CANDIDATE – PLEASE NOTE

PRINT your name on the line below and return this booklet with the answer sheet. Failure to do so may result in disqualification.

TEST CODE **01254010**

FORM TP 2019039

MAY/JUNE 2019

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®

EXAMINATION

ADDITIONAL MATHEMATICS

Paper 01 – General Proficiency

1 hour 30 minutes

05 JUNE 2019 (a.m.)

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READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 45 items. You will have 1 hour and 30 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. 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.
4. A list of formulae is provided on page 2 of this booklet.
5. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

Sample Item

$$\left(4^{-2}\right)^{2} \div \left(\frac{1}{16}\right)^{2} =$$

(A) 4^{-2}
(B) 4^{-1}
(C) 4^{0}
(D) 4^{2}

Sample Answer

(A) (B) ● (D)

The best answer to this item is "4^{0}", so (C) has been shaded.

6. If you want to change your answer, erase it completely before you fill in your new choice.
7. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You can return to that item later.
8. You may use silent, non-programmable calculators to answer items.

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

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1. The expression $x - 2$ is a factor of

(A) $4x^4 - 2x^2 - 56$
(B) $4x^3 + 2x^2 - 16$
(C) $2x^3 + 2x^2 - 4x - 8$
(D) $3x^4 - 10x^3 - 5x^2 + 4$

2. When $x^3 - 7x^2 + 2x - 1$ is divided by $x + 2$, the quotient is

(A) -17
(B) -39
(C) $x^2 - 5x - 8$
(D) $x^2 - 9x + 20$

3. Given that $f(x) = ax^2 + bx + c$, $f(x)$ can be expressed in the form

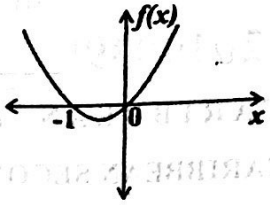
(A) $a\left(x+\frac{b}{a}\right)^2+\frac{ac-b^2}{a^2}$

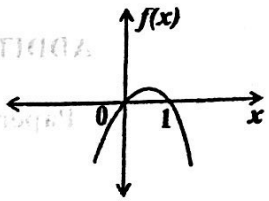
(B) $a\left(x+\frac{b}{2a}\right)^2+\frac{ac-b^2}{a^2}$

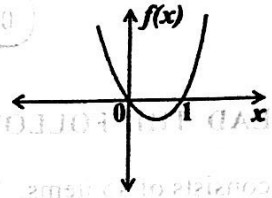
(C) $a\left(x+\frac{b}{2a}\right)^2+\frac{4ac-b^2}{4a}$

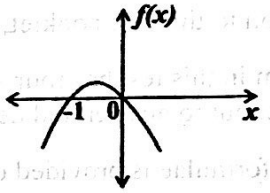
(D) $a\left(x+\frac{b}{2a}\right)^2+\frac{4ac-b^2}{4a^2}$

4. Which of the following graphs BEST represents $f(x) = x(1 - x)$?

(A)


(B)


(C)


(D)


5. The values of x for which $(x + 15)^2 = 64x$ are

(A) 3 and 5
(B) 9 and 5
(C) 3 and 25
(D) 9 and 25

6. The range of values for which $x^2 - 7x + 10 < 0$ is

(A) $2 > x > 5$
(B) $2 < x < 5$
(C) $x < 2$ and $x > 5$
(D) $x < -5$ and $x > -5$

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7. The set of values of x for which $\frac{2x+1}{x-1} \geq 0$ is

(A) $x > 1$

(B) $x \geq -\frac{1}{2}$

(C) $x \geq -\frac{1}{2}$ and $x \geq 1$

(D) $x \leq \frac{1}{2}$ or $x > 1$

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8. If $f(x) = -\frac{2}{9}x^3, -3 \leq x \leq 3, x \in R$, then

(A) $0 \leq f(x) \leq 6$

(B) $-6 \leq f(x) \leq 0$

(C) $-6 \leq f(x) \leq 6$

(D) $6 \leq f(x) \leq -6$

9. The functions f and g are defined as follows:

$f: x \rightarrow \frac{x+1}{x-1}, x \neq 1, x \in R$

$g: x \rightarrow 2x+1, x \neq \frac{1}{2}, x \in R$

The function $fg(x)$ is given by

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(A) $\frac{x+1}{x}, x \neq 0, x \in R$

(B) $\frac{x-2}{x+1}, x \neq -1, x \in R$

(C) $\frac{x+1}{x+2}, x \neq -2, x \in R$

(D) $\frac{x-1}{2x+1}, x \neq -\frac{1}{2}, x \in R$

10. If function $m: x \rightarrow 5 + 2x$, then $m(4 - 2a)$ is

(A) $4 - 4a$
(B) $9 - 2a$
(C) $8 - 4a$
(D) $13 - 4a$

11. If $f^{-1}: x \rightarrow x^2 - 1, x \geq 0$, then

(A) $f: x \rightarrow 1 - x^2, x \in R$

(B) $f: x \rightarrow \sqrt{x+1}, x \geq -1$

(C) $f: x \rightarrow \sqrt{x-1}, x \geq 1$

(D) $f: x \rightarrow \frac{2}{x^2 - 1}, x \neq \pm 1$

12. $\frac{2^{-1}}{8^{\frac{1}{3}}}$ simplifies to

(A) $\frac{1}{4}$

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

(C) $\sqrt{2}$

(D) $\frac{1}{\sqrt{2}}$

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13. Given that $\log_p X = 6$ and $\log_p Y = 4$, the value of $\log_p \left(\frac{X}{Y}\right)$ is

(A) 10

(B) $\log_p 2$

(C) $\frac{\log_p 6}{\log_p 4}$

(D) 2

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14. Given that $3 \times 27^{2x} = 9^x$, the value of x is

(A) $-\frac{1}{4}$

(B) -1

(C) $\frac{1}{4}$

(D) 1

15. The value of x for which $4^{x+1} = 2$ is

(A) $-\frac{1}{2}$

(B) 0

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

(D) 1

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16. The value of x such that $\log_2 (5x + 1) - \log_2 (3x - 5) = 2$ is

(A) 2
(B) 3
(C) 5
(D) 11

17. The series $-2 + \frac{4}{3} - \frac{8}{9} + \ldots$ converges to the limit

(A) $-\frac{6}{5}$

(B) $\frac{6}{5}$

(C) -6

(D) 6

18. The sum of the first n terms of a series is given by $\sum_{r=1}^{n} (5 - 3r)$. The sum of the first 10 terms is

(A) −170
(B) −125
(C) −115
(D) −85

19. The sum of $\sum_{k=1}^{3} \frac{1}{k}$ is

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

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

(C) $\frac{3}{5}$

(D) $\frac{11}{6}$

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20. The first four terms of a convergent geometric progression (GP) are 500, 200, 80 and 32 respectively. The sum to infinity of this GP is

(A) 200
(B) $\frac{500}{3}$
(C) 300
(D) $\frac{2500}{3}$

21. A line **L** passes through the point (6, 5) and is perpendicular to a line whose equation is $3x + 4y - 7 = 0$. The equation of **L** is

(A) $4x - 3y - 9 = 0$
(B) $4x + 3y - 7 = 9$
(C) $3x + 4y - 11 = 0$
(D) $3x - 4y - 30 = 0$

22. The lines $7x - 4y + 25 = 0$ and $3x - y - 5 = 0$ intersect at the point **P**. The coordinates of **P** are

(A) (5, 10)
(B) (–1, 8)
(C) (9, 22)
(D) (–9, –32)

23. A circle **C** has centre (3, –2) and radius 4. The equation of **C** is

(A) $x^2 + y^2 - 3 = 0$
(B) $x^2 + y^2 + 6x - 4y + 3 = 0$
(C) $x^2 + y^2 - 6x + 4y - 3 = 0$
(D) $x^2 + y^2 + 3x - 2y - 3 = 0$

24. Two vectors are equal if they

(A) have the same magnitude and different directions
(B) have the same magnitude and same direction
(C) are parallel and are in different directions
(D) have different magnitudes and are in the same direction

25. The triangle OAB has vertices given by $\begin{pmatrix}0\\0\end{pmatrix}$, $\begin{pmatrix}-3\\a\end{pmatrix}$ and $\begin{pmatrix}6\\2\end{pmatrix}$ respectively. Given that the angle $\hat{AOB}$ is $\frac{\pi}{2}$, then $a =$

(A) 18
(B) 9
(C) –9
(D) 0

26. Given that $OA = \begin{pmatrix}-17\\25\end{pmatrix}$ and $OB = \begin{pmatrix}4\\5\end{pmatrix}$, then the vector $AB =$

(A) $\begin{pmatrix}-13\\30\end{pmatrix}$
(B) $\begin{pmatrix}-13\\-20\end{pmatrix}$
(C) $\begin{pmatrix}-21\\20\end{pmatrix}$
(D) $\begin{pmatrix}21\\-20\end{pmatrix}$

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27. Which of the following formulae are used to calculate the area of a sector, A, with radius, r, arc length, l, and angle, q, in radians?

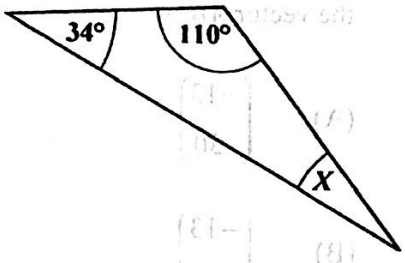
I. $A = \frac{r^2 q}{2}$

II. $A = \frac{l^2}{2q}$

III. $A = \frac{lr}{2}$

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

Item 28 refers to the following triangle (**not drawn to scale**).



28. The size of the missing angle, X, measured in radians, is

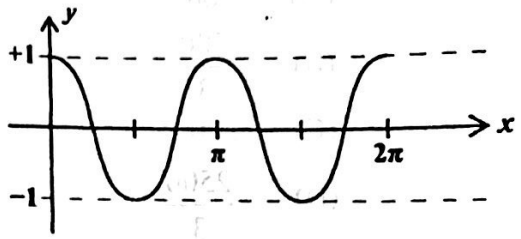
(A) $\frac{\pi}{5}$

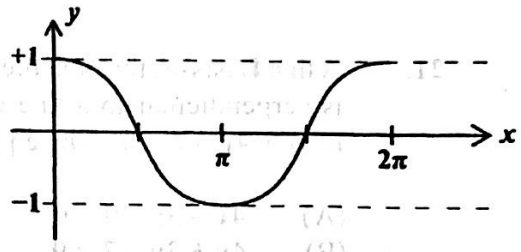
(B) $\frac{\pi}{10}$

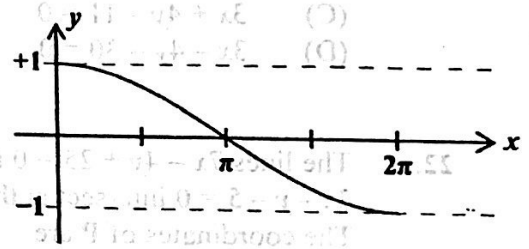
(C) $\frac{\pi}{20}$

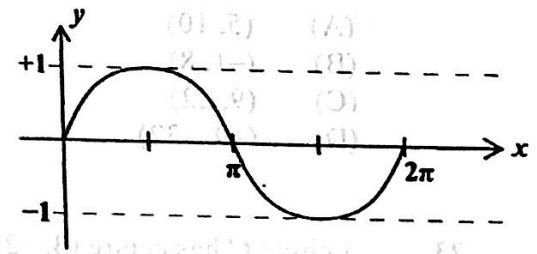
(D) $\frac{\pi}{25}$

29. Which of the following graphs represents $y = \sin x$?

(A)


(B)


(C)


(D)


30. For $0° < x < 360°$, the equation $3\sin^2 x = 8\cos x$ has only one real solution given by

(A) $\sin x = -\frac{1}{3}$

(B) $\cos x = \frac{1}{3}$

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

(D) $\cos x = -\frac{1}{3}$

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31. $\sin(\alpha + 45°)$ is equal to

(A) $\frac{1}{\sqrt{2}}(\sin\alpha + \cos\alpha)$

(B) $\frac{1}{\sqrt{2}}(\cos\alpha - \sin\alpha)$

(C) $\frac{1}{2}(\sin\alpha - \cos\alpha)$

(D) $\frac{1}{2}(\cos\alpha - \sin\alpha)$

32. $\tan\left(2x + \frac{\pi}{4}\right)$ is equal to

(A) $\tan 2x + 1$

(B) $\frac{\tan 2x - 1}{1 + \tan 2x}$

(C) $\frac{\tan 2x + 1}{1 - \tan 2x}$

(D) $\frac{2\tan 2x}{1 - \tan^2 2x}$

33. If $\sin(x + 20°) = \cos x$, then the value of x is

(A) 35°
(B) 45°
(C) 55°
(D) 70°

34. For $0 \leq \theta \leq \frac{\pi}{2}$, $\tan\theta = \frac{4}{3}$. The exact value of $\tan 2\theta$ is

(A) $\frac{8}{3}$

(B) $\frac{24}{25}$

(C) $-\frac{24}{7}$

(D) $-\frac{12}{7}$

35. $\frac{d}{dx}\sqrt{(7x^2 + 4)} =$

(A) $\frac{14x}{\sqrt{7x^2 + 4}}$

(B) $\frac{7x}{\sqrt{7x^2 + 4}}$

(C) $\frac{7x}{2\sqrt{7x^2 + 4}}$

(D) $\frac{7}{\sqrt{7x^2 + 4}}$

36. At the point (7, 4) on the curve $y = f(x)$, $\frac{dy}{dx} = 0$ and $\frac{d^2y}{dx^2} = -5$. The point (7, 4) is

(A) an optimum point
(B) a point of inflexion
(C) a minimum turning point
(D) a maximum turning point

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37. The gradient at $x = \frac{\pi}{6}$ on the curve $y = \cos x$ is

(A) $-\frac{\sqrt{3}}{2}$

(B) $-\frac{1}{2}$

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

(D) $\frac{\sqrt{3}}{2}$

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38. Given that $y = \cos 2x$, then $\frac{dy}{dx} =$

(A) $\sin 2x$

(B) $2 \sin 2x$

(C) $-2 \sin 2x$

(D) $-\frac{1}{2} \sin 2x$

39. The gradient function $\frac{dy}{dx}$ of the curve $y = \sin (2x^2 + 1)$ is

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(A) $4x \cos (2x^2 + 1)$

(B) $\cos (2x^2 + 1)$

(C) $\frac{1}{4x} \cos (2x^2 + 1)$

(D) $-4x \cos (2x^2 + 1)$

40. The region bounded by the curve $y = x^2$, the x-axis and the lines $x = 0$ and $x = 1$ is rotated 360° about the x-axis. The volume of the solid generated can be found from

(A) $\pi \int_0^1 x^2 dx$

(B) $\int_0^1 x^2 dx$

(C) $\int_0^1 x^4 dx$

(D) $\pi \int_0^1 x^4 dx$

41. $\int (2x-5)^3 dx =$

(A) $\frac{(2x-5)^4}{4} + c$

(B) $\frac{(2x-5)^2}{8} + c$

(C) $\frac{(2x-5)^4}{8} + c$

(D) $\frac{2(2x-5)}{4} + c$

42. $\int (\sin x - \cos x) dx$

(A) $2 \sin x - \cos x + C$

(B) $-\cos x - 2 \sin x + C$

(C) $\cos x - 2 \sin x + C$

(D) $-\cos x - \sin x + C$

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43. If $\int_2^a (6+3x)dx = 72$ where $a > 2$, then $a =$

(A) 6
(B) 10
(C) 36
(D) 72

44. If $X = \int_b^a f(x)dx$ and $a < c < b$, then $X =$

(A) $\int_0^a f(x)dx + \int_0^b f(x)dx$

(B) $\int_a^c f(x)dx + \int_b^c f(x)dx$

(C) $\int_a^c f(x)dx + \int_c^b f(x)dx$

(D) $\int_0^a f(x)dx + \int_0^c f(x)dx - \int_0^b f(x)dx$

45. The region R is enclosed by the x-axis, the curve $y = x^2 + 2x - 1$, the lines $x = 2$ and $x = 3$. The area of R in units^2 is

(A) 15
(B) $\frac{31}{3}$
(C) $\frac{19}{3}$
(D) $\frac{59}{3}$

END OF TEST

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

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