f \circ g(3)$ . (2 marks)
- (ii) Derive an expression for  $f^{-1}(x)$ . (3 marks)

Total 9 marks

5. A graph sheet is provided for this question. The table below shows the time spent, to the nearest minute, by 25 students at the school canteen.

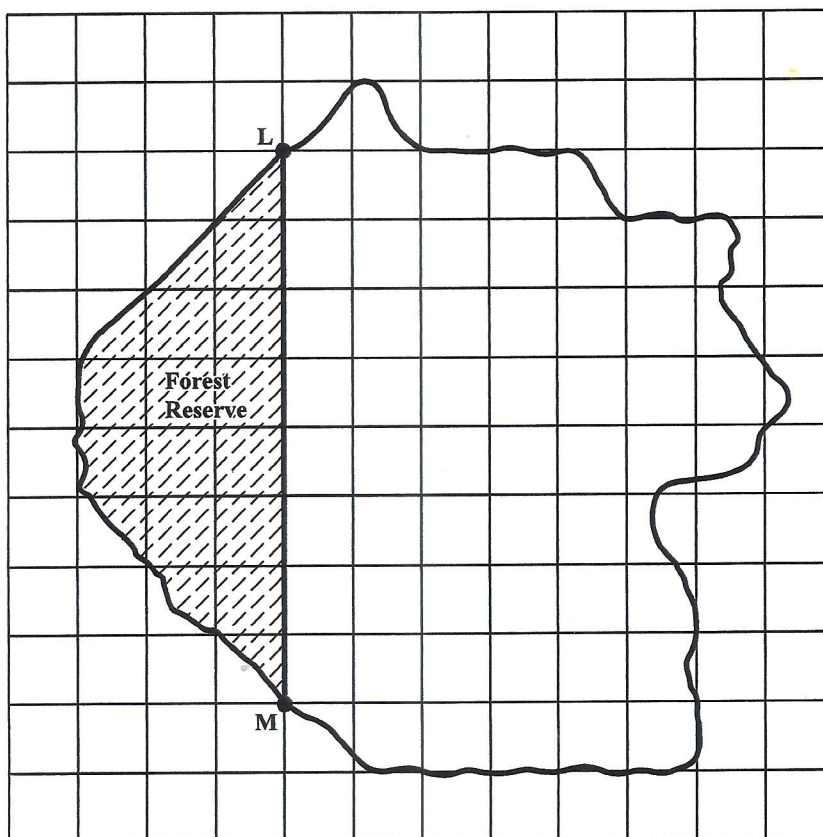
	Time spent at the bookstore (minutes)	Frequency	Cumulative Frequency
	6-10	2	2
	11-15	4	6
	16-30	5	11
(i)	21-25	_____	20
(ii)	26-30	4	_____
	31-35	1	25

- (a) Complete the rows numbered (i) and (ii). (2 marks)
- (b) On your graph on page 7, draw a cumulative frequency curve of the time spent at the canteen, using a scale of 2 cm to represent 5 minutes on the horizontal axis and 2 cm to represent 5 students on the vertical axis. (4 marks)
- (c) Use the graph drawn at (b) to estimate
- (i) the median time spent at the canteen (1 mark)
- (ii) the probability that a student selected at random spent LESS than 24 minutes at the canteen. (2 marks)

Total 9 marks

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6. (a) In this question, use  $\pi = \frac{22}{7}$ .
- (i) A piece of wire is bent to form a square of area  $121 \text{ cm}^2$ . Calculate the perimeter of the square. **(2 marks)**
- (ii) The same piece of wire is bent to form a circle. Calculate the radius of the circle. **(2 marks)**
- (b) The diagram below shows a map of an island drawn on a grid of  $1 \text{ cm}$  squares. The map is drawn to a scale of  $1:50\,000$ .



- (i) L and M are two tracking stations. State, in centimetres, the distance LM on the map. **(1 mark)**
- (ii) Calculate the ACTUAL distance, in kilometres, from L to M on the island. **(2 marks)**
- (iii) Calculate the ACTUAL area, in  $\text{km}^2$ , of the forest reserve, given that  $1 \times 10^{10} \text{ cm}^2 = 1 \text{ km}^2$ . **(2 marks)**

**Total 9 marks**

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7. The table below represents the calculation of the sum of the cubes of the first  $n$  natural numbers. Information is missing from some rows of the table.

(a) Study the pattern in the table and complete the rows marked (i), (ii) and (iii).

<b>n</b>	<b>Series</b>	<b>Sum</b>	<b>Formula</b>
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) <b>n</b>			.....

(6 marks)

(b) It was further noted that:

$$1 + 2 = 3 = \sqrt{9}$$

$$1 + 2 + 3 = 6 = \sqrt{36}$$

$$1 + 2 + 3 + 4 = 10 = \sqrt{100}$$

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

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

(ii) a formula in terms of  $n$  for the series:  $1 + 2 + 3 + 4 + \dots + n$  (2 marks)

**Total 10 marks**

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## SECTION II

Answer ALL questions in this section.

All working must be clearly shown.

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

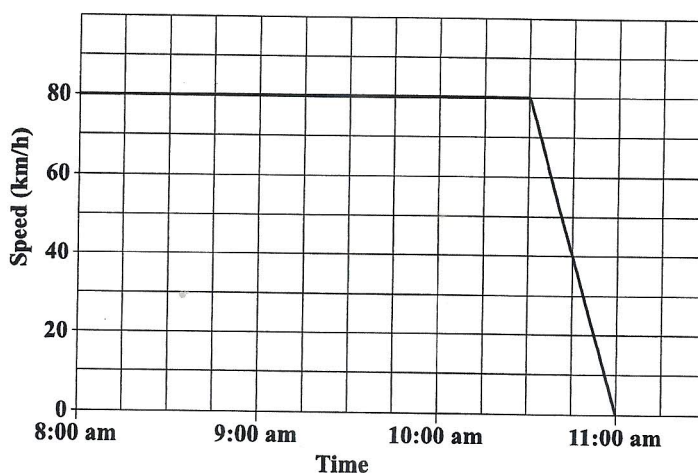
$$x^2 = 4 - y$$

$$x = y + 2$$

(4 marks)

- (b) (i) Express  $3x^2 + 2x + 1$  in the form  $a(x + p)^2 + q$  where  $a, p$  and  $q$  are real numbers. (2 marks)
- (ii) Hence, determine for  $f(x) = 3x^2 + 2x + 1$
- the minimum value for  $f(x)$
  - the equation of the axis of symmetry. (2 marks)

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



Using the graph, determine

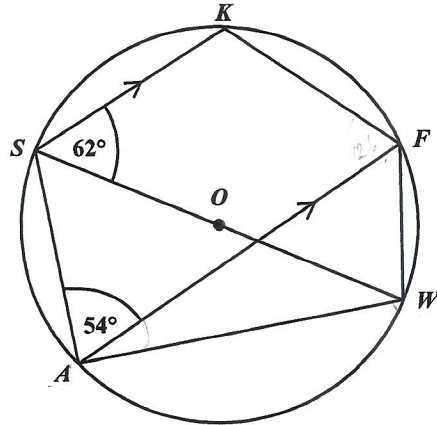
- (i) the time at which the speed of the car was 40 km/h (1 mark)
- (ii) the TOTAL distance the car travelled for the entire journey (2 marks)
- (iii) the average speed of the car for the entire journey. (1 mark)

**Total 12 marks**



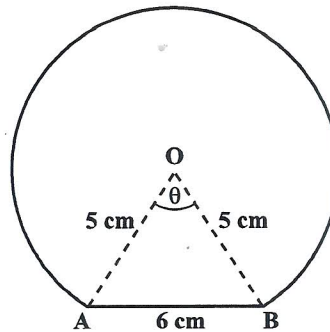
9. (a) In the diagram below, **not drawn to scale**,  $O$  is the centre of the circle. The lines  $SK$  and  $AF$  are parallel.

$$\angle KSW = 62^\circ \quad \angle SAF = 54^\circ$$



Calculate, **giving reasons for your answer**, the measure of:

- (i)  $\angle FAW$  (2 marks)
  - (ii)  $\angle SKF$  (2 marks)
  - (iii)  $\angle ASW$  (2 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 centre,  $O$ .



Use  $\pi = 3.14$

Determine

- (i) the measure of angle  $\theta$  (2 marks)
- (ii) the area of triangle  $AOB$  (2 marks)
- (iii) the area of the disc that was cut off. (2 marks)

**Total 12 marks**

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10. (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  $\begin{bmatrix} x \\ y \end{bmatrix}$  the vectors
- $\vec{OP}$
  - $\vec{RQ}$  (2 marks)
- (ii) Calculate  $|\vec{OP}|$ , the magnitude of  $\vec{OP}$ . (2 marks)
- (iii) State ONE geometrical relationship 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  $K = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ ,
- (i) express as a matrix equation, the relationship between  $K$ ,  $S$ ,  $S'$ ,  $T$  and  $T'$ . (2 marks)
- (ii) hence, determine the values of  $a$ ,  $b$ ,  $c$  and  $d$ . (3 marks)
- (iii) describe COMPLETELY the geometric transformation which is represented by the matrix  $K$ . (2 marks)

**Total 12 marks**

**END OF TEST**

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