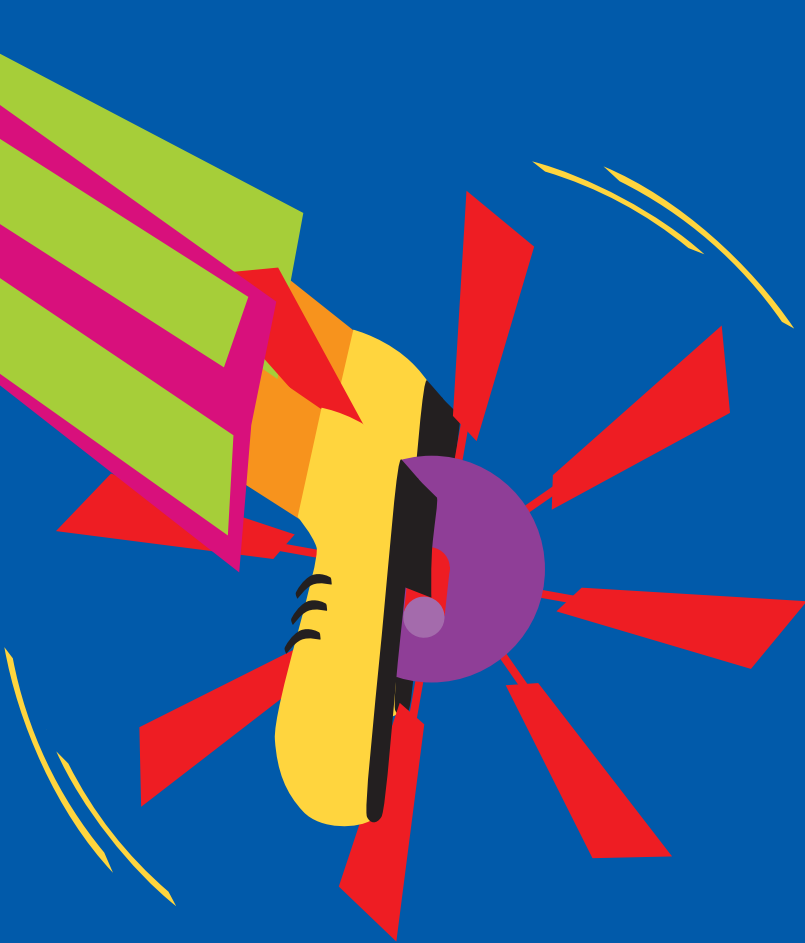


Fundamentals

Games to develop and reinforce mental computation strategies

Sample Game Blue



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EDUCATION



X Zone

Multiplying decimals

2 players

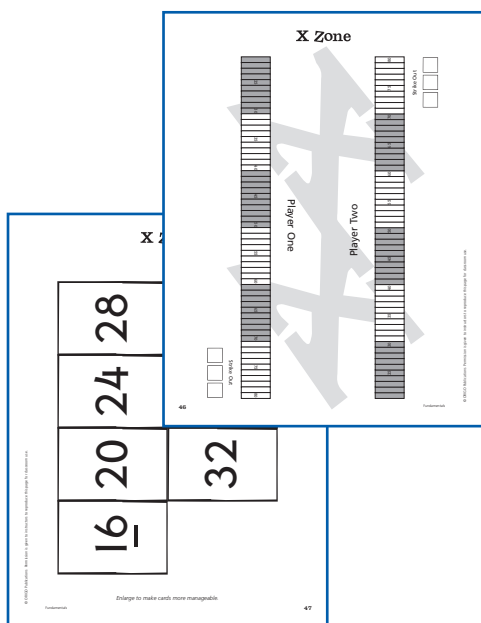
Purpose

In this game, the students multiply two-digit whole numbers by decimals a little greater than one and two. An equivalent fraction and the distributive principle will help the students to calculate the product.

Materials

Each pair of players will need

- An 'X Zone' game board (page 46) as shown below.
- One (1) number cube showing the decimals 1.25, 1.5, 1.75, 2.25, 2.5, and 2.75. This can be made from a blank wooden cube.
- One (1) set of numeral cards. Make two copies of page 47 (shown below). Cut out and laminate the cards to make one set.

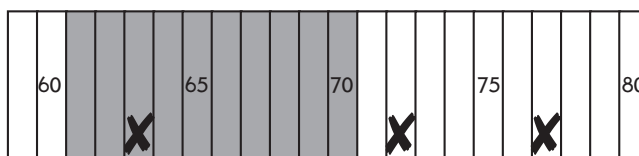


How to Play

The aim is to place three **X** in any one decade or 'zone' from one multiple of 10 **X** to the next on a number line, for example, from 21 to 30, 31 to 40, 41 to 50, and so on.

- The cards are shuffled and placed face down in a stack.
- The first player draws a numeral card and rolls the number cube.
- The player calculates the product and records the answer by marking a **X** on his or her number line on the game board. If a product is unavailable or has been used previously, the player records an **X** in one of the 'Strike Out' boxes.

Example: After five turns, Jesse's number line shows he only needs one more product in the 71 to 80 zone.



- The card is returned to the bottom of the stack.
- The other player has a turn.
- The first player to record three **X** in any one decade or 'zone' before recording three strike outs is the winner. If a player records three strike outs, the other player is the winner.

Reading the Research

Students should be asked to estimate the answers to decimal computation problems before calculating, especially for multiplication and division. Estimation helps them judge the reasonableness of their calculated answers (Hiebert, 1987).

Before the Game

Multiplication of decimals is usually taught as a sequence of rules that tend to become quite complex. In many cases, encouraging students to read decimals correctly will give them a feel for the magnitude of the number, which will in turn make a mental calculation far more efficient and easier to perform. Write '40 x 1.25' on the board. Invite a volunteer to read the number sentence. Encourage the student to say the fraction name (one and twenty-five hundredths) rather than spelling the number (one point two five). Ask, *What do you know about twenty-five hundredths?* (It is the same as one-fourth.) *Where do you think the answer will fall?* (More than 40 but less than 80.) *How can you use 'one-fourth' to help calculate the answer?* The discussion will vary, but the students should be able to explain that 40×1.25 is the same as 40×1 plus $\frac{1}{4}$ of $40 = 50$. Repeat this using other decimals, such as 20×1.5 and 24×2.75 .

During the Game

Encourage the players to share how they are calculating the answers. Are the students reading the decimals correctly? Do they have a feel for the size of the numbers they are multiplying? Are they using efficient mental strategies or attempting to follow the cumbersome paper-and-pencil procedures in their heads? Here are two different mental methods used by students to calculate 20×2.25 :

Joanne: 20×2 is 40. One-fourth of 20 is 5. The answer is $40 + 5$, that's 45.

John: I know 2×2.25 is 4.5. The answer is 10 times bigger. That's 45.

After the Game

Investigate the results of several games. Ask, *Which decades received the greatest number of X?* *Which decades received the fewest X?* The students could make a chart to show all the products that are possible using the seven different number cards and the six decimals on the number cube. The tally chart at right shows that the 41-50 decade has the greatest number of products. It also shows that eight products will automatically give a strike out as the products fall outside the decade range on the number line.

Decades	Products
11–20	
21–30	###
31–40	###
41–50	###
51–60	###
61–70	###
71–80	
81–90	
91–100	
101–110	

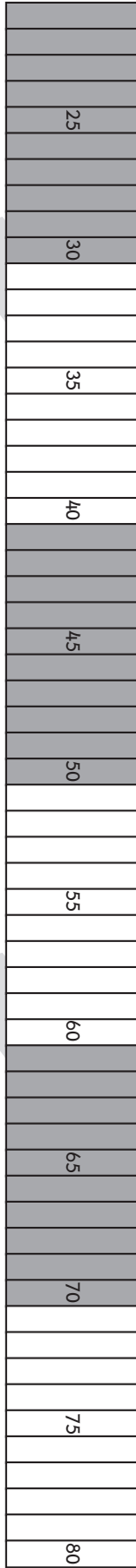
Beyond the Game

- Change the way in which the game is won. Tell the students they must get at least one X in each decade from 21-30 through to 71-80.
- Make another number cube that shows the same fractions. In this version of the game, the students roll both cubes and choose which decimal to use.

X Zone

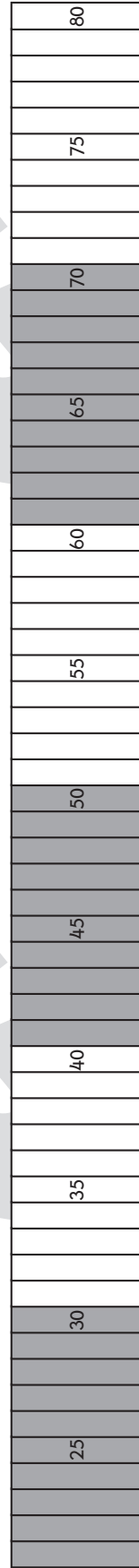
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Strike Out



Player One

Player Two



Strike Out

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X Zone

16	20	24	28	40
				36
				32

Enlarge to make cards more manageable.