

1.) $2^{4x^3} = 16x^4$
 [B] $(2^4)x^3 = 16x^4$
 $x^3 = x^4$
 $x = 0, 1$

2.) $\log_a a \cdot \log_b b \cdot \log_c c \cdot \log_d d \cdot \log_e e$
 [A] $\log_a a$

3.) $x^2 - 4 > 0$ and $x - 1 > 0$
 [C] $x^2 > 4$ $x > 1$
 $x > 2$ or $x < -2$ } $x > 1$
 $x > 2$

4.) $1999^1 = 9$ last digit
 [A] $1999^2 = 1$ even # = 1
 $1999^3 = 9$ odd # = 9
 2000 is even $\Rightarrow 1$

5.) $(\log|x|)^2 - \log|x| - 2 = 0$
 [D] Let $|x| = y$ gives
 $y^2 - y - 2 = 0$
 $y = -1, 2$
 $\log|x| = -1, \log|x| = 2$
 $|x| = \frac{1}{10}, 100 = |x|$
 $x = \pm \frac{1}{10}, \pm 100 = x$

6.) $(-1)^{-\frac{1}{2}} \cdot -(-1)^{\frac{1}{2}}$
 [D] $\frac{1}{i} \cdot (-i)^{-1} = \frac{1}{i} \cdot \frac{-1}{i}$
 $= \frac{-1}{i^2} = 1$

7.) $y = 2^{2000}$
 [B] $\log y = 2000 \log 2$
 $y = 10^{2000 \log 2}$
 $2000 \log 2 \approx 602.06$
 $\Rightarrow 603$

8.) $(2w + 3x + y - z)^4$
 [B] $(2(1) + 3(0) + 1 - (0))^4 = 3^4 = 81$

9.) $2y \log 5 + 2y \log 2 + x \log 40 - x \log 4 = 0$
 [B] $2y(\log 5 + \log 2) + x(\log 40 - \log 4) = 0$
 $2y + x = 0$
 $y = -\frac{1}{2}x$

10.) $z = x + \frac{y}{z}, z = x + \frac{x+1}{z}$
 [A] $z^2 - xz - (x+1) = 0$
 $(z+1)(z-(x+1)) = 0$
 $z = -1, x+1$

11.) $\log 120 = \log 3 + \log 4 + \log 10$
 [D] $= \frac{a}{4} + \frac{b}{2} + 1$
 $\frac{a}{4} = \log 3$ $\frac{a+2b+4}{4}$
 $\frac{b}{2} = \log 4$

12.) $y = \log_3(x+2)$
 [B] $y^2 + \log_3 3 + 2y - 4 = 0$
 $y^2 + 2y - 3 = 0, y = 1, -3$
 $\log_3(x+2) = 1$ $\log_3(x+2) = -3$
 $x = 1$ $x+2 = \frac{1}{27}$
 $x = -1 \frac{26}{27}$
 $1 + (-1 \frac{26}{27}) = \frac{-26}{27}$

13.) Let $y = 10^7$
 [A] $(y+2)(y-2) - y^2 = -4$
 $y^2 - 4 - y^2 = -4$

14.) $y = 0, 0 = 5 \log_2(2x)^3$
 [A] $0 = \log_2(2x)^3$
 $2^0 = (2x)^3$
 $1 = (2x)^3$
 $\frac{1}{8} = x^3$
 $\frac{1}{2} = x$

15.) II, IV

[C]

16.) $\frac{6}{11} \times \frac{\log x a}{\log a} = 243$

[B]

$x = \frac{2}{11}$
 $a = 243$
 $a^5 = 243$
 $a = 3$

17.) $\log_5 1125 \approx 4.36$

[C]

4

18.) $3^C, (2x)^2(-y)^1$

[A]

$3 \cdot 4x^2 \cdot -y$
 $-12x^2y$

19.) $5 \log a - 5 \log a^8$

[B]

$(5 \log a) \mu^3 = 40 \log a$
 $\mu^3 = 8$
 $\mu = 2$

$2(40 \log a) = 80 \log a$
 or $10 \log a^8$

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

[C]

$3^2 - 2(1)$
 7

21.) $x^a = a, y^b = b, \frac{b}{a} = 5$

[A] $\log_b a = \frac{\log a}{\log b} = \frac{a \log x}{b \log y} = \frac{1}{5} \log_y x$

22.) $(2^4 \cdot 4 \cdot x^5 \cdot x^{-3} \cdot y^4 \cdot y^{-2} \cdot z^2)^{\frac{1}{2}}$

[B]

$(2^6 x^2 y^2 z^2)^{\frac{1}{2}}$
 $8 |xyz|$

23.) $\log_a \frac{1}{a} - \log_b \frac{1}{b}$

[C]

$-1 - (-1) = 0$

24.) $3^c = 243$

[E]

$c = 5$
 $25 = b^2 + 9$
 $b = 4$

25.) $\log(x+2)(2x^2+6x+4) = 2$

[C]

$(x+2)^2 = 2x^2+6x+4$
 $x = 0, -2$
 $2(-2)^2+6(-2)+4 = 0$
 $x = 0$

26.) $5-x > 0$ and $x > 0$ & $x \neq 1$

[A]

$x < 5, 0 < x < 5$ and $x \neq 1$

27.) $\log \frac{ab}{c} = \log a + \log b - \log c$

[B]

$.513 + .727 - .240 = 1$

28.) $i(i+1) + i^{-1}(i+1) + i(i-1) + i^{-1}(i-1)$

[B]

$i[(i+1)+(i-1)] + i^{-1}[(i+1)+(i-1)]$
 $i(2i) + i^{-1}(2i)$
 $2i^2 + 2i^0$
 $-2 + 2 = 0$

29.) $10^{2.5} \approx 316.228$

D

30.) $(3^x)(9^x) = 729$

[E]

$3^x \cdot 3^{2x} = 729$
 $3^{3x} = 3^6$
 $x = 2$