Exponent

1. 104 is not equal to which of the following?

100,000

0.1 x 105

10 x 10 x 10 x 10

102 x 102

10,000

ACT Test Study Guide with Practice Questions

2. Multiply 104 by 102

108

102

106

10-2

103

3. Divide x5 by x2

x7

x4

x10

x3

x2.5

4. Find 8.23 x 109

0.00000000823

0.000000823

8.23

8230000000

823000000000

5. 83,000 equals:

83.0 x 104

8.3 x 104

8.3 x 103

83.0 x 105

83.0 x 102

6. .00875 equals:

8.75 x 10-2

8.75 x 10-3

8.75 x 10-4

87.5 x 10-3

875 x 10-4

Answers & Explanations

1. A: 104=10.10.10.10, or 10,000.

2. C: When multiplying terms with the same base, the exponents should be added. Thus, 104 . 102=106.

3. D: When dividing terms with the same base, the exponents should be subtracted. Thus, x5/x2 =x3.

4. D: The decimal will be moved to the right 9 places. Thus 7 zeros will be added to the right of 823, giving 8,230,000,000.

5. B: Moving the decimal to the right of the digit, 8, gives the equivalent expression, 8.3x104, since there are 4 digits to the right of the 8.

6. B: Moving the decimal to the right of the 8 gives 8.75x10-3, since the decimal must be moved 3 places to the right.

Additional Exponent

1. 46/28=

2

8

16

32

64

2. Which of the following expressions is equal to xmn ?

(xm)n

xm+n

xmxn

nxm

3. There are 64 squares on a checkerboard. Bobby puts one penny on the first square, two on the second square, four on the third, eight on the fourth, and continues to double the number of coins at each square until he has covered all 64 squares. How many coins must he place upon the last square?

a. 264

b. 264-1

c. 263

d. 263+1

e. 264-2

4. Which of the following expressions is equivalent to ?

a. 2x8

b. x15

c. x2

d. x8

e. 2x15

5. Simplify the following expression:

50x18t6w3z20 / 5x5t2w2z19

10x13t3wz

10x13t4wz

10x12t4wz

10x13t4wz2

6. Simplify the following expression:

(3x2 * 7x7)+ (2y3 * 9y12)

21x14 + 18y26

10x9 + 11y15

21x14 + 18y15

21x9 + 18y15

7. Simplify the following expression:

(2x4y7m2z) ✓ (5x2y3m8)

10x6y9m10z

7x6y10m10z

10x5y10m10z

10x6y10m10z

8. If 24 = 4x, then x = ?

2

4

6

8

9. If 34 = 9x, then x = ?

2

4

6

8

16

10. If 6x/(62+62+62)=1/3, then what is the value of x?

2

3

4

5

Answers

1. C: Since 4 is the same as 22, 46 = (22)6 = 212 = 212. When dividing exponential numbers with the same base, simply subtract the exponent in the denominator from the exponent in the numerator: 212/28=212-8=24=16.

2. A: To determine the power of a power, multiply the exponents. This example presents the reverse case: the product of exponents is equivalent to the power of a power. For example 22*3=26=64=43=(22)3,

3. C: To see this, consider the following table, which shows the numbers of coins added to the first few squares, and the equivalent powers of 2:

Square	1	2	3	4
Coins	1	2	4	8
Power of 2	2^0	2^1	2^2	2^3

Power of 2

20

21

22

23

The table shows that in this series, the number of coins on each square represents consecutive powers of 2, since the number doubles with each consecutive square. However, the series of powers begins with 0 for the first square, so that for the 64th square, the number of coins will be 263.

4. D: In order to multiply two exponential numbers that have the same base, add their exponents. Therefore, x3 x5=x3+5=x8.

Also note that x3=x*x*x; therefore the expression x3x5 equals x*x*x*x*x*x*x*x = x8.

5. B: To simplify this expression, it is necessary to follow the law of exponents that states:

xn/xm =xn-m

First, the 50 can be divided by 5: 50/5 = 10.

Then, it is simply a matter of using the law of exponents described above to simplify the expression:(50x18t6w3z20)﷼- (5x5t2w2z19)= 10x18-5t6-2w3-2z 20-19 = 10x13t4wz.

6. D: To simplify this expression, it is necessary to observe the law of exponents that states:

xn xm = xn+m

Therefore: (3x2 ﷺ 7x7)+ (2y3 * 9y12) = 37x7+2 + 29y12+3 = 21x9 + 18y 15.

7. D: To simplify this expression, it is necessary to observe the law of exponents that states:

xm xn = xm+n

Therefore, (2x4y7m2z) * (5x2y3m8) = 10x4+2y7+3m2+8z = 10x6y10m10z.

8. A: 24 = 2 x 2 x 2 x 2 = 16. Therefore, since 4x = 16, x = 2.

9. A: 34 = 3 x 3 x 3 x 3 = 81. Therefore, since 9x= 81, x = 2.

10. A: The denominator is equal to 3(62), so that the expression becomes 6^x/(62+62+62)=6x/(3*62)=1/3.

If x = 2 so that 6x = 62, these will cancel on top and bottom, leaving 1/3.