Warm Up

Solve each equation for x.

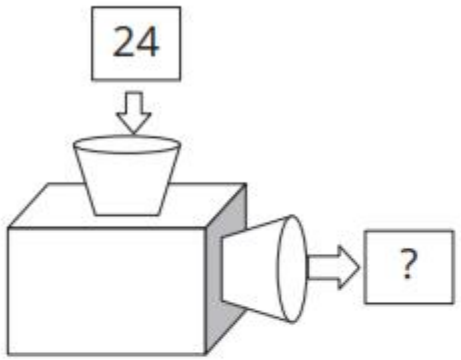
1. $2x^2 - 4 = 8$

2. $(x - 1)^3 - 5 = 0$

3. $3(x - 6)^4 + 11 = 15$

4. $x^3 - 27 = 0$

Factor Tree Factory



At the Factor Tree Factory, a factor machine takes any whole number as input and outputs one of its factor pairs.

1. **Suppose the number 24 is entered into the machine.**

   a. **What factor pairs might you see as the output?**

   b. **How do you know whether two numbers are a factor pair of 24?**

   c. **Can 5 be an output value? Explain your reasoning.**

2. Cherise and Jemma each begin a factor tree for 24 using different outputs from the factor machine.

Cherise

Jemma

Cherise says both factor trees will show the same prime factorization when completed. Jemma says because they each started with a different factor pair, the prime factorizations will be different. Who's correct? Complete each factor tree to justify your answer.

3. Consider the expression $2 \cdot 2 \cdot 2 \cdot 3$.

   a. How does $2 \cdot 2 \cdot 2 \cdot 3$ relate to the factors determined by Cherise and Jemma?

   b. How does it relate to 24?

4. If you know a factor of a given whole number, how can you determine another factor?

5. **What is the remainder when you divide a whole number by any of its factors? Explain your reasoning.**

6. **Create a factor tree to show the prime factorization of each number.**

   a. 66

   b. 210

1. Ping and Shalisha each attempt to factor $3x^3 + 12x^2 - 36x$ by factoring out the greatest common factor.

Ping

$3x^3 + 12x^2 - 36x$

$3x(x^2 + 4x - 12)$

Shalisha

$3x^3 + 12x^2 - 36x$

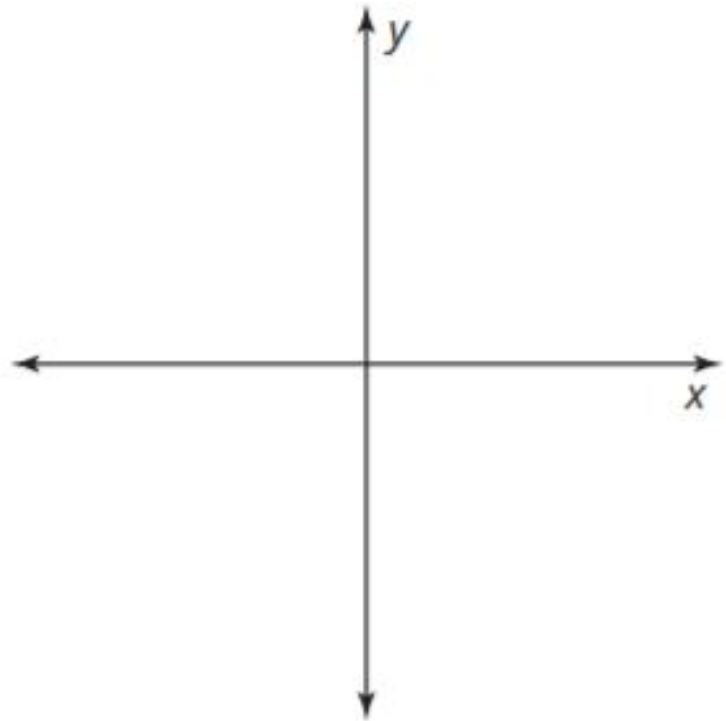
$3(x^3 + 4x^2 - 12x)$

Remember:

A greatest common factor can be a variable, constant, or both.

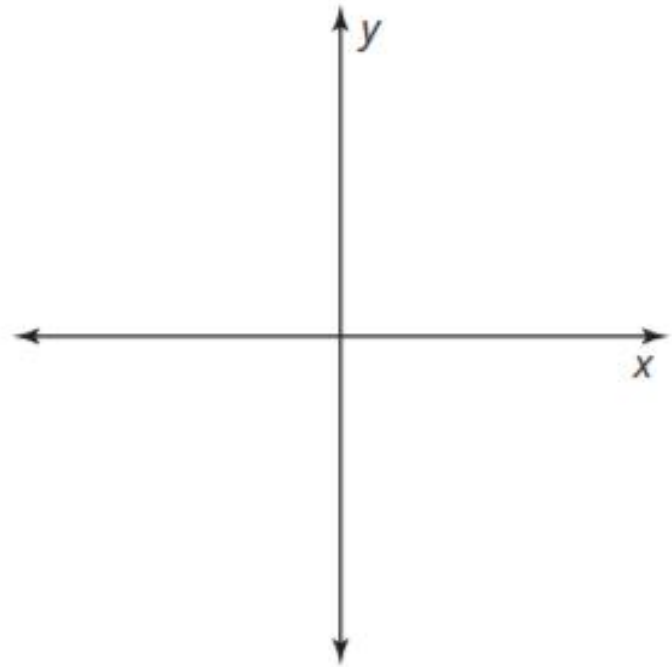
b. Completely factor the expression that Ping and Shalisha started to factor.

c. Use the factors to identify the zeros of $f(x) = 3x^3 + 12x^2 - 36x$. Then sketch the graph of the polynomial.

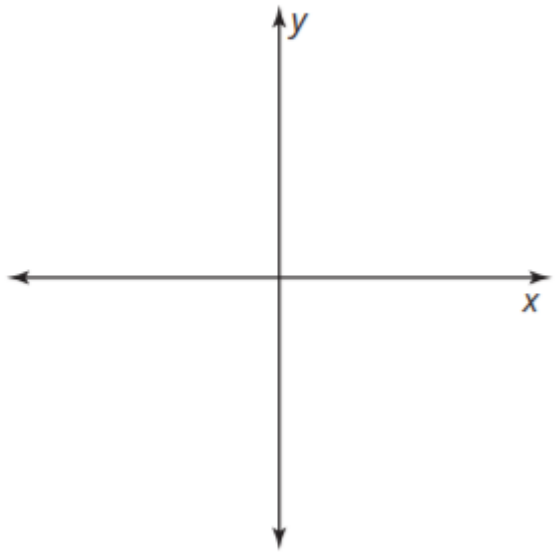


2. **Factor each polynomial function and identify the zeros. Then, use the factors to sketch a graph of the function defined by the polynomial.**

a. $f(x) = 3x^3 + 3x^2 - 6x$



b. $f(x) = 2x^2 + 6x$



c. $f(x) = 3x^2 - 3x - 6$