

## Infix Postfix Prefix Conversion using stack

Infix Expression	Prefix Expression	Postfix Expression
$A + B$	$+ A B$	$A B +$
$A + B * C$	$+ A * B C$	$A B C * +$
$(A + B) * C$	$* + A B C$	$A B + C *$
$A + B * C + D$	$+ + A * B C D$	$A B C * + D +$
$(A + B) * (C + D)$	$* + A B + C D$	$A B + C D + *$
$A * B + C * D$	$+ * A B * C D$	$A B * C D * +$
$A + B + C + D$	$+ + + A B C D$	$A B + C + D +$

## Algorithm to convert Infix To Postfix

Let,  $X$  is an arithmetic expression written in infix notation. This algorithm finds the equivalent postfix expression  $Y$ .

1. Push "(" onto Stack, and add ")" to the end of  $X$ .
2. Scan  $X$  from left to right and repeat Step 3 to 6 for each element of  $X$  until the Stack is empty.
3. If an operand is encountered, add it to  $Y$ .
4. If a left parenthesis is encountered, push it onto Stack.
5. If an operator is encountered, then:
  1. Repeatedly pop from Stack and add to  $Y$  each operator (on the top of Stack) which has the same precedence as or higher precedence than operator.
  2. Add operator to Stack.[End of If]
6. If a right parenthesis is encountered, then:
  1. Repeatedly pop from Stack and add to  $Y$  each operator (on the top of Stack) until a left parenthesis is encountered.
  2. Remove the left Parenthesis.[End of If]  
[End of If]
7. END.

Infix Expression:  **$A + (B * C - (D / E ^ F) * G) * H$** , where  $^$  is an exponential operator.

Symbol	Scanned	STACK	Postfix Expression	Description
1.		(		Start
2.	A	(	A	
3.	+	( +	A	
4.	(	( + (	A	
5.	B	( + (	AB	
6.	*	( + ( *	AB	
7.	C	( + ( *	ABC	
8.	-	( + ( -	ABC*	'*' is at higher precedence than '-'
9.	(	( + ( - (	ABC*	
10.	D	( + ( - (	ABC*D	
11.	/	( + ( - (/	ABC*D	
12.	E	( + ( - (/	ABC*DE	
13.	^	( + ( - (/ ^	ABC*DE	
14.	F	( + ( - (/ ^	ABC*DEF	
15.	)	( + ( -	ABC*DEF^/	Pop from top on Stack, that's why '^' Come first
16.	*	( + ( - *	ABC*DEF^/	
17.	G	( + ( - *	ABC*DEF^/G	
18.	)	( +	ABC*DEF^/G*-	Pop from top on Stack, that's why '^' Come first
19.	*	( + *	ABC*DEF^/G*-	
20.	H	( + *	ABC*DEF^/G*-H	
21.	)	Empty	ABC*DEF^/G*-H*+	END

Resultant Postfix Expression:  **$ABC*DEF^/G*-H*+$**

Infix Expression:  **$A + (B * C - (D / E ^ F) * G) * H$** , where  $^$  is an exponential operator.

Resultant Postfix Expression:  **$ABC*DEF^/G*-H*+$**

$(A + B * C + D)$

$A + BC^* + D$

$ABC^*+ + D$

$ABC^*+D+$

$A + *BC + D$

$+A*BC + D$

$++A*BCD$

$A*B + (C/D) / E-F$

Prefix:  $-+*AB//CDEF$

Postfix:  $AB*CD/E/+F-$

$X^Y/(5*Z) + 2$

Prefix:  $+/^XY*5Z2$

Postfix:  $XY^5Z*/2+$