

Exponents and Roots

For questions in the Quantitative Comparison format (“Quantity A” and “Quantity B” given), the answer choices are always as follows:

- (A) Quantity A is greater.
- (B) Quantity B is greater.
- (C) The two quantities are equal.
- (D) The relationship cannot be determined from the information given.

For questions followed by a numeric entry box , you are to enter your own answer in the

box. For questions followed by fraction-style numeric entry boxes , you are to enter your answer in the form of a fraction. You are not required to reduce fractions. For example, if the answer is 1/4, you may enter 25/100 or any equivalent fraction.

All numbers used are real numbers. All figures are assumed to lie in a plane unless otherwise indicated. Geometric figures are not necessarily drawn to scale. You should assume, however, that lines that appear to be straight are actually straight, points on a line are in the order shown, and all geometric objects are in the relative positions shown. Coordinate systems, such as xy -planes and number lines, as well as graphical data presentations such as bar charts, circle graphs, and line graphs, *are* drawn to scale. A symbol that appears more than once in a question has the same meaning throughout the question.

1.

Quantity A

25^7

Quantity B

5^{15}

2.

$216 = 2^x 3^y$
 x and y are integers.

Quantity A

x

Quantity B

y

3.

Quantity A

Quantity B

$$\sqrt{18}\sqrt{2}$$

$$\sqrt{6}$$

4.

Quantity A

Quantity B

$$\sqrt{3} + \sqrt{6}$$

$$\sqrt{9}$$

5.

Quantity A

Quantity B

$$\sqrt{7,777,777,777}$$

88,000

6. If $5,000 = 2^x 5^y$ and x and y are integers, what is $x + y$?

7. If $3^2 9^2 = 3^x$, what is x ?

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

8.

80 is divisible by 2^x .

Quantity A

Quantity B

x

3

9.

Quantity A

Quantity B

$$(81)^2(900)^3$$

$$270^6$$

10. If $17\sqrt[3]{m} = 34$, what is $6\sqrt[3]{m}$?

$$\frac{1}{\frac{1}{1}}$$

11. $\overline{5^{-2}}$ is equivalent to:

- (A) $\frac{1}{25}$
(B) $\frac{1}{5}$
(C) 1
(D) 5
(E) 25

12. If $77,742y^{11} = 4x^2$, what is $\frac{77,742y^{11}}{8x^2}$?

13. $\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{4}}}} =$

- (A) $\sqrt{2}$
(B) 2
(C) $2\sqrt{2}$
(D) 4
(E) $4\sqrt{2}$

14.

Quantity A

$$\frac{200}{\sqrt{200}}$$

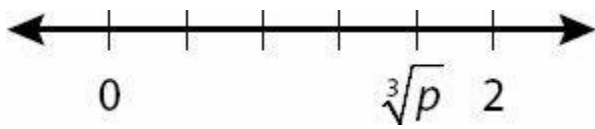
Quantity B

$\sqrt{200}$

15. For what positive integer is the square of the integer divided by the cube root of the integer equal to nine times the integer?

- (A) 4
(B) 8
(C) 16
(D) 27
(E) 125

16.



If the hash marks above are equally spaced, what is the value of p ?

- (A) $3/2$
- (B) $8/5$
- (C) $24/15$
- (D) $512/125$
- (E) $625/256$

17. What is the greatest prime factor of $2^{99} - 2^{96}$?

18. If $2^k - 2^{k+1} + 2^{k-1} = 2^k m$ what is m ?

- (A) -1
- (B) $-1/2$
- (C) $1/2$
- (D) 1
- (E) 2

19.

Quantity A

$$\frac{2}{9}(81)^{50}$$

Quantity B

$$\frac{(3^2)(9)^{99}}{2}$$

20. If $5^{k+1} = 2,000$, what is $5^k + 1$?

- (A) 399
- (B) 401
- (C) 1,996
- (D) 2,000
- (E) 2,001

21. If $3^{11} = 9^x$, what is the value of x ?

22. If $x^7 = 2.5$, what is x^{14} ?

23. If $\sqrt[5]{x^6} = x^{\frac{a}{b}}$, then the value of $a/b =$

24. $\frac{20^{-5}5^{10}8^6}{10^825^{-2}} = ?$

- (A) 1
- (B) 4
- (C) 5
- (D) 6
- (E) 10

25. If $\frac{5^7}{5^{-4}} = 5^a$ and $\frac{2^{-3}}{2^{-2}} = 2^b$ and $3^8(3) = 3^c$, what is the value of $a + b + c$?

26. If 12^x is odd and x is an integer, what is the value of x^{12} ?

27. $\frac{200^{\frac{5}{2}}}{\sqrt{200}} = ?$

- (A) 4
- (B) 40
- (C) 400
- (D) 4,000
- (E) 40,000

28.

$$\frac{(10^3)(0.027)}{(900)(10^{-2})} = (3)(10^m)$$

Quantity A

The value of m

Quantity B

3

29. $\frac{1}{3}(10^6 - 10^4) = ?$

- (A) $33.\overline{3}$
- (B) $3,333.\overline{3}$
- (C) 33,000
- (D) 330,000
- (E) 333,333

30. Simplify: $\frac{2^2 + 2^2 + 2^3 + 2^4}{(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})}$

- (A) 2
- (B) 4
- (C) 8
- (D) 16
- (E) 32

31. $\frac{2^{-4}3^{-20}}{4^{-1}9^{-6}} =$

- (A) 2^23^8
- (B) 2^13^{12}
- (C) $\frac{1}{2^23^8}$
- (D) $\frac{1}{2^13^{12}}$
- (E) $\frac{1}{2^23^{12}}$

32. If $\frac{0.000027 \times 10^x}{900 \times 10^{-4}} = 0.03 \times 10^{11}$, what is the value of x ?

- (A) 13
- (B) 14
- (C) 15
- (D) 16
- (E) 17

33. $(\sqrt[2]{x})(\sqrt[3]{x}) =$

(A) $\sqrt[5]{x}$

(B) $\sqrt[6]{x}$

(C) $\sqrt[3]{x^2}$

(D) $\sqrt[5]{x^6}$

(E) $\sqrt[6]{x^5}$

34. $\left(\sqrt[3]{x^2}\right)\left(\sqrt[4]{x^5}\right)=$

(A) $\sqrt[7]{x^{10}}$

(B) $\sqrt[12]{x^{10}}$

(C) $\sqrt[12]{x^7}$

(D) $\sqrt[9]{x^{23}}$

(E) $\sqrt[12]{x^{23}}$

35.

$$n = 0.00025 \times 10^4 \text{ and } m = 0.005 \times 10^2$$

Quantity A

$$\frac{n}{m}$$

Quantity B

$$0.5$$

36. $\frac{40^{50} - 40^{48}}{2^{96}} \times 10^{-45} =$

(A) 20

(B) $10^3(1,599)$

(C) $10^2(1,601)$

(D) 200^6

(E) 200^{53}

37. Which of the following is equal to $x^{\frac{3}{2}}$?

(A) $x^2\sqrt{x}$

(B) $x\sqrt{x}$

(C) $\sqrt[3]{x^2}$

(D) $\sqrt[3]{x}$

(E) $(x^3)^2$

38. $\sqrt{(360)(240)(3)(2)} =$

(A) 180

(B) 360

(C) 720

(D) 1,440

(E) 3,600

39. If $125^{14}48^8$ is written out as an integer, how many consecutive zeroes will that integer have at the end?

(A) 22

(B) 32

(C) 42

(D) 50

(E) 112