Final revision
Algebra

Choose the correct answer

The conjugate of the number $(i - i^2)$ is ……………

(a) $1 - i$ (b) $1 + i$ (c) $-i - 1$ (d) $i - 1$

$(i - i^2) = i + 1 \xrightarrow{\text{Conj.}} -i + 1$

$1 - i$

Choose the correct answer

The conjugate of the number $i^8 - 3\,i^7$ is ……………

$i^7 = i^4 \cdot i^3$

$= (1)(-i) = -i$

(a) $1 - 3\,i$ (b) $1 + 3\,i$ (c) $3 - i$ (d) $-3\,i$

$i^8 - 3i^7 = 1 - 3(-i)$

$= 1 + 3i \xrightarrow{\text{Conj}} 1 - 3i$

Choose the correct answer

The conjugate of the number $(2 + i)^2$ is ……………

(a) $2 + i$ (b) $2 - i$ (c) $3 + 4i$ (d) $3 - 4i$

$$(2+i)^2 = \underline{\underline{4}} + 4i - \underline{\underline{1}}$$

$$= 3 + 4i \xrightarrow{\text{Conj}} 3 - 4i$$

Choose the correct answer

The number – i is .... of the number i

(a) conjugate

(b) additive inverse

(c) multiplicative inverse

(d) all the previous

$$i^{-1} = \frac{1}{i} = \frac{i^4}{i^1} = i^3 = -i$$

Choose the correct answer

The simplest form of the imaginary number i^{-39} is ....

(a) 1 (b) i (c) -1 (d) $-i$

$$i^{-39} = \frac{1}{i^{39}} = \frac{i^{40}}{i^{39}} = i^{1} = i$$

Choose the correct answer

If $n \in \mathbb{Z}$, then $i^{4n-5} = \dots\dots\dots\dots$

(a) 1 (b) $-i$ (c) i (d) -1

$$i^{4n-5} = i^{4n} \cdot i^{-5} = \frac{i^{4n}}{i^{5}}$$

$$= \frac{1}{i^{5}} = \frac{i^{8}}{i^{5}} = i^{3} = -i$$

Mr. Michael Gamil 0122 73 75 987

Choose the correct answer

If $x = -1$ is one of the roots of the equation $x^2 - kx - 6 = 0$, then the sum of the two roots = ...

(a) -5 (b) 5 (c) -6 (d) 6

$(-1)^2 - k(-1) - 6 = 0$

$1 + k - 6 = 0$

$k - 5 = 0$

$\boxed{k = 5}$

$x^2 - 5x - 6 = 0$

$a = 1 \quad b = -5 \quad c = -6$

$\text{Sum} = \frac{-b}{a} = \frac{5}{1} = 5$

Choose the correct answer

If L , M are the roots of the equation $x^2 + 4x + 5 = 0$

, then the value of $L^2M + M^2L =$ ……………

(a) 4 (b) 20 (c) – 20 (d) 5

$L^2M + M^2L$

$= LM(L+M)$

$= 5(-4) = -20$

$a=1 \quad b=4 \quad c=5$

$L+M = \frac{-b}{a} = -4$

$LM = \frac{c}{a} = 5$

Choose the correct answer

The quadratic equation whose roots are 4 i and – 4 i is ....

(a) $x^2 + 16 = 0$ (b) $x^2 - 16 = 0$ (c) $x^2 + 8\,i = 0$ (d) $x^2 - 8\,i = 0$

Sum $= (4i) + (-4i) =$ Zero

Product $= (4i)(-4i) = -16i^2 = 16$

$x^2 - (\text{Sum})x + \text{Product} = 0$

$x^2 + 16 = 0$

math in use BY MICHAEL GAMIL

Choose the correct answer

If L and M are the roots of the equation $x^2 - 5x + 3 = 0$, then the equation whose roots are L + M and LM is ……………

(a) $x^2 - 8x + 15 = 0$ (b) $x^2 - 15x + 8 = 0$

(c) $x^2 + 8x - 15 = 0$ (d) $x^2 - 15x - 15 = 0$

Given

$a = 1 \quad b = -5 \quad c = 3$

$\text{Sum} = L + M = \frac{-b}{a} = 5$

$\text{Product} = LM = \frac{c}{a} = 3$

Req. equation

$\text{Sum} = 5 + 3 = 8$

$\text{Product} = (5)(3) = 15$

$x^2 - (\text{Sum})x + \text{Product} = 0$

$x^2 - 8x + 15 = 0$

Choose the correct answer

+ve $\forall x \in \mathbb{R}$

The function $f(X) = 7$ is positive in ……………

(a) $]-\infty , \infty[$ (b) $[-7 , 7]$ (c) $]0 , \infty[$ (d) $]-7 , 7[$

Choose the correct answer

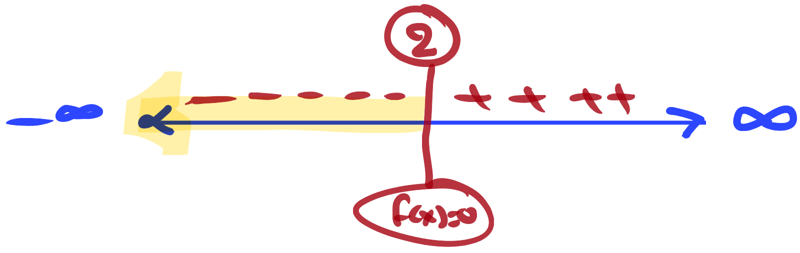
If $f(x) = 2x - 4$, then the function f is negative when $x \in$ ....

(a) $\mathbb{R} - \{2\}$ (b) $[2, \infty[$ (c) $]-\infty, 2[$ (d) $\{2\}$

$2x - 4 = 0$

$2x = 4$

$x = 2$



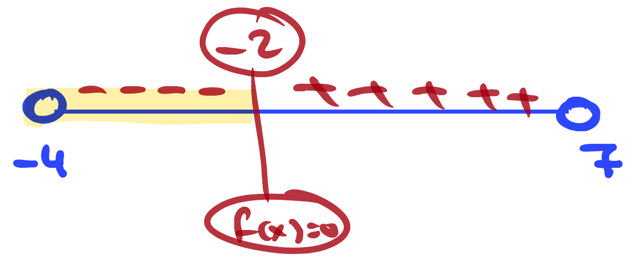
Choose the correct answer

If $f :]-4 , 7[\longrightarrow \mathbb{R}$ where $f(X) = X + 2$, then $f(X)$ is negative when $X \in$ ....

(a) $]-4 , -2[$ (b) $]-\infty , -2[$ (c) $]-2 , \infty[$ (d) $]-2 , 7[$

$x + 2 = 0$

$x = -2$



$]-4 , -2[$

Choose the correct answer

+ve , zero

The function $f : f(x) = 10 - 2x$ is non-negative when ……………

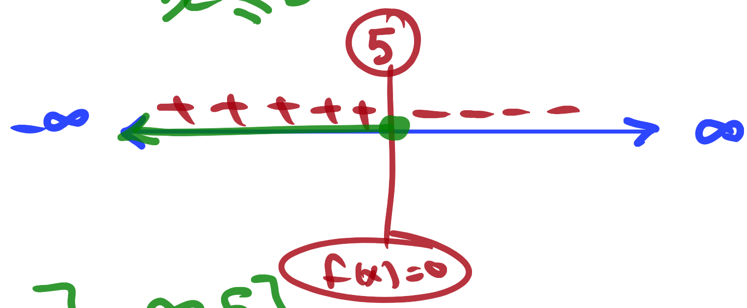
(a) $x < 5$ (b) $x > 5$ (c) $x \leq 5$ (d) $x \geq 5$

$10 - 2x = 0$

$-2x = -10$

$x = 5$

$x \leq 5$



$]-\infty, 5]$

Choose the correct answer

The opposite figure represents the graph of a quadratic function f , then $f(x) < 0$ when $x \in$ ....

(a) $[-1 , 3]$

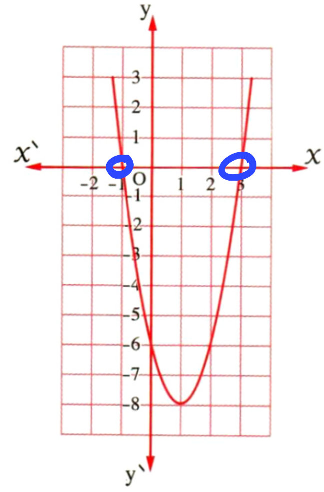
(b) $]-1 , 3[$

(c) $\mathbb{R} - [-1 , 3]$

(d) $\mathbb{R} -]-1 , 3[$

]-1,3[

-ve



Choose the correct answer

$i^{15n+18} =$ .... (in the simplest form where n is an odd number).

(a) $-i^n$ (b) $-i^{-2n}$ (c) i^{-n} (d) i^n

$(x^m)^n = x^{mn}$

$x^{2n} = (x^2)^n$

$i^{3n} = (i^3)^n$

i^{15n+18}

$= i^{15n} \times i^{18}$

$= \cancel{i^{12n}} \times i^{3n} \times \cancel{i^{16}} \times i^2$

$= (i^3)^n \times -1$

$= (-i)^n \times -1$

$= (-1)^n \times -1 \quad i^n$

$= (-1) \times (-1) \times i^n$

$= i^n$

Choose the correct answer

$i\sqrt{-9}\sqrt{-4} = \ldots\ldots\ldots\ldots\ldots$

(a) -6 (b) $6\,i$ (c) 6 (d) $-6\,i$

$i \times 3i \times 2i = 6\,i^3$

$= 6 \times -i$

$= -6i$

Choose the correct answer

If $z = 2 - 3i$, then $z^{-1} = \dots\dots\dots\dots$

(a) $2 + 3i$ (b) $-2 + 3i$ (c) 13 (d) $\frac{2}{13} + \frac{3}{13}i$

$$z^{-1} = \frac{1}{z} = \frac{1}{2-3i} \times \frac{2+3i}{2+3i}$$

$$= \frac{2+3i}{4+9} = \frac{2+3i}{13} = \frac{2}{13} + \frac{3}{13}i$$

math in use BY MICHAEL GAMIL

Choose the correct answer

If $a = 4 + 3i$, $b = 2 + 3i$, then the value of the expression : $a^2 - 2ab + b^2 = \cdots\cdots$

(a) 9 (b) -1 (c) 1 (d) 4

$$a^2 - 2ab + b^2 = (a - b)^2$$

$$= (4 + \cancel{3i} - 2 - \cancel{3i})^2 = (2)^2 = 4$$

Choose the correct answer

The solution set of the equation $x + i^2 = i^4$ in $\mathbb{R}$ is ....

(a) $\{-3\}$ (b) $\{\pm i\}$ (c) $\{2\}$ (d) $\{-1\}$

$x - 1 = 1$

$x = 2$

S.S. in $R = \{2\}$

Choose the correct answer

$5\,i^{17} = 5 \times \cancel{i^{16}} \times i$

If $6\,i^{20} + 5\,i^{17} = x + iy$, then $x \times y =$ .... $6 \times 5 = 30$

(a) 11 (b) – 11 (c) 30 (d) – 30

$6 + 5i = x + iy$

$x = 6$

$y = 5$

math in use
BY MICHAEL GAMIL

Choose the correct answer

$(x-3)+yi=0+5i$

If $(X-3)+y\,i=5\,i$, then $X \times y =$ ....

(a) 15 (b) – 15 (c) 8 (d) – 8

$x-3=0$

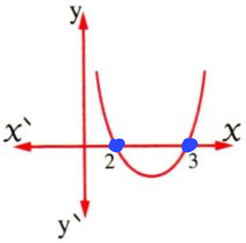
$y=5$

$x=3$

Choose the correct answer

The opposite figure represents the function $f : f(x) = x^2 + bx + c$

, then $b + c = \dots$ $-5+6=1$



(a) 11 (b) 6

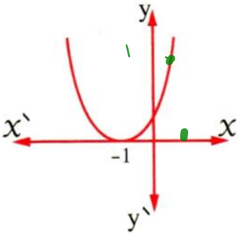
(c) 5 (d) 1

$a=1$ $b=b$ $c=c$ $L=2$ $M=3$

$\text{Sum} = L+M = \frac{-b}{a} \Rightarrow 5 = -b \Rightarrow b=-5$

$\text{Product} = LM = \frac{c}{a} \Rightarrow 6 = c \Rightarrow c=6$

Choose the correct answer



The opposite figure represents

the function $f : f(X) = a\,X^2 + b\,X + c$

, then $(b^2 - 4\,ac) \times f(3) = \ldots\ldots\ldots\ldots$

$0 \times f(3) = \text{zero}$

(a) 3 (b) – 1

(c) – 3 (d) zero

$\boxed{D = 0}$

$b^2 - 4ac = 0$

Choose the correct answer

If the equation $x^2 - 6x + 9 = b$ has two real distinct roots , then b $\in$ ……………

(a) $\mathbb{R}$ (b) $]-\infty, 0]$ (c) $]-\infty, 0[$ (d) $]0, \infty[$

$x^2 - 6x + 9 - b = 0$

$A = 1$ $b = -6$ $c = 9 - b$

$D = b^2 - 4ac > 0$

$36 - 4(9 - b) > 0$

$\cancel{36} - \cancel{36} + 4b > 0$

$4b > 0$ $\therefore b > 0$

$b \in]0, \infty[$

Mr. Michael Gamil

0122 73 75 987

Choose the correct answer

In the quadratic equation a x^2 + b x + c = zero , if ac < 0 , then the roots of the equation are ....

(a) real and equal.

(b) real and different.

(c) imaginary and conjugate.

(d) complex and conjugate.

$b^2 - 4ac$ $\boxed{+ve \quad b}$

$= 0 \quad a$

$+ve \; +ve = +ve \quad -ve \quad c, d$

Choose the correct answer

$i\sqrt{-9}\sqrt{-4} =$ ....

(a) -6 (b) $6i$ (c) 6 (d) $-6i$

Mr. Michael Gamil

0122 73 75 987

Choose the correct answer

If $z = 2 - 3\,i$, then $z^{-1} =$ ....

(a) $2 + 3\,i$ (b) $-2 + 3\,i$ (c) 13 (d) $\frac{2}{13} + \frac{3}{13}\,i$

Choose the correct answer

If $a = 4 + 3i$, $b = 2 + 3i$, then the value of the expression : $a^2 - 2ab + b^2 = \cdots\cdots$

(a) 9 (b) -1 (c) 1 (d) 4

Choose the correct answer

The solution set of the equation $x + i^2 = i^4$ in $\mathbb{R}$ is ……………

(a) $\{-3\}$ (b) $\{\pm i\}$ (c) $\{2\}$ (d) $\{-1\}$

Choose the correct answer

If $6\,i^{20} + 5\,i^{17} = x + iy$, then $x \times y = \dots\dots\dots\dots$

(a) 11 (b) – 11 (c) 30 (d) – 30

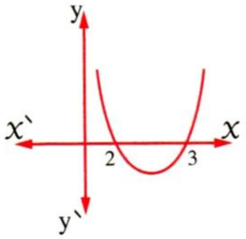
Choose the correct answer

If $(x - 3) + y\,i = 5\,i$, then $x \times y =$ ....

(a) 15 (b) -15 (c) 8 (d) -8

Choose the correct answer

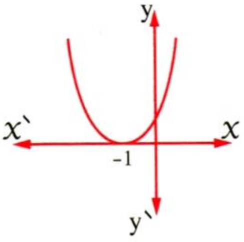
The opposite figure represents the function $f : f(x) = x^2 + b\,x + c$, then b + c = ...



(a) 11
(b) 6
(c) 5
(d) 1

Choose the correct answer

The opposite figure represents the function $f : f(x) = a\,x^2 + b\,x + c$, then $(b^2 - 4ac) \times f(3) = \dots\dots\dots$



(a) 3

(b) – 1

(c) – 3

(d) zero

Choose the correct answer

If the equation $x^2 - 6x + 9 = b$ has two real distinct roots , then $b \in$ ....

(a) $\mathbb{R}$ (b) $]-\infty , 0]$ (c) $]-\infty , 0[$ (d) $]0 , \infty[$

Choose the correct answer

In the quadratic equation a x^2 + b x + c = zero , if ac < 0 , then the roots of the equation are ……………

(a) real and equal.
(b) real and different.
(c) imaginary and conjugate.
(d) complex and conjugate.

Mr. Michael Gamil
0122 73 75 987

Choose the correct answer

If (2 – i) is one of the roots of the equation : $x^2 + b\,x + c = 0$ where b , c $\in \mathbb{R}$, then (b , c) = ……………

$a = 1 \quad b \quad c$

(a) (4 , 5) (b) (– 4 , – 5) (c) (4 , – 5) (d) (– 4 , 5)

$L = 2 - i \qquad M = 2 + i$

$\text{Sum} = L + M = 2 - \cancel{i} + 2 + \cancel{i} = \frac{-b}{a}$

$4 = -b \qquad \therefore b = -4$

$\text{Product} = LM = (2-i)(2+i) = \frac{c}{a}$

$4 + 1 = c \qquad \therefore c = 5$

Choose the correct answer

If the sum of the two roots of the equation : $a x^2 + b x + c = 0$ equals their product , then ....

(a) $a = c$ (b) $b = c$ (c) $b = -c$ (d) $a = -c$

Sum = Product

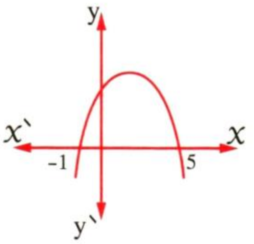
$$\frac{-b}{\cancel{a}} = \frac{c}{\cancel{a}}$$

$\therefore \boxed{-b = c}$ or $\boxed{b = -c}$

Choose the correct answer

The opposite figure represents the curve of the function :

$f(x) = a x^2 + b x + c$, then $\frac{b-c}{a} = \frac{-4+5}{1} = 1$



(a) 5 (b) – 1

(c) 1 (d) – 5

$x = -1$ $x = 5$

$(x+1)(x-5) = 0$

$1x^2 - 4x - 5 = 0$

$ax^2 + bx + c = 0$

$a = 1$ $b = -4$ $c = -5$

Another Sol

$L + M = \frac{-b}{a} = 4$

$LM = \frac{c}{a} = -5$

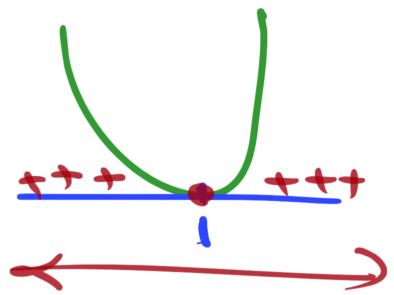
$x^2 - 4x - 5 = 0$

$ax^2 + bx + c$

Choose the correct answer

The solution set of the inquality : $x^2 - 2x + 1 \geq 0$ in $\mathbb{R}$ is ....

(a) $]1 , \infty[$ (b) $]-\infty , 1[$ (c) $\mathbb{R} - \{1\}$ (d) $\mathbb{R}$



Choose the correct answer

$2+i \Rightarrow 2-i$

The conjugate of the number $\frac{2\,i-1}{i}$ is ....

(a) $1-2\,i$ (b) $2+i$ (c) $-1-2\,i$ (d) $2-i$

Choose the correct answer

$i + i^2 + i^3 + i^4 + ... + i^{96} =$ ....

(a) i (b) 1 (c) 96 (d) zero

Choose the correct answer

$(1+i)(1+i^2)(1+i^3)(1+i^4)\ldots(1+i^{49}) = \ldots\ldots\ldots\ldots$

(a) zero (b) -1 (c) 1 (d) 2

Choose the correct answer

(3) (4)

If $(x + 2y) + (x - 2y)\,i = 3 + 4i$, then $x^2 - 4y^2 =$ .... $(x+2y)(x-2y)$

(a) 1 (b) 7 (c) 12 (d) -12

$x + 2y = 3$

$x - 2y = 4$

Choose the correct answer

If $\dfrac{\ell^2 + m^2}{\ell + m\,i} = 5 + 2\,i$, then $\ell + m = \dots$ $5 + (-2) = 3$

(a) 10 (b) 3 (c) 5 (d) 7

$$\frac{\ell^2 + m^2}{\ell + mi} \times \frac{\ell - mi}{\ell - mi} = \frac{\cancel{(\ell^2 + m^2)}(\ell - mi)}{\cancel{\ell^2 + m^2}}$$

$$\ell - mi = 5 + 2i$$

$\ell = 5$ $m = -2$

Choose the correct answer

If the roots of the equation : $x^2 - 4x + k = 0$ are real , then $k \in$ ……………

(a) $[4 , \infty[$ (b) $]-\infty , 4[$ (c) $]4 , \infty[$ (d) $]-\infty , 4]$

$a = 1 \quad b = -4 \quad c = k$

$D = b^2 - 4ac \geq 0$

$16 - 4k \geq 0$

$-4k \geq -16$

$k \leq 4$

$k \in]-\infty , 4]$

Choose the correct answer

The real value of k which makes the equation : $x^2 - 2(k-1)x + k^2 = 0$ has no real roots is ....

(a) $]\frac{1}{2}, \infty[$ (b) $]-\infty, \frac{1}{2}[$ (c) $]-\frac{1}{2}, \infty[$ (d) $]-\infty, \frac{-1}{2}[$

$a = 1$ $b = -2(k-1)$ $b = -2k+2$ $c = k^2$

$D < 0$

$b^2 - 4ac < 0$

$(-2k+2)^2 - 4k^2 < 0$

$\cancel{4k^2} - 8k + 4 - \cancel{4k^2} < 0$

$-8k < -4$

$k > \frac{1}{2}$ $]\frac{1}{2}, \infty[$

Choose the correct answer

If the curve of the function : $f(X) = X^2 - 2(k-2)X + k^2 - 8$ touches the X-axis , then k = ...

(a) – 3 (b) – 2 (c) 2 (d) 3

$a = 1 \quad b = -2k + 4 \quad c = k^2 - 8$

$D = b^2 - 4ac = 0$

$(-2k+4)^2 - 4(k^2 - 8) = 0$

$\cancel{4k^2} - 16k + 16 - \cancel{4k^2} + 32 = 0$

$-16k + 48 = 0$

$-16k = -48$

$k = \frac{-48}{-16} = 3$ $k = 3$

Choose the correct answer

If L , M are the roots of the equation : $x^2 + x + c = 0$ and L + M = 2 LM , then c = ……………

(a) 2 (b) – 2 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$

$a = 1 \quad b = 1 \quad c = c$

$L + M = \frac{-b}{a} = -1$

$LM = \frac{c}{a} = c$

$L + M = 2LM$

$-1 = 2c$

$c = -\frac{1}{2}$

Choose the correct answer

If L and M are the roots of the equation : $x^2 - 2x + 4 = 0$, then $\sqrt{L} + \sqrt{M} =$ ....

(a) 1 (b) $\sqrt{6}$ (c) 2 (d) $\sqrt{2}$

$a = 1$ $b = -2$ $c = 4$

$L + M = \frac{-b}{a} = 2$

$LM = \frac{c}{a} = 4$

$(\sqrt{L} + \sqrt{M})^2 = 6$

$= L + M + 2\sqrt{LM}$

$= 2 + 2\sqrt{4}$

$= 2 + 4 = 6$

Choose the correct answer

If L , 5 – L are the two roots of the equation $x^2 + a\,x - 8 = 0$, then a = ...

(a) 5 (b) – 5 (c) 8 (d) – 8

$\cancel{L} + 5 - \cancel{L} = \frac{-a}{1}$

$-a = 5$

$a = -5$

Choose the correct answer

If L and $\frac{3}{L}$ are the two roots of the equation : a x^2 + b x + 12 = 0 , then a = …………

(a) 3 (b) 4 (c) 6 (d) 12

$(\cancel{L})\left(\frac{3}{\cancel{L}}\right) = \frac{12}{a}$

$\frac{3}{1} = \frac{12}{a} \Rightarrow a = \frac{1 \times 12}{3} = 4$

Choose the correct answer

If one of the roots of the equation : $3x^2 - (k + 2)x + k^2 + 2k = 0$ is multiplicative inverse of the other , then k = ...

(a) – 3 , 1 (b) – 3 , – 1 (c) 3 , – 1 (d) 3 , 1

$3 = k^2 + 2k$

$k^2 + 2k - 3 = 0$

$k = -3$ $k = 1$

Choose the correct answer

If one of the roots of the equation : $x^2 - mx + 8 = 0$ is square of the other root , then m = ……………

(a) – 6 (b) – 2 (c) 2 (d) 6

L , L^2

$(L)(L^2) = \frac{c}{a}$

$L^3 = 8$

$\boxed{L = 2}$

$2 , 4$

$\text{Sum} = 2 + 4 = \frac{-(-m)}{1}$

$6 = m$

Choose the correct answer

If L is one of the roots of the equation : $x^2 + 6x + 10 = 0$, then $(L + 3)^2 =$ …………

(a) – 5 (b) – 3 (c) – 2 (d) – 1

$L^2 + 6L + 10 = 0$

$\boxed{L^2 + 6L = -10}$

$(L+3)^2 = L^2 + 6L + 9$

$= -10 + 9$

$= -1$

Choose the correct answer

If $\frac{1}{L}$, $\frac{1}{M}$ are the two roots of the equation : $4x^2 - 8x + 1 = 0$, then L + M = ………

(a) 6 (b) 8 (c) 16 (d) 2

$a = 4 \quad b = -8 \quad c = 1$

$\text{Sum} = \frac{1}{L} + \frac{1}{M} = \frac{-b}{a}$

$\boxed{\frac{M+L}{LM} = \frac{8}{4} = \frac{2}{1}}$

$\frac{M+L}{4} = \frac{8}{4} = \frac{2}{1}$

$\boxed{\therefore M + L = 8}$

$\text{Product} = \frac{1}{L} \times \frac{1}{M} = \frac{c}{a}$

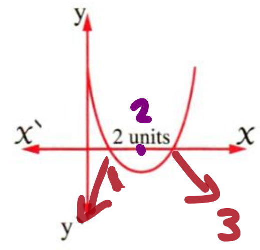
$\frac{1}{LM} = \frac{1}{4} \Rightarrow \boxed{LM = 4}$

Choose the correct answer

The opposite figure represents the function f from the second degree where $f(x) = x^2 - 4x + k - 1$, then k = ……………

(a) 2 (b) 3

(c) 4 (d) 5



$$x = \frac{-b}{2a} = \frac{4}{2(1)} = \frac{4}{2} = 2$$

$L = 1 \quad M = 3$

$$LM = \frac{c}{a} \Rightarrow (1)(3) = \frac{k-1}{1}$$

$k - 1 = 3$

$\boxed{k = 4}$

Choose the correct answer

If one of the roots of the equation : $x^2 - (k^2 - 6k + 9)x - 8 = 0$ is additive inverse of the other , then k = ……………

(a) zero (b) 3 (c) 9 (d) – 3

Choose the correct answer

If L , M are the two roots of the equation : $x^2 - 8x + c = 0$ and $L^2 + M^2 = 40$, then c = ……………

(a) 8 (b) 10 (c) 12 (d) 14

Choose the correct answer

If the ratio between the two roots of the equation : $x^2 - k\,x + 6 = 0$ is $2 : 3$, then the value of $k =$ ……………

(a) ± 5 (b) ± 1 (c) 2 (d) 6

Mr. Michael Gamil 0122 73 75 987

Choose the correct answer

If $L - 1$, $M - 1$ are the roots of the equation : $x^2 - 3x - 6 = 0$, then the equation whose roots are L , M is ....

(a) $x^2 - 2x - 5 = 0$ (b) $x^2 - 5x - 2 = 0$

(c) $x^2 + 2x - 2 = 0$ (d) $x^2 + 5x + 2 = 0$

Choose the correct answer

The function $f : f(\mathcal{X}) = (2 - \mathcal{X})(\mathcal{X} - 3)$ is positive in the interval ....

(a) $]-2, 3[$ (b) $]2, 3[$ (c) $\mathbb{R} - [-2, 3]$ (d) $]-3, 2[$

Choose the correct answer

The function $f(x) = x^2 - 4$ is not positive in the interval ....

(a) $[-2, 2]$ (b) $]-2, 2[$ (c) $\mathbb{R} -]-2, 2[$ (d) $\mathbb{R} - [-2, 2]$

Choose the correct answer

If $f(X) = X - 2$, $g(X) = X^2 - 5X - 6$ both are negative in the interval ....

(a) $]6, \infty[$ (b) $]-1, 2[$ (c) $]-\infty, -2[$ (d) $[2, 6]$