

Factorization

ID: 11498

Time Required
45 minutes

Activity Overview

This activity builds on students' knowledge of finding factors, writing them in expanded form, and writing factors using exponents.

Topic: Numbers and Operations

- *Understand numbers, ways of representing numbers, relationships among numbers, and number systems*
- *Understand the structure of numbers by determining if a number greater than 1 is prime, and if not, factor it into a product of primes*

Teacher Preparation and Notes

- *Before beginning the activity, ensure that all students' calculators have the Logic Ladder App installed. This can be downloaded from education.ti.com/73.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- ***To download the student worksheet and navigator files, go to education.ti.com/exchange and enter "11498" in the quick search box.***

Associated Materials

- *MGAct05_Factorization_worksheet_TI73.doc*
- *MGAct05_Nav01_TI73.act*
- *MGAct05_Nav02_TI73.act*
- *MGAct05_Nav03_TI73.act*
- *MGAct05_LrnChk_TI73.edc*

Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *The Factor Game (TI-73 Explorer with TI-Navigator) — 6674*
- *Logic Ladder Factors (TI-73 Explorer) — 8457*
- *It's Greek to Me (TI-73 Explorer) — 4475*

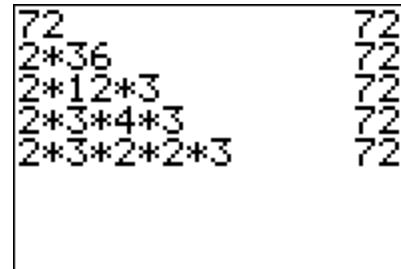
Problem 1 – Factor Challenge

Place students in pairs. One student will enter the first 2 factors. The second student will enter the next line.

Questions 1–6

Students will go back and forth entering an additional factor until they reach prime factorization. Using this format, students can ensure that each step is correct by ensuring the factorization equals the original number.

For Exercise 1, press 7 2 ENTER . Then students will pick factors to enter. This example would be 2×3 6 ENTER , 2×1 2×3 ENTER , then $2 \times 3 \times 4$ $\times 3$ ENTER , and $2 \times 3 \times 2 \times 2 \times 3$ ENTER .

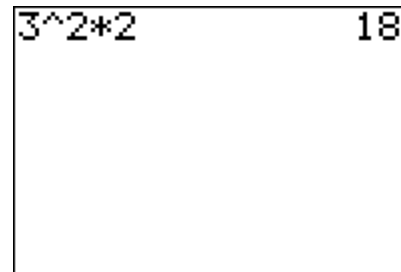


Problem 2 – Writing Factors with Exponents

Questions 7–12

These problems provide practice writing factors in a simplified form.

If desired, students can check their expressions by entering them into the calculator. They will use the \wedge key for the exponent. To enter $3^2 \times 2$, students would press $3 \wedge 2 \times 2$ ENTER .



Problem 3 – Using Logic Ladder

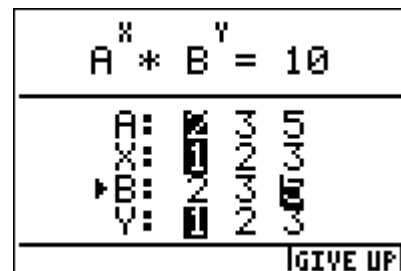
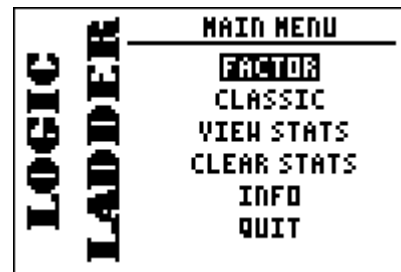
After students work the initial set of six exercises, they can be given time to play the Logic Ladder game. This will give them even more practice factoring numbers.

Questions 13–18

Once students have finished the given problems, you can let them use Logic Ladder. To start the Logic Ladder application, students press APPS , press \downarrow until they highlight **LogicLdr**, and then press ENTER .

From the Main Menu, select FACTOR. On the screen to the right, use the \uparrow \downarrow to move between variables and use \leftarrow \rightarrow to move the highlight left and right to select the value for each variable.

Once students are satisfied with their answer, press ENTER to see if their answer is correct. If not, they will be given another chance, or they can “Give Up” and move to another problem.



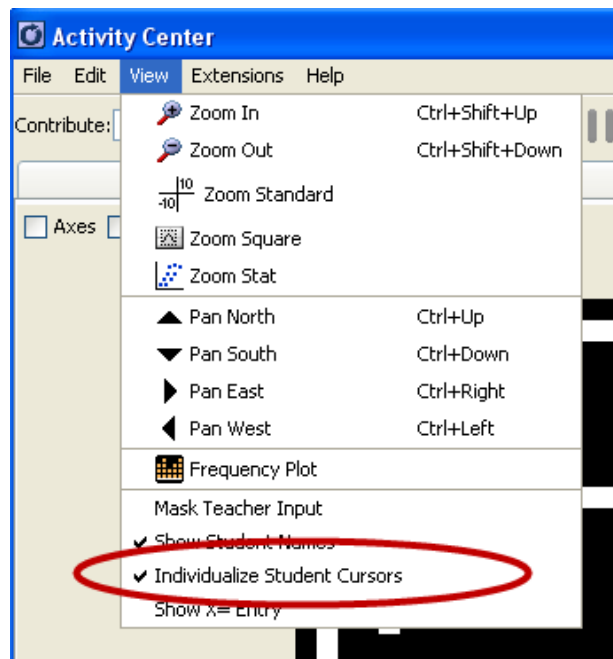
Extension – TI-Navigator™

1. Use **Screen Capture** throughout the lesson to see what approach students are taking to factor numbers.
2. Load the **MGAct05_Nav01_TI73.act** activity settings file into Activity Center. The diagram in activity center shows a grid with the numbers 1–36. This image will also appear on the student calculators. Tell students that they will be playing a game in which they must identify the factors of a number. The rules are as follows: The teacher chooses a number on the game board by moving the cursor to that square and marking a green point. (Note: The teacher must be logged into the NavNet application on a calculator as a teacher.)

A pairs of students (or groups of 3) will then mark the numbers that make the factorization of that number. If a specific number appears more than once, they should place a second (or third) dot on that number.

Individualize the cursors students have so you can tell the students apart. To do this, click **View > Individualize Student Cursors**. When students do not agree on factorizations, discuss as a class.

When ready, you can move to **MGAct05_Nav02_TI73.act** or **MGAct05_Nav03_TI73.act**, which are 1–49 and 1–100.



3. Send **MGAct05_LrnChk_TI73.edc** to students as a brief assessment.

Solutions to Student Worksheet

Problem 1

1. $2 \times 2 \times 2 \times 3 \times 3$

3. $5 \times 5 \times 5$

5. $2 \times 2 \times 2 \times 2 \times 2 \times 2$

2. $2 \times 2 \times 3 \times 3$

4. prime

6. prime

Problem 2

7. $2^3 \times 3^2 \times 5$

9. $2^2 \times 3^2 \times 5 \times 7$

11. $2^2 \times 5^2$

8. $2^2 \times 3 \times 5^3$

10. $2 \times 3^3 \times 7$

12. $2 \times 7 \times 9$

Problem 3

13. $2^3 \times 5^1$

$A^x \cdot B^y = 40$	
A:	2 3 5
X:	1 2 3
B:	2 3 5
Y:	1 2 3
[GIVE UP]	

14. $5^2 \times 3^2$

$A^x \cdot B^y = 225$	
A:	2 3 5
X:	1 2 3
B:	2 3 5
Y:	1 2 3
[GIVE UP]	

15. $2^2 \times 3^3$

$A^x \cdot B^y = 108$	
A:	2 3 5
X:	1 2 3
B:	2 3 5
Y:	1 2 3
[GIVE UP]	

16. $2^3 \times 3^1$

$A^x \cdot B^y = 24$	
A:	2 3 5
X:	1 2 3
B:	2 3 5
Y:	1 2 3
[GIVE UP]	

17. $3^1 \times 5^2$

$A^x \cdot B^y = 75$	
A:	2 3 5
X:	1 2 3
B:	2 3 5
Y:	1 2 3
[GIVE UP]	

18. $2^3 \times 3^3$

$A^x \cdot B^y = 216$	
A:	2 3 5
X:	1 2 3
B:	2 3 5
Y:	1 2 3
[GIVE UP]	

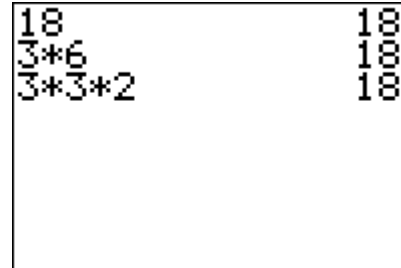
**Problem 1 – Factor Challenge**

With a partner, find the factors of the following numbers. Use the Home screen of the calculator to help. If you cannot find factors, write *prime* for that problem.

Find the factors of 18.

$$18 = 3 \times 6$$

$$18 = 3 \times 3 \times 2$$



1. 72

Factors: _____

2. 36

Factors: _____

3. 125

Factors: _____

4. 91

Factors: _____

5. 64

Factors: _____

6. 41

Factors: _____

Problem 2 – Writing Factors with Exponents

Factors can be shortened by using exponents. For example, the factors of 18, $3 \times 3 \times 2$, can be written as $3^2 \times 2$. Write each factorization using exponents.

7. $3 \times 3 \times 2 \times 2 \times 5 \times 2$

Simplified form:

8. $2 \times 2 \times 3 \times 5 \times 5 \times 5$

Simplified form:

9. $5 \times 3 \times 3 \times 2 \times 2 \times 7$

Simplified form:

10. $3 \times 3 \times 3 \times 7 \times 2$

Simplified form:

11. $2 \times 5 \times 2 \times 5$

Simplified form:

12. $7 \times 9 \times 2$

Simplified form:



Problem 3 – Using Logic Ladder

On the following Logic Ladder screens, circle the appropriate factors.

13.

$A^x * B^y = 40$		
A:	<input checked="" type="checkbox"/>	2
X:	<input type="checkbox"/>	2
B:	<input type="checkbox"/>	5
Y:	<input type="checkbox"/>	5
[GIVE UP]		

14.

$A^x * B^y = 225$		
A:	<input checked="" type="checkbox"/>	3
X:	<input type="checkbox"/>	3
B:	<input type="checkbox"/>	5
Y:	<input type="checkbox"/>	5
[GIVE UP]		

15.

$A^x * B^y = 108$		
A:	<input checked="" type="checkbox"/>	2
X:	<input type="checkbox"/>	2
B:	<input type="checkbox"/>	3
Y:	<input type="checkbox"/>	3
[GIVE UP]		

16.

$A^x * B^y = 24$		
A:	<input checked="" type="checkbox"/>	2
X:	<input type="checkbox"/>	2
B:	<input type="checkbox"/>	3
Y:	<input type="checkbox"/>	3
[GIVE UP]		

17.

$A^x * B^y = 75$		
A:	<input checked="" type="checkbox"/>	3
X:	<input type="checkbox"/>	3
B:	<input type="checkbox"/>	5
Y:	<input type="checkbox"/>	5
[GIVE UP]		

18.

$A^x * B^y = 216$		
A:	<input checked="" type="checkbox"/>	2
X:	<input type="checkbox"/>	2
B:	<input type="checkbox"/>	3
Y:	<input type="checkbox"/>	3
[GIVE UP]		