Final Revision
Algebra (2)

Choose the correct answer

If $2^{x-1} = 7^{x-1}$, then $6^{x-1} =$ ....

(a) 1 (b) 2 (c) 7 (d) 6

$x - 1 = 0 \Rightarrow \therefore x = 1$

$\therefore 6^{x-1} = 6^0 = 1$

Choose the correct answer

$(a^m)^n = (b)^n$

If $7^{x+1} = 3^{2x+2}$, then $x =$ ....

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

$7^{x+1} = 3^{2(x+1)}$

$7^{x+1} = 9^{x+1}$

$\therefore m + 1 = 0$

$\therefore m = -1$

Choose the correct answer

If $2^x = 5$, then $2^{x-3} = \dots\dots\dots\dots$

(a) $\frac{2}{5}$ (b) $\frac{5}{8}$ (c) $\frac{2}{3}$ (d) $\frac{3}{5}$

$$2^{x-3} = 2^x \times 2^{-3}$$

$$= \frac{5}{1} \times \frac{1}{8} = \frac{5}{8}$$

Choose the correct answer

If $\sqrt[3]{x^2} = 4$, then $x =$ ……………

(a) ± 4 (b) ± 8 (c) ± 16 (d) ± 32

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = \pm(4)^{\frac{3}{2}}$$

$$x = \pm 8$$

Choose the correct answer

If $3^{x} = 2$, then $9^{x} + 1 =$ ……………

(a) 5 (b) 36 (c) 12 (d) 27

$9^{x} + 1 = (3^{2})^{x} + 1$

$= (3^{x})^{2} + 1$

$= (2)^{2} + 1 = 5$

$(a^{m})^{n} = (a^{n})^{m}$

Choose the correct answer

If $x^{x-5} = 3^{x-5}$, then $x \in$ ....

(a) $\{\cancel{3}, 5\}$ (b) $\{-3, 5\}$ (c) $\{3, 5, -3\}$ (d) $\{5\}$

$x - 5 = 0$

$x = 5$

$x = 3$

$x = -3$

$(3)^0 = (-3)^0$

Choose the correct answer

The solution set of the equation : $(2x-25)^{\frac{4}{3}} = 81$ in $\mathbb{R}$ is ……………

(a) $\{-1\}$ (b) $\{26\}$ (c) $\{-1, 26\}$ (d) $\varnothing$

$$\left[(2x-25)^{\frac{4}{3}}\right]^{\frac{3}{4}} = \pm\left[81\right]^{\frac{3}{4}}$$

$$2x-25 = \pm 27$$

$$2x-25 = 27 \qquad\qquad 2x-25 = -27$$

$$x = \frac{27+25}{2} = \underline{26} \qquad\qquad x = \frac{-27+25}{2} = \underline{-1}$$

Choose the correct answer

If $x^{\frac{3}{5}} = 8$, then $x =$ ……………

(a) 32 (b) -16 (c) ± 32 (d) 16

$$\left(x^{\frac{3}{5}}\right)^{\frac{5}{3}} = (8)^{\frac{5}{3}}$$

$$x = 32$$

Choose the correct answer

If $\left(\frac{1}{2}\right)^{a^2 - a - 2} = 1$ where $a > 0$, then $a =$ ……………

(a) -3 (b) 1 (c) 2 (d) 3

$a^2 - a - 2 = 0$

$a = 2$ $a = -1$

Choose the correct answer

If $x^{\frac{4}{3}} = 9\,y^{-\frac{2}{3}} = 81$, then $|x\,y| =$ ....

(a) 2 (b) 3 (c) 1 (d) 4

$\left[x^{\frac{4}{3}}\right]^{\frac{3}{4}} = \pm[81]^{\frac{3}{4}}$

$x = \pm 27$

$9\,y^{-\frac{2}{3}} = 81$

$\left[y^{-\frac{2}{3}}\right]^{-\frac{3}{2}} = \pm[9]^{-\frac{3}{2}}$

$y = \pm\frac{1}{27}$

$|xy| = \left|\pm 27 \times \pm\frac{1}{27}\right| = |\pm 1| = 1$

Choose the correct answer

If $\frac{2^{x^2}}{4^x} = 8$, then the values of $x =$ ……………

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

$$\frac{2^{x^2}}{2^{2x}} = 2^3 \Rightarrow 2^{x^2-2x} = 2^3$$

$$x^2 - 2x = 3$$

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

$x = 3$ $x = -1$

Choose the correct answer

If $3^x = k$, $2^x = m$, then $12^x =$ ……………

(a) km (b) k^2m (c) km^2 (d) $k + m$

$$(12)^x = (2^2 \times 3^1)^x$$

$$= (2^2)^x \times (3^1)^x$$

$$= (2^x)^2 \times (3^x)^1$$

$$= m^2 k = k m^2$$

$$\begin{array}{r|l} 12 & 2 \\ 6 & 2 \\ 3 & 3 \\ 1 & \end{array}$$

Choose the correct answer

If $2^x = 7$, $7^y = 16$, then $x\,y =$ ....

(a) -4 (b) 7 (c) 8 (d) 4

$(\cancel{7})^y = 16$

$(2^x)^y = 16 \Rightarrow 2^{xy} = 2^4$

$\boxed{\therefore xy = 4}$

Choose the correct answer

The solution set of the equation : $7^{x^2} = 49^{x+4}$ is ……………

(a) $\{-2\}$ (b) $\{-2, 4\}$ (c) $\{-2, 3\}$ (d) $\{2, -4\}$

$$7^{x^2} = (7^2)^{x+4}$$

$$7^{x^2} = 7^{2x+8}$$

$$x^2 = 2x + 8$$

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

$x = 4$ $x = -2$

Choose the correct answer

The solution set of the equation : $3^{x+2} + 3^{x-2} = 246$ in $\mathbb{R}$ is ……………

(a) $\{2\}$ (b) $\{1\}$ (c) $\{3\}$ (d) $\{\text{zero}\}$

$$(\cancel{3^x} \times 3^2) + (\cancel{3^x} \times 3^{-2}) = 246$$

$$3^x [3^2 + 3^{-2}] = 246$$

$$3^x = \frac{246}{3^2 + 3^{-2}} \Rightarrow 3^x = 27$$

$$3^x = 3^3$$

$$\boxed{x = 3}$$

Choose the correct answer

The solution set of the equation : $3^{2x} - 6 \times 3^{x} - 27 = 0$ is ....

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

let $3^x = y$

$y^2 - 6y - 27 = 0$

$y = 9$ $y = -3$

$3^x = 9$ $3^x = -3$ (ref.)

$\boxed{x = 2}$

Choose the correct answer

If $f\ (X) = 2^{X}$, then $f\ (-2) =$ ……………

(a) -4 (b) 4 (c) $\frac{1}{4}$ (d) $\frac{-1}{4}$

$f(-2) = 2^{-2} = \frac{1}{4}$

Choose the correct answer

If $f(x) = 2^x$, then $\frac{f(x+1)}{f(x-1)} + \frac{f(x-1)}{f(x+1)} = \ldots\ldots\ldots\ldots$

(a) 1 (b) 4 (c) $\frac{17}{4}$ (d) $\frac{4}{17}$

$$\frac{2^{x+1}}{2^{x-1}} + \frac{2^{x-1}}{2^{x+1}}$$

$$2^{\cancel{x}+1-\cancel{x}+1} + 2^{\cancel{x}-1-\cancel{x}-1}$$

$$2^{2} + 2^{-2} = 4\frac{1}{4} = \frac{17}{4}$$

4.25

Choose the correct answer

If $f : f(X) = a^X$ is an exponential function , then $a \in$ ....

(a) $\mathbb{R}$ (b) $\mathbb{R}^+ - \{1\}$ (c) $\mathbb{R}^-$ (d) $\mathbb{R}^+$

Choose the correct answer

The opposite figure represents the function $f(X) = a^X$, then a = ...

(a) 2

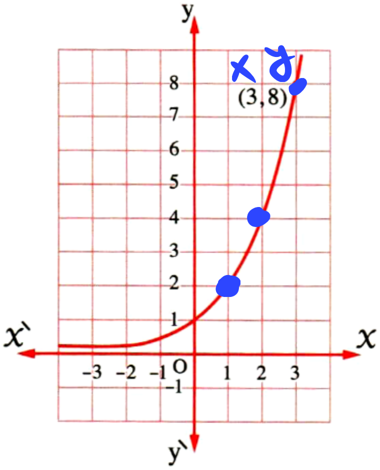
(b) 3

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

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

$a^3 = 8$

$f(x) = 2^x$



Choose the correct answer

The exponential function with the base (a) is increasing if ……………

(a) $a > 0$ (b) $a > 1$ (c) $0 < a < 1$ (d) $a = 1$

Choose the correct answer

The function $f(x) = a^{x}$ is decreasing on its domain $\mathbb{R}$ when ....

(a) $a = 1$ (b) $a > 1$ (c) $0 < a < 1$ (d) $a = -1$

Choose the correct answer

The function $f : f(X) = \left(\frac{2}{m}\right)^{x}$ is decreasing if ……………

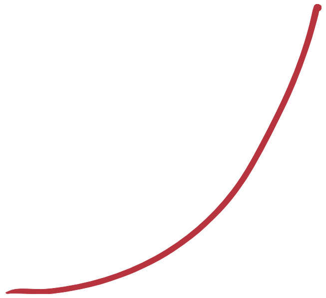
(a) $m < 1$ (b) $m > 1$ (c) $m > 2$ (d) $m < 2$

$m > 2$

Choose the correct answer

The function $f\,(X) = \left(\frac{1}{a}\right)^{X}$ is increasing if ……………

(a) $a > 1$ (b) $0 < a < 1$ (c) $a < 1$ (d) $a < 0$



$0 < a < 1$

$\frac{1}{a} > 1$

$1 > a$

Choose the correct answer

If $f(x) = 3^{x}$, then the solution set of the equation $f(x+1) - f(x-1) = 24$ is ....

(a) 3 (b) 8 (c) zero (d) 2

$$3^{x+1} - 3^{x-1} = 24$$

$$(3^{x} \times 3^{1}) - (3^{x} \times 3^{-1}) = 24$$

$$3^{x}[3^{1} - 3^{-1}] = 24$$

$$3^{x} = \frac{24}{3^{1} - 3^{-1}} \Rightarrow 3^{x} = 3^{2}$$

$$\boxed{\therefore x = 2}$$

Choose the correct answer

If $f : \mathbb{R} \longrightarrow \mathbb{R}$ where $f(x) = x + 3$, then $f^{-1}(5) = \dots\dots\dots$

$x \longrightarrow y$

(a) 2 (b) -2 $y = x+3$ (c) 3 (d) -3

$f(x) = x+3$

$5 = x+3$

$y = x+3$

$x = y+3$

$x-3 = y$

$f^{-1}(x) = x-3$

$f^{-1}(5) = 5-3 = 2$

Choose the correct answer

If $f(x) = 5 + \frac{4}{x}$, then $f^{-1}(x) = \ldots\ldots\ldots\ldots$

$(0,5)$

(a) $4 + 5x$ (b) $5 + \frac{x}{4}$ (c) $\frac{4}{x-5}$ (d) $\frac{x-5}{4}$

$y = \frac{4}{x} + 5$

$x = \frac{4}{y} + 5 \Rightarrow \frac{x-5}{1} = \frac{4}{y}$

$$\boxed{y = \frac{4}{x-5}}$$

Choose the correct answer

If f is a function , $f(5) = 7$, then $f^{-1}(7) =$ ……………

$(5, 7)$ $(7, 5)$

(a) 5 (b) -5 (c) 7 (d) -7

Choose the correct answer

If $f(X) = 5X$, then $f^{-1}(2) + f^{-1}(3) = \frac{2}{5} + \frac{3}{5} = 1$

(a) zero (b) 1 (c) -1 (d) 25

$y = 5x$

$X = 5y$

$y = \frac{X}{5} \Rightarrow f^{-1}(x) = \frac{x}{5}$

$f^{-1}(2) = \frac{2}{5}$ $f^{-1}(3) = \frac{3}{5}$

Choose the correct answer

If $f(X) = aX + b$, $f^{-1}(9) = 3$, $f^{-1}(5) = 2$, then $a \times b =$ ....-12

(a) -12 (b) -8 (c) -7 (d) -10

$y = ax + b$

$$\boxed{\begin{array}{l} f(3) = 9 \\ f(2) = 5 \end{array}}$$

$3a + b = 9$

$2a + b = 5$

$a = 4$, $b = -3$

Choose the correct answer

If $f(X) = \{(4, 5), (a, 2)\}$, $f^{-1}(X) = \{(2, 3), (5, b)\}$, then $a\,b = \ldots 12 \ldots$

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

a = 3

b = 4

Choose the correct answer

The logarithmic form equivalent to the exponential form of $2^7 = 128$ is ....

(a) $\log_2 128 = 7$ (b) $\log_2 7 = 128$ (c) $\log_7 128 = 2$ (d) $\log_7 2 = 128$

$\log_2 128 = 7$

Choose the correct answer

If $f(X) = 2^X$, then $f^{-1}(X) = \dots\dots\dots\dots$

~~(a)~~ x^2 ~~(b)~~ $\left(\frac{1}{2}\right)^x$ (c) $\log_x 2$ (d) $\log_2 x$

$y = 2^x \rightarrow$ base $\log_2$

$x = 2^y$

$\log x = \log 2^y$

$\log x = y \log 2 \Rightarrow y = \frac{\log x}{\log 2}$

$f^{-1}(x)$

$= \log_2 x$

math in use
BY MICHAEL GAMIL

Choose the correct answer

If the curve $y = \log_4 (1 - a X)$ passes through $\left(\frac{1}{4}, -\frac{1}{2}\right)$, then a = ...

x y

(a) 2 (b) 3 (c) 4 (d) 8

$$-\frac{1}{2} = \log_4 \left(1 - \frac{1}{4}a\right)$$

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

$$\frac{1}{2} = 1 - \frac{1}{4}a$$

$$\frac{1}{4}a = \frac{1}{2}$$

$$a = \frac{1}{2} \div \frac{1}{4} = 2$$

math in use
BY MICHAEL GAMIL

Choose the correct answer

The domain of the function $f(x) = \log(x - 4)$ is ……………

(a) $]4, \infty[$ (b) $[4, \infty[$ (c) $[0, 2]$ (d) $]-\infty, 4[$

$x - 4 \neq 1$

$x - 4 > 0$

$x > 4$ $]4, \infty[$

Choose the correct answer

The domain of the function f where $f(X) = \log_X (5 - X)$ is ……………

(a) $]0, 5[- \{1\}$ (b) $[0, 5]$ (c) $]0, 5[$ (d) $]-\infty, 5[$

$5 - x > 0$ $x > 0$ $x \neq 1$

$-x > -5$ $]0, \infty[$

$x < 5$ 0

$]-\infty, 5[$

$\boxed{]0,5[- \{1\}}$

Choose the correct answer

The domain of the function f where $f(x) = \log_{x-1}(6 - x)$ is ……………

(a) $]1, 6[$ (b) $\mathbb{R} -]1, 6[$ (c) $]1, 6[- \{2\}$ (d) $[1, 6]$

$6 - x > 0$

$-x > -6$

$x < 6$

$]-\infty, 6[$

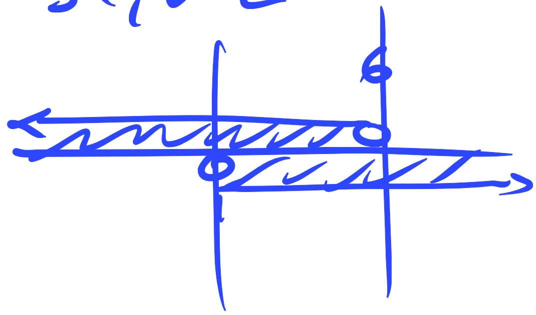
$x - 1 > 0$

$x > 1$

$]1, \infty[$

$x - 1 \neq 1$

$x \neq 2$



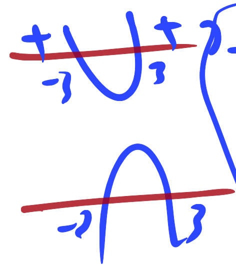
Choose the correct answer

$\pm \quad \neq 0$

* The domain of the function $f : f(x) = \log |x^2 - 9|$ is ……………

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

$$|x^2 - 9| \begin{cases} x^2 - 9 \\ -x^2 + 9 \end{cases}$$



$]-\infty, -3[$

$]3, \infty[$

$]-3, 3[$

$$\mathbb{R} - \{\pm 3\}$$

Choose the correct answer

If $\log_3 2 = a$, then $\log_2 6 = \dots\dots\dots\dots$

(a) $2a$ (b) $\frac{a+1}{a}$ (c) $\frac{a}{a+1}$ (d) $\frac{a^2+1}{a}$

$$\log_2 6 = \frac{\log 6}{\log 2}$$

$$= \frac{\log(3\times 2)}{\log 2}$$

$$= \frac{\log 3 + \log 2}{\log 2} = \frac{\log 3}{\log 2} + \frac{\log 2}{\log 2}$$

$$= \log_2 3 + 1$$

$$= \frac{1}{\log_3 2} + 1 = \frac{1}{a} + \frac{1}{1}$$

$$= \frac{1+a}{a}$$

Choose the correct answer

v.imp

If $\log_3 x + 3\log_3 x = 4$, then $x =$ ....

(a) 3 (b) -3 (c) ~~± 3~~ (d) zero

$\log_3 x + \log_3 x^3 = 4$

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$\log_3 x^4 = 4$

$3^4 = x^4$

$\boxed{x = \pm 3}$

Choose the correct answer

$\log_7^7 \times \log_7^x$

If $\log_7 x = 1$, then $\log_7 7x + \log_3 (x + 2) =$ ......1 × 1......

(a) 3 (b) 4 (c) 5 (d) 6

$\log_7 49 + \log_3 9$

$2 + 2 = 4$

Choose the correct answer

$1 + \log 2 =$ ....

(a) $\log 12$ (b) $\log 5$ (c) $\log 20$ (d) $-\log 5$

$\log \underline{10} + \log \underline{2} = \log 20$

Choose the correct answer

$\log_{xy} x + \log_{xy} y =$ ....

(a) y (b) x (c) x y (d) 1

$\log_{xy} xy = 1$

Choose the correct answer

If $\log_2 x = \log_4 9$, then $x =$ ....

(a) 3 (b) 4 (c) 9 (d) 12

$$\frac{\log x}{\log 2} = \frac{\log 9}{\log 4}$$

$$\frac{\log x}{\log 2} = \frac{\cancel{2}\log 3}{\cancel{2}\log 2}$$

Choose the correct answer

If $\frac{\log x}{\log 5} = \frac{\log 36}{\log 6} = \frac{\log 64}{\log y}$, then $x + y =$ .... $25 + 8$

(a) 25 (b) 8 (c) 17 (d) 33

$$\frac{\log x}{\log 5} = \frac{2\cancel{\log 6}}{\cancel{\log 6}} = \frac{\log 64}{\log y}$$

$\log_5 x = 2$

$5^2 = x$

$x = 25$

$\log_y 64 = 2$

$y^2 = 64$

$y = \pm 8$

$\boxed{y = 8}$

Choose the correct answer

The solution set of the equation : $(\log x)^2 = \log x^2$ in $\mathbb{R}$ is ....

(a) $\{1, 10\}$ (b) $\{100, 10\}$ (c) $\{1, 100\}$ (d) $\{1, 0.01\}$

$(\log x)^2 - 2\log x = 0$ $\log x = y$

$y^2 - 2y = 0$

$y = 2$ $y = 0$

$\log_{10} x = 2$ $\log_{10} x = 0$

$x = 10^2$ $x = 10^0$

$\boxed{x = 100}$ $\boxed{x = 1}$

Choose the correct answer

If $\log_{2} \log_{3} x = 1$, then $x =$ ……………

(a) 9 (b) 8 (c) 6 (d) 1

$\log_{\boxed{3}} x = 2$

$x = 3^2 = 9$

Choose the correct answer

$\log(\cos\theta) + \log(\sec\theta) = \ldots\ldots\ldots$ where $\theta \in [0, \frac{\pi}{2}[$

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

$\log[\cos\theta \times \sec\theta]$

$\log 1 = \text{Zero}$

Choose the correct answer

The expression $2\log_c 3 + \log_c 5 - \log_c 45 =$ ....

(a) 1 (b) 5 (c) 10 (d) zero

$\log_c 3^2 + \log_c 5 - \boxed{\log_c 45}$

$\log_c \frac{9 \times 5}{45} = \log_c 1$

$= \text{zero}$

Choose the correct answer

If $\log_a b = 6$, $\log_c b = 3$, then $\log_c a =$ ....

(a) 2 (b) 3 (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

$$\frac{\log b}{\log a} = 6 , \frac{\log b}{\log c} = 3$$

$$\frac{\log a}{\log c} = \frac{\log a}{\log b} \times \frac{\log b}{\log c} = \frac{1}{6} \times 3 = \frac{1}{2}$$

Choose the correct answer

If L and M are the roots of the equation : $2x^2 - 9x + 8 = 0$

, then the value of $\log_2 L + \log_2 M =$ ....

(a) 2 (b) 4 (c) 12 (d) 8

Choose the correct answer

$$\frac{1}{\log_5 30} + \frac{1}{\log_3 30} + \frac{1}{\log_2 30} = \dots\dots\dots\dots$$

(a) 30 (b) 1 (c) 2 (d) – 1

Choose the correct answer

If $\frac{\log x}{\log 3} + \frac{\log x}{\log 9} + \frac{\log x}{\log 27} = 22$, then $x =$ ....

(a) 3^2 (b) 3^9 (c) 3^{12} (d) 3^{27}

$$\frac{\log x}{\log 3} + \frac{\log x}{2\log 3} + \frac{\log x}{3\log 3} = 22$$

$$\frac{6\log x + 3\log x + 2\log x}{6\log 3} = 22$$

$$\frac{11\log x}{6\log 3} = 22$$

$$\frac{11}{6}\log_3 x = 22$$

$$\log_3 x = 22 \div \frac{11}{6}$$

$$\log_3 x = 12$$

$$x = 3^{12}$$

Choose the correct answer

If $\log_2 y = \log_3 5 \times \log_4 3 \times \log_5 4$, then y = ...

(a) 2 (b) 3 (c) 4 (d) 5

Choose the correct answer

If $\log_2 y = \log_3 5 \times \log_4 3 \times \log_5 4$, then $y =$ ....

(a) 2 (b) 3 (c) 4 (d) 5

Choose the correct answer

The solution set of the equation : $\log(x+2) + \log(x-2) = 1 - \log 2$ in $\mathbb{R}$ is ……

(a) $\{3\}$ (b) $\{3, -3\}$ (c) $\{1, 2\}$ (d) $\{5\}$

Choose the correct answer

The solution set of the equation : $(2x - 25)^{\frac{4}{3}} = 81$ in $\mathbb{R}$ is ....

(a) $\{-1\}$ (b) $\{26\}$ (c) $\{-1, 26\}$ (d) $\varnothing$