FORM TP 2014036 [redacted] TEST CODE 01254010

MAY/JUNE 2014

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®

EXAMINATION

ADDITIONAL MATHEMATICS

Paper 01 – General Proficiency

*1 hour 30 minutes*

09 JUNE 2014 (p.m.)

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

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

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

   Sample Answer

   The best answer to this item is "$4^0$", so answer space (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, omit it and go on to the next one. Your score will be the total number of correct answers.
8. You may use silent non programable calculators to answer the items.

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

1. When $2x^3 + 3x^2 - 2x + 3$ is divided by $2x - 1$ the remainder is

(A) 0

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

(C) 3

(D) 6

2. The expression $ab + 3c - 3b - ac$ is equal to

(A) $(a + 3)(c - b)$

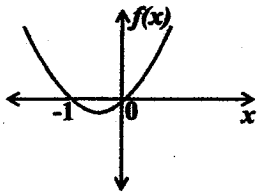
(B) $(a + 3)(b - c)$

(C) $(a - 3)(b + c)$

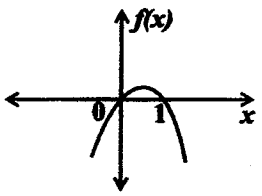
(D) $(a - 3)(b - c)$

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

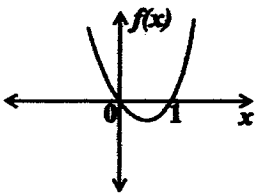
(A)



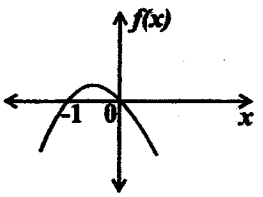

(B)




(C)




(D)




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

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 $x > -5$

7. 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) $\{x : x > -2\}$

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

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

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

(C) $3 - 4x$

(D) $4x - 3$

Item 9 refers to the tables below which 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 |

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

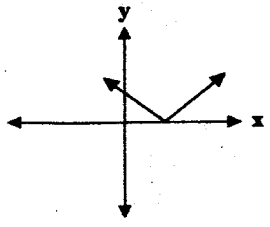
(A) $\frac{1}{2}$

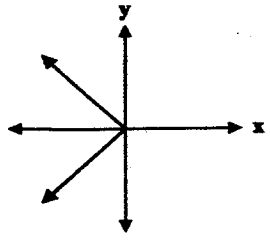
(B) 2

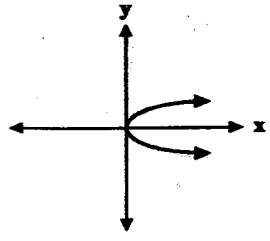
(C) 5

(D) 7

**10.** Which of the graphs below is a function?

(A)



(B)



(C)
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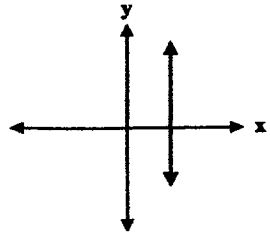



**11.** A function is defined by $f: x \to \frac{1}{x+1}, x \neq -1$.

The value of $f^{-1}(1)$ is

(A) 0

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

(C) 1

(D) 2

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

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

(B) $3^{n+3m}$

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

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

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

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

(B) 0

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

(D) 1

**14.** 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

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

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. Which of the following is NOT an arithmetic sequence?

(A) 11, 2, –8, –19 . . . .
(B) 8, 12, 16, 20, . . . .
(C) 51, 45, 39, 33, . . . .
(D) –7, –9, –11, –13 . . . .

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

(A) (1, –3)
(B) (–1, 3)
(C) (3, –1)
(D) (–3, 1)

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 points of intersection of the line with equation $x + y = 7$ and the circle with equation $x^2 + y^2 = 25$ are $P$ and $Q$. The coordinates of $P$ and $Q$ respectively are

(A) (–3, –4) and (–4, –3)
(B) (–3, 4)and (–4, 3)
(C) (3, –4) and (4, –3)
(D) (3, 4) and (4, 3)

**24.** Two vectors are equal

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

**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 vector of the point $P$ relative to an origin O is given as $\mathbf{p} = 5\mathbf{i} + 2\mathbf{j}$ and the position vector of $Q$ relative to an origin O is given as $\mathbf{q} = -4\mathbf{i} + 10\mathbf{j}$.

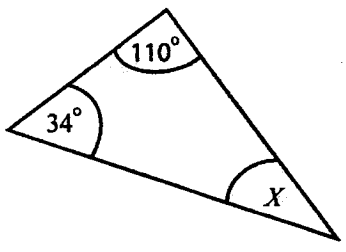
Which of the following is TRUE?

(A) **p** and **q** are parallel.
(B) The acute angle between **p** and **q** is 60°.
(C) **p** and **q** are perpendicular.
(D) The acute angle between **p** and **q** is 45°.

**27.** The exact value of $\dfrac{\sin 150^\circ}{\cos 150^\circ}$ is given as

(A) $-\dfrac{1}{\sqrt{3}}$
(B) $\dfrac{1}{\sqrt{3}}$
(C) $-\sqrt{3}$
(D) $\sqrt{3}$

Item 28 refers to the following triangle.

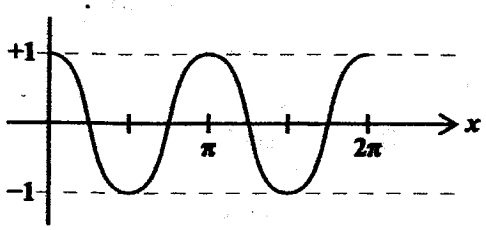



**28.** The size of the missing angle $X$, measured in radians, is

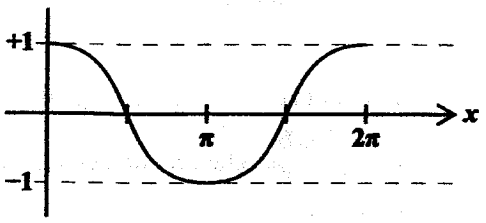
(A) $\dfrac{\pi}{5}$
(B) $\dfrac{\pi}{10}$
(C) $\dfrac{\pi}{20}$
(D) $\dfrac{\pi}{25}$

29. Which of the following represents the graph of $y = \sin 2x$.

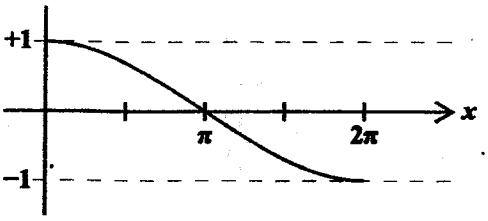
(A)



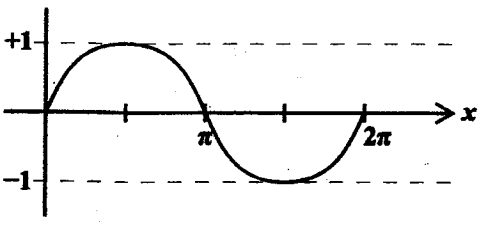

(B)




(C)




(D)




30. The smallest positive angle for $0 \leq \theta \leq 2\pi$, for which the equation $(2\cos\theta - 1)(\cos\theta - 2) = 0$ is positive is

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

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

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

(D) $\frac{5\pi}{3}$

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. The value of $\frac{4\pi}{5}$ radians expressed as degrees is

(A) 72°
(B) 144°
(C) 180°
(D) 288°

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

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

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

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

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

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 $y = \cos x$ is

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

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

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

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

37. The curve $C$ is given by the equation $y = 2x^3 - 3x^2 - 12x + 6$. The values of $x$ at which stationary points occur are

(A) 1 and –2
(B) –1 and 2
(C) –1 and –2
(D) 1 and 2

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

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

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

(C) $-2 \sin 2x$
(D) $2 \sin 2x$

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

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

(B) $\frac{(2x-4)^2}{8} + \kappa$

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

(D) $(2x-4)^4 + \kappa$

42. If $X = \int_a^b f(x)dx$ and $a < c < b$ then

(A) $X = \int_o^a f(x)dx + \int_o^b f(x)dx$

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

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

(D) $X = \int_o^a f(x)dx + \int_o^c f(x)dx - \int_o^b f(x)dx$

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. If $\int_1^3 f(x)dx = 5$, then $\int_1^3 2f(x)dx + 3 =$

(A) 5
(B) 7
(C) 9
(D) 13

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

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

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

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

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

**END OF TEST**

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