Numbers Near and Far

Sort estimates written in scientific notation.

PA.N.1.2 "Express and compare approximations of very large and very small numbers using scientific notation."

NAME _____ DATE _____

HUGE ESTIMATE

A positive exponent means the number is greater than 1. The estimate is large.

$7.3 \times 10^{6} \approx 7{,}300{,}000$

TINY ESTIMATE

A negative exponent means the number is less than 1. The estimate is small.

$2.5 \times 10^{-4} \approx 0.00025$

1 SORT

8 items

Circle HUGE or TINY for each estimate, then choose one of each and explain in Part 2 how its exponent helped you decide.

1. About 3.4×10^{8} people in the United States — HUGE TINY

2. About 1.2×10^{-7} m across a virus — HUGE TINY

3. About 5.0×10^{-6} m across a cell — HUGE TINY

4. About 4.0×10^{7} m around Earth — HUGE TINY

5. About 8.2×10^{9} people on Earth — HUGE TINY

6. About 2.0×10^{-3} m long for an ant — HUGE TINY

7. About 1.5×10^{8} km from Earth to the Sun — HUGE TINY

8. About 9.0×10^{-5} m wide for a human hair — HUGE TINY

2 PROVE IT

Explain your thinking

Choose one of each and explain in Part 2 how its exponent helped you decide.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new estimate in scientific notation for each category, and label each HUGE or TINY.

HUGE _____

TINY _____

CHALLENGE

Which estimate is greater, item 1 or item 5? Write both as ordinary numbers to prove it.

ANSWER KEY # Numbers Near and Far

GRADE 8 · PA.N.1.2

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	About 3.4×10^{8} people in the United States	**HUGE**	The positive exponent makes this estimate greater than 1.
2	About 1.2×10^{-7} m across a virus	**TINY**	The negative exponent makes this estimate less than 1.
3	About 5.0×10^{-6} m across a cell	**TINY**	The negative exponent makes this estimate less than 1.
4	About 4.0×10^{7} m around Earth	**HUGE**	The positive exponent makes this estimate greater than 1.
5	About 8.2×10^{9} people on Earth	**HUGE**	The positive exponent makes this estimate greater than 1.
6	About 2.0×10^{-3} m long for an ant	**TINY**	The negative exponent makes this estimate less than 1.
7	About 1.5×10^{8} km from Earth to the Sun	**HUGE**	The positive exponent makes this estimate greater than 1.
8	About 9.0×10^{-5} m wide for a human hair	**TINY**	The negative exponent makes this estimate less than 1.

PART 2 · PROVE IT

Task: Choose one of each and explain in Part 2 how its exponent helped you decide.
Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **HUGE**: About 4.6×10^{5} people at a large event
- **TINY**: About 3.1×10^{-3} m across a small seed

Challenge: Item 5 is greater. Item 1 is about 340,000,000 people, and item 5 is about 8,200,000,000 people.

For Part 2, look for one positive-exponent item and one negative-exponent item, with an explanation that connects each exponent to whether the estimate is greater or less than 1. Accept other reasonable Part 3 estimates written with a number from 1 up to, but not including, 10 multiplied by a power of 10.