

INTRODUCTION

The **Puddles of Fun MathBox** includes activities that emphasize an innovative approach to working with grouping symbols (parentheses and brackets) used to clarify or change the order of operations.

The inside-out approach to parentheses and brackets can be greatly simplified if the parentheses are made into ovals and the brackets into rectangles.

For example, the following problem with no apparent inside or outside

$$[(3 \times 2) + 10] \div [2 \times (7 - 3)]$$

becomes much simpler when presented in this form.

The diagram shows the equation $[(3 \times 2) + 10] \div [2 \times (7 - 3)]$ where the inner parentheses are represented by ovals and the outer brackets by rectangles. The expression is $(3 \times 2) + 10 \div 2 \times (7 - 3)$.

It is then very easy to work through this problem in steps.

The diagram shows the simplification steps in boxes. The first row shows $6 + 10 \div 2 \times 4$. The second row shows $16 \div 8$.

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Once this concept is explained, students can set to work on the challenging, thought-provoking problems provided in each Puddles of Fun activity.

Each activity includes an explanation sheet with examples and their solutions, a problem sheet, and an accompanying solution sheet. The listed solutions aren't necessarily the only ones, so encourage your students to explore other possibilities.

As students progress through each activity, not only will they strengthen their basic skills, but their ability to analyze, set up, and solve problems will improve.

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EQUAL-O

It is important for you to realize that arithmetic operations are performed on only TWO numbers at a time!

This activity requires a great deal of thought. You are required to examine several options before achieving success.

Although grouping symbols are not required to solve the problems in this activity, they are used. This allows for an easier transition into the activity EXPANDED EQUAL-O.

Try these sample problems. Place the correct sign between each pair of numbers to make both sides equal. The solutions are written below.

A. $(24 \quad 6) = (10 \quad 3)$

B. $(72 \quad 12) = (8 \quad 2)$

C. $(8 \quad 8) = (32 \quad 32)$

Solutions:

A. $(24 + 6) = (10 \times 3)$

B. $(72 \div 12) = (8 - 2)$

C. 3 possible solutions: $(8 \times 8) = (32 + 32)$

$(8 \div 8) = (32 \div 32)$

$(8 - 8) = (32 - 32)$

Name: _____

EQUAL-O

Place the correct sign between each pair of numbers to make both sides equal. Circle the letter of any problem where no solution is possible. Some problems have more than one solution.

A. $(20 \quad 5) = (8 \quad 4)$

B. $(7 \quad 6) = (45 \quad 3)$

C. $(10 \quad 2) = (4 \quad 6)$

D. $(35 \quad 5) = (8 \quad 5)$

E. $(16 \quad 8) = (16 \quad 2)$

F. $(6 \quad 4) = (14 \quad 4)$

G. $(8 \quad 6) = (12 \quad 4)$

H. $(35 \quad 7) = (14 \quad 3)$

I. $(8 \quad 1) = (6 \quad 3)$

J. $(6 \quad 6) = (4 \quad 3)$

K. $(8 \quad 3) = (18 \quad 6)$

L. $(30 \quad 10) = (11 \quad 9)$

M. $(16 \quad 4) = (8 \quad 4)$

N. $(18 \quad 2) = (8 \quad 2)$

O. $(14 \quad 4) = (6 \quad 3)$

P. $(30 \quad 6) = (12 \quad 3)$

Q. $(30 \quad 6) = (12 \quad 2)$

R. $(30 \quad 6) = (12 \quad 15)$

S. $(30 \quad 6) = (15 \quad 3)$

T. $(55 \quad 55) = (44 \quad 44)$

EQUAL-O Solutions

A. $20 \div 5 = 8 - 4$

B. $7 \times 6 = 45 - 3$

C. $10 - 2 = 4 + 6$

D. $35 + 5 = 8 \times 5$

E. $16 - 8 = 16 \div 2$

F. $6 + 4 = 14 - 4$

G. $8 \times 6 = 12 \times 4$

H. $35 + 7 = 14 \times 3$

I. $8 + 1 = 6 + 3$

J. 2 possible solutions:

$$6 + 6 = 4 \times 3$$

$$6 \div 6 = 4 - 3$$

K. $8 \times 3 = 18 + 6$

L. $30 - 10 = 11 + 9$

M. 2 possible solutions:

$$16 - 4 = 8 + 4$$

$$16 \div 4 = 8 - 4$$

N. $18 - 2 = 8 \times 2$

O. $14 + 4 = 6 \times 3$

P. $30 + 6 = 12 \times 3$

Q. $30 - 6 = 12 \times 2$

R. $30 \times 6 = 12 \times 15$

S. $30 \div 6 = 15 \div 3$

T. 2 possible solutions:

$$55 - 55 = 44 - 44$$

$$55 \div 55 = 44 \div 44$$

HIGH-SIGN COMBO

Using any four arithmetic signs, combine the numbers 5, 4, 3, 2, and 1 in any order to satisfy each target answer (KEY) from 1 to 10.

Then, using the following scale, score each exercise by adding each sign's "value".

$$\div = 4 \quad \times = 3 \quad - = 2 \quad + = 1$$

Try to get the HIGHEST score possible for each targeted answer.

Can you beat these examples? Study them carefully.

A. $[4 \div (5 - 3)] \div (2 \div 1) = 1$ (score = 14 points)

B. $[(5 \times 3) + 1] \div 4 \div 2 = 2$ (score = 12 points)

C. $4 - [(5 \div 1) \div (2 + 3)] = 3$ (score = 11 points)

D. $4 \div [(5 \div 1) \div (2 + 3)] = 4$ (score = 13 points)

E. $5 \times [(3 \div 1) - (4 \div 2)] = 5$ (score = 13 points)

F. $[(5 - 1) \div (4 \div 2)] \times 3 = 6$ (score = 13 points)

G. $[(5 \times 4) \div 2] - 3 \div 1 = 7$ (score = 13 points)

H. $[(5 \times 3) + 1] \div (4 \div 2) = 8$ (score = 12 points)

I. $[5 - [(4 \div 2) \div 1]] \times 3 = 9$ (score = 13 points)

J. $[[5 \div (4 - 3)] \div 1] \times 2 = 10$ (score = 13 points)

Name: _____

HIGH-SIGN COMBO

Using any four arithmetic signs, combine the numbers 5, 4, 3, 2, and 1 in any order to satisfy each targeted answer from 11 to 20.

Then, using the following scale, score each exercise by adding each sign's "value".

$$\div = 4 \quad \times = 3 \quad - = 2 \quad + = 1$$

Try to get the HIGHEST score possible for each targeted answer.

A. _____ = 11 (score = _____ points)

B. _____ = 12 (score = _____ points)

C. _____ = 13 (score = _____ points)

D. _____ = 14 (score = _____ points)

E. _____ = 15 (score = _____ points)

F. _____ = 16 (score = _____ points)

G. _____ = 17 (score = _____ points)

H. _____ = 18 (score = _____ points)

I. _____ = 19 (score = _____ points)

J. _____ = 20 (score = _____ points)

HIGH-SIGN COMBO Solutions

$$\div = 4 \quad \times = 3 \quad - = 2 \quad + = 1$$

A. $[(3 \times 4) \div 2] + 5 \div 1 = 11$ (score = 12 points)

B. $[(5 \times 4) \div 2] + (3 - 1) = 12$ (score = 10 points)

C. $[(5 \times 4) \div (2 \div 1)] + 3 = 13$ (score = 12 points)

D. $[(5 \times 3) - 4] + (2 + 1) = 14$ (score = 7 points)

E. $[(5 \times 4) - 3] - 2 \div 1 = 15$ (score = 11 points)

F. $(5 + 3) \times [(4 \div 2) \div 1] = 16$ (score = 12 points)

G. $[(1 \times 5) \times 3] + 4 - 2 = 17$ (score = 9 points)

H. $[(4 \times 3) \times 2] - 1 - 5 = 18$ (score = 10 points)

I. $[(4 \times 3) \times 2] - 5 \div 1 = 19$ (score = 12 points)

J. $[(5 \times 4) \div 1] \div (3 - 2) = 20$ (score = 13 points)

Notice that all four signs are used in exercise B.
Can this be achieved in any of the other exercises?