

Casting Nines

Casting nines is a method of checking the accuracy of math calculations in addition, subtraction, multiplication and division. It is a “quick check” which flags wrong answers. A great many mistakes in calculation are the result of careless errors and people’s reluctance to spend time checking their work. Casting nines is quick and easy, once mastered, and many students consider it a game. In many cases, students who learn and apply this technique will get better grades and have more fun in math. When teachers don’t have to deal with careless errors, it is possible to move on more quickly to new math concepts. **Warning:** This checking method has one limitation. It can occasionally fail to flag a wrong answer. This happens when a zero is added or left out, when there is a transposition such as 3,528 instead of 3,582, and in some other cases.

To cast nines from a number, add the digits:

$$17 \quad 1 + 7 = 8 \quad 8 \text{ is the result of casting the nines.}$$

If the sum of the digits is nine, cast (throw away) the nine. It becomes a zero.

$$36 \quad 3 + 6 = 9 \quad 9 - 9 = 0 \quad 0 \text{ is the result of casting the nines.}$$

If the sum of the digits is more than nine, cast the nines. You will *always* end up with just one digit when this is completed: 0, 1, 2, 3, 4, 5, 6, 7, or 8.

$$28 \quad 2 + 8 = 10 \quad 10 - 9 = 1 \quad 1 \text{ is the result of casting the nines}$$

Instead of *subtracting* the nine from a two-digit number as shown above, you may *add* the two digits. The result is the same.

$$28 \quad 2 + 8 = 10 \quad 1 + 0 = 1 \quad 1 \text{ is the result of casting the nines}$$

Here is an example of casting nines from a large number:

$$\begin{aligned} 5,628 & \quad 5 + 6 = 11, 1 + 1 \text{ (from the 11)} = 2 \\ & \quad 2 \text{ (from the 5 + 6) + 2 (the next digit in 5,628)} = 4 \\ & \quad 4 \text{ (from the 2 + 2 above) + 8 (next digit)} = 12, 1 + 2 \text{ (from 12)} = 3 \\ & \quad 3 \text{ is the result of casting nines from 5,628} \end{aligned}$$

To speed up casting nines from large numbers, look for and cross out nines or combinations which equal nine. Add the remaining digits. For example:

$$5,629,384,272$$

$$5,629,384,272 \quad \text{Cross out any nines.}$$

$$5,629,384,272 \quad \text{Cross out any combinations which make 9: } 5+2+2, 6+3, 7+2$$

Then add any digits still not crossed out: $8 + 4 = 12, 1 + 2 \text{ (from the 12)} = 3$

3 is the result of casting nines from 5,629,384,272.

Once you are able to cast nines from any number, use it to check problems as shown on the next page.

Addition

Cast nines from both addends and add the one-digit results for the “check number” (circled). Cast nines from the sum. The results must match or the answer is wrong.

addend	38	cast nines from 38: $3 + 8 = 11$, $1 + 1 =$	2
addend	<u>+76</u>	cast nines from 76: $7 + 6 = 13$, $1 + 3 =$	<u>+4</u>
sum	114	add the two digits to get check number	(6)

Then cast nines from the sum, 114: $1 + 1 = 2 + 4 = 6$. This must match the check number. If there is no match, thoroughly check the problem to locate and fix the error.

Multiplication

Cast nines from the multiplicand and the multiplier and multiply the one-digit results for the “check number” (circled). Cast nines from the product. The results must match.

multiplicand	78	cast nines from 78: $7 + 8 = 15$, $1 + 5 =$	6
multiplier	<u>x 8</u>	cast nines from 8 (no nines to cast) =	<u>x 8</u>
product	624	multiply the two digits	48

Cast nines from the 48 to get the 1-digit check number: $4 + 8 = 12$, $1 + 2 =$ **(3)**

Then cast nines from the product, 624: $6 + 2 = 8 + 4 = 12$, $1 + 2$ (from the 12) = **3**

Subtraction

Cast nines from the minuend and the subtrahend. Subtract for the “check number” (circled). Cast nines from the difference. The result must equal the check number.

minuend	53	cast nines from 53: $5 + 3 =$	8
subtrahend	<u>-38</u>	cast nines from 38: $3 + 8 = 11$, $1 + 1 =$	<u>-2</u>
difference	15	subtract the two digits to get check number	(6)

Then cast nines from the difference, 15: $1 + 5 = 6$. This must match the check number.

In subtraction, the one-digit result on the bottom (subtrahend) may be larger than that on the top (minuend). If this occurs, add a nine to the minuend so subtraction is possible, as shown below. Continue as shown above.

minuend	93	cast nines from 93:	3 + 9 = 12
subtrahend	<u>-44</u>	cast nines from 44: $4 + 4 =$	<u>-8</u> <u>-8</u>
difference	49	subtract the two digits for check number	can't do (4)

Division

Cast nines from the dividend to get the “check number” (circled). Cast nines from the quotient. Cast nines from the divisor. Cast nines from the remainder. Multiply the one-digit results as is done normally in checking division: quotient times divisor plus remainder. The result must equal the check number.

Cast 9's from dividend, 89, for **(8)**, the check number.

quotient	<u>14 r5</u>	remainder	quotient 14, $1 + 4 = 5$ times divisor 6 = 30 ($3 + 0 = 3$)
divisor	6) 89	dividend	plus remainder 5 = 8 . This matches check number.