



CHALLENGING EXPONENTS QUESTIONS

CANSU OLCE

A STAR MATHS (www.astarmaths.com.au)



1. $4^{a+2} = 24$
 $2^{b-3} = 6$
Find b in terms of a.

2. $8^{x+1} = 16^{x-1}$
Find x.

3. $(0.16)^{x+2} = 1$
Find x.

4. $2^{a-1} = 3$
 $2^{a+1} = ?$

5. $\frac{(-4)^{-5}}{-8^{-8}} = ?$

6. $6^x = 18$
Find $2^{x-1} \times 3^{x-1}$.

7. $\frac{1}{4^{x-1}} = 32^{x+1}$
Find x.

8. $12^{2n} \times 9 = 2^{4n}$
Find n.

9. $\frac{6^x + 6^x + 6^x}{3^x + 3^x} = 24$
Find x.

10. $\left(\frac{2}{3}\right)^{3x+4} = \left(\frac{9}{4}\right)^{4-3x}$
Find x.

11. $\frac{5^x - 3^x}{3^x} = \frac{16}{9}$
Find x.

12. $(2x + 5)^3 = (10 - 3x)^3$
Find x.

13. $\frac{1}{3^{a-1}} + \frac{1}{3^{a-2}} = 108$

Find a.

14. $\frac{6^x + 4^x}{2^x} = 13$

Find x.

15. $x^{\frac{3}{5}} = 2$

$x^3 = ?$

16. How many digits does $32^3 \times 125^4$ have?

17. $3^x = 2$
 $\frac{9^x - 1}{3^{-x}} = ?$

18. $20^x = a$

$10^x = b$

Find 2^x in terms of a and b.

19. $2^{x-1} = m$

$4^{x+1} = n$

Find n in terms of m.

20. $x^3 = 3^{\frac{3}{2}}$

$x^4 = ?$

21. $2^{x+1} + 2^x - 2^{x-1} = 20$

Find x.

22. $3^{n+1} - 3^n + 3^{n-1} + 3^{n-2} = 22$

Find n.

23. $27^{a-b} = 81^{a+b}$
Find $\frac{3b-a}{8b+a}$.

24. $\frac{5}{2^x - 3} = \frac{9}{2^x + 1}$
Find x.

25. $2^a \times 3^b = 12$
 $2^a \times 3^a = 18$
Find a+b.

26. $15^x = 5^{x+1}$
 $9^x = ?$

27. $3^a = 5^b$
 $3^{\frac{2a}{b}} = ?$

28. $(-2^8)^{-x+1} = (-4^{-8})^{x-1}$
Find x.

29. $2^a = 9$
 $2^b = 27$
Find $\frac{a}{b}$.

30. $2^a = b$
Find $\frac{4^a + 2^a}{8^a + 4^a}$.

31. $2^x = 3^{y+1}$
 $\frac{2^{2x+3}}{3^{2y+2}} = ?$

32. $3^x - 1 = a$
 $3^x + 1 = b$
 $a \times b = 80$
Find x.

33. $\frac{3 \times 3 \times 3 \times 3 \times 3 \times 3}{3 + 3 + 3 + 3 + 3 + 3} = ?$

34. $(-2^0 + 2^{-2})^{-1} + 3^{-1} = ?$

35. $(-2)^2 \times (-2)^{-4} \times (-2^6) = ?$

36. $\left(-\frac{1}{3}\right)^{-2} + \left(-\frac{1}{3}\right)^{-3} - (-3^2) = ?$

37. $\frac{3^{n+1} - 3^n}{3^{n+2} + 3^{n+1}} = ?$

38. $\frac{50^n - 8^n}{10^n + 4^n} = ?$

39. $\frac{(-1)^4 - (-1)^5 - (-1)^6}{(-4^2) - (-4)^3} = ?$

40. $\frac{(-2^4)}{(-2^{-1})^{-3}} = ?$

ANSWER KEY

1. $2a+5$

2. 7

3. -2

4. 12

5. 2^{14}

6. 3

7. $-3/7$

8. -1

9. 4

10. 4

11. 2

12. 1

13. -2

14. 2

15. 32

16. 13

17. 6

18. a/b

19. $16m^2$

20. 9

21. 3

22. 2

23. 10

24. 3

25. 3

26. 25

27. 25

28. 1

29. $2/3$

30. b^{-1}

31. 8

32. 2

33. $81/2$

34. -1

35. -16

36. -9

37. $1/6$

38. $5^n - 2^n$

39. $1/48$

40. 2

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