

Pathways (Products Tic-Tac-Toe)

Variation: Times Ten

Overview

During this two-player game, students get practice with some of the more challenging multiplication facts. Players select factors, multiply them, and cover the corresponding product on the game board. The objective of the game is to be the first player to complete a continuous pathway across the game board, from one side to the other. There are four different game boards from which to select based on the needs of your students. As a variation, *Times Ten* is offered. It, too, has four versions. It is played in the same manner as *Pathways*, but it incorporates multiplying by ten, thus providing practice with the powers-of-ten concept.

Materials

- *Pathways* Game Board (REPRODUCIBLES 30, 31, 32, or 33), 1 per pair of students
- paper clips, 2 per pair of students
- cubes, tiles, counters, or other game markers, 20 (2 sets of 10, each set a different color) per pair of students
- *Pathways* Game Directions (REPRODUCIBLE G-25A), 1 per pair of students



See the Connections to the Common Core State Standards for Mathematics, page xv.

Recommended Grades 4–5

Time Instruction: 45 minutes
Independent Play: 20–30 minutes



TEACHING TIPS

Reusable Game Boards

Instead of making consumable copies of the game boards, laminate a set or place copies in plastic sleeves and provide dry erase pens to use during game play.



TIME SAVER

Managing the Materials

For ease in managing the distribution of materials, place the two paper clips and the game markers in quart-size sandwich bags (one bag for each pair of students playing the game).

Adapted from *Teaching Arithmetic: Lessons for Extending Multiplication: Grades 4–5* by Maryann Wickett and Marilyn Burns (Math Solutions, 2001, 162).





TEACHING TIP

Arranging Students

For the modeling part of this game, have students make two concentric circles. In the first circle, students kneel or sit; in the second, students stand. This placement ensures that everyone can view the demonstration area.



TECHNOLOGY TIP

Enlarged Game Board

For modeling purposes, scan the game board and use your whiteboard tools ink layer so that you can interact with the board and use the markers to note your moves. Although not necessary, this tool helps everyone to see the demonstration more clearly.

Related Games

Game 2: Addition Table Trail (the variation Multiplication Table Trail)

Game 16: Hit the Target (Mental Multiplication)

Key Questions

- What space do you try to get first? Why?
- What factors will get you to that space?

Teaching Directions

Part I: The Connection

Relate the game to students' ongoing work.

This game is best played after the concept of multiplication has been solidified. Prior to playing this game, students should understand the relationship of addition and multiplication and know that multiplication is repeated addition. A game in the earlier grades that supports this concept development is *Circles and Stars* (Game 6).

Part II: The Teaching

Introduce and model the game to students.

1. Explain to students that they will be playing the game *Pathways* in pairs. The game will help them learn some of the more challenging multiplication facts as well as build automaticity. Emphasize that students will want to be quick and accurate with their basic facts.
2. Gather students around a table or demonstration area of your classroom. Show them the *Pathways* Game Board (REPRODUCIBLE 30, 31, 32, or 33). Explain that the numbers below the game board are the factors and the numbers on the grid are the products.
3. Take the two paper clips and place them on two factors (the numbers below the game board).
4. Multiply the numbers and cover the corresponding product on the game board with a game marker.



5. Next, move only one of the paper clips so that it covers a different factor. Multiply the two numbers and cover the corresponding product on the game board with a different color game marker.
6. Explain that play alternates between two players, with the goal being to create a pathway across the game board.
7. Show what qualifies as a pathway. Using the game markers, build examples of pathways across the game board. A pathway connects by sharing two sides or a corner of a square across the game board. Pathways need to move across the game board from left to right, not from top to bottom (although pathways will move up and down).



TEACHING TIP
The Same Factors

When modeling how to play this game, point out to students that placing the paper clips on the same factors is permitted, provided the corresponding product is still uncovered on the game board.

81	54	63	36	72	
28	18	32	81	24	
48	64	21	16	56	
12	9	42	49	27	
3	4	6	7	8	9

Part III: Active Engagement

Engage students to ensure they understand how to play the game.

8. Now give students an opportunity to explore the game. Have students remain in the arrangement around the demonstration area. This time, assign the seated students as Team 1 and the standing students as Team 2.
9. Ask students to think about how to make their moves purposeful to win the game.
10. Have a player from Team 1 position the two paper clips over two factors. The player's team then helps multiply the numbers and



DIFFERENTIATING YOUR INSTRUCTION

There are several ways to modify the game according to the levels and needs of your students.

Show Your Work

Encourage students to show you what they've learned. If using consumable game boards, have students record their moves with two different colors of crayons or markers, then have students explain their game with both equations and words.

Times Tables

Make completed times tables available for students who are struggling with some of their multiplication facts.

Times Ten

The game *Times Ten* is a variation of *Pathways* for students who need a challenge or for students who have mastered their basic facts and need practice with multiples of ten.

REPRODUCIBLES 34, 35, 36, and 37, and *Times Ten* Game Directions (**REPRODUCIBLE G-25B**) are provided for this purpose.

determine the product. The player covers the corresponding product on the game board.

11. A player from Team 2 now moves just one of the paper clips to cover a new factor. The player's team then helps determine the product and the player covers the corresponding product on the game board.
12. Play continues, with teams alternating turns, until a complete pathway has been built.
13. As students play, check for misunderstandings and moderate students so that all voices are heard and all students are engaged.

Part IV: The Link

Students play the game independently.

14. Set up students for independent practice with the game. Give each pair of students the necessary materials and a game board (**REPRODUCIBLE 30, 31, 32, or 33**). Also, distribute the game directions (**REPRODUCIBLE G-25A**), as needed.

MATH WORKSHOP AND SUMMARIZING THE EXPERIENCE

Teach this game at the beginning of the week to the whole class and then make it a fundamental part of your math workshop (for more on math workshops, see Chapter 5 in *From Reading to Math* by Maggie Siena). Build in time to observe students playing the game. Note their individual skill level and fluency with multiplication facts. After students have had several opportunities to play the game, group students to discuss the game. Group students according to the version of the game board with which they played (group sizes will vary). Ask groups to discuss their answers to the questions:

- Is there an advantage to going first? Explain.
- What number do you try to secure first? Why?

Then, have the class come back together as a whole and ask, "When do you play to win and when do you play to block?" Ask, "What other games involve both a 'play-to-win' and 'play-to-block' strategy?" Students will likely come up with the classic games Tic-Tac-Toe and Connect Four.



Game 25A: Pathways (Products Tic-Tac-Toe)

Objective

Players select factors, multiply them, and cover the corresponding product on the game board. The objective of the game is to be the first player to complete a continuous pathway across the game board, from one side to the other.

Materials

- paper clips, 2 per pair of players
- game markers, 2 sets of 10 (each set a different color)
- *Pathways* Game Board
(REPRODUCIBLES 30, 31, 32, or 33)

Players

2

Directions

1. Decide who is Player 1 and who is Player 2, and the color game marker each player will use.
2. Look at the factors listed at the bottom of the game board. Player 1 chooses two factors and places a paper clip over each.
3. Player 1 then multiplies the factors and covers the corresponding product on the game board with one of her game markers. *Remember:* Both paper clips may be placed on the same factor!
4. Player 2 moves just one of the paper clips to another factor, multiplies the two numbers, and places one of his game markers on the product.
5. Repeat Step 4, alternating turns. The winner is the first player to make a continuous pathway across the game board.

A Pathway

A pathway may include boxes that share a common side or common corner. Pathways move across the game board from left to right, not from top to bottom (although pathways will move up and down).



PATHWAYS GAME BOARD 1

Reproducible 30

Copy the game board as needed to play the game (one game board for each game).

81	54	63	36	72
28	18	32	81	24
48	64	21	16	56
12	9	42	49	27

3

4

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PATHWAYS GAME BOARD 2

Reproducible 31

Copy the game board as needed to play the game (one game board for each game).

81	64	48	36	63
30	42	32	35	28
72	25	49	24	45
16	54	20	40	56

4 5 6 7 8 9



PATHWAYS GAME BOARD 3

Reproducible 32

Copy the game board as needed to play the game (one game board for each game).

54	28	42	72	63
77	36	16	99	64
49	32	44	81	121
56	48	66	88	24

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PATHWAYS GAME BOARD 4

Reproducible 33

Copy the game board as needed to play the game (one game board for each game).

72	36	49	88	54
84	77	96	132	56
63	81	48	108	121
66	99	144	64	42

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Game 25B: Times Ten

Objective

Players select factors, multiply them, and cover the corresponding product on the game board. The objective of the game is to be the first player to complete a continuous pathway across the game board, from one side to the other.

Materials

- paper clips, 2 per pair of players
- cubes, tiles, counters, or other game markers (2 sets of 10, each set a different color), 20 per pair of players
- *Times Ten* Game Board (REPRODUCIBLES 34, 35, 36, or 37), 1 per pair of players

Players

2

Directions

1. Decide who is Player 1 and who is Player 2, and the color game marker each player will use.
2. Look at the factors listed at the bottom of the game board. Player 1 chooses two factors and places a paper clip over each.
3. Player 1 multiplies the factors, determines the product, and then multiplies the product by ten. Player 1 then covers the final product on the game board with one of her game markers. *Remember:* Both paper clips may be placed on the same factor!
4. Player 2 moves just one of the paper clips to another factor, multiplies the two numbers, and then multiplies the product by ten. Player 2 places one of his game markers on the final product.
5. Repeat Step 4, alternating turns. The winner is the first player to make a continuous pathway across the game board.

A Pathway

A pathway may include boxes that share a common side or common corner. Pathways move across the game board from left to right, not from top to bottom (although pathways will move up and down).



TIMES TEN GAME BOARD 1

Reproducible 34

Copy the game board as needed to play the game (one game board for each game).

90	450	300	810	200
180	630	540	350	250
240	150	210	270	360
420	280	160	490	120

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TIMES TEN GAME BOARD 2

Reproducible 35

Copy the game board as needed to play the game (one game board for each game).

810	480	540	640	630
210	360	160	720	560
280	120	180	90	320
420	810	490	240	270

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TIMES TEN GAME BOARD 3

Reproducible 36

Copy the game board as needed to play the game (one game board for each game).

560	400	200	640	160
720	250	490	240	450
300	420	320	350	280
810	640	480	360	630

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TIMES TEN GAME BOARD 4

Reproducible 37

Copy the game board as needed to play the game (one game board for each game).

540	630	990	440	480
280	770	640	810	660
420	360	490	1210	880
720	160	320	560	240

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