

Prefix/Infix/Postfix Notation Worksheet
Created by Sam Craig for the West Lafayette High School ACSL Club of
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In prefix, the operator comes before the operands; infix between; and postfix after. Only infix has parentheses, as the operator will always only have two operands in the other two notations. \uparrow designates an exponent such that e^x in prefix is $\uparrow e x$. Use asterisks (*) instead of times signs (\times) when using prefix or postfix. Convert square and n-th roots $\sqrt[n]{x}$ to, in prefix, $\uparrow x / 1 n$. ACSL will probably not have a problem on their test including a square root.

Questions

1. Translate the following equation into prefix.

$$E = mc^2$$

2. Translate the following equation into postfix.

$$x = \frac{\sqrt{b^2 - 4ac} - b}{2a}$$

3. Translate the following prefix expression into infix.

$$+ A - B \uparrow C D$$

4. Evaluate the following postfix expression with $A = 10, B = 5, C = 15$.

$$A A B + C A B / - + *$$

Answers

1.

$$\begin{aligned}
 E = mc^2 &\rightarrow (E = (m \times (c^2))) \\
 &\rightarrow (E = (m \times (c \uparrow 2))) \\
 &\rightarrow (= E (\times m (\uparrow c 2))) \\
 &\rightarrow = E \times m \uparrow c 2 \\
 &\rightarrow = E * m \uparrow c 2
 \end{aligned}$$

2.

$$\begin{aligned}
 x = \frac{\sqrt{b^2 - 4ac} - b}{2a} &\rightarrow \left(x = \left(\frac{\left(\left(\sqrt{((b^2) - (4ac))} \right) - b \right)}{(2a)} \right) \right) \\
 &\rightarrow \left(x = \left(\frac{(((b \uparrow 2) - (4ac)) \uparrow (1/2)) - b}{(2a)} \right) \right) \\
 &\rightarrow (x = (((((b \uparrow 2) - (4ac)) \uparrow (1/2)) - b)/(2a))) \\
 &\rightarrow (x = (((((b \uparrow 2) - (4 \times a \times c)) \uparrow (1/2)) - b)/(2 \times a))) \\
 &\rightarrow (x (((((b 2 \uparrow) (4 a \times c \times) -) (1 2 /) \uparrow) b -) (2 a \times) /) =) \\
 &\rightarrow x b 2 \uparrow 4 a \times c \times - 1 2 / \uparrow b - 2 a \times / = \\
 &\rightarrow x b 2 \uparrow 4 a * c * - 1 2 / \uparrow b - 2 a * /
 \end{aligned}$$

3.

$$\begin{aligned}
 + A - B \uparrow C D &\rightarrow (+ A (- B (\uparrow C D))) \\
 &\rightarrow (A + (B - (C \uparrow D))) \\
 &\rightarrow A + B - C^D
 \end{aligned}$$

4.

$$\begin{aligned}
 A A B + C A B / - + * &\rightarrow (A ((A B +) (C (A B /) -) +) *) \\
 &\rightarrow (10 ((10 5 +) (15 (10 5 /) -) +) *) \\
 &\rightarrow (10 (15 (15 2 -) +) *) \\
 &\rightarrow (10 (15 13 +) *) \\
 &\rightarrow (10 28 *) \\
 &\rightarrow 280
 \end{aligned}$$