SOLVED EXAMPLES

Ex. 1. Simplify : (i) 8888 + 888 + 88 + 8
(ii) 11992 - 7823 - 456

Sol. i) 8888 + 888 + 88 + 8 = 9872

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  8888
   888
    88
+    8
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  9872
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ii) 11992 - 7823 - 456 = 11992 - (7823 + 456)
= 11992 - 8279 = 3713-

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  7823        11992
+  456      -  8279
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  8279         3713
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Ex. 2, What value will replace the question mark in each of the following equations ?
(i) ? - 1936248 = 1635773 (ii) 8597 - ? = 7429 - 4358

Sol. (i) Let x - 1936248=1635773.Then, x = 1635773 + 1936248=3572021.
(ii) Let 8597 - x = 7429 - 4358.
Then, x = (8597 + 4358) - 7429 = 12955 - 7429 = 5526.

Ex. 3. What could be the maximum value of Q in the following equation? 5P9 + 3R7 + 2Q8 = 1114

Sol. We may analyse the given equation as shown :
Clearly, 2 + P + R + Q = ll.
So, the maximum value of Q can be
(11 - 2) i.e., 9 (when P = 0, R = 0);

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   1 2
   5 P 9
   3 R 7
   2 Q 8
  ------
  11 1 4
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Ex. 4. Simplify : (i) 5793405 x 9999 (ii) 839478 x 625
Sol.
i)5793405x9999=5793405(10000-1)=57934050000-5793405=57928256595.b

ii) 839478 x 625 = 839478 x 5^4 = $\frac{8394780000}{16}$ = 524673750.

Ex. 5. Evaluate : (i) 986 x 237 + 986 x 863 (ii) 983 x 207 - 983 x 107
Sol.
(i) 986 x 137 + 986 x 863 = 986 x (137 + 863) = 986 x 1000 = 986000.
(ii) 983 x 207 - 983 x 107 = 983 x (207 - 107) = 983 x 100 = 98300.

Ex. 6. Simplify : (i) 1605 x 1605 ii) 1398 x 1398
Sol.
i) 1605 x 1605 = $(1605)^2$ = $(1600 + 5)^2$ = $(1600)^2 + (5)^2$ + 2 x 1600 x 5
= 2560000 + 25 + 16000 = 2576025.
(ii) 1398 x 1398 - $(1398)^2$ = $(1400 - 2)^2$= $(1400)^2 + (2)^2$ - 2 x 1400 x 2

$=1960000 + 4 - 5600 = 1954404.$

Ex. 7. Evaluate : (313 x 313 + 287 x 287).

Sol.

$(a^2 + b^2) = 1/2\ [(a + b)^2 + (a - b)^2]$

$(313)^2 + (287)^2 = 1/2\ [(313 + 287)^2 + (313 - 287)^2] = ½[(600)^2 + (26)^2]$

$= 1/2\ (360000 + 676) = 180338.$

Ex. 8. Which of the following are prime numbers ?

(i) 241 (ii) 337 (Hi) 391 (iv) 571

Sol.

(i) Clearly, 16 > Ö241. Prime numbers less than 16 are 2, 3, 5, 7, 11, 13.
241 is not divisible by any one of them.
241 is a prime number.

(ii) Clearly, 19>Ö337. Prime numbers less than 19 are 2, 3, 5, 7, 11,13,17.
337 is not divisible by any one of them.
337 is a prime number.

(iii) Clearly, 20 > Ö39l". Prime numbers less than 20 are 2, 3, 5, 7, 11, 13, 17, 19.
We find that 391 is divisible by 17.
391 is not prime.

(iv) Clearly, 24 > Ö57T. Prime numbers less than 24 are 2, 3, 5, 7, 11, 13, 17, 19, 23.
571 is not divisible by any one of them.
571 is a prime number.

Ex. 9. Find the unit's digit in the product (2467)163 x (341)72.

Sol. Clearly, unit's digit in the given product = unit's digit in $7^{153} \times 1^{72}$.

Now, 74 gives unit digit 1.

7^{152} gives unit digit 1,

$\therefore 7^{153}$ gives unit digit (l x 7) = 7. Also, 1^{72} gives unit digit 1.

Hence, unit's digit in the product = (7 x 1) = 7.

Ex. 10. Find the unit's digit in $(264)^{102} + (264)^{103}$

Sol. Required unit's digit = unit's digit in $(4)^{102} + (4)^{103.}$

Now, 4^2 gives unit digit 6.

$\therefore (4)^{102}$ gives unjt digit 6.

$\therefore$ (4)103 gives unit digit of the product (6 x 4) i.e., 4.

Hence, unit's digit in (264)m + (264)103 = unit's digit in (6 + 4) = 0.

Ex. 11. Find the total number of prime factors in the expression $(4)^{11} \times (7)^5 \times (11)^2$.

Sol. $(4)^{11} \times (7)^5 \times (11)^2 = (2 \times 2)^{11} \times (7)^5 \times (11)^2 = 2^{11} \times 2^{11} \times 7^5 \times 11^2 = 2^{22} \times 7^5 \times 11^2$

Total number of prime factors = (22 + 5 + 2) = 29.

Ex.12. Simplify : (i) 896 x 896 - 204 x 204
(ii) 387 x 387 + 114 x 114 + 2 x 387 x 114
(iii) 81 X 81 + 68 X 68-2 x 81 X 68.

Sol.

(i) Given exp = $(896)^2 - (204)^2 = (896 + 204)(896 - 204) = 1100 \times 692 = 761200$.

(ii) Given exp = $(387)^2 + (114)^2 + (2 \times 387 \times 114)$
$= a^2 + b^2 + 2ab$, where a = 387,b=114
$= (a+b)^2 = (387 + 114)^2 = (501)^2 = 251001$.

(iii) Given exp = $(81)^2 + (68)^2 - 2 \times 81 \times 68 = a^2 + b^2 - 2ab$, Where a =81,b=68
$= (a-b)^2 = (81 - 68)^2 = (13)^{2 = 169.}$

Ex.13. Which of the following numbers is divisible by 3 ?
(i) 541326 (ii) 5967013

Sol.

(i) Sum of digits in 541326 = (5 + 4 + 1 + 3 + 2 + 6) = 21, which is divisible by 3.
Hence, 541326 is divisible by 3.

(ii) Sum of digits in 5967013 =(5+9 + 6 + 7 + 0+1 +3) = 31, which is not divisible by 3.
Hence, 5967013 is not divisible by 3.

Ex.14.What least value must be assigned to * so that the number 197*5462 is r 9 ?

Sol.

Let the missing digit be x.
Sum of digits = (1 + 9 + 7 + x + 5 + 4 + 6 +»2) = (34 + x).
For (34 + x) to be divisible by 9, x must be replaced by 2 .
Hence, the digit in place of * must be 2.

Ex. 15. Which of the following numbers is divisible by 4 ?
(i) 67920594 (ii) 618703572

Sol.

(i) The number formed by the last two digits in the given number is 94, which is not divisible by 4.
Hence, 67920594 is not divisible by 4.

(ii) The number formed by the last two digits in the given number is 72, which is divisible by 4.
Hence, 618703572 is divisible by 4.

Ex. 16. Which digits should come in place of * and $ if the number 62684*$ is divisible by both 8 and 5 ?

Sol.

Since the given number is divisible by 5, so 0 or 5 must come in place of $. But, a number ending with 5 is never divisible by 8. So, 0 will replace $.

Now, the number formed by the last three digits is 4*0, which becomes divisible by 8, if * is replaced by 4.

Hence, digits in place of * and $ are 4 and 0 respectively.

Ex. 17. Show that 4832718 is divisible by 11.

Sol. (Sum of digits at odd places) - (Sum of digits at even places)

$= (8 + 7 + 3 + 4) - (1 + 2 + 8) = 11$, which is divisible by 11.

Hence, 4832718 is divisible by 11.

Ex. 18. Is 52563744 divisible by 24 ?

Sol. $24 = 3 \times 8$, where 3 and 8 are co-primes.

The sum of the digits in the given number is 36, which is divisible by 3. So, the given number is divisible by 3.

The number formed by the last 3 digits of the given number is 744, which is divisible by 8. So, the given number is divisible by 8.

Thus, the given number is divisible by both 3 and 8, where 3 and 8 are co-primes. So, it is divisible by 3×8, i.e., 24.

Ex. 19. What least number must be added to 3000 to obtain a number exactly divisible by 19 ?

Sol. On dividing 3000 by 19, we get 17 as remainder.

$\therefore$ Number to be added $= (19 - 17) = 2$.

Ex. 20. What least number must be subtracted from 2000 to get a number exactly divisible by 17 ?

Sol. On dividing 2000 by 17, we get 11 as remainder.

$\therefore$ Required number to be subtracted = 11.

Ex. 21. Find the number which is nearest to 3105 and is exactly divisible by 21.

Sol. On dividing 3105 by 21, we get 18 as remainder.

$\therefore$ Number to be added to 3105 $= (21 - 18) - 3$.

Hence, required number $= 3105 + 3 = 3108$.

Ex. 22. Find the smallest number of 6 digits which is exactly divisible by 111.

Sol. Smallest number of 6 digits is 100000.

On dividing 100000 by 111, we get 100 as remainder.

$\therefore$ Number to be added = (111 - 100) - 11.

Hence, required number = 100011.-

Ex. 23. On dividing 15968 by a certain number, the quotient is 89 and the remainder is 37. Find the divisor.

Sol. $$\text{Divisor} = \frac{\text{Dividend - Remainder}}{\text{.Quotient}} = \frac{15968-37}{89} = 179.$$

Ex. 24. A number when divided by 342 gives a remainder 47. When the same number ift divided by 19, what would be the remainder ?

Sol. On dividing the given number by 342, let k be the quotient and 47 as remainder.

Then, number – 342k + 47 = (19 x 18k + 19 x 2 + 9) = 19 (18k + 2) + 9.

$\therefore$ The given number when divided by 19, gives (18k + 2) as quotient and 9 as remainder.

Ex. 25. A number being successively divided by 3, 5 and 8 leaves remainders 1, 4 and 7 respectively. Find the respective remainders if the order of divisors be reversed,

Sol.

3	X	
5	y	- 1
8	z	- 4
	1	- 7

$\therefore$ z = (8 x 1 + 7) = 15; y = {5z + 4) = (5 x 15 + 4) = 79; x = (3y + 1) = (3 x 79 + 1) = 238.

Now,

8	238	
5	29	- 6
3	5	- 4
	1	- 9,

$\therefore$ Respective remainders are 6, 4, 2.

Ex. 26. Find the remainder when 2^{31} is divided by 5.

Sol. 2^{10} = 1024. Unit digit of 2^{10} x 2^{10} x 2^{10} is 4 [as 4 x 4 x 4 gives unit digit 4].

$\therefore$ Unit digit of 231 is 8.

Now, 8 when divided by 5, gives 3 as remainder.

Hence, 231 when divided by 5, gives 3 as remainder.

Ex. 27. How many numbers between 11 and 90 are divisible by 7 ?

Sol. The required numbers are 14, 21, 28, 35, ... 77, 84.

This is an A.P. with a = 14 and d = (21 - 14) = 7.

Let it contain n terms.

Then, $T_n = 84$ => a + (n - 1) d = 84

=> 14 + (n - 1) x 7 = 84 or n = 11.

∴ Required number of terms = 11.

Ex. 28. Find the sum of all odd numbers upto 100.

Sol. The given numbers are 1, 3, 5, 7, ..., 99.

This is an A.P. with a = 1 and d = 2.

Let it contain n terms. Then,

1 + (n - 1) x 2 = 99 or n = 50.

∴ Required sum = $\frac{n}{2}$ (first term + last term)

= $\frac{50}{2}$ (1 + 99) = 2500.

Ex. 29. Find the sum of all 2 digit numbers divisible by 3.

Sol. All 2 digit numbers divisible by 3 are :

12, 51, 18, 21, ..., 99.

This is an A.P. with a = 12 and d = 3.

Let it contain n terms. Then,

12 + (n - 1) x 3 = 99 or n = 30.

∴ Required sum = $\frac{30}{2}$ x (12+99) = 1665.

Ex.30.How many terms are there in 2,4,8,16……1024?

Sol. Clearly 2,4,8,16……..1024 form a GP. With a=2 and r = 4/2 =2.

Let the number of terms be n . Then

$2 \times 2^{n-1}$ =1024 or $2^{n-1 = 512 = 2}$9.

∴ n-1=9 or n=10.

Ex. 31. $2 + 2^2 + 2^3 + ... + 2^8$ = ?

Sol. Given series is a G.P. with a = 2, r = 2 and n = 8.

∴ sum = $\frac{a(r^n-1)}{(r-1)} = \frac{2 \times (2^8-1)}{(2-1)}$ = (2 x 255) =510