

In this year, the first women to become FBI agents completed their training in Quantico, Virginia. The new agents were Susan Roley and Joanne Pierce. Solve this puzzle to learn the year.

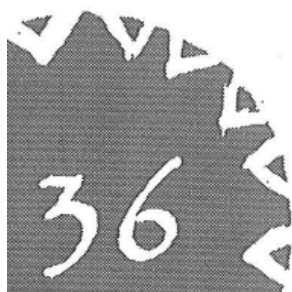
- The two-digit number formed by my tens and units digits is equal to the complement of an 18° angle.
- My hundreds digit increased by 6 is equal to 15.
- The sum of all of my digits is equal to $|-9 - 10|$.

What year am I?



Godzilla took out a restraining order on Chuck Norris.

Thousands	Hundreds	Tens	Units
-----------	----------	------	-------



Famous Firsts

Page 36: The women became FBI agents in 1972.

$$x^2 \cdot x^3 \cdot x^4$$

$$(x \cdot x) \cdot (x \cdot x \cdot x) \cdot (x \cdot x \cdot x \cdot x) = x^9$$

$$5^3 \cdot 5^6$$

$$(5 \cdot 5 \cdot 5)(5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5) = 5^9$$

$$(2^4)^3 = (2 \cdot 2 \cdot 2 \cdot 2)^3 = (2 \cdot 2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2 \cdot 2) = 2^{12}$$

$$(y^2)^4 = (y \cdot y)^4 = (y \cdot y)(y \cdot y)(y \cdot y)(y \cdot y) = y^8$$

$$[(-3)^3]^2$$

$$[-3 \cdot -3 \cdot -3]^2 =$$

$$[-3 \cdot -3 \cdot -3] [-3 \cdot -3 \cdot -3]$$

$$(-3)^6$$

$$(-3a)^2$$

$$(-3a)(-3a) = 9a^2$$

$$(2xy)^3$$

$$2 \cdot 2 \cdot 2 x x x y y y (2xy)(2xy)(2xy)$$

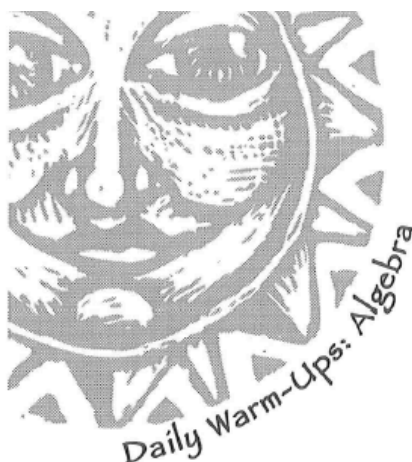
$$8x^3y^3$$

$$-1(3a)^2$$

$$-(3a)^2$$

$$-(3a)(3a) = -9a^2$$

challenge: $[(a + 1)^2]^5 = (a+1)^{10}$



On January 5 of this year, the first junior high school was opened in the United States. Solve this puzzle to learn the year.

- The two-digit number formed by my tens and units digits is equal to the sum of the first four counting numbers.
- My hundreds digit is equal to the value of n in this equation:

$$\frac{2}{3}n + 4 = n + 1.$$
- The sum of all of my digits is the same as the number of players each team has on a football field.

What year am I?

Thousands	Hundreds	Tens	Units

[Chuck Norris found Waldo... in a Harry Potter's book.](#)



- My hundreds digit is

$$\frac{2}{3}n + 4 = n + 1.$$

$$\begin{array}{r} -\frac{2}{3}n \quad -\frac{2}{3}n \\ \hline \end{array} \quad (\text{SPÉ})$$

$$4 = \frac{1}{3}n + 1$$

$$\begin{array}{r} -1 \quad -1 \\ \hline \end{array} \quad (\text{SPÉ})$$

$$\begin{array}{r} 3(3 = \frac{1}{3}n)3 \\ \hline \end{array} \quad (\text{MPE})$$

$$9 = n$$

$$\begin{array}{r} 3 \left(\frac{2}{3}n + 4 = n + 1 \right) 3 \\ \hline 2n + 12 = 3n + 3 \\ -2n \quad -2n \\ \hline 12 = n + 3 \\ -3 \quad -3 \\ \hline 9 = n \end{array}$$

$$\frac{1}{5} \left(\frac{3}{5}x + 4 \right) = \frac{1}{3}x - 5$$

$$9x + 60 = 5x - 75$$

Can x^8y^4 be simplified? Explain.

$x x x x x x x x y y y y$

$x^8 y^4$

Is $a^5 \cdot a^3 = a^{15}$? Why or why not?

$$a^8 = (a a a a a)(a a a)$$

$a b = b a$ Is $(-3b)^4 = -12b^4$? Why or why not?

|

$$\begin{aligned} & (-3b)(-3b)(-3b)(-3b) \\ & (-3 \cdot -3 \cdot -3 \cdot -3)(b b b b) \\ & 81b^4 \end{aligned}$$

a. $2^2 \cdot 2^5 =$

$$(2 \cdot 2)(2 \cdot 2 \cdot 2 \cdot 2 \cdot 2)$$

$$= 2^7$$

$$x^1 = x = 1x$$

b. $(5^3)^2 =$

$$(5 \cdot 5 \cdot 5)(5 \cdot 5 \cdot 5)$$

$$5^6$$

$$15,625$$

c. $(-2x)^4 =$

$$(-2x)(-2x)(-2x)(-2x)$$

$$16x^4$$

d. $-(2x)^4 = -1(2x)^4$

$$= -1(2x)(2x)(2x)(2x)$$

$$= -16x^4$$

e. $(3a^4)^3 \left(\frac{1}{3}a^3\right)^2 =$

$$(3a^4)^3 \left(\frac{1}{3}a^3\right)^2 =$$

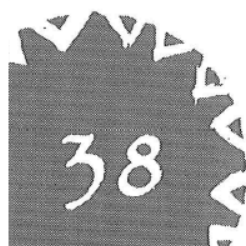
$$(3a^4)(3a^4)(3a^4) \left(\frac{1}{3}a^3\right)\left(\frac{1}{3}a^3\right)$$

$$3a^{16}$$

Nellie Tayloe Ross became the first woman to be elected a governor in the United States. She took the oath of office on January 5 of this year. The state was Wyoming.

- The product of my tens and units digits is equal to the sum of my hundreds and thousands digits.
- The two-digit number formed by my tens and units digits is the value of t in this equation: $\frac{2}{5}t = 10$.
- The sum of all of my digits is equal to the value of c in this equation: $-5.73c = -97.41$.

What year am I?



<u>1</u>	<u>9</u>	<u>2</u>	<u>5</u>
Thousands	Hundreds	Tens	Units

Chuck Norris once stapled water to a tree.

#1

$$\frac{5}{1} \left(\frac{2}{5}t = 10 \right) \frac{5}{1} \text{MP}\varepsilon$$

$$\frac{10}{5}t = 50$$

$$\frac{2t}{2} = \frac{50}{2}$$

$$t = 25$$

#2

$$\frac{.4t = 10}{.4 \quad .4}$$

$$\begin{array}{r} 25 \\ 4 \overline{) 100} \end{array}$$

or

$$t = \frac{10}{.4}$$

$$t = 25$$

#3

$$\frac{5}{2} \left(\frac{2}{5} t = 10 \right) \frac{5}{2}$$

$$t = \frac{50}{2} = 25$$

f. $(x^3)^2 = (x \cdot x \cdot x)^2 = \underline{(x \cdot x \cdot x)(x \cdot x \cdot x)} = \underline{x^6}$

g. $(x^4 \cdot y^2)(y^5) = (x \cdot x \cdot x \cdot x \cdot y \cdot y)(y \cdot y \cdot y \cdot y \cdot y) = x^4 y^7$

h. $(x^1 y^2)^2 (5 y^3) = (x y y)(x y y)(5 y y y) = 5 x^2 y^7$

i. $(-x y)^4 (x y^8)^2 = (-1 x y)(-1 x y)(-1 x y)(-1 x y)(x y y y y y y y)(x y y y y y y y)$
 $(-1 x y)^4$
 $= x^6 y^{20}$

$$9. 4^2 \cdot 4^3 = (4 \cdot 4)(4 \cdot 4 \cdot 4) = 4^5$$

$$12. 10^2 \cdot 10^9$$

$$15. [(2x + 3)^3]^2$$

$$18. [(5 + x)^3]^6$$

$$21. (4a)^2 \cdot a$$

$$24. (x \cdot x^2)^3 \cdot 3$$

$$27. 2x^3 \cdot (3x)^2 = (2xxx)(3x3x) = 18x^5$$

$$30. (-rs)(rs^3)^2$$

$$33. (4a^2)^3 \left(\frac{1}{2}a^3\right)^2 \rightarrow (4aa)(4aa)(4aa) \left(\frac{1}{2}aaa\right)\left(\frac{1}{2}aaa\right) = 16a^{12}$$

$$36. (-y)^4(-y)^3(-y)^2$$

$$39. (abc^2)^3(a^2b)^2$$



On January 7 of this year, the *Alex La Valley* crossed “the path between the seas” from the Atlantic Ocean to the Pacific Ocean when the Panama Canal opened. Find the year this happened by solving this puzzle.

- The two-digit number formed by my tens and units digits is equal to the value of y in this equation: $420 + y = 31y$.
- My hundreds digit is equal to twice my units digit plus 1.
- The sum of all of my digits is equal to $\sqrt{225}$.

What year am I?

<u>1</u>	<u>9</u>	<u>1</u>	<u>4</u>
Thousands	Hundreds	Tens	Units

Chuck Norris can play Xbox with a Playstation controller



$$11. (-x)^3 (-y^2)^4 (xyz^5)^2$$

$$(-1x)(-1x)(-1x)(-1yy)(-1yy)(-1yy)(-1yy)$$

$$(xyzzzzz)(xyzzzzz)$$

$$-x^5 y^{10} z^0$$

$$\textcircled{19.} \quad (xy^2)^2 (5y^3)$$

$$(xyy)(xyy)(5yyy)$$

$$\textcircled{5x^2y^7}$$

$$\textcircled{21.} \quad (-3x)^3 \left(\frac{4}{y^3}\right)^2$$

$$(-3x)(-3x)(-3x)\left(\frac{4}{yyy}\right)\left(\frac{4}{yyy}\right)$$

$$\textcircled{-432x^3y^6}$$

$2^3 = 8$	$3^3 = 27$	$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$
$2^2 = 4$	$3^2 = 9$	$2^{-4} = \frac{1}{2^4} = \frac{1}{16}$
$2^1 = 2$	$3^1 = 3$	$a^{-3} = \frac{1}{a^3}$
$2^0 = 1$	$3^0 = 1$	
$2^{-1} = \frac{1}{2}$	$3^{-1} = \frac{1}{3}$	
$2^{-2} = \frac{1}{2^2}$	$3^{-2} = \frac{1}{3^2}$	

$$a^{-m} = \frac{1}{a^m}$$

$$2x^{-3} = 2 \cdot x^{-3} = 2 \cdot \frac{1}{x^3} = \left(\frac{2}{x^3} \right)$$

$$(3x)^{-2} = \frac{1}{(3x)^2} = \frac{1}{(3x)(3x)} = \left(\frac{1}{9x^2} \right)$$

Formula for Simplifying Negative Exponents

The general formula for simplifying negative exponents is shown in image below

$$x^{-a} = \frac{1}{x^a}$$

© MW

At every step
divide by 2

$$2^3 = 8$$

$$2^2 = 4$$

$$2^1 = 2$$

$$2^0 = 1$$

$$2^{-1} = 1/2$$

$$2^{-2} = 1/4$$

$$2^{-3} = 1/8$$

At every step
divide by 3

$$3^3 = 27$$

$$3^2 = 9$$

$$3^1 = 3$$

$$3^0 = 1$$

$$3^{-1} = 1/3$$

$$3^{-2} = 1/9$$

$$3^{-3} = 1/27$$

At every step
divide by 10

$$10^3 = 1000$$

$$10^2 = 100$$

$$10^1 = 10$$

$$10^0 = 1$$

$$10^{-1} = 1/10$$

$$10^{-2} = 1/100$$

$$10^{-3} = 1/1000$$

© mathwarehouse.com

$$(3x)^{-2} = \frac{1}{(3x)^2} = \frac{1}{3^2 x^2} = \frac{1}{9x^2}$$

© mathwarehouse.com

12. $10^2 \cdot 10^3$

15. $[(2x + 3)^3]^2$

16. $1/5 + 1/3$

$$[(2x+3)(2x+3)(2x+3)]$$

$$(2x+3)(2x+3)(2x+3)$$

$$(2x+3)^6$$

$$(2+3)^2 = 25$$

$$2^2 + 3^2 = 13$$

40. $(-w)(-w)$

$$41. (-3xy^2)^3(-2x^2y)^2 = (-3 \cdot -3 \cdot -3 \cdot -2 \cdot -2)$$

$$(-3xy^2)(-3xy^2)(-3xy^2)$$

$$(-2x^2y)(-2x^2y) = -108x^7y^8$$

$$ab = ba$$

7. In the general exponential equation $y = C(a)^x$, suppose that $a = 2$, and $x = 3$. Describe how y changes when x is increased by 1.

$$y = C(2)^3$$

so as x increases by 1 the y value will double

$$21. (4a)^2 \cdot a$$

$$(4 \cdot 4)(aa)(a) = 16a^3$$

$$(4a)(4a) \cdot a = 16a^3$$

.

$$y^2 \cdot y^3 = y^{2+3} = y^5$$

$$y \cdot y \cdot y \cdot y \cdot y = y^5$$

$$5. \frac{a^{-7}}{3} = \frac{1}{3a^7}$$

$$37. (2t)^3(-t^2)$$

$$-5^2 = -1 \cdot 5^2 = -25$$

$$(-5)^2 = (-5)(-5) = 25$$

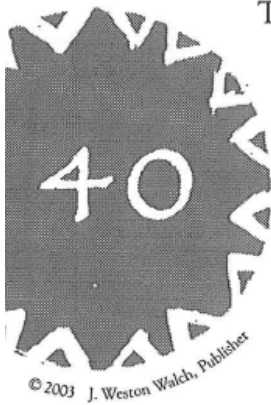
$$(2t)(2t)(2t)(-1 \cdot t \cdot t)$$

The first woman United States senator, Hattie Caraway, was elected from the state of Arkansas in this year. Solve the puzzle to learn the year.

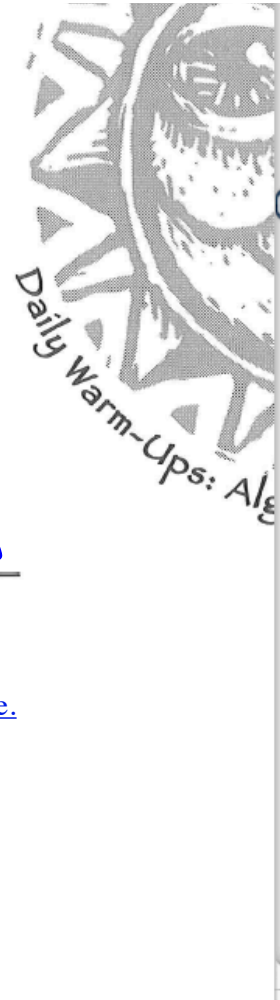
- The two-digit number formed by my tens and units digits is equal to the fifth power of 2.
- My hundreds digit is equal to z in this equation: $\frac{4z + 8}{2} = 22$.
- The sum of all of my digits is equal to the sum of the first five counting numbers.

What year am I?

<u>1</u>	<u>9</u>	<u>3</u>	<u>2</u>
Thousands	Hundreds	Tens	Units



[Chuck Norris can eat chicken noodle soup with a knife.](#)



$$5y^{-3} =$$

© MW

$$(2y)^{-3} =$$

$$3x^{-3} =$$

$$2) \frac{m^4 \cdot 2m^{-3}}{1} = \frac{m^4 \cdot 2}{m^3} = \frac{\cancel{m} \cancel{m} \cancel{m} \cancel{m} \cdot 2}{\cancel{m} \cancel{m} \cancel{m}} = 2m$$

$$\frac{3}{3} = 1$$

$$\frac{n}{n} = 1$$

$$4) 4n^4 \cdot 2n^{-3} = \frac{\cancel{4} \cancel{n} \cancel{n} \cancel{n} n \cdot 2}{\cancel{n} \cancel{n} \cancel{n}} = 8n$$

$$6) 2x^3 y^{-3} \cdot 2x^{-1} y^3 = \frac{\cancel{2} \cancel{x} \cancel{x} \cancel{x} \cdot \cancel{2} \cancel{y} \cancel{y} \cancel{y}}{\cancel{y} \cancel{y} \cancel{y} x} = \frac{4}{x^2}$$

$$8) 4v^3 \cdot vu^2 = \frac{4 \cancel{v} \cancel{v} \cancel{v} \cdot v u u}{\cancel{v} \cancel{v} \cancel{v} v} = \frac{4}{v^4} u^2$$

$$10) x^2 y^{-4} \cdot x^3 y^2$$

$$12) (2x^2)^{-4}$$

$$14) (4a^3)^2$$

$$16) (4xy)^{-1}$$

$$18) (x^2 y^{-1})^2$$

$$20) (3m)^{-2}$$

$$22) \frac{x^{-1}}{4x^4}$$

$$24) \frac{m^4}{2m^4}$$

$$26) \frac{2x^4 y^{-4} z^{-3}}{3x^2 y^{-3} z^4}$$

$$28) \frac{2h^3 j^{-3} k^4}{3jk}$$

$$30) \frac{3x^3 y^{-1} z^{-1}}{x^{-4} y^0 z^0}$$

a. $y = 3^x$ b. $y = 0.5(3)^x$
c. $y = (0.5)^x$ d. $y = 2(0.5)^x$

Identify the equations above as either exponential growth or decay. Then determine the start value point, growth/decay factor, and growth/decay rate

$$y_1 = 30(1.8)^x$$

$$y_6 = \frac{40}{x}$$

$$y_2 = 107(2)^x$$

$$y_7 = 16(3.2)^x$$

$$y_3 = 42(0.7)^x$$

$$y_8 = 400(.95)^x$$

$$y_4 = 121(0.05)^x$$

$$y_5 = 3x + 4$$