

Nemeth Code Symbols Used in High School and Strategies for Supporting Math Learning

Lesson 3: Symbols for Advanced Math, Part 3



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Objectives

Participants will be able to:

- Read and write problems containing
 1. superscripts
 2. subscripts
 3. radicals with an index
 4. functions
 5. Greek letters
- Use the five step rule for Sigma notation

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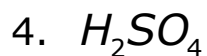
Activity 3A

Braille the following problems.

$$1. f^{-1}(x) = \frac{x+7}{2}$$

$$2. \log_{10} x^2 = x^2$$

$$3. x_r = \frac{y^2}{z}$$



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Activity 3A: Answer Key

$$1. f^{-1}(x) = \frac{x+7}{2}$$

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$$2. \log_{10} x^2 = x^2$$

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Activity 3A: Answer Key (Continued)

$$3. \quad x_r = \frac{y^2}{z}$$

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Radicals Review (Square Roots)

⠠⠽ radical symbol

⠠⠑⠑⠑ termination symbol

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$$\sqrt{\frac{1}{4}}$$

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$$\sqrt{25} - 3$$

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$$\sqrt{x + 7}$$

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$$\sqrt{0.49}$$

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Radicals with an Index

 index-of-radical indicator

 $\sqrt[3]{64}$

Read: the cube root of 64

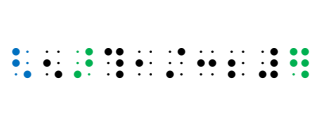
 $\sqrt[7]{x} + 3$

Read: the 7th root of x end root plus 3

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Radicals with an Index (Continued)

 $\sqrt[5]{\frac{1}{32}}$

Read: the 5th root of open fraction 1 over 32 close fraction end root

 $\sqrt[4]{0.0016}$

Read: the 4th root of zero point zero zero one six

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Activity 3B

Interline the problems.

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Activity 3B: Answer Key

$$1. f^{-1}(x) = \sqrt[3]{x} - 2$$

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$$2. x^3 - 6x^2 + 12x - 8 = (x - 2)^3$$

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$$3. \ln e^{x^6} = x^6$$

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Activity 3B: Answer Key (Continued)

4. $a_n = 2(a_{n-1} + 3)$

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5. $\sqrt[8]{x^{16}} = x^2$

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6. The midpoint of (x_1, y_1) and (x_2, y_2) is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

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Functions

⠠⠊⠠⠎ sin (sine)

⠠⠊⠠⠎ cos (cosine)

⠠⠊⠠⠎ tan (tangent)

⠠⠊⠠⠎ log (log)

⠠⠊⠠⠎ ln (natural log)

- Note that e is often used with ln.
- Do not use the English Letter Indicator in a function.

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Examples of Functions

⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ $\sin 45^\circ$ Read: sine of 45 degrees

⠠⠠⠠⠠ ⠠⠠⠠ $\cos A$ Read: cosine of A

⠠⠠⠠⠠ ⠠⠠⠠⠠⠠ $\tan 2B$ Read: tangent of 2B

⠠⠠⠠⠠ ⠠⠠⠠ $\log_2 8$ Read: log base 2 of 8

⠠⠠⠠ ⠠⠠⠠⠠ $\ln e^6$ Read: natural log of e to the 6th power

Find $\sin A$, if $\cos A = \frac{1}{2}$.

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Greek Letters

⠠⠠⠠ Greek letter indicator

⠠⠠⠠ alpha (lowercase) α

⠠⠠⠠ beta (lowercase) β

⠠⠠⠠ pi (lowercase) π

⠠⠠⠠ theta (lowercase) θ

⠠⠠⠠⠠ delta (uppercase) Δ


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Examples with Greek Letters

 $\cos 2\alpha$ Read: cosine of two alpha

 $\beta = 30^\circ$ Read: beta equals 30 degrees

 $\langle 3, \pi \rangle$ Read: open angle bracket 3 comma pi close angle bracket

 $\sec \theta = 2$ Read: secant of theta equals 2

 $m = \frac{\Delta y}{\Delta x}$

Read: m equals open fraction delta y over delta x close fraction.

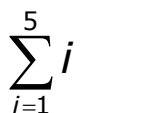
 Find $\sin(\alpha - \beta)$.

Read: Find sine of open parenthesis alpha minus beta close parenthesis.

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The Greek Letter Sigma

 $\sum_{i=1}^5 i$ Read: the sum from i=1 to 5 of i



Multipurpose indicator, sigma, directly under indicator, i = 1, directly over indicator, 5, termination indicator, i


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Steps for Sigma Notation

Uses the Five-Step Rule


Step 1  Multipurpose indicator

Step 2  sigma (uppercase) Σ - Expression being modified

Step 3  Directly under indicator

Step 4    $i = 1$ Modifier

Step 3  Directly over indicator

Step 4  5 Modifier

Step 5  Termination indicator

Putting it together              

$$\sum_{i=1}^5 i$$






Read: the sum from $i=1$ to 5 of i

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Examples of Sigma Notation

$$\sum_{j=2}^{10} 5j - 3$$

Read: the sum from $j=2$ to 10 of $5j$ minus 3

$$\sum_{i=0}^{\infty} 2 \left(\frac{1}{3} \right)^i$$

Read: the sum from $i=0$ to infinity of 2 open parenthesis open fraction 1 over 3 close fraction close parenthesis to the i power.

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Activity 3C

Braille the problems.

$$1. \cot x = \frac{\cos x}{\sin x}$$

$$2. \log_3 81 = 4$$

$$3. \log_b m^2 = 2 \log_b m$$

$$4. \sin \theta = \cos \left(\frac{\pi}{2} - \theta \right)$$

$$5. \text{Find the sum. } \sum_{j=0}^{\infty} (0.6)^j$$

$$6. \text{The formula for work is } W = |F| |D| \cos A.$$

Problem 1: cot stands for cotangent and would be brailled: ⠠⠠⠠⠠⠠⠠

Problem 6: A multipurpose indicator (dot 5) will be needed between two vertical bars where the first is a closing vertical bar and the second is an opening vertical bar.

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Activity 3C: Answer Key

$$1. \cot x = \frac{\cos x}{\sin x}$$

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$$2. \log_3 81 = 4$$

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$$3. \log_b m^2 = 2 \log_b m$$

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