

Prefix, Infix, Postfix - Solution

1. 02-03 C4 Prefix/Infix/Postfix

$$(2 * X + Y) / (X - 2 * Y) \Rightarrow / + * 2 X Y - X * 2 Y \quad /+*2XY-X*2Y$$

2. 02-03 C4 Prefix/Infix/Postfix

$$\begin{aligned} 84 / 32 * 6431 + * + - + &= & -14 \\ (8/4) (3*2) (6 + 4 *(3 + 1)) - + & \\ (2) +((6) - (6 + 4 * 4)) = 2 + (6 - 22) &= -14 \end{aligned}$$

3. 03-04 C4 Prefix/Infix/Postfix

$$\begin{aligned} S = (A - A * R^N) / (1 - R) \text{ in infix converts to} & & \text{SAARN}\uparrow * - 1R - / = \\ S A A R N \uparrow * - 1 R - / = \text{ in postfix.} & & \end{aligned}$$

4. 03-04 C4 Prefix/Infix/Postfix

$$+ / * A B D \uparrow C D \text{ becomes } \frac{AB}{D} + C^D = \frac{20 * 4}{5} + 2^5 = 48 \quad 48$$

5. 04-05 C4 Prefix/Infix/Postfix

$$\begin{aligned} * / + 231 * + 45 - 62 = * / (2 + 3) 1 * (4 + 5) (6 - 2) &= & 180 \\ * (5 / 1) (9 * 4) = (5) (36) = 180 & & \end{aligned}$$

6. 04-05 C4 Prefix/Infix/Postfix

$$\begin{aligned} \frac{A+B^2}{C} - 2C + \frac{B}{D-A} = \frac{A+B2\uparrow}{C} - 2C * + \frac{B}{DA-} &= & AB2\uparrow + C / 2C * - BDA - / + \\ (AB2\uparrow + C /) - (2C *) + (BDA - /) &= \\ AB2\uparrow + C / 2C * - BDA - / + & \end{aligned}$$

7. 05-06 C4 Prefix/Infix/Postfix

$$\begin{aligned} + / * 45 + 32 / * 34 / 82 = + / (* 45) (+ 32) / (* 34) (/ 82) &= & 7 \\ + (/ 205) (/ 124) = + 43 = 7 & & \end{aligned}$$

8. 05-06 C4 Prefix/Infix/Postfix

$$\begin{aligned} & ((A-B)^2 + (C-D)^2)^{\frac{1}{2}} = \\ & ((A-B)2 \uparrow + (C-D)2 \uparrow)12 / \uparrow = \\ & AB - 2 \uparrow CD - 2 \uparrow + 12 / \uparrow \end{aligned}$$

$$AB - 2 \uparrow CD - 2 \uparrow + 12 / \uparrow$$

9. 06-07 C4 Prefix/Infix/Postfix

$$\begin{aligned} & / * + * A B C - * A B C * B C = (AB+C)(AB-C)/(BC) = \\ & (6 * 2 + 4)(6 * 2 - 4)/(2 * 4) = 16 * 8 / 8 = 16 \end{aligned}$$

16

10. 06-07 C4 Prefix/Infix/Postfix

Translate the following infix expression to postfix:

$$\frac{A+B}{C^2} - \frac{C}{AB} = A B + C 2 \uparrow / C A B * / -$$

AB+C2↑/CAB* / -

11. 07-08 C4 Prefix/Infix/Postfix

$$\begin{aligned} & + / \uparrow + 4 5 2 - 4 1 * 2 + 8 4 = + / \uparrow (+ 4 5) 2 (- 4 1) * 2 (+ 8 4) \\ & = + / \uparrow 9 2 3 * 2 12 = + / (\uparrow 9 2) 3 (* 2 12) = + (/ 81 3) 24 \\ & = + 27 24 = 51 \end{aligned}$$

51

12. 07-08 C4 Prefix/Infix/Postfix

$$\begin{aligned} & \frac{A}{B} + C * B^2 = (A/B) + C * (B \uparrow 2) \\ & = (AB /) + C * (B2 \uparrow) \\ & = (AB /) + (CB2 \uparrow *) \\ & = AB / CB2 \uparrow * + \end{aligned}$$

AB / CB2 ↑ * +

13. 08-09 C4 Prefix/Infix/Postfix

$$\begin{aligned} & / + 2 3 5 / * 2 + 1 3 8 = - / (+ 2 3) 5 / * 2 (+ 1 3) 8 \\ & = - (/ 5 5) / (* 2 4) 8 \\ & = - 1 (/ 8 8) = - 1 1 = 0 \end{aligned}$$

0

14. 08-09 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 & + / * A + B C + A B \uparrow - * A B C 2 && ABC+*AB+/AB*C-2\uparrow+ \\
 & = + / * A (+ B C) (+ A B) \uparrow - (* A B) C 2 \\
 & = + / (* A (B+C))(A+B) \uparrow (- (A*B) C) 2 \\
 & = + / (A*(B+C))(A+B)\uparrow(A*B-C)2 \\
 & = (A*(B+C))/(A+B) + (A*B-C)\uparrow 2 \\
 & \text{This is infix. Now to postfix:} \\
 & = (A*(BC+))/(AB+) + ((AB*)-C)\uparrow 2 = (ABC+*)/(AB+)+(AB*C-)\uparrow 2 \\
 & = (ABC+*AB+)/(AB*C-2\uparrow) = ABC+*AB+/AB*C-2\uparrow+
 \end{aligned}$$

15. 09-10 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 + - / + 8 6 2 \uparrow 2 3 * 4 + 1 3 &= + - / (8 + 6) 2 (2^3) * 4 (1 + 3) && 15 \\
 &= + - (14 / 2) 8 (4 * 4) = + (7 - 8) 16 = (-1) + 16 = 15
 \end{aligned}$$

16. 09-10 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 A + \frac{B*(C-A)}{A^2} &= A + \frac{B*(CA-)}{A2\uparrow} && ABCA -*A2\uparrow / + \\
 &= A + \frac{BCA-*}{A2\uparrow} \\
 &= A + (BCA -*A2\uparrow /) \\
 &= ABCA -*A2\uparrow / +
 \end{aligned}$$

17. 10-11 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 (2 3 +)(5 3 -) * (2 3 \uparrow)4 / * 4 + (2 2 \uparrow) / &= (2+3)(5-3) * (2^3) 4 / * 4 + (2^2) / && 6 \\
 = (5 2 *)(8 4 /) * 4 + 4 / &= (5*2)(8/4) *4 + 4 / = (10 2 *) 4 + 4 / \\
 = (10 * 2) 4 + 4 / &= (20 4 +) 4 / = (20 + 4) 4 / = 24 4 / = 24 / 4 = 6
 \end{aligned}$$

18. 10-11 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 / + * A + B C * A B * - B C + * B C A &&& \frac{A(B+C) + AB}{(B-C)(BC+A)} \\
 = / + * A (+ B C) (* A B) * (- B C) + (* B C) A &&& \\
 = / + (* A (B+C)) (A * B) * (B -C) (+ (B *C) A) &&& \\
 = / (+ (A *(B+C)) (A * B)) (* (B -C) (B *C+ A)) &&& \\
 = / (A *(B+C)) + (A * B) ((B -C) * (B *C+ A)) &&& \\
 = \frac{A(B+C) + AB}{(B-C)(BC+A)} &&&
 \end{aligned}$$

19. 11-12 C4 Prefix/Infix/Postfix

$$\begin{aligned} + / + A B \uparrow C 2 * A - B C &= + / (A + B) \uparrow C 2 * A (B - C) & 12 \\ &= + / (A + B) (C \uparrow 2) (A * (B - C)) = ((A+B)/(C\uparrow 2))+(A*(B - C)) \\ &= ((9+3)/(2\uparrow 2))+(9*(3 - 2)) = 12/4+9*1 = 3 + 9 = 12 \end{aligned}$$

20. 11-12 C4 Prefix/Infix/Postfix

$$\begin{aligned} 1 + 2 * 3 - 4 * 9 - 7 &= 1 + (2 * 3) - (4 * 9) - 7 & 123*+49*-7- \\ &= (1 + (2 3 *)) - (4 9 *) - 7 = ((1 2 3 * +) - (4 9 *)) - 7 \\ &= (1 2 3 * + 4 9 * -) - 7 = 1 2 3 * + 4 9 * - 7 - \end{aligned}$$

21. 12-13 C4 Prefix/Infix/Postfix

$$\begin{aligned} + / + 2 4 3 / * 4 + / 6 2 1 8 &= + / (2 + 4) 3 / * 4 + (6 / 2) 1 8 & 4 \\ &= + / 6 3 / * 4 + 3 1 8 = + (6 / 3) / * 4 (3 + 1) 8 = + 2 / * 4 4 8 \\ &= + 2 / (4 * 4) 8 = + 2 / 16 8 = + 2 (16 / 8) = + 2 2 = 2 + 2 = 4 \end{aligned}$$

22. 12-13 C4 Prefix/Infix/Postfix

$$\frac{A+B}{C} + \frac{C*(A-B)}{B+C} = A B + C / C A B - * B C + / + \quad AB+C/CAB-*BC+ / +$$

23. 13-14 C4 Prefix/Infix/Postfix

$$\begin{aligned} 3 1 4 + 2 \uparrow * 6 2 / 3 * - &= 3 (1 4 +) 2 \uparrow * (6 2 /) 3 * - & 66 \\ &= 3 (5 2 \uparrow) * (3 3 *) - \\ &= (3 2 5 *) 9 - = 7 5 9 - = 66 \end{aligned}$$

24. 13-14 C4 Prefix/Infix/Postfix

$$\begin{aligned} \frac{A^2(B+C)}{BC} &= ((A^2)*(B+C))/(B*C) & /*\uparrow A2+BC*BC \\ &= / * \uparrow A 2 + B C * B C \end{aligned}$$

25. 14-15 C4 Prefix/Infix/Postfix

$$\begin{aligned} + - / * 2 + 4 6 2 \uparrow 3 2 / 6 + 2 1 &= + - / * 2 (+ 4 6) 2 (\uparrow 3 2) / 6 (+ 2 1) & 3 \\ &= + - / (* 10 2) 2 9 (/ 6 3) \\ &= + - (/ 20 2) 9 2 = + (- 10 9) 2 \\ &= + 1 2 = 3 \end{aligned}$$

26. 14-15 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 3x^2 + 4y - 2(x+y^2) + 4x/5y &= 3*(x^2) + (4*y) - 2*(x+(y^2)) + (4*x)/(5*y) \\
 &= (3*(x^2)) + (4*y) - 2*(x+(y^2)) + ((4*x)/(5*y)) \\
 &= (3 x 2 \uparrow^*) + (4 y^*) - (2 *(x y 2 \uparrow +)) + (4 x * 5 y^* /) \\
 &= ((3 x 2 \uparrow^*) + (4 y^*)) - (2 x y 2 \uparrow +^*) + (4 x * 5 y^* /) \\
 &= ((3 x 2 \uparrow^* 4 y^* +) - (2 x y 2 \uparrow +^*)) + (4 x * 5 y^* /) \\
 &= ((3 x 2 \uparrow^* 4 y^* + 2 x y 2 \uparrow +^* -) + (4 x * 5 y^* /) \\
 &= 3 x 2 \uparrow^* 4 y^* + 2 x y 2 \uparrow +^* - 4 x * 5 y^* / +
 \end{aligned}$$

As shown

27. 15-16 C4 Prefix/Infix/Postfix

$$\begin{aligned}
 a b / a b c \uparrow^* + a b c^* a -^* a / - &= (a b /) a (b c \uparrow)^* + a (b c^*) a -^* a / - \\
 &= (a/b) a (b \uparrow c)^* + a (b^* c) a -^* a / - = 6 (a 8^*) + a (6 a -)^* a / - \\
 &= 6 (a^* 8) + a (6 - a)^* a / - = (6 96 +) (a -6^*) a / - = (6 + 96) (a^* -6) a / - \\
 &= 102 (-72 a /) - = 102 (-72/a) - = 102 -6 - = 108
 \end{aligned}$$

108

28. 15-16 C4 Prefix/Infix/Postfix

Inserting symbols and parentheses, the expression becomes:

$$\begin{aligned}
 (a * (b - c) \uparrow 2) / b - (c / a \uparrow 2) &= (a * (- b c) \uparrow 2) / b - (c / (\uparrow a 2)) \\
 &= (a * (\uparrow - b c 2)) / b - (/ c \uparrow a 2) \\
 &= (* a \uparrow - b c 2) / b) - (/ c \uparrow a 2) \\
 &= - / * a \uparrow - b c 2 b / c \uparrow a 2
 \end{aligned}$$

As shown