FAS-PASS
Maths

SOLUTIONS TO THE MC SPECIMEN PAPER

The solutions to all 45 questions have been deliberately written and explained in much detail, as a primary benefit to the student. The authors attempt to remind students of the mathematical laws and their usages that are associated with CSEC Additional Mathematics multiple choice examination. Also, the authors saw it necessary to satisfy the needs of students as they seek proper explanations for the working of the questions. This has been adhered to as much as possible.

Often times, suggested options for the answer to a question may appear similar, differing perhaps only by a sign. A simple computational error can therefore result in an incorrect choice and so candidates are reminded of the need to be careful. The authors are quite conscious of a student's desire for success in this venture and the pleasure that is derived and which accompanies this success.

The authors embrace this opportunity to wish great success on all candidates as they grow, learn, master and aspire to become global citizens. Remember, if you try to touch the stars and persevere to do so, a day shall dawn when the stars will try to touch you.

Fayad W. Ali & Shereen A. Khan

SOLUTIONS

1. $(x-2)$ is a factor of $f(x)=x^3+2x^2-5x+k$.

   $\therefore f(2)=0$ (according to the remainder and factor theorem)

   $$\begin{aligned}\therefore (2)^3+2(2)^2-5(2)+k&=0\\ 8+8-10+k&=0\\ k&=-6\end{aligned}$$

   Answer: (A)

2. $a(b+c)-b(a+c)$

   Expanding to get:

   $$\begin{aligned}ab+ac-(ab+bc)&=ab+ac-ab-bc\\ &=ac-bc\\ &=c(a-b)\end{aligned}$$

   Answer: (C)

3. $\sum_{r=1}^{20}(3r-1)$

   When $r=1$

   $$\begin{aligned}3r-1&=3(1)-1\\ &=2\end{aligned}$$

   When $r=2$

   $$\begin{aligned}3r-1&=3(2)-1\\ &=5\end{aligned}$$

   When $r=3$

   $$\begin{aligned}3r-1&=3(3)-1\\ &=8\end{aligned}$$

   The series $3r-1=2,\ 5,\ 8,\ \ldots$

$$\sum_{r=1}^{20}(3r-1)=2+5+8+...$$

This is in arithmetic progression where

$a=2$ (1st term)

$d=3$ (the common difference)

$n=20-1+1$

$=20$ (no. of terms)

$\sum_{r=1}^{20}$ means the sum of the terms from the 1st to the 20th.

$$S_{20}=\frac{20}{2}\{2(2)+(20-1)3\}$$
$$=10\{4+19(3)\}$$
$$=10\times(4+57)$$
$$=10\times 61$$
$$=610$$

Answer: (B)

4. Length of the 1st piece of string = 30 cm
Length of the 4th piece of string = 24 cm

We let the first term of the arithmetic progression $=a$
$=30$

We let the common difference $=d$

$$T_4=a+3d \quad \text{(data)}$$
$$\therefore 24=30+3d$$
$$\therefore d=-2$$

In the arithmetic progression given, $n=10$.
The sum of the lengths of the 10 pieces of string is the original length of the uncut string.

$$S_{10} = \frac{10}{2}\left\{2(30) + (10-1)\times -2\right\}$$
$$= 5\left\{60 + (9\times -2)\right\}$$
$$= 5\left\{60 - 18\right\}$$
$$= 5\times 42$$
$$= 210 \text{ cm}$$

Answer: (B)

5. The first term of the geometric progression $= a$
$= 16$

$$T_5 = ar^4 \quad (r = \text{common ratio})$$
$$\therefore 16r^4 = 81$$
$$r^4 = \frac{81}{16}$$
$$r = \sqrt[4]{\frac{81}{16}}$$
$$r = \pm\frac{3}{2}$$

$$T_4 = ar^3$$
$$= 16\left(\frac{3}{2}\right)^3 \text{ or } 16\left(-\frac{3}{2}\right)^3$$

$$T_4 > 0 \Rightarrow T_4 = 16\left(\frac{3}{2}\right)^3$$
$$= 16\times\frac{27}{8}$$
$$= 54$$

Answer: (C)

6. Geometric progression is 81, 27, 9, 3, …
Let the common ratio be r

$$\therefore r = \frac{27}{81}$$
$$= \frac{1}{3}$$

$|r| < 1$ (This is expected since the geometric progression is convergent)

$$S_\infty = \frac{a}{1-r}$$
$$= \frac{81}{1-\frac{1}{3}}$$
$$= \frac{81}{\frac{2}{3}}$$
$$= \frac{243}{2}$$
$$= 121.5$$

Answer: (B)

7. $$2 \times 4^{x+1} = 16^{2x}$$
$$\therefore 2 \times \left(2^2\right)^{x+1} = \left(2^4\right)^{2x}$$

By the power law of indices the equation becomes:

$$2 \times 2^{2(x+1)} = 2^{4(2x)}$$
$$2 \times 2^{2x+2} = 2^{8x}$$
$$2^{1+2x+2} = 2^{8x}$$
$$2^{2x+3} = 2^{8x}$$

Equating indices since the bases are equal, we obtain

$$2x + 3 = 8x$$
$$6x = 3$$
$$x = \frac{1}{2}$$

Answer: (D)

8. $$\sqrt[n]{2 \times 4^m} = \sqrt[n]{2 \times \left(2^2\right)^m}$$

$$= \sqrt[n]{2 \times 2^{2m}}$$
$$= \sqrt[n]{2^{2m+1}}$$
$$= \left(2^{2m+1}\right)^{\frac{1}{n}}$$
$$= 2^{\frac{2m+1}{n}}$$

Answer: (D)

9. $\log_2 x + \log_2 (6x+1) = 1$

$\therefore \log_2 x + \log_2 (6x+1) = \log_2 2 \quad$ (logarithmic equation)

$$\log_2 \left(x \times (6x+1)\right) = \log_2 2$$

We can now remove 'logs' and equate the expression to get,

$$x(6x+1) = 2$$
$$6x^2 + x - 2 = 0$$
$$(3x+2)(2x-1) = 0$$
$$x = -\frac{2}{3} \text{ or } \frac{1}{2}$$

$x \neq -\frac{2}{3}$, since the equation would involve one or more terms involving, $\log_2 (-\text{ve})$. The log (0 or –ve) does not exist.

$\therefore x = \frac{1}{2}$ only

Answer: (B)

10. $\log_4 (8) - \log_4 (2) + \log_4 \left(\frac{1}{16}\right) = \log_4 \left\{\frac{8}{2} \times \frac{1}{16}\right\}$

$$= \log_4 \left(\frac{1}{4}\right)$$
$$= \log_4 (4)^{-1}$$
$$= -1 \log_4 4$$
$$= -1(1)$$
$$= -1$$

Answer: (A)

11. $\dfrac{1+\sqrt{3}}{\sqrt{3}-1}$

We multiply both the numerator and the denominator by the conjugate of the denominator i.e rationalise the expression

$$\begin{aligned}\frac{1+\sqrt{3}}{\sqrt{3}-1}\times\frac{\sqrt{3}+1}{\sqrt{3}+1}&=\frac{\sqrt{3}+3+1+\sqrt{3}}{3-1}\\&=\frac{2\sqrt{3}+4}{2}\\&=\frac{2\left(\sqrt{3}+2\right)}{2}\\&=\sqrt{3}+2\end{aligned}$$

Answer: (D)

12. $$\begin{aligned}f(x)&=-5-8x-2x^2\\&=-5-2\left(x^2+4x\right)\\&=*-2\left(x+2\right)^2\end{aligned}$$

Where $*$ is a number to be obtained

$$\begin{aligned}-2\left(x+2\right)^2&=-2\left(x^2+4x+4\right)\\&=-2x^2-8x-8\end{aligned}$$

Hence

And so $$\begin{aligned}*+-8&=-5\\ *&=3\end{aligned}$$

$\therefore f(x)=3-2\left(x+2\right)^2$

Answer: (C)

13. $2x^2-x+1=0$ is of the form $ax^2+bx+c=0$, where $a=2$, $b=-1$ and $c=1$.

$$b^2 = (-1)^2$$
$$= 1$$

$$4ac = 4(2)(1)$$
$$= 8$$

$$1 < 8$$
$$b^2 < 4ac$$

$\therefore$ Roots are not real and distinct (the roots are imaginary).

Answer: (D)

Note:
The roots of a quadratic can NEVER be 'not real and equal' as suggested in (C). If they are not real (or imaginary) then they also have to be unequal.

14. $4-(x+1)^2$
$\geq 0 \ \forall x$

$(x+1)^2 \geq 0 \ \ \forall x$

$\therefore$ Maximum value of $4-(x+1)^2 = 4-0$
$= 4$

When $-(x+1)^2 = 0$
then the value of
$x = -1$.

$\therefore$ The maximum value is 4 occurs when $x = -1$.

Answer: (C)

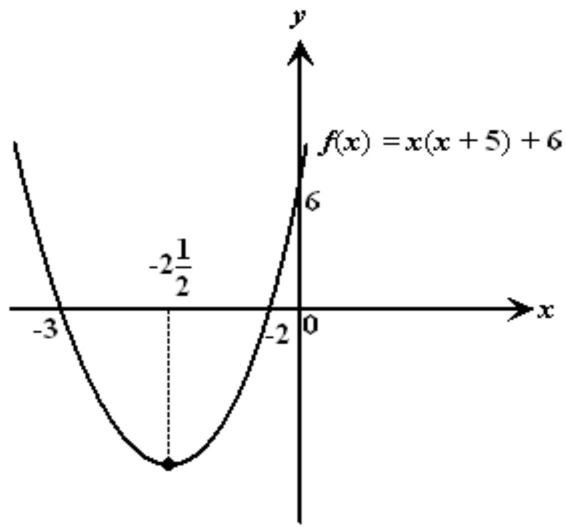
15. $f(x) = x(x+5)+6$
$f(x) = x^2+5x+6$
$= (x+2)(x+3)$

Coefficient of $x^2 > 0 \Rightarrow$ The quadratic graph of $f(x)$ has a minimum point.

$f(0) = 6$

The minimum value of $f(x)$ occurs at $x = \dfrac{-(5)}{2(1)}$

$$= -\frac{5}{2}$$

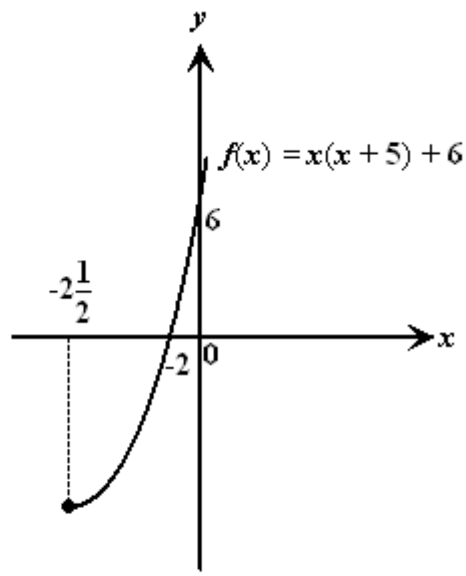


For any $f(x) = ax^2 + bx + c$, the maximum **OR** minimum value occurs at $x = \dfrac{-b}{2a}$ since the axis of symmetry passes through the maximum or the minimum point on the curve.

$f(x)$ is one to one for values of x on either side of the axis of symmetry

$f(x)$ is one to one for $x \geq \dfrac{-b}{2a}$ **OR** $x \leq \dfrac{-b}{2a}$.

If $f(x)$ is one to one for $x \geq k$ as stated in the question, then:



$k = -2\frac{1}{2}$ or $-\frac{5}{2}$.

Answer: (A)

16. Let $y = \dfrac{x+3}{x-1}$

$$\begin{aligned}(x-1)y &= x+3\\ xy - y &= x+3\\ xy - x &= y+3\\ x(y-1) &= y+3\\ \therefore x &= \frac{y+3}{y-1}\end{aligned}$$

Replace y by x we obtain

$$f^{-1}(x) = \frac{x+3}{x-1},\ x \neq 1$$

$$\begin{aligned}f^{-1}(-4) &= \frac{-4+3}{-4-1}\\ &= \frac{-1}{-5}\\ &= \frac{1}{5}\end{aligned}$$

Answer: (B)

17. $g : x \to 3x - 1$

$$g(3a-1) = 3(3a-1) - 1$$
$$= 9a - 3 - 1$$
$$= 9a - 4$$

Answer: (D)

18. $f : x \to 3x - 2$

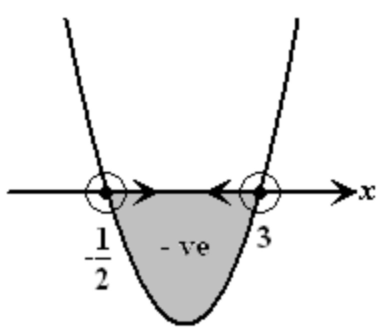
$$g : x \to \frac{12}{x} - 4,\ x \neq 0$$
$$fg : x \to 3\left(\frac{12}{x} - 4\right) - 2$$
$$= \frac{36}{x} - 12 - 2$$
$$= \frac{36}{x} - 14,\ x \neq 0$$

Answer: (B)

19.
$$2x^2 < 5x + 3$$
$$2x^2 - 5x - 3 < 0$$
$$(2x+1)(x-3) < 0$$

$y = 2x^2 - 5x - 3$ cuts the horizontal axis at $-\frac{1}{2}$ and 3.

The coefficient of $x^2 > 0$ and hence the quadratic graph $y = 2x^2 - 5x - 3$ has a minimum point.



The range for $2x^2 < 5x+3$ is $-\frac{1}{2} < x < 3$ as shown shaded in the above diagram

Answer: (A)

Note: This is best stated as $\left\{x : -\frac{1}{2} < x < 3\right\}$.

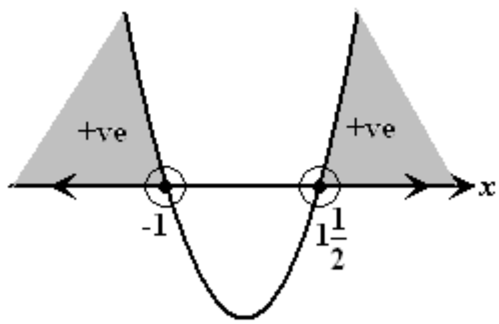
20. $\frac{2x-3}{x+1} > 0$

$\times(x+1)^2$

$(2x-3)(x+1) > 0$

The coefficient of $x^2 > 0$ and so $y = (2x-3)(x+1)$ has a minimum point.

$y = (2x-3)(x+1)$ cuts the x – axis at – 1 and $\frac{3}{2}$.



$x > 1\frac{1}{2}$ or $x < -1$

(as shown shaded in the above diagram)

Answer: (C)

Note: This is best stated as $\left\{x : x > 1\frac{1}{2}\right\} \cup \{x : x < -1\}$ **written in set builder notation.**

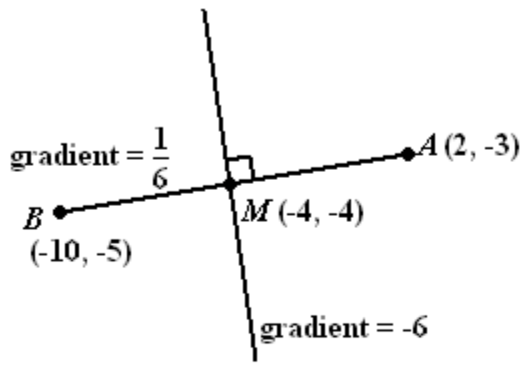
21. $A = (2, -3)$ $B = (-10, -5)$

Gradient of $AB = \frac{-5-(-3)}{-10-2}$

$$= \frac{-2}{-12}$$
$$= \frac{1}{6}$$

$\therefore$ The gradient of **ANY** line perpendicular to $AB = \frac{-1}{\frac{1}{6}}$
$$= -6$$

The midpoint, M, of $AB = \left(\frac{2+(-10)}{2}, \frac{-3+(-5)}{2} \right)$
$$= (-4, -4)$$



The equation of the perpendicular bisector of AB is

$$\frac{y-(-4)}{x-(-4)} = -6$$
$$y+4 = -6(x+4)$$
$$y = -6x - 28 \text{ or } 6x + y + 28 = 0$$

Answer: (B)

22. We solve the two equations simultaneously to obtain the point of intersection.
Let
$2y - 3x - 13 = 0 \qquad \ldots❶$
$y + x + 1 = 0 \qquad \ldots❷$

From ❷
$y = -1 - x$

Substitute this expression in ❶

$$2(-1-x)-3x-13=0$$
$$-2-2x-3x-13=0$$
$$-5x=15$$
$$x=-3$$

When $x=-3$
$$y=-1-(-3)$$
$$=2$$

$$\therefore P=(-3,\ 2)$$

Answer: (D)

23.
$$x^2+y^2-6x+4y-12=0$$
We re-write the equation as:
$$x^2+y^2+2(-3)x+2(+2)y+(-12)=0$$
This is of the form $x^2+y^2+2gx+2fy+c=0$, which is the equation of a circle and where $g=-3,\ f=+2$ and $c=-12$.

The radius of the circle $=\sqrt{g^2+f^2-c}$
$$=\sqrt{(-3)^2+(+2)^2-(-12)}$$
$$=\sqrt{9+4+12}$$
$$=\sqrt{25}$$
$$=5 \text{ units}$$

The center of the circle $=(-g,\ -f)$
$$=(-(-3),\ -(2))$$
$$=(3,\ -2)$$

$$\therefore C=(3,\ -2) \text{ and } r=5$$

Answer: (D)

24.

$\mathbf{p} = 2\mathbf{i} - k\mathbf{j}$

$|\mathbf{p}| = \sqrt{13}$

$$\therefore \sqrt{(2)^2 + (-k)^2} = \sqrt{13}$$
$$\therefore 4 + k^2 = 13$$
$$k^2 = 9$$
$$k = \pm 3$$

Answer: (A)

25.

$\mathbf{a} = 4\mathbf{i} + t\mathbf{j}$

$\mathbf{b} = 2\mathbf{i} - 3\mathbf{j}$

a and **b** are parallel.

Hence either vector, **a** or **b** can be represented as a scalar multiple of the other.
Let $\mathbf{a} = \alpha.\mathbf{b}$, where α is a scalar.

$$4(\mathbf{i} + t\mathbf{j}) = 2(2\mathbf{i} - 3\mathbf{j})$$
$$4\mathbf{i} + t\mathbf{j} = 4\mathbf{i} - 6\mathbf{j}$$

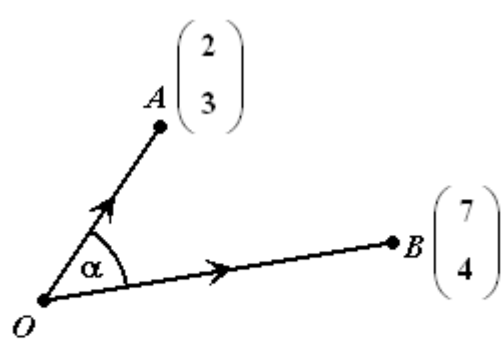
Equating components:

$t = -6$

Answer: (A)

26.

$OA = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $OB = \begin{pmatrix} 7 \\ 4 \end{pmatrix}$



$$
\begin{aligned}
OA.OB &= (2\times 7)+(3\times 4) \\
&= 14+12 \\
&= 26
\end{aligned}
$$

$$
\begin{aligned}
|OA| &= \sqrt{(2)^2+(3)^2} \\
&= \sqrt{13}
\end{aligned}
$$

$$
\begin{aligned}
|OB| &= \sqrt{(7)^2+(4)^2} \\
&= \sqrt{65}
\end{aligned}
$$

$$OA.OB = |OA||OB|\cos A\hat{O}B$$

$$A\hat{O}B = \cos^{-1}\left(\frac{26}{\sqrt{13}.\sqrt{65}}\right)$$

Answer: (B)

27.

$$\frac{1+\sin x}{\cos x}+\frac{\cos x}{1+\sin x}$$

$$
\begin{aligned}
\frac{(1+\sin x)^2+(\cos x)^2}{\cos x(1+\sin x)} &= \frac{1+\sin^2 x+2\sin x+\cos^2 x}{\cos x(1+\sin x)} \\
&= \frac{1+2\sin x+\left(\sin^2 x+\cos^2 x\right)}{\cos x(1+\sin x)}
\end{aligned}
$$

Recall: $\sin^2 x+\cos^2 x=1$

And so the L.H.S reduces to

$$
\begin{aligned}
&= \frac{2+2\sin x}{\cos x(1+\sin x)} \\
&= \frac{2(1+\sin x)}{\cos x(1+\sin x)} \\
&= \frac{2}{\cos x}
\end{aligned}
$$

Answer: (B)

28.

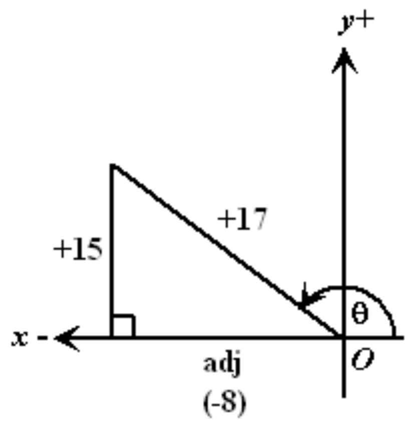
$$\cos(A-B)-\cos(A+B)$$

By the compound angle formula:

$$= \cos A \cos B + \sin A \sin B - (\cos A \cos B - \sin A \sin B)$$
$$= 2 \sin A \sin B$$

Answer: (A)

29.



(θ is obtuse so the right-angled triangle is shown in quadrant 2).

By Pythagoras' theorem

$$\text{adj} = \sqrt{17^2 - 15^2}$$
$$= \pm 8$$

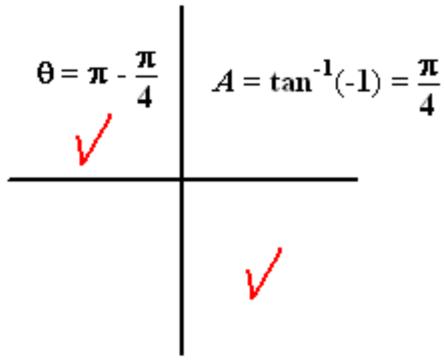
In the above diagram, the adjacent side is taken as -8 since it is measured along OX^{-1}

$$\therefore \cos\theta = \frac{-8}{+17}$$
$$= -\frac{8}{17}$$

Answer: (C)

30.

$$\sin\theta + \cos\theta = 0$$
$$\cos\theta = -\sin\theta$$
$$\therefore \tan\theta = -1$$



$\therefore$ Smallest positive θ

$= \pi - \frac{\pi}{4}$

$= \frac{3\pi}{4}$

Answer: (B)

31.

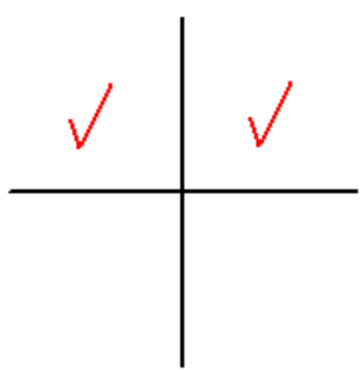
$4\sin^2\theta - 1 = 0 \qquad\qquad 0 \le \theta \le 2\pi$

$4\sin^2\theta = 1$

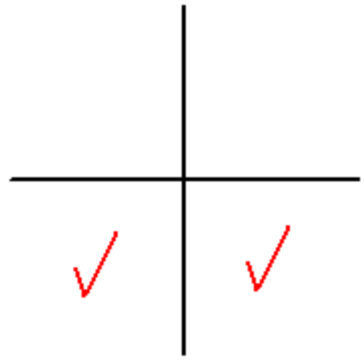
$\sin^2\theta = \frac{1}{4}$

$\sin\theta = \pm\frac{1}{2}$

$\sin\theta = \frac{1}{2}$ has solutions in quadrants 1 and 2 only.



$\sin\theta = -\frac{1}{2}$ has solutions in quadrants 3 and 4 only.



$\therefore 4\sin^2\theta - 1 = 0$ for $0 \le \theta \le 2\pi$ has solutions in quadrants 1, 2, 3 and 4.

Answer: (D)

32.

$2\sin\left(x - \frac{\pi}{2}\right)$

Expanding using the compound angle formula:

$= 2\left\{\sin x \cos\frac{\pi}{2} - \cos x \sin\frac{\pi}{2}\right\}$

Recall $\cos\frac{\pi}{2} = 0$, $\sin\frac{\pi}{2} = 1$ and so the expansion reduces to

$= 2\{(\sin x)0 - (\cos x)\times 1\}$

$= -2\cos x$

Answer: (B)

33. $f(x) = 2 + \cos 3x$

The only variable in the expression is the term in 'cos'

$-1 \le \cos 3x \le 1 \;\; \forall x$

Hence the maximum value of $f(x) = 2 + 1$

$= 3$

And the minimum value of $f(x) = 2 - 1$

$= 1$

$\therefore 1 \le f(x) \le 3$

Answer: (A)

34.

$$2\cos^2 x + 3\sin x = 0$$

Recall the trig identity, $\sin^2 x + \cos^2 x = 1$

So, $\cos^2 x = 1 - \sin^2 x$

Hence,

$$2\left(1-\sin^2 x\right) + 3\sin x = 0$$

$$2\sin^2 x - 3\sin x - 2 = 0$$

$$(2\sin x + 1)(\sin x - 2) = 0$$

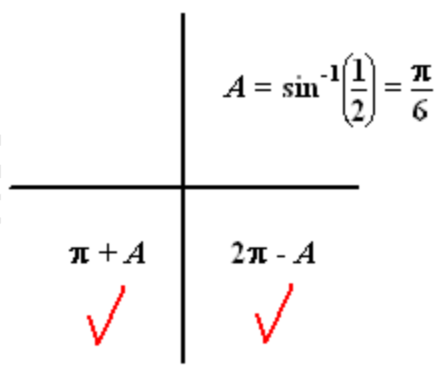
$$\sin x = -\frac{1}{2} \text{ or } 2$$

$\sin x \not> 1$

Hence $\sin x = 2$ will have no real solutions

$\therefore \sin x = -\frac{1}{2}$ only

Since $\sin x$ is - ve, then x lies in quadrants 3 and 4



$$\therefore x = \pi + \frac{\pi}{6},\ 2\pi - \frac{\pi}{6}$$

$$= \frac{7\pi}{6},\ \frac{11\pi}{6}$$

Answer: (C)

35.

$$y = (3x-2)^3$$

Let $t = 3x - 2$ $\qquad \frac{dt}{dx} = 3$

$y = t^3 \qquad \frac{dy}{dt} = 3t^2$

$$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx} \quad \text{(Chain rule)}$$
$$= \left(3t^2\right)3$$
$$= 9t^2$$

Resubstituting:

$$\frac{dy}{dx} = 9\left(3x-2\right)^2$$

Answer: (D)

36.

$y = \frac{3x+5}{2x-11}$ is of the form $y = \frac{u}{v}$, where

$u = 3x+5$ and $\frac{du}{dx} = 3$

AND

$v = 2x-11$ and $\frac{dv}{dx} = 2$

$$\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2} \quad \text{(Quotient law)}$$
$$= \frac{\left(2x-11\right)\left(3\right)-\left(3x+5\right)\left(2\right)}{\left(2x-11\right)^2}$$

Answer: (C)

37. $y = 3\sin x + 2$

$$\frac{dy}{dx} = 3\cos x + 0$$
$$= 3\cos x$$

At $x = \frac{\pi}{3}$,

$$\frac{dy}{dx} = 3\cos\left(\frac{\pi}{3}\right)$$

$$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$$

$$\therefore \frac{dy}{dx} = 3\times\left(\frac{1}{2}\right)$$
$$= \frac{3}{2}$$

Answer: (B)

38.

$$y = x(x-3)^2$$
$$= x(x^2 - 6x + 9)$$
$$= x^3 - 6x^2 + 9x$$

The gradient function, $\frac{dy}{dx} = 3x^2 - 12x + 9$

$\therefore$ The gradient of the tangent at $P\ (2,\ 2) = 3(2)^2 - 12(2) + 9$
$= 12 - 24 + 9$
$= -3$

$\therefore$ The gradient of the normal at $P = \frac{1}{3}$

(Product of the gradients of perpendicular lines $= -1$)

$\therefore$ Equation of normal at P is

$$\frac{y-2}{x-2} = \frac{1}{3}$$

$$y - 2 = \frac{1}{3}(x-2)$$

Answer: (C)

39.

$$y = 4x + \frac{9}{x}$$
$$= 4x + 9x^{-1}$$

The 1st derivative, $\frac{dy}{dx} = 4 + 9\left(-1x^{-2}\right)$

$$= 4 - 9x^{-2}$$

The 2nd derivative, $\frac{d^2y}{dx^2} = 0 - 9\left(-2x^{-3}\right)$

$$= 18x^{-3}$$

$$= \frac{18}{x^3}$$

Answer: (B)

40.

$$\int_0^z x^2 \ dx = 9$$

$$\int_0^z x^2 \ dx = 9$$

$$\left[\frac{x^3}{3}\right]_0^z = 9$$

$$\therefore \frac{(z)^3}{3} - \frac{(0)^3}{3} = 9$$

$$\frac{z^3}{3} = 9$$

$$z^3 = 27$$

$$z = \sqrt[3]{27}$$

$$z = 3$$

Answer: (A)

41.

$$\frac{dy}{dx} = \frac{1}{(3x+4)^2}$$

$$= (3x+4)^{-2}$$

The equation of the curve is $y = \int (3x+4)^{-2} \ dx$

Let $t = 3x + 4$ $\qquad \frac{dt}{dx} = 3$

$$\therefore y = \int t^{-2} \frac{dt}{3}$$

$$= \frac{t^{-1}}{-1 \times 3} + C \quad \text{(where } C \text{ is a constant)}$$

$$y = \frac{-1}{3t} + C$$

$$y = \frac{-1}{3(3x+4)} + C$$

$P\left(-1, \frac{2}{3}\right)$ lies on the curve (data)

$$\therefore \frac{2}{3} = \frac{-1}{3(3(-1)+4)} + C$$

$$\frac{2}{3} = \frac{-1}{3(1)} + C$$

$$C = \frac{2}{3} + \frac{1}{3}$$

$$C = 1$$

$$\therefore y = \frac{-1}{3(3x+4)} + 1$$

Answer: (B)

42. The area of R can be found by:

$$\int_{x_1}^{x_2} y \; dx = \int_0^3 (x-3)^2 \; dx$$

$$= \int_0^3 \left(x^2 - 6x + 9\right) dx$$

$$= \left[\frac{x^3}{3} - 3x^2 + 9x\right]_0^3$$

$$= \left[\frac{(3)^3}{3} - 3(3)^2 + 9(3)\right] - \left[\frac{(0)^3}{3} - 3(0)^2 + 9(0)\right]$$

$$= 9 - 27 + 27$$

$$= 9$$

Answer: (C)

43.

$$V = \pi \int_{x_1}^{x_2} y^2 \; dx$$
$$= \pi \int_0^3 \left(\sqrt{x}\right)^2 \; dx$$
$$= \pi \int_0^3 x \; dx$$

Answer: (B)

44. $\int (2x+3)^5 \; dx$

Let $t = 2x+3$ $\quad\quad \dfrac{dt}{dx} = 2$

$$\int (2x+3)^5 \; dx = \int t^5 \frac{dt}{2}$$
$$= \frac{t^6}{6 \times 2} + C \quad \text{(where } C \text{ is a constant)}$$
$$= \frac{t^6}{12} + C$$
$$= \left[\frac{1}{12}(2x+3)^6\right] + C$$

Answer: (C)

45.

$$\frac{dy}{dx} = 3\sin x - 2\cos x$$
$$\therefore \int (3\sin x - 2\cos x) \; dx = 3\int \sin x \; dx - 2\int \cos x \; dx$$
$$= 3(-\cos x) - 2(\sin x) + C \text{ (where } C \text{ is a constant)}$$
$$= -3\cos x - 2\sin x + C$$

Answer: (C)

CSEC ADDITIONAL MATHEMATICS SPECIMEN PAPER 1

MULTIPLE CHOICE ANSWER SHEET

NAME:

1.	●	B	C	D	16.	A	●	C	D	31.	A	B	C	●
2.	A	B	●	D	17.	A	B	C	●	32.	A	●	C	D
3.	A	●	C	D	18.	A	●	C	D	33.	●	B	C	D
4.	A	●	C	D	19.	●	B	C	D	34.	A	B	●	D
5.	A	B	●	D	20.	A	B	●	D	35.	A	B	C	●
6.	A	●	C	D	21.	A	●	C	D	36.	A	B	●	D
7.	A	B	C	●	22.	A	B	C	●	37.	A	●	C	D
8.	A	B	C	●	23.	A	B	C	●	38.	A	B	●	D
9.	A	●	C	D	24.	●	B	C	D	39.	A	●	C	D
10.	●	B	C	D	25.	●	B	C	D	40.	●	B	C	D
11.	A	B	C	●	26.	A	●	C	D	41.	A	●	C	D
12.	A	B	●	D	27.	A	●	C	D	42.	A	B	●	D
13.	A	B	C	●	28.	●	B	C	D	43.	A	●	C	D
14.	A	B	●	D	29.	A	B	●	D	44.	A	B	●	D
15.	●	B	C	D	30.	A	●	C	D	45.	A	B	●	D

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