

PART I GET STARTED

Today's Mathematics

We will use divisibility patterns to find factors, distinguish prime and composite numbers, and write prime factorizations.

Essential Question

Without dividing, how can you tell when a number is divisible by another number?

DO NOW

Review Section 1.3. Evaluate each expression using the agreed order.

1. $9 - 6 \div 3$
2. $8 + (10 - 4) - 3^2$
3. $(3 + 5)^2 \div 4 + 19$
4. $12(3 + 3) \div 18$

SEE IT

Consider the number 120.

1. Which digits or digit sums show that 120 is divisible by 2, 3, 5, and 10?
2. List three factor pairs of 120.
3. Begin a factor tree for 120. When will the tree be finished?

QUICK WRITE | 2 MINUTES

Describe one divisibility rule and explain why it helps when finding prime factors.

PART II INVESTIGATE

DIVISIBILITY PATTERNS

Complete the table. Test each number without carrying out long division.

Number	2	3	5	9	10	Evidence
120						
234						
405						
1,200						

FROM FACTORS TO PRIMES

Choose 120 or 234. Make two different factor trees. Compare the final prime factors.

MAKE A CLAIM

What do you notice about the prime factors from the two trees?

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

1. Use divisibility rules to locate useful factors quickly. 2. Continue factoring until every factor is prime. 3. Different factor trees for the same number lead to the same prime factorization.

WORKED MODEL

$$144 = 12 \cdot 12 = (2^2 \cdot 3)(2^2 \cdot 3) = 2^4 \cdot 3^2.$$

FOCUSED PRACTICE

Show a clear strategy and enough work that another student could follow your reasoning.

1. List the factor pairs of 26. Is 26 prime or composite?
2. Write the prime factorization of 1,200 using exponents.

CHALLENGE

Create a new problem that uses today's idea and has a whole-number answer. Trade with a partner and solve.

MATH WRITE | 5 MINUTES

Explain how divisibility rules and a factor tree work together to produce a prime factorization.

PART IV PUZZLE PRACTICE

Homework

Name _____ Date _____

DID YOU HEAR ABOUT ...

Complete each exercise. Find the answer in the answer bank. Write its word in the box with the exercise letter.

A. Factor pairs of 18

C. Factor pairs of 41

E. Factor pairs of 63

G. Prime factorization of 12

I. Prime factorization of 60

K. Prime factorization of 81

M. $2 \cdot 5 \cdot 17$ O. $2^2 \cdot 5 \cdot 11$ Q. $2^2 \cdot 3 \cdot 5^2$

B. Factor pairs of 36

D. Factor pairs of 55

F. Factor pairs of 87

H. Prime factorization of 45

J. Prime factorization of 33

L. Prime factorization of 75

N. $2^2 \cdot 3^2 \cdot 7$ P. $2 \cdot 3^2 \cdot 5$ R. $2 \cdot 3 \cdot 5^2$

S. Sixteen cheerleaders stand in equal rows. Find every possible row arrangement.

Pairs of 18 / THE	Pairs of 36 / CAMPER	Pairs of 41 / WHO	Pairs of 55 / BOUGHT
Pairs of 63 / A	Pairs of 87 / NEW	$2^2 \cdot 3$ / SLEEPING	$3^2 \cdot 5$ / BAG
$2^2 \cdot 3 \cdot 5$ / AND	$3 \cdot 11$ / HAD	3^4 / TO	$3 \cdot 5^2$ / SPEND
170 / TWO	252 / WEEKS	220 / TRYING	90 / TO
300 / WAKE	150 / IT	Rows of 16 / UP	400 / SUNRISE

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S		