Number Properties

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.

On a number line, the distance from A to B is 4 and the distance from B to C is 5.

Quantity A	**Quantity B**
The distance from A to C	9

2.

$a, b, c,$ and d are consecutive integers such that $a < b < c < d$

Quantity A	**Quantity B**
The average of $a, b, c,$ and d	The average of b and c

3. $w, x, y,$ and z are consecutive odd integers such that $w < x < y < z$. Which of the following statements must be true?

Indicate all such statements.

☐ $wxyz$ is odd
☐ $w + x + y + z$ is odd
☐ $w + z = x + y$

4.

Quantity A	**Quantity B**
The sum of all the odd integers from 1 to 100, inclusive	The sum of all the even integers from 1 to 100, inclusive

5. If $a + b + c + d + e$ is odd, and $a, b, c, d,$ and e are integers, which of the following could be the number of integers among $a, b, c, d,$ and e that are even?

Indicate all such numbers.

☐ 0
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

6.

Quantity A	**Quantity B**
The least odd number greater than or equal to 5!	The greatest even number less than or equal to 6!

7. If set S consists of all positive integers that are multiples of both 2 and 7, how many numbers in set S are between 140 and 240, inclusive?

8.

$ab > 0$
$bc < 0$

Quantity A	**Quantity B**
ac	0

9.

$mn < 0$
$mp > 0$

Quantity A	Quantity B
np	0

10.

$abc < 0$
$b^2c > 0$

Quantity A	Quantity B
ab	0

11.

a, b, and c are integers such that $a < b < c$

Quantity A	Quantity B
$\frac{a+b+c}{3}$	b

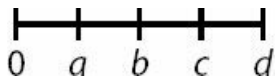
12. If $x^2 = y^2$, which of the following must be true?

- ☐ $x = y$
- ☐ $x^2 - y^2 = 0$
- ☐ $|x| - |y| = 0$

13. If p and k are even, and q is odd, which of the following cannot be even?

(A) pk
(B) pq
(C) $\frac{k}{p}$
(D) $\frac{qp}{k}$
(E) $\frac{q}{p}$

14.



Quantity A	Quantity B
$a \times c$	$b \times d$

15. If $a > b > c > d$ and $a = 2$, which of the following must be negative?

(A) ab
(B) ac
(C) ad
(D) bd
(E) None of the above.

16. If $y^2 = 4$ and $x^2y = 18$, $x + y$ could equal which of the following values?

Indicate <u>two</u> such values.

☐ -5
☐ -1
☐ 1
☐ 5
☐ 6

17.

Quantity A	**Quantity B**
The remainder when 10^{11} is divided by 2	The remainder when 3^{13} is divided by 3

18.

q is odd

Quantity A	**Quantity B**
$(-1)^q$	$(-1)^{q+1}$

19.

n is a positive integer

Quantity A	**Quantity B**
$(-1)^{4n} \times (-1)^{202}$	$(3)^3 \times (-5)^5$

20. If n is the smallest of three consecutive positive integers, which of the following must be true?

(A) n is divisible by 3
(B) n is even
(C) n is odd
(D) $(n)(n + 2)$ is even
(E) $n(n + 1)(n + 2)$ is divisible by 3

21. If x, y, and z are integers, $y + z = 13$, and $xz = 9$, which of the following must be true?

(A) x is even

(B) $x = 3$
(C) y is odd
(D) $y > 3$
(E) $z < x$

22.

$abc > 0$,
$a < b$,
and $a^2(c) < 0$

Quantity A	**Quantity B**
ab	$b(ac)^2$

23. On a number line, A is 6 units from B and B is 2 units from C. What is the distance between A and C?

(A) 4
(B) 8
(C) 12
(D) 4 or 8
(E) 4, 8, or 12

24. The average of 11 integers is 35. What is the sum of all the integers?

25. What is the sum of all the integers from 1 to 80, inclusive?

(A) 3,200
(B) 3,210
(C) 3,230
(D) 3,240
(E) 3,450

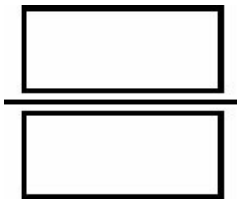
26. The average of a set of 18 consecutive integers is 22.5. What is the smallest integer in the set?

27. p is the sum of all the integers from 1 to 150, inclusive. q is the sum of all the integers from 1 to 148, inclusive. What is the value of $p - q$?

28. If m is the product of all the integers from 2 to 11, inclusive, and n is the product of all the integers from 4 to 11,

inclusive, what is the value of $\frac{n}{m}$?

Give your answer as a fraction.



29. If $\sqrt{x}$ is an integer and $xy^2 = 36$, how many values are possible for the integer y?

(A) 2
(B) 3
(C) 4
(D) 6
(E) 8

30.

a, b, and c are positive even integers such that $8 > a > b > c$

Quantity A	**Quantity B**
The range of a, b, and c	The average of a, b, and c

31. If x is a non-zero integer and $0 < y < 1$, which of the following must be greater than 1?

(A) x
(B) $\frac{x}{y}$
(C) xy^2
(D) x^2y
(E) $\frac{x^2}{y}$

32.

a, b, and c are consecutive integers such that $a < b < c < 4$

Quantity A	**Quantity B**
The range of a, b, and c	The average of a, b, and c

33.

$x = 2y = 4z$ and x, y, and z are integers

Quantity A	**Quantity B**
The average of x and $2y$	$4z + x - 2y$

34.

$\sqrt{xy}$ is a prime number, xy is even, and $x > 4y > 0$

Quantity A	**Quantity B**
y	1

35.

$abcd$ is even and positive, and abc is odd and positive

Quantity A	**Quantity B**
1	d

36.

$b - a < 0$ and $a + 2c < 0$

Quantity A	**Quantity B**
b	$-2c$

37.

In set N consisting of n integers, the average equals the median.

Quantity A	**Quantity B**
The remainder when n is divided by 2	The remainder when $n - 1$ is divided by 2

38.

x is even, $\sqrt{x}$ is a prime number, and $x + y = 11$

Quantity A	Quantity B
x	y

39.

The product of integers f, g, and h is even and the product of integers f and g is odd

Quantity A	**Quantity B**

The remainder when f is divided by 2	The remainder when h is divided by 2

40.

x, y, and z are integers
$xyz \geq 0$
$yz < 0$
$y < 0$

Quantity A	**Quantity B**
x	z

41.

$\sqrt{y} = 3$
$x^2 = 16$
$y - x > 10$

Quantity A	**Quantity B**
x	xy

42. If $\frac{17}{2^{10}5^{13}}$ is expressed as a terminating decimal, how many zeroes are located to the right of the decimal point before the first non-zero digit?

(A) 10
(B) 12
(C) 13
(D) 15
(E) 17

43. If x is odd, all of the following must be odd EXCEPT:

(A) $x^2 + 4x + 6$
(B) $x^3 + 5x + 3$
(C) $x^4 + 6x + 7$
(D) $x^5 + 7x + 1$
(E) $x^6 + 8x + 4$

44.

$x^2 > 25$ and $x + y < 0$

Quantity A	**Quantity B**
x	y

45.

The positive integer a is divisible by 2, and $0 < ab < 1$

Quantity A	**Quantity B**
b	$\frac{1}{2}$

46.

p and w are single-digit prime numbers
$p + w < 6$
p^2 is odd

Quantity A	**Quantity B**
3	w

47. If $\frac{x}{23}$ is a positive integer with a factor of 6, which of the following statements must be true?

Indicate <u>two</u> such statements.

- ☐ $x > 23$
- ☐ x has at least 3 prime factors
- ☐ x is odd
- ☐ x is prime
- ☐ x is not divisible by 5

48.

$x^2 > y^2$ and $x > -|y|$

Quantity A	**Quantity B**
x	y

49.

The sum of four consecutive integers is -2

Quantity A	**Quantity B**
The smallest of the four integers	-2

50. If g is an integer and x is a prime number, which of the following must be an integer?

Indicate <u>all</u> such expressions.

☐ $\frac{g^2x+5gx}{x}$

☐ $g^2-x^2\left(\frac{1}{3}\right)$

☐ $6\left(\frac{g}{2}\right)-100\left(\frac{g}{2}\right)^2=$

51. If $k=\frac{19!}{16!}$, which of the following is the smallest choice that does not have a prime factor in common with k?

(A) 19
(B) 34
(C) 77
(D) 115
(E) 133

52. If $4^6 25^5 = 10^x + k$, and x is an integer, what is the minimum positive value k could be?

(A) 0
(B) 30,000
(C) 30,000,000
(D) 10,000,000,000
(E) 30,000,000,000

53. Jose is making a necklace with beads in a repeating pattern of blue, red, green, orange, purple. If the 1st bead is blue, what color will the 234th bead be?

(A) blue
(B) red
(C) green
(D) orange
(E) purple

54. What is the units digit of 7^{94}?

55. What is the units digit of the sum $3^{47} + 5^{43} + 2^{12}$?

Number properties answer Key							
1	D		21	D		41	A
2	C		22	B		42	A
3	I and II only		23	D		43	C
4	B		24	385		44	D
5	I, III and V only		25	D		45	B
6	B		26	14		46	A
7	8		27	289		47	I and II only
8	B		28	1/6		48	A
9	B		29	E		49	C
10	B		30	C		50	I and III only
11	D		31	E		51	C
12	II and III only		32	D		52	E
13	E		33	C		53	D
14	B		34	B		54	9
15	E		35	D		55	8
16	-1, 5		36	B			
17	C		37	D			
18	B		38	B			
19	A		39	A			
20	E		40	B			