**GRE quantitative course**

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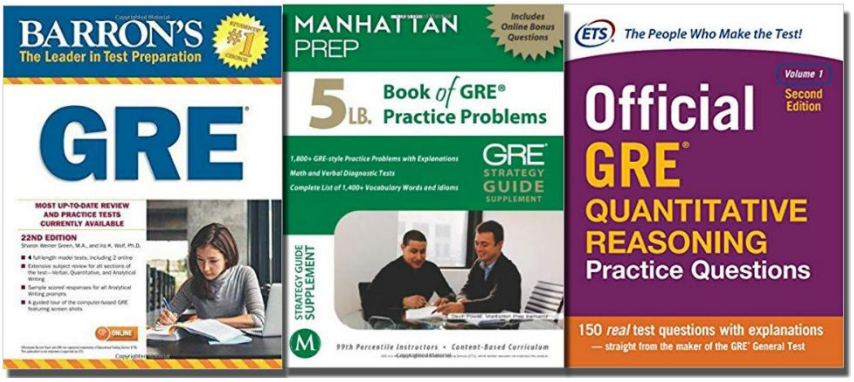
**March 2019**




## Basic Arithmetic concepts

- The Number Line
- Absolute Value
- Addition, Subtraction, Multiplication, Division
- Integers
- Exponents and Roots
- Squares and Square Roots
- Order of operations

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.

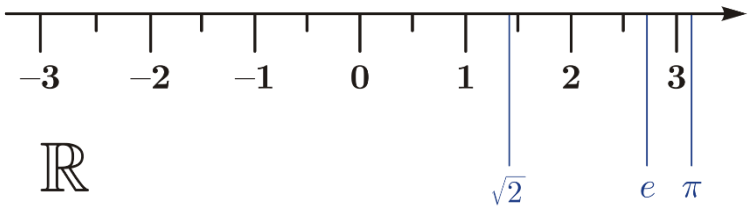
(B) Quantity B is greater.

(C) The two quantities are equal.

(D) The relationship cannot be determined from the information given.

The word ***number*** always means ***real numbers***.

In mathematics, a real number is a value of a continuous quantity that can represent a distance along a line.




## Signed numbers

For any number ***a***, exactly one of the following is true:

- ***a*** is negative
- ***a*** = 0
- ***a*** is positive

## The absolute value:

**|3| = 3**

**|-3| = 3**

## Basic Operations

| | | | |
|---|---|---|---|
| + | **Addition** | Sum of 9 and 8 | 9 + 8 =17 |
| - | **Subtraction** | Subtract 9 from 16. | 16 – 9 = 7 |
| | | Difference between 16 and 9 | |
| × | **Multiplication** | Product of 7.5 and 1000 | 7.5 × 1000 = 7500 |
| ÷ | **Division** | Quotient of 12 and 4 | 12 ÷ 4 = 3 |

$23 \div 10 = 2.3 = \frac{23}{10} = 2\frac{3}{10}$

$n \div m, \qquad n = mq + r$

$23 \div 10, \qquad 23 = 10(2) + 3$

The quotient is 2 and there is a remainder of 3.

What is the sum of the product and quotient of 8 and 8?

Ⓐ 16
Ⓑ 17
Ⓒ 63
Ⓓ 64
Ⓔ 65

**The answer is 65 (E)**

## Divide by zero:

- 0 ÷ 7 = 0
- 7 ÷ 0 is meaningless

**The product of 0 and any number is 0**

| Quantity A | Quantity B |
| --- | --- |
| The product of the integers from -7 to 2 | The product of the integers from -2 to 7 |

**The answer is C**


**The product of an even number of negative factors is positive**

**The product of an odd number of negative factors is positive**

| Quantity A | Quantity B |
| --- | --- |
| (-1)(2)(-3)(4)(-5) | (1)(-2)(3)(-4)(5) |

**The answer is B**

**To find the sum of positive and negative number, find the difference of their absolute values and use the sign of number with the larger absolute value.**

2 + (- 6) =

6 – 2 = 4 → -4

**The sum of two positive number is positive**

2 + 2 = 4

**The sub of two negative number is negative**

(-2) + (-2) = -4

**More Example:**

**2 – 6 =** -4

**2 – (-6) =** 2 + 6 = 8

**(-2) – (-6) =** -2 + 6 = 4

**(-2) – 6 =** -2 + -6 = -8

To subtract signed numbers, change the problem to an addition problem, by changing the sign of what is being subtracted, and use the last tip.

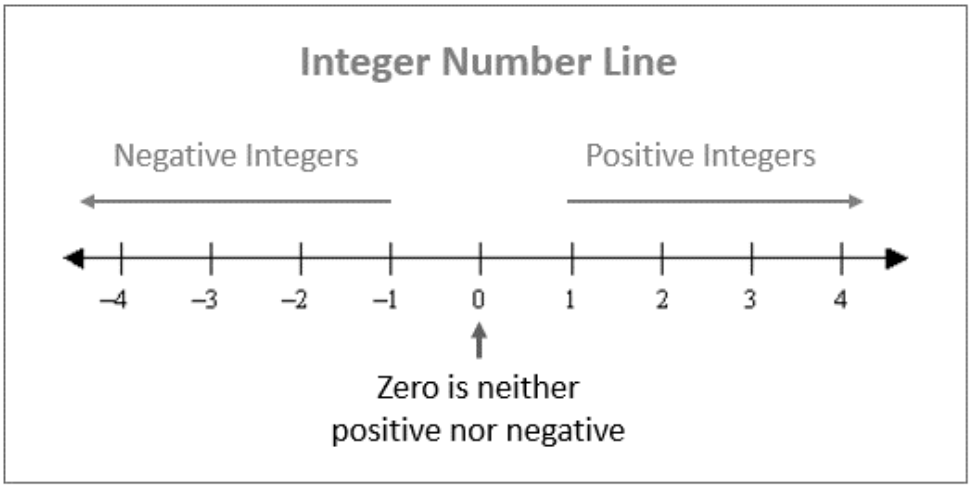
2 + (-6) = -4

2 + (6) = 8

-2 + (6) = 4

-2 + (-6) = -8

## Integers Numbers




**Consecutive integers** are two or more integers written in sequence in which each integer is 1 more than the preceding integer.

24, 25, 26  -3,-2  -3,-2, -1, 0  $n$, $n$ +1, $n$ +2, $n$ +3

If the sum of three consecutive integers is less than 75, what is the greatest possible value of the smallest one?

Ⓐ 23
Ⓑ 24
Ⓒ 25
Ⓓ 26
Ⓔ 27

$n + (n+1) + (n+2) < 75$

$3n + 3 < 75 \rightarrow 3n < 75 - 3$

$3n < 72 \rightarrow n < \frac{72}{3} \rightarrow n < 24$

**The answer is A**

If $2 < x < 4$ and $3 < y < 7$, what is the largest integer value of $x + y$?

If x and y are integers, the largest value is 3 + 6 = 9.

However, although x + y is to be an integer, neither x nor y must be. If x = 3.8 and y = 6.2, then x + y = 10.

**CAUTION**

Never assume that number means integer: 3 is not the only number between 2 and 4; there are

Infinitely many, including 2.5, 3.99, π

How many positive integers less than 100 have a remainder of 3 when divided by 7?

**The answer is A**

If today is Saturday, what day will it be in 500 days?

Ⓐ Friday
Ⓑ Saturday
Ⓒ Sunday
Ⓓ Monday
Ⓔ Tuesday

**The answer is E**

If ***a*** and ***b*** are integers, the following four terms are synonymous:

***a*** is a **divisor** of ***b*** = 3 is a **divisor** of 12

***a*** is a **factor** of ***b*** = 3 is a **factor** of 12

***b*** is **divisible** by ***a*** = 12 is **divisible** by 3

***b*** is **multiple** of ***a*** = 12 is **multiple** of 3

They all mean that when b is divided by a there is no remainder (or, more precisely, the remainder is 0). For example:30/6 = 5

The only positive divisor of 1 is 1.

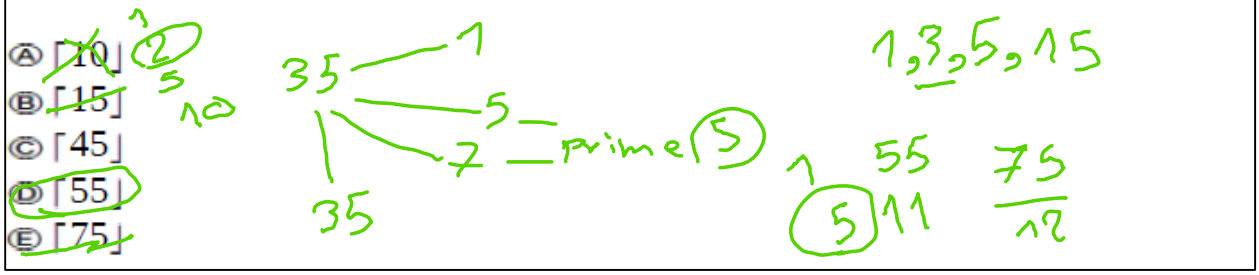
All other positive integers have at least 2 positive divisors: 1 and itself, and possibly many more. For example, 6 is divisible by 1 and 6, as well as 2 and 3.

7 is divisible only by 1 and 7. Positive integers, such as 7, that have exactly 2 positive divisors are called ***prime numbers*** or ***primes***.

Positive integers greater than 1 that are not prime are called ***composite numbers***.

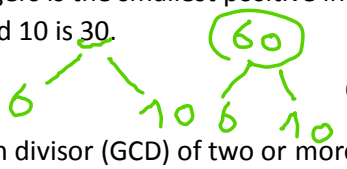
For any positive integer $a$, let $\lceil a \rfloor$ denote the smallest prime factor of $a$. Which of the following is equal to $\lceil 35 \rfloor$?

(A) $\lceil 10 \rfloor$
(B) $\lceil 15 \rfloor$
(C) $\lceil 45 \rfloor$
(D) $\lceil 55 \rfloor$
(E) $\lceil 75 \rfloor$



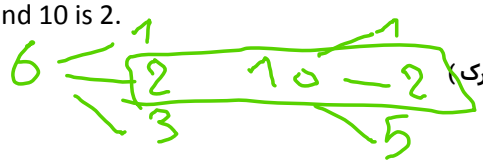

**The answer is D**

**The least common multiple (LCM)** of two or more integers is the smallest positive integer that is a multiple of each of them. For example, the LCM of 6 and 10 is 30.




( کوچکترین مضرب مشترک )

**The greatest common factor (GCF)** or greatest common divisor (GCD) of two or more integers is the largest integer that is a factor of each of them. For example, the only positive integers that are factors of both 6 and 10 are 1 and 2, so the GCF of 6 and 10 is 2.

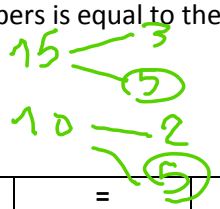



( بزرگترین مقسوم علیه مشترک )

The product of the GCF and LCM of two numbers is equal to the product of the two numbers.

GCF (***a*** and ***b***) × LCM (***a*** and ***b***) = ***a*** × ***b***

Example: ***a*** = 15, ***b*** = 10




| **GCF (*a* and *b*)** | × | **LCM (*a* and *b*)** | = | ***a*** | × | ***b*** |
|---|---|---|---|---|---|---|
| 5 | × | 30 | = | 15 | × | 10 |
| 1500 | | | | 1500 | | |

What is the smallest number that is divisible by both 34 and 35?

**The answer is 1.190**

LCM

$1 \times LCM = 34 \times 35$

$LCM = 1,190$

## Exponents and Roots

In the expression $2^3$, **2** is called the **base** and **3** is the **exponent**.

$2^3 = 2 \times 2 \times 2 = 8$

## Laws of exponents

| | |
|---|---|
| Product of Powers | $x^m \cdot x^n = x^{m+n}$ |
| Quotient of Powers | $\frac{x^m}{x^n} = x^{m-n}$ |
| Power of a Power | $(x^m)^n = x^{m \cdot n}$ |
| Power of a Product | $(xy)^m = x^m y^m$ |
| Power of a Quotient | $\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$ |
| Negative Exponent | $x^{-n} = \left(\frac{1}{x}\right)^n$ |
| | $\left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^n$ |
| Identity Exponent | $x^1 = x$ |
| Zero Exponent | $x^0 = 1$ |

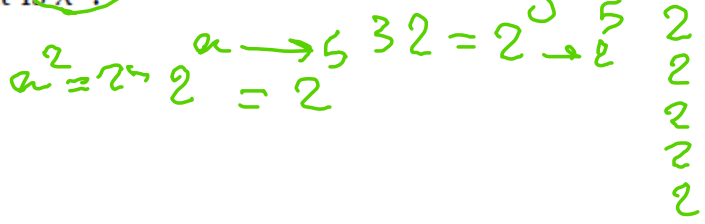
**Example:**

$7^5 \times 5^7 = ?$

None of the rules applies to this expressions

If $2^x = 32$, what is $x^2$?

Ⓐ 5
Ⓑ 10
Ⓒ 25 ✓
Ⓓ 100
Ⓔ 1,024



**The answer is C**

$3^{(a+b)} = \frac{a+b}{2} = \frac{100}{2} = 50$

If $3^a \times 3^b = 3^{100}$, what is the average (arithmetic mean) of a and $b$?

**The answer is 50**

| Quantity A | Quantity B |
|---|---|
| $(-13)^{10}$ | $(-13)^{25}$ |

**The answer is A**

$- - \rightarrow +$

$- - - \rightarrow -$

## Squares and Square Roots

$5^2 = 25$

$\sqrt{81} = 9$

For any positive numbers ***a*** and ***b***:

$\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

| | | |
|---|---|---|
| $\sqrt{ab}$ | = | $\sqrt{a} \times \sqrt{b}$ |
| $\sqrt{9 \times 4}$ | = | $\sqrt{9} \times \sqrt{4}$ |
| $\sqrt{36}$ | = | $3 \times 2$ |
| 6 | = | 6 |

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

| | | |
|---|---|---|
| $\sqrt{\frac{a}{b}}$ | = | $\frac{\sqrt{a}}{\sqrt{b}}$ |
| $\sqrt{\frac{36}{16}}$ | = | $\frac{\sqrt{36}}{\sqrt{16}}$ |
| $\sqrt{2.25}$ | = | $\frac{6}{4}$ |
| *1.5* | = | *1.5* |

| Quantity A | Quantity B |
|---|---|
| $\sqrt{x^{20}}$ | $(x^5)^2 \rightarrow x^{10}$ |

$x^{10} \cdot x^{10}$

$\sqrt{(x^{10})^2} \rightarrow x^{10}$

**The answer is C**

What is the circumference of a circle whose area is $10\pi$?

(A) $5\pi$
(B) $10\pi$
(C) $\pi\sqrt{10}$
(D) $2\pi\sqrt{10}$
(E) $\pi\sqrt{20}$

$\pi r^2 = 10\pi$

$\pi r^2 = \pi 10 \rightarrow r^2 = 10$

$r = \sqrt{10}$

$C = 2\pi r$

$2\pi\sqrt{10}$

**The answer is D**

## Order of operations

Parentheses, Exponents, Multiplication and Division, Addition and Subtraction

| Quantity A | Quantity B |
|---|---|
| $5(a - 7)$ | $5a - 7$ |

$5a - 35$

**The answer is B**

| Quantity A | Quantity B |
|---|---|
| $\frac{50 + x}{5}$ | $10 + x$ |

$\frac{50}{5} + \frac{x}{5}$

$10 + \frac{x}{5}$

**The answer is D**

$\frac{50}{5}$

$\frac{51}{5}$

10

11

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$\times$

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