FORM TP 2020041

CANDIDATE – PLEASE NOTE!

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

TEST CODE **01254010**

MAY/JUNE 2020

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®

EXAMINATION

ADDITIONAL MATHEMATICS

Paper 01 – General Proficiency

1 hour 30 minutes

03 JUNE 2020 (a.m.)

563

A006

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

$(4^{-3})^2 \div \left(\frac{1}{16}\right)^2 =$

(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 may 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 $ab + 3c - 3b - ac$ is equal to

(A) $(a+3)(c-b)$
(B) $(a+3)(b-c)$
(C) $(a-3)(b+c)$
(D) $(a-3)(b-c)$

2. $\frac{1}{x+3} + \frac{3}{x^2-9}$ expressed as a single fraction is

(A) $\frac{4}{x+3}$

(B) $\frac{x}{x^2-9}$

(C) $\frac{x+6}{x^2-9}$

(D) $\frac{x^2-6}{(x^2-9)(x+3)}$

3. Given that $f(x) = 1 - 4x - 2x^2$, then $f(x)$ can be expressed in the form

(A) $2(x+1)^2 - 3$

(B) $3 - 2(x-1)^2$

(C) $3 - 2(x+1)^2$

(D) $3 - (2x+1)^2$

4. If $x^2 - 6x + 13 = a(x+h)^2 + k$, then

(A) $a=1 \quad h=3 \quad k=4$
(B) $a=1 \quad h=-3 \quad k=4$
(C) $a=1 \quad h=-4 \quad k=3$
(D) $a=-1 \quad h=4 \quad k=3$

5. A quadratic equation is such that the sum of its roots is $-\frac{2}{3}$ and the product of its roots is $\frac{3}{4}$. The quadratic equation is

(A) $12x^2 + 8x + 9 = 0$
(B) $12x^2 - 8x - 9 = 0$
(C) $12x^2 - 8x + 9 = 0$
(D) $12x^2 + 8x - 9 = 0$

6. The set of values of x for which $3x + 2 > x - 2$ is

(A) $\{x : x > 2\}$
(B) $\{x : x < -2\}$
(C) $\{x : x > 0\}$
(D) $\{x : x > -2\}$

7. The values of x for which $\frac{3x-2}{2x+1} \leq 0$ are

(A) $x \leq \frac{2}{3}$

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

(C) $-\frac{1}{2} < x \leq \frac{2}{3}$

(D) $x \leq -\frac{1}{2}$ or $x \geq \frac{2}{3}$

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. A function is defined by $f: x \to \frac{1}{x+1}$, $x \neq -1$. The value of $f^{-1}(1)$ is

(A) 0

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

(C) 1

(D) 2

10. The functions f and g are defined by

$f: x \to 2x - 5$ and $g: x \to 4 + \frac{3}{x}, x \neq 0$.

The composite function gf is defined by

(A) $gf: x \to \frac{6}{x} - 5, x \neq 0$

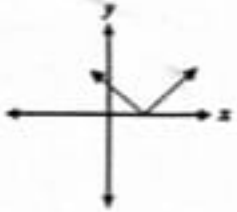
(B) $gf: x \to 3 + \frac{6}{x}, x \neq 0$

(C) $gf: x \to \frac{8x-17}{2x-5}, x \neq \frac{5}{2}$

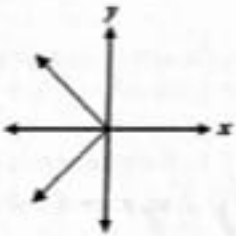
(D) $gf: x \to \frac{8x-20}{2x-5}, x \neq \frac{5}{2}$

11. Which of the following graphs depict function?

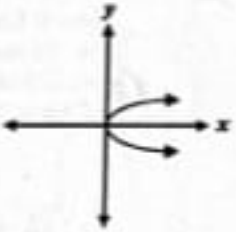
(A)



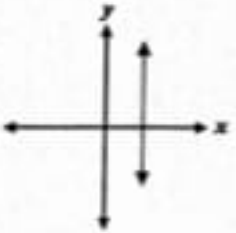
(B)



(C)



(D)



12. The expression $\frac{\sqrt{5}-1}{1+\sqrt{5}}$ when simplified is equal to

(A) $\frac{1}{3}(3-\sqrt{5})$

(B) $\frac{1}{2}(\sqrt{5}-3)$

(C) $\frac{1}{3}(\sqrt{5}-3)$

(D) $\frac{1}{2}(3-\sqrt{5})$

13. The value of 2^z where $z = 5 + \log_2 3$ is

(A) $\log_3 96$

(B) 2^5

(C) 96

(D) 2^{96}

14. Given that $\log_2 x^3 = 6$, then the value of x is

(A) 2
(B) 4
(C) 8
(D) 64

15. Which of the following mathematical statements are true?

I. $\log_a PQ = \log_a P \times \log_a Q$

II. $\log_a \frac{P}{Q} = \log_a P - \log_a Q$

III. $\log_a P^b = b \log_a P$

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

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

(A) -1

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

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

(D) 1

17. The sum of the first n terms of a geometric series is $S_n = 4^n - 1$. For this series

I. the common ratio is -1

II. the first 3 terms are 3, 12 and 48

III. $S_{2n} = 2^{4n} - 1$

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

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

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

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

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

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

GO ON TO THE NEXT PAGE

19. The common ratio of the geometric sequence 8, 12, 18, . . . is

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

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

(C) $\frac{3}{4}$

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

20. The sum of the **odd** integers between 10 and 50 is

(A) 60
(B) 600
(C) 630
(D) 1960

21. The coordinates of the centre of a circle with equation $(x-1)^2 + (y+3)^2 = 36$ is

(A) $(-1, 3)$
(B) $(-3, 1)$
(C) $(1, -3)$
(D) $(3, -1)$

22. The points of intersection of the line with equation $y - x - 2 = 0$ and the circle with equation $x^2 + y^2 = 10$ are

(A) $(3, 1)$ and $(-1, -3)$
(B) $(3, -1)$ and $(1, -3)$
(C) $(-3, -1)$ and $(-1, -3)$
(D) $(-3, -1)$ and $(1, 3)$

23. The line $y = 2x - 7$ and the line $x + 3y = 7$ intersect at the point

(A) $(4, 1)$
(B) $(8, 6)$
(C) $(-5, 4)$
(D) $(0, -7)$

24. The vectors **i** and **j** represent 1 km/h east and north respectively. A man sails a boat on a lake such that the velocity is $-\mathbf{i} + 2\mathbf{j}$ when there is no current. If there is a current of $3\mathbf{i}$, then the resultant velocity, v, is given by

(A) $2\mathbf{i} + 2\mathbf{j}$ km/h
(B) $4\mathbf{i} - 2\mathbf{j}$ km/h
(C) $-4\mathbf{i} + 2\mathbf{j}$ km/h
(D) $-4\mathbf{i} - 2\mathbf{j}$ km/h

25. 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

GO ON TO THE NEXT

26. The position vector of two points A and B relative to an origin O are given by $\overrightarrow{OA} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$ and $\overrightarrow{OB} = \begin{pmatrix} 8 \\ 5 \end{pmatrix}$ respectively.

The modulus of $\overrightarrow{AB}$ and the angle $\overrightarrow{AB}$ makes with the x-axis respectively are

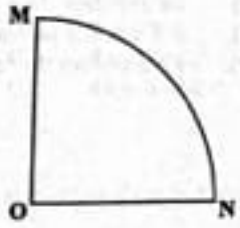
(A) modulus = 10, angle = 45°
(B) modulus = 10, angle = 30°
(C) modulus = $\sqrt{50}$, angle = 45°
(D) modulus = $\sqrt{50}$, angle = 90°

27. The trigonometrical expression

$\frac{\sin x}{1 - \cos x} + \frac{\sin x}{1 + \cos x}$ is identical to

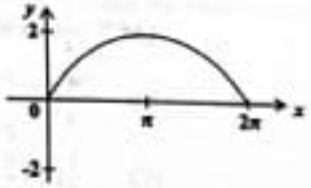
(A) $2 \sin x$
(B) $2 \tan x$
(C) $\tan^2 x$
(D) $\frac{2}{\sin x}$

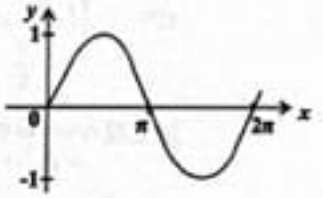
28. The figure MON below shows a quarter circle with radius 4 cm. The perimeter of the figure, in cm, is

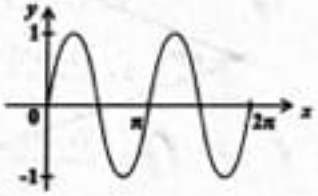


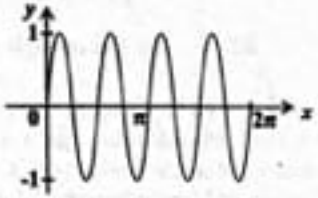
(A) 2π
(B) 4π
(C) $\pi + 8$
(D) $2(\pi + 4)$

29. The graph of $y = \sin 2x$ is

(A)


(B)


(C)


(D)


30. The **smallest** positive angle in radians, within the range $0 \leq \theta \leq 2\pi$ that satisfies the equation $(2 \cos \theta - 1)(\cos \theta - 2) = 0$, is

(A) $\frac{\pi}{3}$
(B) $\frac{2\pi}{3}$
(C) $\frac{4\pi}{3}$
(D) $\frac{5\pi}{3}$

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31. The exact value of $\cos\left(\frac{5\pi}{12}\right)$ is

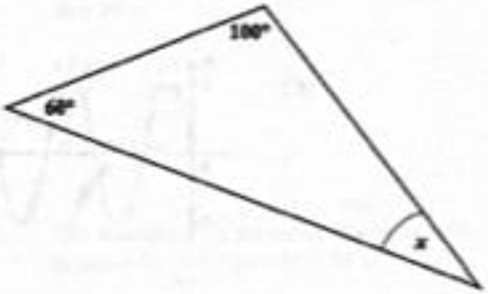
(A) $\frac{1}{4}(\sqrt{6}+\sqrt{2})$

(B) $\frac{1}{4}(\sqrt{6}-\sqrt{2})$

(C) $\frac{1}{2}(\sqrt{6}+\sqrt{2})$

(D) $\frac{1}{2}(\sqrt{6}-\sqrt{2})$

Item 32 refers to the figure below.



32. The size of angle x, measured in radians, is

(A) $\frac{\pi}{12}$

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

(C) $\frac{\pi}{6}$

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

33. If $\sin x = s$, then $\cos 2x =$

(A) $2s$
(B) $1 - s^2$
(C) $1 - 2s^2$
(D) $2s^2 - 1$

34. $\sin(\alpha - 45^\circ)$ 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) $\frac{1}{2}(\cos\alpha - \sin\alpha)$

35. If $f(x) = \sin 3x - \cos 4x$, then $f''(x) =$

(A) $3\cos 3x + 4\sin 4x$
(B) $9\sin 3x - 16\cos 4x$
(C) $9\sin 3x + 16\cos 4x$
(D) $-9\sin 3x + 16\cos 4x$

36. The curve C has the equation $y = f(x)$. C has a stationary point at $(-2, 5)$. If $f''(x) = x^2 - 15$, then $(-2, 5)$ is

(A) a vertex
(B) an intercept
(C) a minimum turning point
(D) a maximum turning point

37. $\frac{d}{dx}\left(\frac{2x-1}{5-x}\right) =$

(A) $\frac{9}{(5-x)^2}$

(B) $\frac{-9-4x}{(5-x)^2}$

(C) $-\frac{9}{(5-x)^2}$

(D) $\frac{9-4x}{(5-x)^2}$

38. The point $P(1,1)$ lies on the curve $y=\frac{3x-2}{2x-1}$. The value of the gradient of the curve at P is

(A) 1

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

(C) 5

(D) -1

39. Given $y = 2x^2 + 3\sin x$, then $\frac{dy}{dx} =$

(A) $x + \cos x$
(B) $x - \cos x$
(C) $4x - 3\cos x$
(D) $4x + 3\cos x$

40. If $\int_1^4 f(x)\,dx = 6$, then $\int_1^4 4f(x)\,dx + 5 =$

(A) 9
(B) 11
(C) 29
(D) 44

41. The region **R** is enclosed by the x-axis, the curve $y = -x^2 + 2$ and the lines $x = 0$ and $x = 1$. The area of **R** is

(A) 1

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

(C) 2

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

42. $\int (2x-4)^3\,dx =$

(A) $(2x-4)^4 + k$

(B) $\frac{(2x-4)^4}{2} + k$

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

(D) $\frac{(2x-4)^4}{8} + k$

43. The region bounded by the curve $y = 2\sin x$, the x-axis and the lines $x = 0$ and $x = \pi$ is revolved about the x-axis to form a solid of revolution. The volume of the solid generated can be found from

(A) $\pi\int_0^{\pi} 4\sin^2 x\,dx$

(B) $\pi\int_0^{\pi} 2\sin^2 x\,dx$

(C) $2\pi\int_0^{\pi} 4\sin^2 x\,dx$

(D) $4\pi\int_0^{\pi} 2\sin^2 x\,dx$

44. If $y = 3x^2 + \cos x$, then $\int y\,dx =$

(A) $x^3 - \sin x + c$

(B) $x^3 + \sin x + c$

(C) $6x - \sin x + c$

(D) $3x^3 - \sin x + c$

45. $\int (\cos x - 2 \sin x)\,dx =$

(A) $-\sin x + \cos x + c$

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

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

(D) $\sin x + 2 \cos x + c$

END OF TEST

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