

# Play with 2014

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*A series of year-related arithmetic problems, with my solutions provided.*

**1. Obtain 2014, using the digits from 1 to 9 in order. (Only addition, subtraction, multiplication, and division are allowed. Digits can be combined.)**

$$123 + 45 * 6 * 7 - 8 + 9 = 2014$$

**2. Obtain 2014, using the digits from 9 to 1 in order. (Only addition, subtraction, multiplication, and division are allowed. Digits can be combined.)**

$$9 + 8 * 7 * 6 * 5 + 4 + 321 = 2014$$

**3. Obtain 2014, using the digits from 1 to 9 in order. (Only addition, subtraction, multiplication, division, and parentheses are allowed. Digits cannot be combined.)**

$$\begin{aligned}(1 - 2 + 3) * ((4 * 5 * 6 + 7) * 8 - 9) &= 2014 \\ 1 - 2 - (3 - 4 - 5 * 6) * (7 * 8 + 9) &= 2014 \\ 1 - 2 + (3 - 4 - 5 * 6) * (7 - 8 * 9) &= 2014 \\ 1 - 2 + 3 + 4 * (5 - 6 + 7 * 8 * 9) &= 2014 \\ 1 - 2 - (3 - (4 + 5 * 6)) * (7 * 8 + 9) &= 2014 \\ 1 - 2 + (3 - (4 + 5 * 6)) * (7 - 8 * 9) &= 2014 \\ 1 - 2 + 3 + 4 * (5 - (6 - 7 * 8 * 9)) &= 2014 \\ 1 - (2 - 3) + 4 * (5 - 6 + 7 * 8 * 9) &= 2014 \\ (1 - (2 - 3)) * ((4 * 5 * 6 + 7) * 8 - 9) &= 2014 \\ 1 - (2 - 3) + 4 * (5 - (6 - 7 * 8 * 9)) &= 2014 \\ 1 - (2 - 3 - 4 * (5 - 6 + 7 * 8 * 9)) &= 2014 \\ 1 - (2 - 3 - 4 * (5 - (6 - 7 * 8 * 9))) &= 2014 \\ (1 - (2 / 3 - 4) * 5) * (6 * 7 + 8 * 9) &= 2014 \\ (1 + 2 + (3 + 4) * 5) * (6 + 7 * 8 - 9) &= 2014 \\ 1 - (2 + (3 - 4 - 5 * 6)) * (7 * 8 + 9) &= 2014 \\ 1 - (2 - (3 - 4 - 5 * 6)) * (7 - 8 * 9) &= 2014 \\ 1 - 2 * 3 * (4 - 5 - 6 * 7 * 8) - 9 &= 2014 \\ 1 - (2 * 3 * (4 - 5 - 6 * 7 * 8) + 9) &= 2014 \\ 1 - (2 - (3 + 4 * (5 - 6 + 7 * 8 * 9))) &= 2014 \\ 1 - (2 + (3 - (4 + 5 * 6)) * (7 * 8 + 9)) &= 2014 \\ 1 - (2 - (3 - (4 + 5 * 6)) * (7 - 8 * 9)) &= 2014 \\ 1 - 2 * 3 * (4 - (5 + 6 * 7 * 8)) - 9 &= 2014 \\ 1 - (2 * 3 * (4 - (5 + 6 * 7 * 8)) + 9) &= 2014 \\ 1 - (2 - (3 + 4 * (5 - (6 - 7 * 8 * 9)))) &= 2014\end{aligned}$$

**4. Obtain 2014, using the digits from 9 to 1 in order. (Only addition, subtraction, multiplication, division, and parentheses are allowed. Digits cannot be combined.)**

$$\begin{aligned}(9 * 8 - 7) * (6 * 5 - 4 + 3 + 2) - 1 &= 2014 \\ (9 * 8 - 7) * (6 * 5 + 4 - 3) - 2 + 1 &= 2014 \\ (9 * 8 - 7) * (6 * 5 + 4 - 3) - (2 - 1) &= 2014 \\ (9 * 8 - 7) * (6 * 5 - (4 - 3) + 2) - 1 &= 2014 \\ (9 * 8 - 7) * (6 * 5 - (4 - 3 - 2)) - 1 &= 2014 \\ (9 * 8 - 7) * (6 * 5 - (4 - (3 + 2))) - 1 &= 2014 \\ (9 * 8 - 7) * (6 + (5 + 4) * 3 - 2) - 1 &= 2014 \\ (9 * 8 - 7) * (6 + 5 * 4 + 3 + 2) - 1 &= 2014 \\ (9 * 8 - 7) * (6 + 5 + 4 * (3 + 2)) - 1 &= 2014\end{aligned}$$

$(9 * 8 - 7) * (6 + 5 * (4 + 3 - 2)) - 1 = 2014$   
 $(9 * 8 + 7 * 6) * (5 * (4 / 3 + 2) + 1) = 2014$   
 $(9 + 8 * 7) * (6 * 5 - 4 + 3 + 2) - 1 = 2014$   
 $(9 + 8 * 7) * (6 * 5 + 4 - 3) - 2 + 1 = 2014$   
 $(9 + 8 * 7) * (6 * 5 + 4 - 3) - (2 - 1) = 2014$   
 $(9 + 8 * 7) * (6 * 5 - (4 - 3) + 2) - 1 = 2014$   
 $(9 + 8 * 7) * (6 * 5 - (4 - 3 - 2)) - 1 = 2014$   
 $(9 + 8 * 7) * (6 * 5 - (4 - (3 + 2))) - 1 = 2014$   
 $(9 + 8 * 7) * (6 + (5 + 4) * 3 - 2) - 1 = 2014$   
 $(9 + 8 * 7) * (6 + 5 * 4 + 3 + 2) - 1 = 2014$   
 $(9 + 8 * 7) * (6 + 5 + 4 * (3 + 2)) - 1 = 2014$   
 $(9 + 8 * 7) * (6 + 5 * (4 + 3 - 2)) - 1 = 2014$   
 $(9 * 8 * 7 - 6 + 5) * 4 + 3 - 2 + 1 = 2014$   
 $(9 * 8 * 7 - 6 + 5) * 4 + 3 - (2 - 1) = 2014$   
 $(9 * 8 * 7 + 6 - 5) * 4 - 3 - 2 - 1 = 2014$   
 $(9 * 8 * 7 + 6 - 5) * 4 - 3 - (2 + 1) = 2014$   
 $(9 * 8 * 7 + 6 - 5) * 4 - (3 + 2) - 1 = 2014$   
 $((9 * 8 * 7 + 6 - 5) * 4 - 3 * 2) * 1 = 2014$   
 $((9 * 8 * 7 + 6 - 5) * 4 - 3 * 2) / 1 = 2014$   
 $(9 * 8 * 7 + 6 - 5) * 4 - (3 + 2 + 1) = 2014$   
 $(9 * 8 * 7 + 6 - 5) * 4 - 3 * 2 * 1 = 2014$   
 $(9 * 8 * 7 + 6 - 5) * 4 - 3 * 2 / 1 = 2014$   
 $(9 * 8 * 7 - (6 - 5)) * 4 + 3 - 2 + 1 = 2014$   
 $(9 * 8 * 7 - (6 - 5)) * 4 + 3 - (2 - 1) = 2014$   
 $9 + ((8 * 7 - 6) * 5 * 4 + 3) * 2 - 1 = 2014$   
 $(9 * 8 * (7 - 6 + (5 + 4) * 3) - 2) * 1 = 2014$   
 $(9 * 8 * (7 - 6 + (5 + 4) * 3) - 2) / 1 = 2014$   
 $9 * 8 * (7 - 6 + (5 + 4) * 3) - 2 * 1 = 2014$   
 $9 * 8 * (7 - 6 + (5 + 4) * 3) - 2 / 1 = 2014$   
 $9 + ((8 + 7 * 6) * 5 * 4 + 3) * 2 - 1 = 2014$   
 $(9 * (8 + (7 + 6 + 5) * 4 * 3) - 2) * 1 = 2014$   
 $(9 * (8 + (7 + 6 + 5) * 4 * 3) - 2) / 1 = 2014$   
 $9 * (8 + (7 + 6 + 5) * 4 * 3) - 2 * 1 = 2014$   
 $9 * (8 + (7 + 6 + 5) * 4 * 3) - 2 / 1 = 2014$   
 $9 * 8 * 7 / (6 - 5) * 4 - 3 + 2 - 1 = 2014$   
 $9 * 8 * 7 / (6 - 5) * 4 - (3 - 2) - 1 = 2014$   
 $9 * 8 * 7 / (6 - 5) * 4 - (3 - 2 + 1) = 2014$   
 $9 * 8 * 7 / (6 - 5) * 4 - (3 - (2 - 1)) = 2014$   
 $9 * 8 * 7 * (6 - 5) * 4 - 3 + 2 - 1 = 2014$   
 $9 * 8 * 7 * (6 - 5) * 4 - (3 - 2) - 1 = 2014$   
 $9 * 8 * 7 * (6 - 5) * 4 - (3 - 2 + 1) = 2014$   
 $9 * 8 * 7 * (6 - 5) * 4 - (3 - (2 - 1)) = 2014$   
 $9 * 8 * 7 / ((6 - 5) / 4) - 3 + 2 - 1 = 2014$   
 $9 * 8 * 7 / ((6 - 5) / 4) - (3 - 2) - 1 = 2014$   
 $9 * 8 * 7 / ((6 - 5) / 4) - (3 - 2 + 1) = 2014$   
 $9 * 8 * 7 / ((6 - 5) / 4) - (3 - (2 - 1)) = 2014$   
 $(9 * 8 * (7 - (6 - (5 + 4) * 3)) - 2) * 1 = 2014$   
 $(9 * 8 * (7 - (6 - (5 + 4) * 3)) - 2) / 1 = 2014$   
 $9 * 8 * (7 - (6 - (5 + 4) * 3)) - 2 * 1 = 2014$   
 $9 * 8 * (7 - (6 - (5 + 4) * 3)) - 2 / 1 = 2014$   
 $(9 * 8 * (7 + (6 + 5 - 4) * 3) - 2) * 1 = 2014$   
 $(9 * 8 * (7 + (6 + 5 - 4) * 3) - 2) / 1 = 2014$   
 $9 * 8 * (7 + (6 + 5 - 4) * 3) - 2 * 1 = 2014$   
 $9 * 8 * (7 + (6 + 5 - 4) * 3) - 2 / 1 = 2014$   
 $(9 * 8 * 7 * (6 + 5 - 4 - 3) - 2) * 1 = 2014$   
 $(9 * 8 * 7 * (6 + 5 - 4 - 3) - 2) / 1 = 2014$   
 $9 * 8 * 7 * (6 + 5 - 4 - 3) - 2 * 1 = 2014$

$$9 * 8 * 7 * (6 + 5 - 4 - 3) - 2 / 1 = 2014$$

$$(9 * 8 * 7 * (6 + 5 - (4 + 3)) - 2) * 1 = 2014$$

$$(9 * 8 * 7 * (6 + 5 - (4 + 3)) - 2) / 1 = 2014$$

$$9 * 8 * 7 * (6 + 5 - (4 + 3)) - 2 * 1 = 2014$$

$$9 * 8 * 7 * (6 + 5 - (4 + 3)) - 2 / 1 = 2014$$

**5. Obtain 2014, using the digits from 1 to 8 in order. (Only addition, subtraction, multiplication, division, and parentheses are allowed. Digits can be combined.)**

$$(1 + 2 * 34) * 5 * 6 - 7 * 8 = 2014$$

$$(1 / 2 + 3 / 4 * 5 * 67) * 8 = 2014$$

$$(1 / 2 + 3 / (4 / 5) * 67) * 8 = 2014$$

$$(1 / 2 + 3 / (4 / 5 / 67)) * 8 = 2014$$

$$1 / 2 * (3 * 4 * 5 * 67 + 8) = 2014$$

$$(1 / 2 + 3 / (4 / (5 * 67))) * 8 = 2014$$

$$1 / (2 / (3 * 4 * 5 * 67 + 8)) = 2014$$

**6. Obtain 2014, using the digits from 8 to 1 in order. (Only addition, subtraction, multiplication, division, and parentheses are allowed. Digits can be combined.)**

$$8 - 7 + (65 - 4) * (32 + 1) = 2014$$

$$8 - (7 - (65 - 4) * (32 + 1)) = 2014$$

$$(8 * 7 * 6 * (5 + 4 - 3) - 2) * 1 = 2014$$

$$(8 * 7 * 6 * (5 + 4 - 3) - 2) / 1 = 2014$$

$$8 * 7 * 6 * (5 + 4 - 3) - 2 * 1 = 2014$$

$$8 * 7 * 6 * (5 + 4 - 3) - 2 / 1 = 2014$$

**7. Obtain 2014, using the digits from 1 to 7 in order. (Only addition, subtraction, multiplication, division, exponentiation, and parentheses are allowed. Digits can be combined.)**

NO SOLUTION

**8. Obtain 2014, using the digits from 7 to 1 in order. (Only addition, subtraction, multiplication, division, and parentheses are allowed. Digits can be combined.)**

$$76 * ((54 - 3) / 2 + 1) = 2014$$

$$76 * (5 + 43 / 2) * 1 = 2014$$

$$76 * (5 + 43 / 2) / 1 = 2014$$

$$76 * (5 + 43 / 2 * 1) = 2014$$

$$76 * (5 + 43 / 2 / 1) = 2014$$

$$76 * (5 + 43 / (2 * 1)) = 2014$$

$$76 * (5 + 43 / (2 / 1)) = 2014$$

$$76 * (5 * (4 + 3 / 2) - 1) = 2014$$

$$(7 * 6 * (5 + 43) - 2) * 1 = 2014$$

$$(7 * 6 * (5 + 43) - 2) / 1 = 2014$$

$$7 * 6 * (5 + 43) - 2 * 1 = 2014$$

$$7 * 6 * (5 + 43) - 2 / 1 = 2014$$

**9. Obtain all numbers from 0 to 30, using the digits 2, 0, 1, 4 in order. (Addition, subtraction, multiplication, division, exponentiation, factorials, and parentheses are allowed. Digits can be combined.)**

$$0 = 2 * 0 * 1 * 4$$

$$1 = 2 + 0 - 1 ^ 4$$

$$2 = 2 + 0 * 1 / 4$$

$$3 = 2 * 0 - 1 + 4$$

$$\begin{aligned}4 &= 2 * 0 * 1 + 4 \\5 &= 2 + 0 - 1 + 4 \\6 &= 2 + 0 + 1 * 4 \\7 &= 2 + 0 + 1 + 4 \\8 &= (2 + 0) / 1 * 4 \\9 &= (2 + 0!) - 1 + 4 \\10 &= (2 + 0) * (1 + 4) \\11 &= (2 + 0!) + 1 + 4 \\12 &= (2 - 0 + 1) * 4 \\13 &= - 2 + 0! + 14 \\14 &= 2 * 0 + 14 \\15 &= 20 - 1 - 4 \\16 &= 20 * 1 - 4 \\17 &= 20 + 1 - 4 \\18 &= 2 + (0! + 1) ^ 4 \\19 &= 20 - 1 ^ 4 \\20 &= 20 * 1 ^ 4 \\21 &= 20 + 1 ^ 4 \\22 &= 2 * (0 - 1) + 4! \\23 &= 20 - 1 + 4 = 23 \\24 &= 20 * 1 + 4 \\25 &= 20 + 1 + 4 \\26 &= (2 + 0) * 1 + 4! \\27 &= (2 + 0!) * 1 + 4! \\28 &= (2 + 0) * 14 \\29 &= (2 + 0!) - 1 + 4! \\30 &= 2 * (0! + 14)\end{aligned}$$