Factor Detectives

Sort numbers by their factors

6.N.2 "Read, write, and model whole-number and integer operations to solve problems. Estimate solutions for integer addition and subtraction of problems in order to assess the reasonableness of results..."

NAME _____ DATE _____

PRIME

A prime number has exactly two positive factors: 1 and itself.

17 is prime because its only factors are 1 and 17.

COMPOSITE

A composite number has more than two positive factors.

27 is composite because 1, 3, 9, and 27 are its factors.

1 SORT

8 items

Circle PRIME or COMPOSITE for each number, then choose two items and explain your choices using factors.

1.	22	PRIME COMPOSITE
2.	39	PRIME COMPOSITE
3.	43	PRIME COMPOSITE
4.	47	PRIME COMPOSITE
5.	55	PRIME COMPOSITE
6.	59	PRIME COMPOSITE
7.	77	PRIME COMPOSITE
8.	91	PRIME COMPOSITE

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new prime number and one new composite number that do not appear above, and list the factors that prove each choice.

PRIME _____

COMPOSITE _____

CHALLENGE

Find a composite number between 100 and 120 that has exactly two different prime factors, then write its prime factorization using exponents.

ANSWER KEY # Factor Detectives

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	22	**COMPOSITE**	22 = 2 × 11.
2	39	**COMPOSITE**	39 = 3 × 13.
3	43	**PRIME**	Its only positive factors are 1 and 43.
4	47	**PRIME**	Its only positive factors are 1 and 47.
5	55	**COMPOSITE**	55 = 5 × 11.
6	59	**PRIME**	Its only positive factors are 1 and 59.
7	77	**COMPOSITE**	77 = 7 × 11.
8	91	**COMPOSITE**	91 = 7 × 13.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **PRIME**: 19 is prime. Its factors are 1 and 19.
- **COMPOSITE**: 24 is composite. Its factors are 1, 2, 3, 4, 6, 8, 12, and 24.

Challenge: $108 = 2^2 \times 3^3$.

For Part 2, a student might explain that 43 is prime because its only factors are 1 and 43, while 55 is composite because 5 × 11 = 55.