

Level 7: Integer \times and \div Fact Families, Part 2

Warm Up with Fact Families

Complete the fact families below. The first set is given as an example.

$5 \times 4 = 20$	$20 \div 5 = 4$	$3 \times 2 = 6$	$6 \div 3 = \underline{2}$
$4 \times 5 = 20$	$20 \div 4 = 5$	$2 \times 3 = 6$	$6 \div 2 = 3$

$2 \times 12 = 24$	$24 \div 2 = 12$	$9 \times 4 = 36$	$36 \div 9 = 4$
$12 \times 2 = 24$	$24 \div 12 = 2$	$4 \times 9 = 36$	$36 \div 4 = 9$

Create your own fact families for \times and \div .

Check your work with a peer or teacher.

Integer Fact Families for \times and \div

The relationship between multiplication and division applies to integers as well. Complete the integer fact families below. The first set is given as an example.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">$5 \times (-4) = -20$</td> <td style="padding: 5px;">$(-20) \div 5 = -4$</td> </tr> <tr> <td style="padding: 5px;">$(-4) \times 5 = -20$</td> <td style="padding: 5px;">$(-20) \div (-4) = 5$</td> </tr> </tbody> </table>	$5 \times (-4) = -20$	$(-20) \div 5 = -4$	$(-4) \times 5 = -20$	$(-20) \div (-4) = 5$	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">$3 \times (-2) = -6$</td> <td style="padding: 5px;">$(-6) \div 3 = -2$</td> </tr> <tr> <td style="padding: 5px;">$(-2) \times 3 = -6$</td> <td style="padding: 5px;">$(-6) \div 2 = 3$</td> </tr> </tbody> </table>	$3 \times (-2) = -6$	$(-6) \div 3 = -2$	$(-2) \times 3 = -6$	$(-6) \div 2 = 3$
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Create a variety of fact families for \times and \div with integers.

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Check your work with a peer or teacher.

Generalize Properties of \times and \div with Non-Zero Integers

Complete the table. Check prior pages if you're unsure.

Math Symbols	Words	Example
$(+) \times (+) = +$	A positive times a positive is positive.	$3 \times 10 = 30$
$(+) \times (-) = -$	Positive times negative is negative.	
$(-) \times (+) = -$	Negative times positive is negative.	
$(-) \times (-) = +$	Negative times negative is positive.	
$(+) \div (+) = +$	Positive divided by positive is positive.	
$(+) \div (-) = -$	Positive divided by negative is negative.	
$(-) \div (+) = -$	Negative divided by positive is negative.	
$(-) \div (-) = +$	Negative divided by negative is positive.	

In **one** sentence, summarize the entire table above so that you always remember how positives and negatives work with integers. [There is a way to do this precisely and completely in **one** sentence of reasonable length.]

<p>If the signs are the same, the result is positive.</p> <p>If the signs are different, the result is negative.</p>
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Check your work with a peer or teacher.

Generalize Properties of \times and \div Involving Zero

Complete the table. Check prior pages if you're unsure.

Math Symbols	Words	Example
$(+) \times 0 = 0$	A positive times zero is zero.	$5 \times 0 = 0$
$0 \times (+) = 0$	Zero times positive is zero.	
$(-) \times 0 = 0$	Negative times zero is zero.	
$0 \times (-) = 0$	Zero times negative is zero.	
$0 \div (+) = 0$	Zero divided by positive is zero.	
$(+) \div 0 = \text{undefined}$	Positive divided by zero is undefined	
$(-) \div 0 = \text{undefined}$	Negative divided by zero is undefined	
$0 \div (-) = 0$	Zero divided by negative is zero.	

Check your work with a peer or teacher. Do not move on until this is done!

Which row in the table was hardest for you?

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Explain as clearly as you can why mathematicians concluded that $12 \div 0$ is undefined but $0 \div 12$ is just zero. Try first on your own, then feel free to discuss with peers, look online or in other books, etc. Use examples and/or stories and/or diagrams etc.

In as few words as possible, state the key properties of multiplication and division of integers involving zero.
