

NUMBER SYSTEM EXAMPLES

Advertisements

Q 1 - Which of the following is a prime number?

A - 187

B - 811

C - 341

D - 437

Answer - B

Explanation

Step 1. Find a whole number k such that $k^2 > n$ for each number.

$$14^2 > 187.$$

$$30^2 > 811.$$

$$19^2 > 341.$$

$$21^2 > 437.$$

Step 2. Get all prime numbers which are $< k$

14 - 2, 3, 5, 7, 11, 13

30 - 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

19 - 2, 3, 5, 7, 11, 13, 17

21 - 2, 3, 5, 7, 11, 13, 17, 19

Step 3. Check divisibility of each number with prime numbers which are $< k$.

187 is divisible by 11.

811 is not divisible by any prime number.

341 is divisible by 11.

437 is divisible by 19.

Result: 811 is the prime number.

Q 2 - Which of the following is the output of 6894×99 ?

A - 685506

B - 682506

C - 683506

D - 684506

Answer - B

Explanation

$$\begin{aligned} 6894 \times 99 &= 6894 \times (100 - 1) \\ &= 6894 \times 100 - 6894 \times 1 \\ &= 689400 - 6894 \\ &= 682506 \end{aligned}$$

Q 3 - Which of the following is the output of 685798×125 ?

A - 8224750

B - 8225750

C - 8225950

D - 8224760

Answer - A

Explanation

$$\begin{aligned} &685798 \times 125 \\ &= 685798 \times 5^3 \\ &= 685798 \times (10/2)^3 \\ &= (685798 \times 10^3) / 2^3 \\ &= 685798000 / 8 \\ &= 85724750 \end{aligned}$$

Q 4 - Which of the following is the output of 43986×625 ?

A - 27491450

B - 27491350

C - 27491250

D - 27491750

Answer - C

Explanation

$$\begin{aligned} &43986 \times 625 \\ &= 43986 \times 5^4 \\ &= 43986 \times (10/2)^4 \\ &= (43986 \times 10^4) / 2^4 \\ &= 439860000 / 16 \\ &= 27491250 \end{aligned}$$

Q 5 - Which of the following is the output of $869 \times 738 + 869 \times 262$?

A - 262000

B - 738000

C - 969000

D - 869000

Answer - D

Explanation

$$\begin{aligned} &869 \times 738 + 869 \times 262 \\ &= 869 \times (738 + 262) \\ &= 869 \times 1000 \\ &= 869000 \end{aligned}$$

Q 6 - Which of the following is the output of $936 \times 587 - 936 \times 487$?

A - 93600

B - 58700

C - 48700

D - 100

Answer - A

Explanation

$$\begin{aligned} & 936 \times 587 - 936 \times 487 \\ &= 936 \times (587 - 487) \\ &= 936 \times 100 \\ &= 93600 \end{aligned}$$

Q 7 - Which of the following is the output of 1496×1496 ?

A - 3338016

B - 2238016

C - 2248016

D - 2258016

Answer - B

Explanation

$$\begin{aligned} & 1496 \times 1496 \\ &= 1496^2 \\ &= (1500-4)^2 \\ &= 1500^2 + 4^2 - 2 \times 1500 \times 4 \\ &= 2250000 + 16 - 12000 \\ &= 2238016 \end{aligned}$$

We've used following formula here:

$$(a-b)^2 = a^2 + b^2 - 2ab.$$

Q 8 - Which of the following is the output of 1607×1607 ?

A - 2581449

B - 2583449

C - 2582449

D - 2584449

Answer - C

Explanation

$$\begin{aligned} & 1607 \times 1607 \\ &= 1607^2 \\ &= (1600+7)^2 \end{aligned}$$

$$\begin{aligned} &= 1600^2 + 7^2 + 2 \times 1600 \times 7 \\ &= 2560000 + 49 + 22400 \\ &= 2582449 \end{aligned}$$

We've used following formula here:

$$(a+b)^2 = a^2 + b^2 + 2ab.$$

Q 9 - Which of the following is the output of $596 \times 596 - 104 \times 104$?

- A - 377700
- B - 366600
- C - 355500
- D - 344400

Answer - D

Explanation

$$\begin{aligned} &596 \times 596 - 104 \times 104 \\ &= 596^2 - 104^2 \\ &= (596 + 104) \times (596 - 104) \\ &= 700 \times 492 \\ &= 344400 \end{aligned}$$

We've used following formula here:

$$a^2 - b^2 = (a + b)(a - b).$$

Q 10 - Which of the following is the output of $57 \times 57 + 43 \times 43 + 2 \times 57 \times 43$?

- A - 10000
- B - 5700
- C - 4300
- D - 1000

Answer - A

Explanation

$$\begin{aligned} &57 \times 57 + 43 \times 43 + 2 \times 57 \times 43 \\ &= (57 + 43)^2 \\ &= (100)^2 \\ &= 10000 \end{aligned}$$

We've used following formula here:

$$(a + b)^2 = a^2 + b^2 + 2ab.$$

Q 11 - Which of the following is the output of $93 \times 93 + 73 \times 73 - 2 \times 93 \times 73$?

- A - 200
- B - 400

C - 300

D - 100

Answer - B

Explanation

$$\begin{aligned} & 93 \times 93 + 73 \times 73 - 2 \times 93 \times 73 \\ &= (93 - 73)^2 \\ &= (20)^2 \\ &= 400 \end{aligned}$$

We've used following formula here:

$$(a - b)^2 = a^2 + b^2 - 2ab.$$

Q 12 - Which of the following is the output of $(578 \times 578 \times 578 + 432 \times 432 \times 432) / (578 \times 578 - 578 \times 432 + 432 \times 432)$?

A - 2000

B - 4000

C - 3000

D - 1000

Answer - D

Explanation

$$(578 \times 578 \times 578 + 432 \times 432 \times 432) / (578 \times 578 - 578 \times 432 + 432 \times 432)$$

Let's have $a = 578$, $b = 432$

$$\begin{aligned} & \text{Now expression is } (a^3 + b^3) / (a^2 - ab + b^2) \\ &= a + b \\ &= 578 + 432 \\ &= 1000 \end{aligned}$$

We've used following formula here:

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2).$$

Q 13 - Which of the following is the output of $(141 \times 141 \times 141 - 58 \times 58 \times 58) / (141 \times 141 + 141 \times 58 + 58 \times 58)$?

A - 83

B - 100

C - 90

D - 73

Answer - A

Explanation

$$(141 \times 141 \times 141 - 58 \times 58 \times 58) / (141 \times 141 + 141 \times 58 + 58 \times 58)$$

Let's have $a = 141$, $b = 58$
Now expression is $(a^3 - b^3) / (a^2 + ab + b^2)$
 $= a - b$
 $= 141 - 58$
 $= 83$

We've used following formula here:

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2).$$

Q 14 - Which of the following is the output of $213 \times 213 + 187 \times 187$?

A - 50338

B - 80338

C - 90338

D - 70338

Answer - B

Explanation

$213 \times 213 + 187 \times 187$
Let's have $a = 213$, $b = 187$
Now expression is $a^2 + b^2$
Using following formula, $(a + b)^2 + (a - b)^2 = 2 \times (a^2 + b^2)$
 $2 \times (213 \times 213 + 187 \times 187) = (213 + 187)^2 + (213 - 187)^2$
 $2 \times (213 \times 213 + 187 \times 187) = 400^2 + 26^2$
 $2 \times (213 \times 213 + 187 \times 187) = 160000 + 676$
 $213 \times 213 + 187 \times 187 = 160676 / 2$
 $= 80338$

Q 15 - Which of the following is the output of $((637 + 478)^2 - (637 - 478)^2) / (637 \times 478)$?

A - 4

B - 6

C - 8

D - 24

Answer - C

Explanation

$((637 + 478)^2 - (637 - 478)^2) / (637 \times 478)$
Let's have $a = 637$, $b = 478$
Now expression is $((a + b)^2 - (a - b)^2) / ab$
 $= (a^2 + b^2 + 2ab - (a^2 + b^2 - 2ab)) / ab$
 $= (a^2 + b^2 + 2ab - a^2 - b^2 + 2ab) / ab$
 $= 4ab / ab$
 $= 4$

We've used following formulae here:

$$(a + b)^2 = a^2 + b^2 + 2ab.$$
$$(a - b)^2 = a^2 + b^2 - 2ab.$$

Q 16 - Which of the following is the output of $((964 + 578)^2 + (964 - 578)^2) / (964 \times 964 + 578 \times 578)$?

A - 4

B - 6

C - 8

D - 2

Answer - D

Explanation

$$\begin{aligned} & ((964 + 578)^2 + (964 - 578)^2) / (964 \times 964 + 578 \times 578) \\ \text{Let's have } a &= 964, b = 578 \\ \text{Now expression is } & ((a + b)^2 + (a - b)^2) / (a^2 + b^2) \\ &= (a^2 + b^2 + 2ab + (a^2 + b^2 - 2ab)) / (a^2 + b^2) \\ &= (a^2 + b^2 + 2ab + a^2 + b^2 - 2ab) / (a^2 + b^2) \\ &= 2(a^2 + b^2) / (a^2 + b^2) \\ &= 2 \end{aligned}$$

We've used following formulae here:

$$\begin{aligned} (a + b)^2 &= a^2 + b^2 + 2ab. \\ (a - b)^2 &= a^2 + b^2 - 2ab. \end{aligned}$$

Q 17 - On dividing a number by 342, 47 is the remainder. What will be remainder if same number is divided by 18?

A - 11

B - 6

C - 8

D - 2

Answer - A

Explanation

$$\begin{aligned} \text{Let's quotient is } a \text{ and given number be } b. \\ b &= 342a + 47 \\ &= (18 \times 19)a + 36 + 11 \\ &= (18 \times 19)a + (18 \times 2) + 11 \\ &= 18 \times (19a + 2) + 11 \\ \text{Thus, if same number is divided by 18, remainder will be 11.} \end{aligned}$$

We've used following formulae here:

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Reminder}$$

Q 18 - What will be unit digit in $(3157)^{754}$?

A - 8

B - 9

C - 7

D - 6

Answer - B

Explanation

unit digit in $(3157)^{754}$
= unit digit in $(7)^{754}$
= unit digit in $(7^4)^{188} \times 7^2$
= unit digit in (1×49)
= 9
Thus Unit digit in $(3157)^{754}$ is 9.

We've used following formulae here:

Unit digit in $7^1 = 7$
Unit digit in $7^2 = 9$
Unit digit in $7^3 = 3$
Unit digit in $7^4 = 1$
Unit digit in $7^5 = 7$
Unit digit in $7^6 = 9$
Unit digit in $7^7 = 3$
Unit digit in $7^8 = 1$

So pattern is 7-9-3-1. This pattern works for all numbers. So Unit digit in $((7)^4)^n$ will be 1.

Q 19 - What will be unit digit in $658 \times 539 \times 436 \times 312$?

A - 8

B - 9

C - 4

D - 6

Answer - C

Explanation

Multiply unit digits of each number.
Unit digit in $658 \times 539 \times 436 \times 312$
= Unit digit in $8 \times 9 \times 6 \times 2$.
= Unit digit in 864.
= 4.

Q 20 - What will be unit digit in $3^{57} \times 6^{41} \times 7^{63}$?

A - 8

B - 9

C - 4

D - 6

Answer - C

Explanation

$$3^{57} = (3^4)^{14} \times 3$$

So Unit digit in 3^{57}
= Unit digit in 1×3
= 3

$$6^{41} = (6^4)^{10} \times 6$$

So Unit digit in 6^{41}
= Unit digit in 6×6
= 6

$$7^{63} = (7^4)^{15} \times 7^3$$

So Unit digit in 7^{61}
= Unit digit in 1×343
= 3

So Unit digit in $3^{57} \times 6^{41} \times 7^{63}$
= Unit digit in $3 \times 6 \times 3$
= 4

We've used following formulae here:

$$\text{Unit digit in } 3^4 = 1$$

$$\text{Unit digit in } 6^4 = 6$$

$$\text{Unit digit in } 7^4 = 1$$

So Unit digit

- in $((3^4)^n)$ will be 1.
- in $((6^4)^n)$ will be 6.
- in $((7^4)^n)$ will be 1.