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Online Homework

Focused Exercises for Math SAT

Skill Set 11: Exponents

Many of the problems in this exercise set came from The College Board, writers of the SAT exam.

1. If $2^{2x} = 8^{x-1}$, what is the value of x ?

(A) 2
(B) 3
(C) 4
(D) 5
(E) 6

2. If $(a+b)^{\frac{1}{2}} = (a-b)^{-\frac{1}{2}}$, which of the following must be true?

(A) $b = 0$
(B) $a + b = 1$
(C) $a - b = 1$
(D) $a^2 + b^2 = 1$
(E) $a^2 - b^2 = 1$

3. If $2^{4x} = 16$, then $x =$

(A) 1
(B) 2
(C) 4
(D) 8
(E) 12

4. Positive integers x, y, and z satisfy the equations $x^{-\frac{1}{2}} = \frac{1}{3}$ and $y^z = 16$.
If $z > y$, what is the value of $x + z$?

(A) 5
(B) 7
(C) 11
(D) 13
(E) 15

5. $3x^2 < (3x)^2$

For what value of *x* is the statement above FALSE ?

(A) -3

(B) 0

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

(D) 1

(E) For no value of *x*

6. If *a*, *b*, and *c* are different positive integers and $2^a \cdot 2^b \cdot 2^c = 64$, then $2^a + 2^b + 2^c =$

(A) 14
(B) 17
(C) 21
(D) 28
(E) 34

7. If *x* and *y* are positive consecutive odd integers, where y > x, which of the following is equal to $y^2 - x^2$?

(A) 2*x*
(B) 4*x*
(C) 2*x* + 2
(D) 2*x* + 4
(E) 4*x* + 4

8. If *a* and *b* are positive integers and $\left(a^{\frac{1}{2}} b^{\frac{1}{3}}\right)^6 = 432$, what is the value of *ab* ?

(A) 6
(B) 12
(C) 18
(D) 24
(E) 36

9. If $x^3 = y^9$, what is x in terms of y ?

(A) $\sqrt{y}$
(B) y^2
(C) y^3
(D) y^6
(E) y^{12}

10. If k, n, x, and y are positive numbers satisfying $x^{-\frac{4}{3}} = k^{-2}$ and $y^{\frac{4}{3}} = n^2$, what is $(xy)^{-\frac{2}{3}}$ in terms of n and k ?

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

(B) $\frac{n}{k}$

(C) $\frac{k}{n}$

(D) nk

(E) 1

11. If $m^x \bullet m^7 = m^{28}$ and $\left(m^5\right)^y = m^{15}$, what is the value of $x + y$?

(A) 7
(B) 12
(C) 14
(D) 24
(E) 31

12. If $2^x + 2^x + 2^x + 2^x = 2^7$, what is the value of x ?

13. If n is a positive integer, then $\left(6 \times 10^{-n}\right) + \left(1 \times 10^{-n}\right)$ must equal

(A) $\frac{7}{10}$

(B) $\frac{7}{10^n}$

(C) $\frac{7}{10^{2n}}$

(D) $\frac{6}{10^n}$

(E) $\frac{6}{10^{2n}}$

14. If x and y are positive integers and $4\left(2^x\right) = 2^y$, what is x in terms of y ?

(A) $y - 2$
(B) $y - 1$
(C) y
(D) $y + 1$
(E) $y + 2$

15. If $27^{15} = 3^y$, what is the value of y ?

16. If $a > 1$ and $a^b a^4 = a^{12}$, what is the value of b ?

17. If $3^x = y$, which of the following equals $9y$ in terms of x ?

(A) $3^{\frac{x}{2}}$

(B) 3^{2x}

(C) 3^{2+x}

(D) 3^{x^2}

(E) 27^x

18. If $2^4 = 4^x$, then x =

(A) 1
(B) 2
(C) 4
(D) 5
(E) 8

19. If $2^x = 7$, then $2^{2x} =$

(A) 3.5
(B) 7
(C) 14
(D) 28
(E) 49

20. If *a* and *b* are positive integers, which of the following expressions is equivalent to $\frac{\left(3^a\right)^b}{3^a}$?

(A) 1^b
(B) 3^b
(C) 3^{ab-1}
(D) $3^{ab} - 3^a$
(E) $\left(3^a\right)^{b-1}$

21. If $3^{x-2} = 3$, then *x* =

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

22. If m and k are positive and $10m^2k^{-1} = 100m$, what is m^{-1} in terms of k?

(A) $\frac{k}{10}$

(B) $\frac{k}{90}$

(C) $\frac{\sqrt{k}}{10}$

(D) $\frac{1}{10k}$

(E) $\frac{1}{90k}$