Factor Detective

Sort factorizations, explain your choices, and make your own.

6.N.2.5 "Factor whole numbers and express prime and composite numbers as a product of prime factors with exponents."

NAME _____ DATE _____

PRIME FACTORS ONLY

Every number being multiplied is prime. An exponent shows how many times a prime factor is used.

$56 = 2^3 \times 7$

COMPOSITE FACTOR INCLUDED

The product equals the number shown, but at least one number being multiplied is composite. A composite number can be broken into smaller factors.

$45 = 5 \times 9$

1 SORT

8 items

For each numbered factorization, circle PRIME or MIXED.

1. $24 = 2^3 \times 3$ — PRIME MIXED

2. $40 = 2^3 \times 5$ — PRIME MIXED

3. $36 = 4 \times 3^2$ — PRIME MIXED

4. $72 = 2^3 \times 3^2$ — PRIME MIXED

5. $60 = 4 \times 3 \times 5$ — PRIME MIXED

6. $90 = 9 \times 2 \times 5$ — PRIME MIXED

7. $100 = 2^2 \times 5^2$ — PRIME MIXED

8. $98 = 2 \times 7^2$ — PRIME MIXED

2 PROVE IT

Explain your thinking

Pick one PRIME item and one MIXED item, and explain how you knew where each belongs.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new, correct factorization for each category.

PRIME

MIXED

CHALLENGE

Choose a MIXED item from Part 1 and rewrite it using only prime factors and exponents.

ANSWER KEY # Factor Detective

GRADE 6 · 6.N.2.5

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	$24 = 2^3 \times 3$	**PRIME**	The factors 2 and 3 are prime, and their product is 24.
2	$40 = 2^3 \times 5$	**PRIME**	The factors 2 and 5 are prime, and their product is 40.
3	$36 = 4 \times 3^2$	**MIXED**	The product is 36, but 4 is composite.
4	$72 = 2^3 \times 3^2$	**PRIME**	The factors 2 and 3 are prime, and their product is 72.
5	$60 = 4 \times 3 \times 5$	**MIXED**	The product is 60, but 4 is composite.
6	$90 = 9 \times 2 \times 5$	**MIXED**	The product is 90, but 9 is composite.
7	$100 = 2^2 \times 5^2$	**PRIME**	The factors 2 and 5 are prime, and their product is 100.
8	$98 = 2 \times 7^2$	**PRIME**	The factors 2 and 7 are prime, and their product is 98.

PART 2 · PROVE IT

Task: Pick one PRIME item and one MIXED item, and explain how you knew where each belongs. Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **PRIME**: $18 = 2 \times 3^2$
- **MIXED**: $18 = 6 \times 3$

Challenge: Item 3: $36 = 2^2 \times 3^2$

For PROVE IT, accept an explanation that identifies only prime factors in the PRIME item and names a composite factor in the MIXED item. Check that each student-created product equals the number shown.