CANDIDATE – PLEASE NOTE!

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

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FORM TP 2012036

TEST CODE **01254010**

MAY/JUNE 2012

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

ADDITIONAL MATHEMATICS

Paper 01 – General Proficiency

90 minutes

12 JUNE 2012 (p.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 45 items. You will have 90 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. 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

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

(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 answer space (C) has been shaded.

5. If you want to change your answer, erase it completely before you fill in your new choice.
6. 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, omit it and go on to the next one. Your score will be the total number of correct answers.
7. You may use silent non programable calculations to answer the items.

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

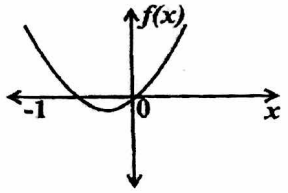
1. The expression x – 2 is a factor of

(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. 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) $(a - 3)(b - c)$

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

(A)


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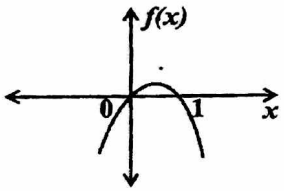

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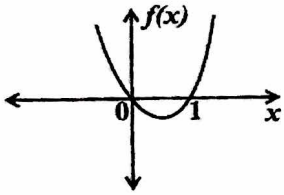

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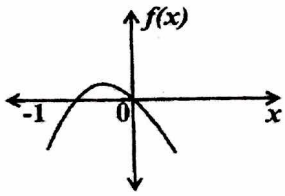


4. The number of visas, V(x), issued by an embassy annually is given by $V(x) = 7x^2 - 42x + 72$. The LEAST number of visas issued in a particular year, x, is

(A) 6
(B) 9
(C) 42
(D) 72

5. The roots of the equation $5x^2 + 6x - 2 = 0$ are

(A) not real and not distinct
(B) not real and not equal
(C) real and distinct
(D) real and equal

6. The set of values of x for which $5x + 7 > 10x - 13$ is

(A) $x < -4$
(B) $x > -4$
(C) $x < 4$
(D) $x > 4$

7. The range of values of x for which $5x + 6 \leq x^2$ is

(A) $\{x : -3 \leq x \leq -2\}$
(B) $\{x : x \leq -1\} \cup \{x : x \geq 6\}$
(C) $\{x : x \geq -1\} \cup \{x : x \geq 6\}$
(D) $\{x : -1 \leq x \leq 6\}$

8. If $f(x) = 3x - 4$ and $fg(x) = x$, then $g(x)$ is

(A) $\dfrac{1}{3x-4}$

(B) $\dfrac{x+4}{3}$

(C) $3 - 4x$

(D) $4x - 3$

9. The tables below show the ordered pairs for two functions f and g.

x	0	1	2	3	4	5
$f(x)$	7	5	3	2	–7	–5

x	0	1	2	3	4	5
$g(x)$	3	$\frac{1}{4}$	$\frac{1}{2}$	5	$\frac{1}{3}$	2

The value of $g^{-1}[f(3)]$ is

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

(B) 2

(C) 5

(D) 7

10. A function h is defined by $h : x \to 5x + 2$. Expressed in terms of a, $h(2a + 3)$ is

(A) $10a + 15$

(B) $2a + 15$

(C) $10a + 17$

(D) $5a + 17$

11. A function f is defined by $f : x \to 2x - 1$. The function f^2 is defined as

(A) $f^2 : x \to 4x^2 - 4x + 1$

(B) $f^2 : x \to 2x^2 - 1$

(C) $f^2 : x \to 4x^2 + 1$

(D) $f^2 : x \to 4x - 3$

12. $\sqrt[n]{3 \times 27^m}$ is equal to

(A) $3^{\frac{3m+1}{n}}$

(B) 3^{n+3m}

(C) $\sqrt[n]{81^{3m}}$

(D) $3^{\frac{4m}{n}}$

13. $(8+\sqrt{5})(2-\sqrt{5})$ can be expressed as

(A) $11-6\sqrt{5}$

(B) $21-6\sqrt{5}$

(C) $11+6\sqrt{5}$

(D) $11+10\sqrt{5}$

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

(A) $\log_2 96$

(B) 2^5

(C) 96

(D) 2^{96}

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

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

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

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

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

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

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

(B) $\sqrt{2}$

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

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

17. In a geometric progression, each of whose terms is positive, the fifth term is 45 and the seventh term is 5. The SIXTH term is

(A) 9
(B) 15
(C) 25
(D) 40

18. The sum of the ODD integers between 10 and 50 is

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

19. The first four terms of a convergent geometric progression (GP) is given by 500, 200, 80, 32. The sum to infinity of this GP is

(A) 200

(B) $\frac{500}{3}$

(C) 300

(D) $\frac{2500}{3}$

20. A long-distance runner runs the first kilometre of a race in 3 minutes 45 seconds but finds that his speed drops steadily so that each kilometre takes him 12 seconds more than the preceding one. The time taken to cover the first 12 kilometres is

(A) 58 mins 12 secs
(B) 31 mins 48 secs
(C) 9 mins 18 secs
(D) 63 mins 36 secs

21. The lines $7x - 4y + 25 = 0$ and $3x - y - 5 = 0$ intersect at the point P, where

(A) $P(5, 10)$
(B) $P(-1, 8)$
(C) $P(-9, -32)$
(D) $P(9, 22)$

22. The line through the points $P(k, 2)$ and $Q(6, 8)$ is parallel to the line with equation $3x + y - 21 = 0$. The value of k is

(A) 1
(B) 4
(C) 8
(D) 24

23. The point (2, 3) is at one end of a diameter of the circle whose equation is

$x^2 + y^2 - 10x + 2y + 1 = 0.$

The coordinates of the other end of the diameter are

(A) (−12, −5)
(B) (−12, −1)
(C) (8, −1)
(D) (8, −5)

24. The vector **a** is given as $5\mathbf{i} + 12\mathbf{j}$. A unit vector parallel to **a** is

(A) $15\mathbf{i} + 36\mathbf{j}$

(B) $195\mathbf{i} + 468\mathbf{j}$

(C) $\frac{1}{13}(5\mathbf{i} + 12\mathbf{j})$

(D) $\frac{3}{13}(5\mathbf{i} + 12\mathbf{j})$

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

(A) $\begin{pmatrix} -13 \\ 30 \end{pmatrix}$

(B) $\begin{pmatrix} -13 \\ -20 \end{pmatrix}$

(C) $\begin{pmatrix} -21 \\ 20 \end{pmatrix}$

(D) $\begin{pmatrix} 21 \\ -20 \end{pmatrix}$

26. The position vectors of A and B relative to an origin O are $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ respectively. The acute angle AOB is given by

(A) $\cos^{-1}\left(\frac{1}{\sqrt{290}}\right)$

(B) $\cos^{-1}\left(\frac{11}{\sqrt{290}}\right)$

(C) $\cos^{-1}\left(\frac{\sqrt{11}}{\sqrt{290}}\right)$

(D) $\cos^{-1}\left(\frac{-1}{290}\right)$

27. If $\sin\theta = \frac{5}{13}$ and θ is **obtuse**, then $\tan\theta =$

(A) $-\frac{12}{13}$

(B) $-\frac{5}{12}$

(C) $\frac{5}{12}$

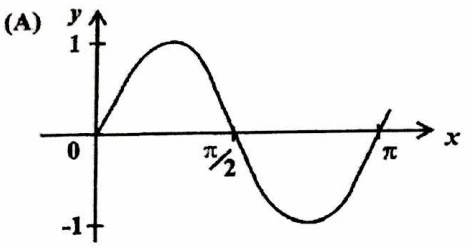
(D) $\frac{12}{13}$

28. $\cos(A + B) + \cos(A - B) \equiv$

(A) $2\cos A$
(B) $2\cos A + 2\cos B$
(C) $\cos^2 A \cos^2 B$
(D) $2\cos A \cos B$

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

(A)



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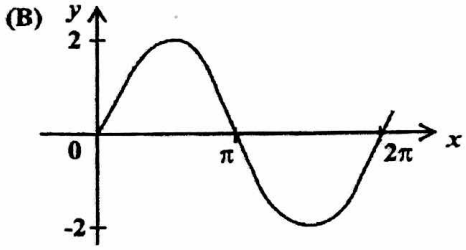

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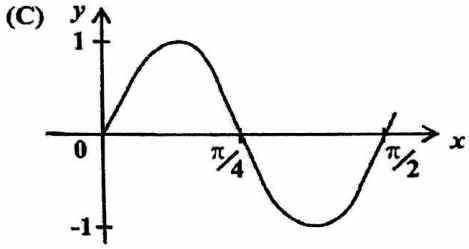

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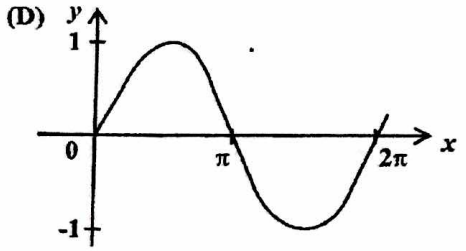

30. The SMALLEST positive angle for which the equation $\sin\theta - \cos\theta = 0$ for $\theta \leq \theta \leq 2\pi$, is

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

(B) $\frac{\pi}{4}$

(C) $\frac{5\pi}{6}$

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

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. Convert $\frac{4\pi}{5}$ radians into degrees.

(A) 72
(B) 144
(C) 180
(D) 288

33. The **exact** value of $\tan 150°$ is given by

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

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

(C) $-\sqrt{3}$

(D) $\sqrt{3}$

34. 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) $\frac{2}{\sin x}$

(D) $\tan^2 x$

35. Given that $y = (5 - 2x)^5$, then $\frac{dy}{dx} =$

(A) $-10(5 - 2x)^4$
(B) $(5 - x)^4$
(C) $-5(5 - 2x)^4$
(D) $10(5 - 2x)^4$

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

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

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

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

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

37. The equation of a curve is given by $y = (x^2 + 2)(x - 1)^3$.

The gradient function, $\frac{dy}{dx}$, is given by

(A) $(x - 1)(5x^2 - 2x + 6)$

(B) $(x - 1)^2(-x^2 - 2x - 6)$

(C) $(x - 1)^2(5x^2 - 2x + 6)$

(D) $(x - 1)^2(5x^2 + 2x + 6)$

38. Given $y = 5 \sin 2x$, then $\frac{dy}{dx} =$

(A) $-5 \cos 2x$

(B) $-10 \cos 2x$

(C) $5 \cos 2x$

(D) $10 \cos 2x$

39. The curve C is given by the equation $y = x^2 + \frac{16}{x}$. The second derivative, $\frac{d^2y}{dx^2}$ is given by

(A) $2 - \frac{16}{x^2}$

(B) $2 + \frac{32}{x^3}$

(C) $2 + \frac{32}{x^2}$

(D) $2 + \frac{16}{x^3}$

40. The value of a for which $\int_0^a (x^2 - 5)\, dx = \frac{50}{3}$ is

(A) 5
(B) 6
(C) 8
(D) 10

41. $\int (3x-5)^4 \, dx =$

(A) $\frac{(3x-5)^5}{5} + K$

(B) $\frac{(3x-5)^3}{15} + K$

(C) $\frac{(3x-5)^5}{15} + K$

(D) $\frac{3(3x-5)^5}{5} + K$

42. The region in the first quadrant enclosed by the curve $y = x - \frac{1}{2}x^2$, the lines $x = 0$ and $x = 2$ is rotated completely about the x-axis. The volume in units^3 of the solid generated is

(A) $\frac{2\pi}{3}$

(B) 8π

(C) $\frac{4\pi}{15}$

(D) $\frac{64\pi}{15}$

43. 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 in units^2 of R is

(A) 15

(B) $\frac{31}{3}$

(C) $\frac{19}{3}$

(D) $\frac{59}{3}$

44. $\int (\sin x + 2\cos x) \, dx =$

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

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

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

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

45. Given that $\frac{d}{dx}\left(\frac{x}{1+x}\right) = \frac{1}{(1+x)^2}$, then $\int_0^2 \frac{3}{(1+x)^2} dx$ is equal to

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

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

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

(D) 2

END OF TEST