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Math is a Language, so you must discover the symbols used

Lecture No.A4: Math, the Universal Language, the symbols used

"Mathematics is the most powerful tool we have. It controls our world. We can use it to put men on the moon. We use it to calculate how much insulin a diabetic should take. **It is hard to get right**." [Houston, *How To Think Like A Mathematician*, 2009]

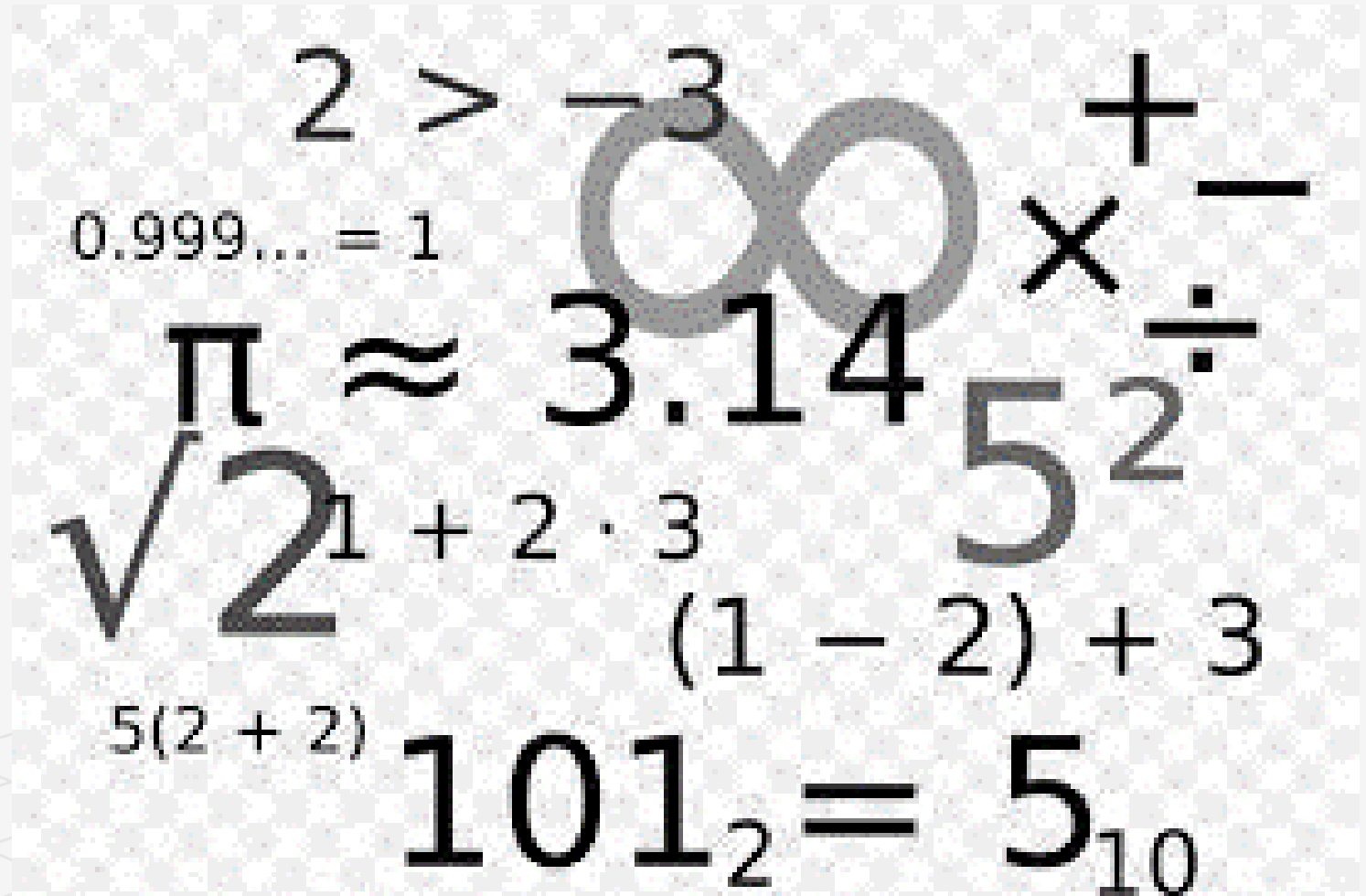"Whatever your hand finds to do, do it with your might." Ecc 9:10

Common Core Standards: X-REF1

'Mathematics is a universal language, commonly used and adopted worldwide, although characters are used within the constructs that reflects the geo-cultural framework in play. Here in the United States, we use English as our common language. So English characters and words will be used here in this lecture.

It is impossible to comprehend, much less problem-solve without first mastering the symbols used in math and understanding how those symbols influences the problem.

NOTE: Not all symbols used in math is listed here. Instead, here we focus on those widely used.

$$2 > -3$$

$$0.999... = 1$$

$$\infty$$

$$\pi \approx 3.14$$

$$+$$
$$-$$
$$\times$$
$$\div$$

$$\sqrt{2}$$

$$1 + 2 \cdot 3$$

$$5^2$$

$$(1 - 2) + 3$$

$$5(2 + 2)$$

$$101_2 = 5_{10}$$

Source: mathequalslove.net

Intended audience: Mature audiences (gr 8 and up)

1 **Geo-cultural:** Despite nature of written language, arranging from **ideograms or logograms (like Chinese script)** to **phonetic syllabic signs, aka, syllabary (like English),** Mathematics, being truly a **Universal Language,** share a common **set of symbols** and **logograms** we recognize as **Arabic numerals**.

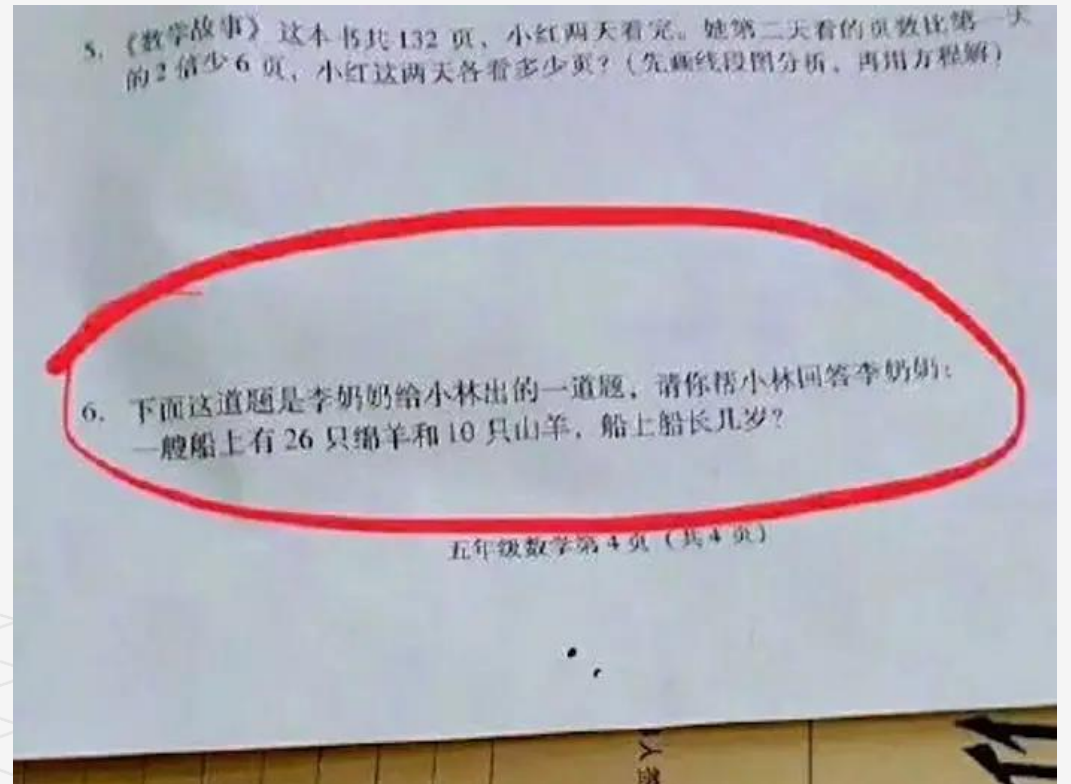**Question:** Notice anything familiar in this Chinese math problem?

Answer: You should recognize the numbers.

2 **AGENDA:** The following is an exploration of **common symbols** used in math **by grade** from start to finish.
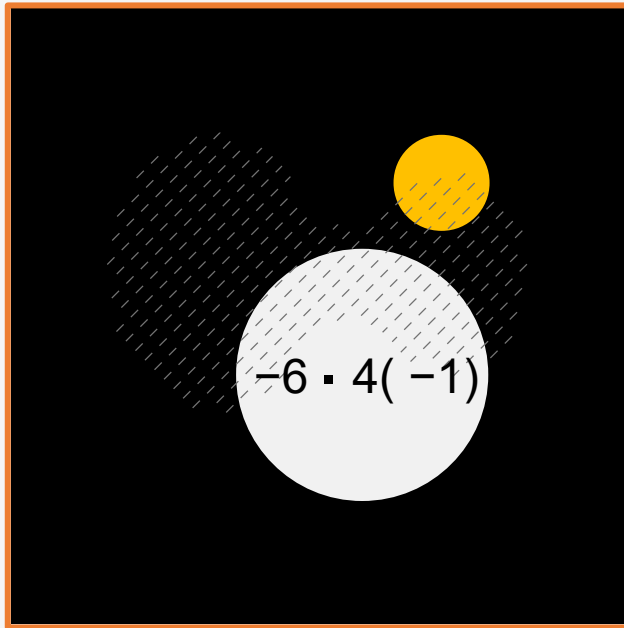
3 NOTE: This list is not intended to be comprehensive, as those highly specialized have been reserved for those particular explorations and lessons.
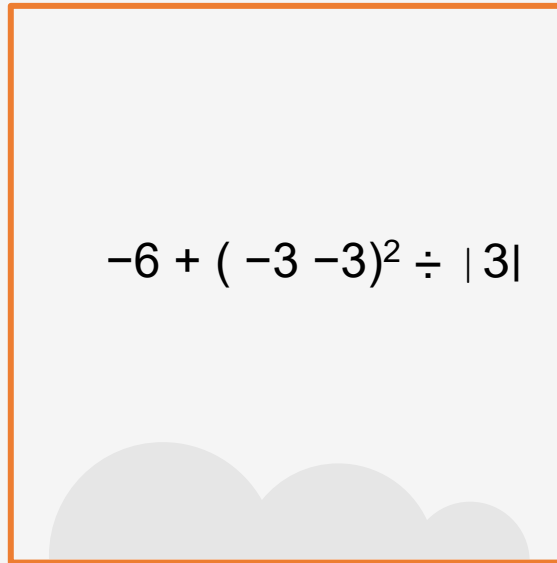
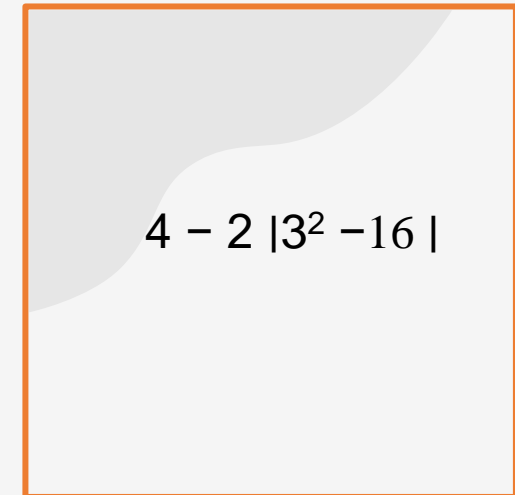# But First: No.A4: Pre-Test PoP-3 (need two of the three to advance)

Problem 1

$$-6 \cdot 4(-1)$$

Problem 2

$$-6 + (-3 -3)^2 \div |3|$$

Problem 3

$$4 - 2 |3^2 - 16|$$

ANSWER KEY: See the next slide.

SCORE: You want to get at least two of the three PoP-3 (Problems of the Day). **HONOR**

Answer Key: Pre-Test (PoP-3)

No.1 **Answer = 24** $\left(-6\cdot 4(-1)\right),\ \left(-6\cdot(-4)\right)$

No.2 **Answer = 6** $\left(-6+(-3-3)^2\div|-3|\right),\ \left(-6+(-6)^2\div|-3|\right),\ \left(-6+(36)\div|-3|\right),\ \left(-6+36\div 3\right),\ \left(-6+12\right)$

No.3 **Answer = -10** $\left(4-2|3^2-16|\right),\ \left(4-2|9-16|\right),\ \left(4-2|-7|\right),\ \left(4-2(7)\right),\ \left(4-14\right)$

> If you **MISSED ONE** or **MORE**, you might want to return to this lesson, and studying it once again. If this make twice, revisit the Foundation skills. **Revisit this lecture again.**

Exploratory Stage: (Got to get your hands dirty!) Student-centered

Experiment 1: **Merge two groups** (1) Grab a sheet of paper. (2) In 60 secs, draw pictures of as many round objects you see. (3) Add as many rectangular one you see, you got 60 secs. (4) Now, you goal is to combine the two groups, and report how many there are in total. Note: you are free to document your work as you wish. (5) Consult one other person, asking them to evaluate your work and conclusions. (6) Reflect on their report.

SUPPLIES: (A1 Experiment 1)

1. Paper and pen/pencil
2. Stop-watch/timer

Experiment 2: **Analyze the before and after** (1) Using the work from Experiment 1, remove from the combined group, the heaviest and the lightest objects. (2) Observe the new group, representing what objects remaining. (3) In light of the condition of the group in (1) as compared to the new group in (2), analyze and report the difference between the two groups. (4) Consult one other person, asking them to evaluate your work and conclusions. (5) Reflect on their report.

SUPPLIES: (A1 Experiment 2)

1. Paper and pen/pencil
2. Stop-watch/timer

Intervention Stage: (Terms Introduction phase) Teacher-centered

See **A4 Math Symbols** lecture notes. Click the links to pull up the details.

A4: Math Symbols

Arabic Numerals – the Stars of the Mathematics Show, the Deci System

Mathematics, at its core, concerns itself exclusively with Arabic Numerals, we call Alphanumeric characters.

The known Universe have adopted the ten logograms 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9, the ten digits. Along with the Decimal Point, the arrange of composite numbers is infinite.

In addition to the digits, Math relies on an extensive collection of symbols used to help direct the work and/or express the relationships existing between the various parts. These open with the most familiar, the EQUAL (=) and the ADD sign (+).
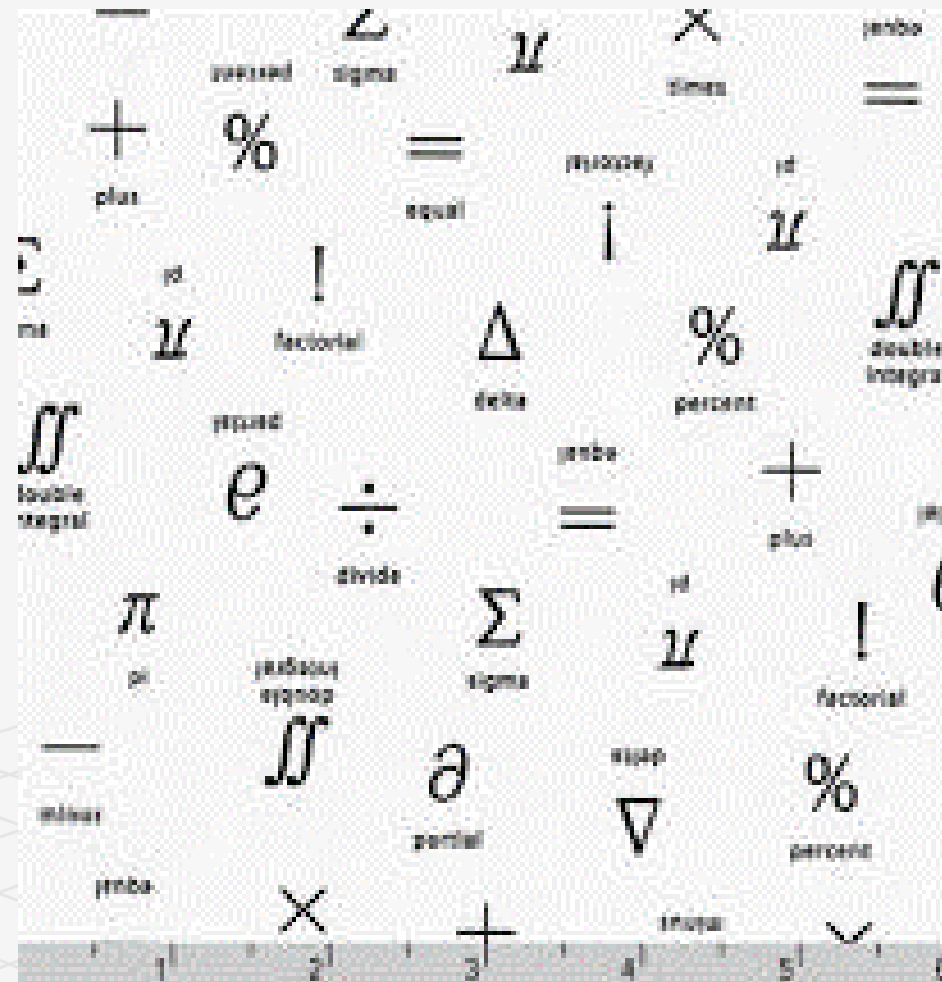
Source: Etsy.com

Discovery Stage: (Try your hands at the following)

Experiment 3: **Computational test** (1) Create an expression using seven non-repeating single-

digit numbers. Between each digit insert randomly one of the four operators (+), (-), (x), and (/). (2) Using same

numbers, scramble the operators so none a in repeating positions. (3) Now calculate values for both expressions. For

(4)&(5), repeat no.1 & 2, but insert (at-will) a pair of parathesis. Then finally, for (6) calculate values both expressions.

SUPPLIES: (A1 Experiment 3)

1. Paper and pen/pencil
2. Calculator (okay)

Experiment 4: **Computational test** (1) Create an expression using five non-repeating single-

digit numbers. Between each digit insert randomly one of the four operators (+), (-), (x), and (/). Add a square exponent

on the value immediate to left of the first (-). Group the two digits straddling that first (-). (2) reuse same numbers,

same conditions, only difference being the need to scramble the operators, to prevent repeating the same positions. (3)

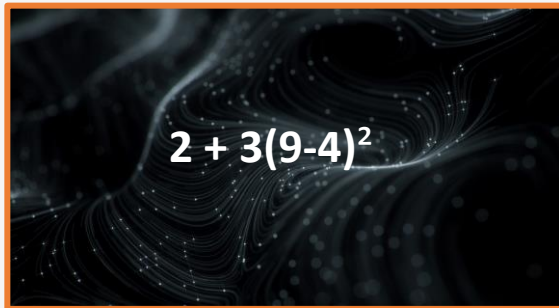Calculate the values for both expressions.

SUPPLIES: (A1 Experiment 4)

1. Paper and pen/pencil
2. Calculator (okay)

Finally: No.A4: Post-Test PoP-3 (need three of the three to advance)
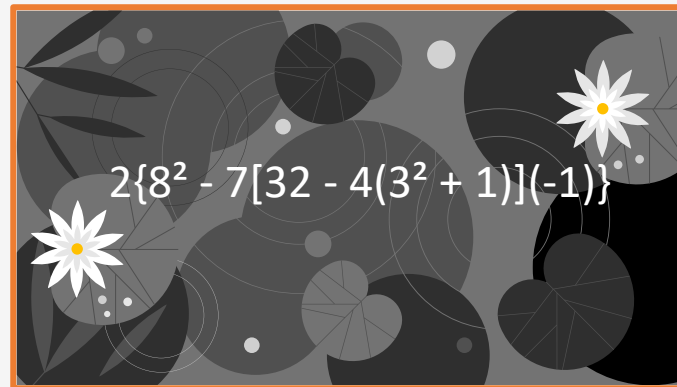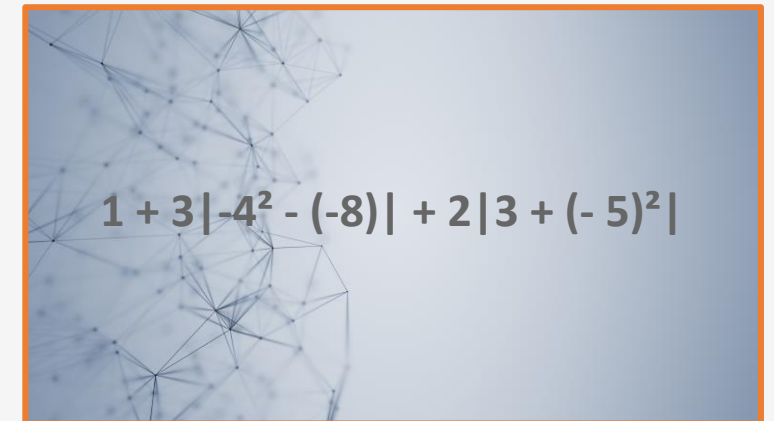
Problem 1

2 + 3(9-4)²

Problem 2

2{8² - 7[32 - 4(3² + 1)](-1)}

Problem 3

1 + 3|-4² - (-8)| + 2|3 + (- 5)²|

ANSWER KEY: See next slide.

SCORE: You want to get at least two of the three PoP-3 (Problems of the Day).

HONOR SYSTEM: Why fool self?

Answer Key: Post-Test (PoP-3)

No.1 **Answer = 77** $(2 + 3(9 - 4)^2)$, $(2 + 3(5)^2)$, $(2 + 3(25))$, $(2 + 75)$

No.2 **Answer = 16** $(2\{8^2 - 7[32 - 4(3^2 + 1)](-1)\})$, $(2\{8^2 - 7[32 - 4(10)](-1)\})$, $(2\{8^2 - 7[- 8](-1)\})$, $(2\{64 - 7[-8](-1)\})$, $(2\{64 + 56(-1)\})$, $(2\{64 - 56\})$

No.3 **Answer = 81** $(1 + 3|- 4^2 - (- 8)| + 2|3 + (- 5)^2|)$, $(1 + 3|- 16 - (- 8)| + 2|3 + 25|)$, $(1 + 3| - 8 | + 2| 28 |)$, $(1 + 24 + 56)$

If you **MISSED ONE** or **MORE**, you might want to return to this lesson, and studying it once again. If this make twice, revisit the Foundation skills. **Revisit this lecture again.**

The END! Any questions?

Ready for Next Cookie?   Click here **A5: Sets in Mathematics and Number Types**

"Remember your PO, and always do good work."