

Lesson Title: The Power of Tens Designer: Diane Hunter

Discipline: Math Grade Level: 4-5

Activity 1: Powers of Ten POINTS!

(Appropriate for AFTER the Broadcast Lesson)

Activity Goal: Practice multiplying by different powers of 10s; during the game, get as close to 2000 points without going over.

Targeted Math Skills: Increase fluency with multiplying by a power of ten.

Materials: Blank paper, writing utensil (pencil), digit cards (see attached), and the power of 10 cards (see attached).

Steps:

1. One person gets to grab 2 digit cards and 1 power of 10 card.
2. They can choose which order to put digit cards (i.e. 2 and 5 could be 25 or 52).
3. Multiply by the power of 10 card.
4. Next person repeats.
5. Person 1 repeats but can either choose to add to points or subtract.
6. After 5 turns each, the final score is checked.

Questions to Consider:

1. What are you hoping for this turn?
2. Do you think you'll add or subtract next time?
3. As you multiply by a power of ten, what do you think about?

Activity 2: Choose a digit and multiply by tens.

(Appropriate for AFTER the Broadcast Lesson)

Activity Goal: "Prove" if the pattern of digit shifting works for all numbers.

Targeted Math Skills: Digits shift based on the number of tens multiplied by.

Materials: Blank paper, writing utensil (pencil), sample problems (attached), and calculator (optional).

Steps:

1. Create an argument to prove that the pattern of shifting digits works for any value.
2. Explore different problems where you multiply by 10, 100, and 1000. *Note: feel free to use a calculator (if accessible) to make sure that the pattern you have found works.

Questions to Consider:

1. What do you notice about the shifting of the digits?
2. Do you think it matters what the digits are? Why or why not?

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Further Extension:

1. Would the approach you used above work for numbers with a value less than 1 or between wholes? (i.e. 0.75 or 2.21)

Additional Resources for Lesson-Related Extension Activities:

- **Helpful Tips:** We have a habit of saying “just add zeros.” but remember that we want to know the why behind things here. Give time for them to explore before jumping to a shortcut.
- **Student-Facing / Teacher-Facing:**
 - Supplemental Lesson/Practice: Powers of Ten (BBC); (Learnzillion)-
<https://www.bbc.co.uk/bitesize/topics/z36tyrd/articles/z2fkwx>
 - https://learnzillion.com/lesson_plans/2737-9-practice-shifting-the-positions-of-the-digits-in-a-number-when-multiplying-and-dividing-by-10-fp/?card=41615
- **Teacher-Facing:**
 - Supplemental Lesson Resource: Powers of Ten (Marilyn Burns’ Math Blog); (Maths No Problem Blog)-<http://www.marilynburnsmathblog.com/when-you-multiply-by-10-just-add-a-zero-horrors/>
 - <https://mathsnoproblem.com/blog/teaching-tips/maths-misconceptions-multiplying-ten/>

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Activity 1 Materials

- Sample expressions:

| | | |
|-----------------|-----------------|-----------------|
| 12x10 12x100 | 4x100 4x10 | 25x10 25x100 |
| 7x10 7x100 | 32x10 32x100 | 87x1000 |

Activity 2 Materials

- Digit cards:

| | | | | |
|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 |

- Power of Ten cards:

| | | | | |
|-----|------|------|------|-------|
| x10 | x10 | x100 | x100 | x1000 |
| x10 | x100 | x10 | x100 | x10 |