CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®
EXAMINATION

"*"Barcode Area"*"
Front Page Bar Code

20 JANUARY 2021 (p.m.)

FILL IN ALL THE INFORMATION REQUESTED CLEARLY IN CAPITAL LETTERS.

TEST CODE | 0 | 1 | 2 | 3 | 4 | 0 | 3 | 2 |

SUBJECT MATHEMATICS – Paper 032

PROFICIENCY GENERAL

REGISTRATION NUMBER | | | | | | | | | | |

SCHOOL/CENTRE NUMBER						

NAME OF SCHOOL/CENTRE

CANDIDATE'S FULL NAME (FIRST, MIDDLE, LAST)

"*"Barcode Area"*"
Current Bar Code

DATE OF BIRTH | D | D | M | M | Y | Y | Y | Y |

SIGNATURE _____

"*"Barcode Area"*"
Sequential Bar Code

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FORM TP 2021020

TEST CODE **01234032**

JANUARY 2021

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

MATHEMATICS

Paper 032 – General Proficiency

1 hour

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of TWO questions. Answer BOTH questions.
2. Write your answers in the spaces provided in this booklet.
3. Do NOT write in the margins.
4. All working MUST be clearly shown.
5. **A list of formulae is provided on page 4 of this booklet.**
6. 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**.
7. **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.**
8. **ALL diagrams in this booklet are NOT drawn to scale, unless otherwise stated.**

Required Examination Materials

Electronic calculator
Geometry set

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

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LIST OF FORMULAE

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

Volume of a cylinder — $V = \pi r^2 h$ where r is the radius of the base and h is the perpendicular height.

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.

Arc length — $S = \frac{\theta}{360} \times 2\pi r$ where θ is the angle subtended by the arc, measured in degrees.

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

Area of a sector — $A = \frac{\theta}{360} \times \pi r^2$ where θ is the angle of the sector, measured in degrees.

Area of a 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 $ax^2 + bx + c = 0$,

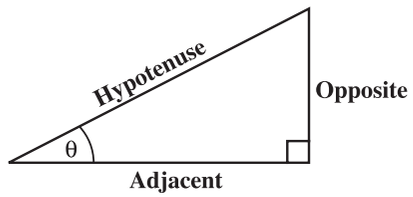
then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Trigonometric ratios

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

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

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



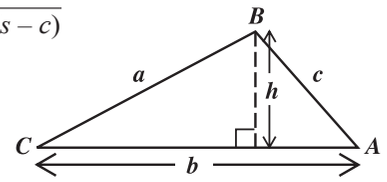
Area of a triangle — Area of $\Delta = \frac{1}{2} bh$ where b is the length of the base and h is the perpendicular height.

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

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

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

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

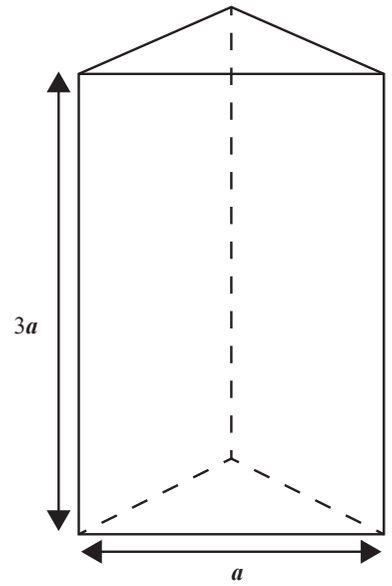


Cosine rule — $a^2 = b^2 + c^2 - 2bc \cos A$

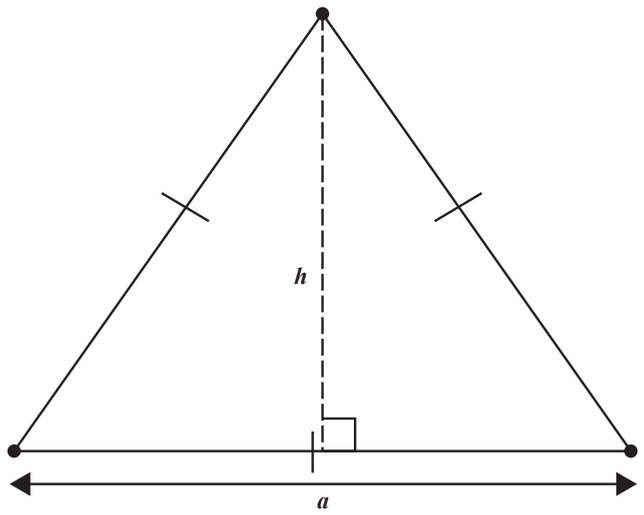
GO ON TO THE NEXT PAGE

NOTHING HAS BEEN OMITTED.

1. The diagram below shows a container of length $3a$ that John made to store cooking oil. The cross-section of the container is an equilateral triangle of side a and perpendicular height h.



(a) An enlarged diagram of the triangular cross-section of the container is shown below.



Find the perpendicular height, h, in terms of a.

.....

(3 marks)

(b) Show that the area of the triangular cross-section, in terms of a, is $\frac{\sqrt{3}}{4}a^2$.

$\left[\textbf{Note}: \frac{\sqrt{3}}{4} \approx 0.433\right]$

.....

(1 mark)

(c) Determine, in terms of a, the volume of the container. **Simplify your answer.**

.....

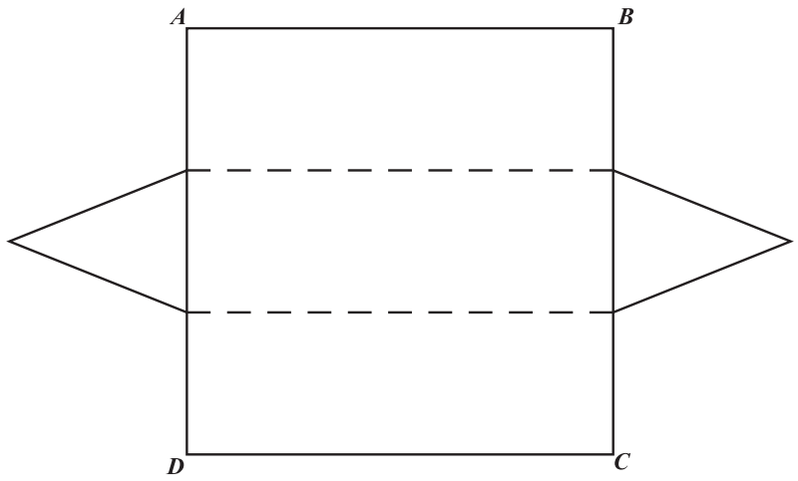
(2 marks)

(d) Given that a = 10 cm, calculate the depth of the oil in the container when John pours 800 cm^3 of oil into it.

.....

(2 marks)

(e) The diagram below shows the **net** of the container when it is opened.



Show that the area of the net, in terms of a, is $\frac{1}{2}\, a^2\,(18 + \sqrt{3}) \approx 9.866\, a^2$.

(**Hint**: *ABCD* is a square.)

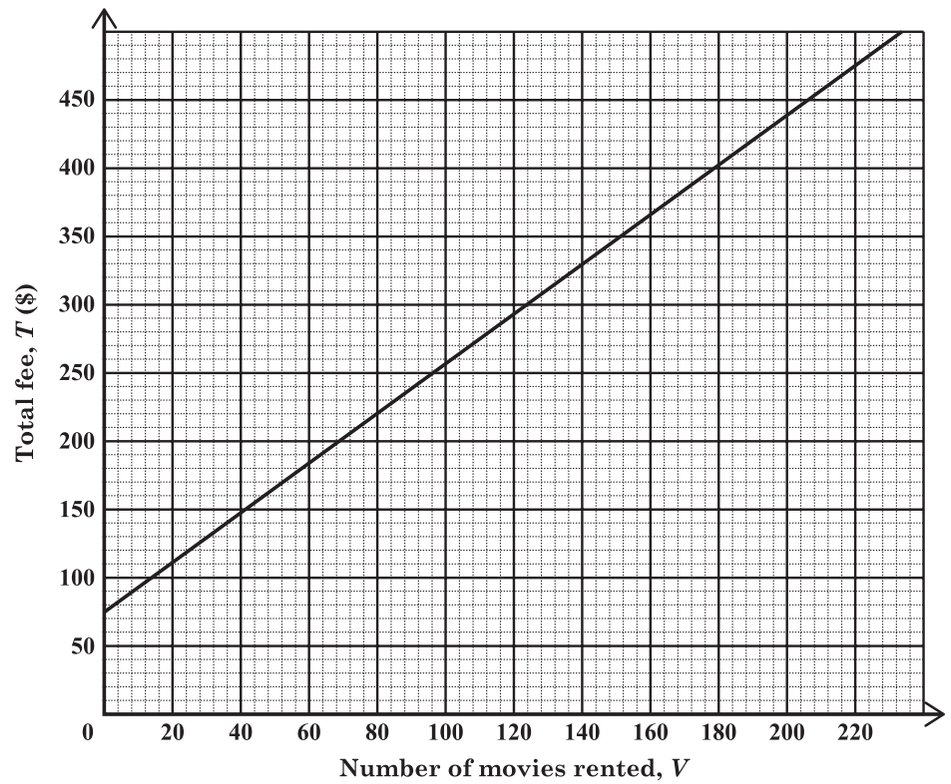
.....

(2 marks)

Total 10 marks

2. Flagship Movie Rentals charges an annual membership fee plus an additional fee for the weekly rental of each movie.

The graph below shows the total fee, (T), as it varies with the number of movies rented, (V).



(a) Using the graph, fill in the missing values in the table below.

Number of Movies Rented (V)	Total Fee, T ($)
_____	75
30	130
50	_____
124	300

(2 marks)

(b) The total fee, T, is related to the number of movies rented, V, by the equation $T = mV + c$. Determine the value of

(i) c

.....

(1 mark)

(ii) m.

.....

(1 mark)

(c) Complete the following statement.

According to the graph, the annual membership fee is $ ..... and the fee to rent one movie for a week is $ ..... . **(2 marks)**

(d) Brooke and her family budgeted $700 for renting movies for the year.

(i) Using an equation, or otherwise, determine the MAXIMUM number of movies they can rent.

.....

(2 marks)

(ii) At Rightstar Movie Rentals, there is no membership fee but Brooke will pay $1.95 to rent a movie for one week. From which of the two rental clubs would Brooke be able to rent more movies on the same budget? **Show calculations to justify your answer.**

.....

(2 marks)

Total 10 marks

END OF TEST

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

EXTRA SPACE

If you use this extra page, you MUST write the question number clearly in the box provided.

Question No.

EXTRA SPACE

If you use this extra page, you MUST write the question number clearly in the box provided.

Question No.

DO NOT WRITE ON THIS PAGE

CANDIDATE'S RECEIPT

INSTRUCTIONS TO CANDIDATE:

1. **Fill in all the information requested clearly in capital letters.**

TEST CODE: | 0 | 1 | 2 | 3 | 4 | 0 | 3 | 2 |

SUBJECT: MATHEMATICS – Paper 032

PROFICIENCY: GENERAL

REGISTRATION NUMBER: | | | | | | | | | | |

FULL NAME: _____

(BLOCK LETTERS)

Signature: _____

Date: _____

2. **Ensure that this slip is detached by the Supervisor or Invigilator and given to you when you hand in this booklet.**

3. **Keep it in a safe place until you have received your results.**

INSTRUCTION TO SUPERVISOR/INVIGILATOR:

Sign the declaration below, detach this slip and hand it to the candidate as his/her receipt for this booklet collected by you.

I hereby acknowledge receipt of the candidate's booklet for the examination stated above.

Signature: _____
Supervisor/Invigilator

Date: _____