

RPN Calculators and Mathematics Competitions

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Introduction

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 - ▶ Polish Notation was invented by Jan Lukasiewicz in the 1920s.
3. Reverse Polish Notation (Postfix Notation or RPN)
 - ▶ RPN was proposed in the 1950s by Australian philosopher Charles L Hamblin.
 - ▶ The RPN calculator was invented using Reverse Polish Notation and was introduced in the late 1960s and early 1970s.

Example of Algebraic

$$((15/(7 - (1 + 1))) * 3) - (2 + (1 + 1)) =$$

Example in Polish Notation

$- \quad * \quad / \quad 15 \quad - \quad 7 \quad + \quad 1 \quad 1 \quad 3 \quad + \quad 2 \quad + \quad 1 \quad 1$

Example in Polish Notation

— * / 15 — 7 + 1 1 3 + 2 + 1 1
— * / 15 — 7 2 3 + 2 + 1 1

Example in Polish Notation

—	*	/	15	—	7	+	1	1	3	+	2	+	1	1
—	*	/	15	—	7		2		3	+	2	+	1	1
—	*	/	15			5			3	+	2	+	1	1

Example in Polish Notation

—	*	/	15	—	7	+	1	1	3	+	2	+	1	1
—	*	/	15	—	7		2		3	+	2	+	1	1
—	*	/	15			5			3	+	2	+	1	1
—	*				3				3	+	2	+	1	1

Example in Polish Notation

—	*	/	15	—	7	+	1	1	3	+	2	+	1	1
—	*	/	15	—	7		2		3	+	2	+	1	1
—	*	/	15			5			3	+	2	+	1	1
—	*				3				3	+	2	+	1	1
—					9					+	2	+	1	1

Example in Polish Notation

—	*	/	15	—	7	+	1	1	3	+	2	+	1	1
—	*	/	15	—	7		2		3	+	2	+	1	1
—	*	/	15			5			3	+	2	+	1	1
—	*				3				3	+	2	+	1	1
—					9					+	2	+	1	1
—					9					+	2		2	

Example in Polish Notation

—	*	/	15	—	7	+	1	1	3	+	2	+	1	1
—	*	/	15	—	7		2		3	+	2	+	1	1
—	*	/	15			5			3	+	2	+	1	1
—	*				3				3	+	2	+	1	1
—					9					+	2	+	1	1
—					9					+	2		2	
—					9							4		

Example in Polish Notation

—	*	/	15	—	7	+	1	1	3	+	2	+	1	1
—	*	/	15	—	7		2		3	+	2	+	1	1
—	*	/	15			5			3	+	2	+	1	1
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—					9					+	2		2	
—					9							4		
						5								

Polish v. Reverse Polish

Polish/Prefix:

$- \ * \ / \ 15 \ - \ 7 \ + \ 1 \ 1 \ 3 \ + \ 2 \ + \ 1 \ 1$

RPN/Postfix:

$15 \ 7 \ 1 \ 1 \ + \ - \ / \ 3 \ * \ 2 \ 1 \ 1 \ + \ + \ -$

Example in Reverse Polish Notation

15 7 1 1 + - / 3 * 2 1 1 + + -

Example in Reverse Polish Notation

15	7	1	1	+	−	/	3	*	2	1	1	+	+	−
15	7		2		−	/	3	*	2	1	1	+	+	−

Example in Reverse Polish Notation

15	7	1	1	+	−	/	3	*	2	1	1	+	+	−
15	7		2		−	/	3	*	2	1	1	+	+	−
15			5			/	3	*	2	1	1	+	+	−

Example in Reverse Polish Notation

15	7	1	1	+	-	/	3	*	2	1	1	+	+	-
15	7		2		-	/	3	*	2	1	1	+	+	-
15			5			/	3	*	2	1	1	+	+	-
			3				3	*	2	1	1	+	+	-

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15	7	1	1	+	-	/	3	*	2	1	1	+	+	-
15	7		2		-	/	3	*	2	1	1	+	+	-
15			5			/	3	*	2	1	1	+	+	-
			3				3	*	2	1	1	+	+	-
			9						2	1	1	+	+	-

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15			5			/	3	*	2	1	1	+	+	-
			3				3	*	2	1	1	+	+	-
			9						2	1	1	+	+	-
			9						2		2		+	-

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15			5			/	3	*	2	1	1	+	+	-
			3				3	*	2	1	1	+	+	-
				9					2	1	1	+	+	-
				9					2		2		+	-
				9							4			-

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15	7	1	1	+	−	/	3	*	2	1	1	+	+	−
15	7		2		−	/	3	*	2	1	1	+	+	−
15			5			/	3	*	2	1	1	+	+	−
			3				3	*	2	1	1	+	+	−
				9					2	1	1	+	+	−
				9					2		2		+	−
				9							4			−
							5							

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- ▶ The RPN allows users to see intermediate results
- ▶ In most cases the RPN saves keystrokes and thus saves time
- ▶ Most Math Competitions are won by competitors who use RPN Calculators

Mike Harmon, YISD

RPNs in high school math competitions

QUESTIONS?