

Gridforge — Activity Book

A Spark & Anvil activity book — puzzles, questions, and fun from Gridforge.

Write in the book, circle your answers, and check the Answer Key at the back.

1. connection

Circle the correct answer

1. In Connect-4, you win by making a line of:
(A) four of your discs in a row (B) three in a row (C) two in a row (D) five in a row
2. A Connect-4 disc, when dropped into a column, falls to:
(A) the middle (B) the lowest empty slot (C) the top (D) any slot you pick
3. A winning Connect-4 line can be:
(A) horizontal, vertical, OR diagonal (B) horizontal only (C) vertical only (D) diagonal only
4. Rowan's signature is:
(A) blocking only (B) making boxes (C) flipping discs (D) extending a chain toward the winning connection
5. On your turn in Connect-4 you may:
(A) remove a disc (B) drop two discs (C) drop one disc into any non-full column (D) move an existing disc
6. You cannot drop a disc into a column that is:
(A) in the center (B) empty (C) full (D) on the edge

Write the answer

7. Playing the CENTER column early is strong because it:
Answer: _____
8. If your opponent has three in a row with an open end, you should usually:
Answer: _____
9. Three in a row open on BOTH ends is dangerous because:
Answer: _____

10. Because discs stack, the square directly ABOVE a slot only becomes playable:

Answer: _____

Match each question to its answer

1. A diagonal four-in-a-row goes: →
2. Setting up TWO threats at once (a fork) is strong because the opponent: →
3. The first player in Connect-4, with perfect play, can: →
4. Watching the opponent's discs lets you: →
5. If you can win THIS move or block the opponent's win, you should: →

- (A) force a win (Connect-4 is solved)
 - (B) corner-to-corner through four stacked-and-shifted slots
 - (C) can only block one
 - (D) take your own win
 - (E) spot and block their threats early
-

2. tactics

Circle the correct answer

11. A "fork" (double-threat) is a move that creates:
(A) a draw (B) one threat (C) two winning threats at once (D) no threats
12. A fork wins because the opponent gets:
(A) no moves (B) two moves (C) extra turns (D) only one move to stop two threats
13. Twain's signature is:
(A) blocking only (B) creating two threats at once (the fork) (C) single lines (D) flipping
14. In Connect-4, a classic fork is three-in-a-row that is:
(A) vertical only (B) open on both ends (C) blocked on both ends (D) only one long
15. To defend against a fork, you should:
(A) pass (B) block after the fork (C) let them fork (D) prevent the opponent from setting up two threats
16. If your opponent threatens to make a fork next move, you should:
(A) build elsewhere (B) fill a full column (C) block the fork-setup square (D) ignore it

Write the answer

17. A fork with two threats that the opponent CAN answer with one move is:

Answer: _____

18. Forks reward the player who:

Answer: _____

19. The fork is an example of the math practice:

Answer: _____

20. A fork is powerful because it changes "one threat" into:

Answer: _____

Match each question to its answer

1. In Connect-4, creating threats on two different rows/diagonals at once is a: →

2. The opponent facing a fork should: →

3. Forks appear in many games because the idea is: →

4. A "double threat" and a "fork" are: →

5. Setting up a fork often needs a: →

(A) quiet preparing move first

(B) block the more dangerous threat and accept losing the other

(C) fork

(D) one move, two threats — general across grid games

(E) the same idea

3. defense

Circle the correct answer

21. A "threat" is a move away from:

(A) losing a disc (B) the game ending in a draw (C) the opponent (or you) completing a winning line (D) filling a column

22. When the opponent has three-in-a-row with one open end, you must:

(A) ignore it (B) block the open end (C) fill a full column (D) build your own three

23. Rowan and Twain together in this kit show that you must:

(A) ignore the board (B) build your threats AND read the opponent's (C) only attack (D) only defend

24. If the opponent can win next move, your first priority is to:

(A) pass (B) build your line (C) fill a column (D) block that win (unless you can win first)

25. An open three (both ends open) is dangerous because:

(A) it blocks itself (B) it can't win (C) it is only one threat (D) one block can't stop both ends

26. Reading threats means:

(A) counting your own only (B) noticing the opponent's lines before they complete (C) guessing (D) ignoring their discs

Write the answer

27. Blocking too late (after a fork forms) often:

Answer: _____

28. A good defender blocks:

Answer: _____

29. If blocking one threat CREATES your own threat, that block is:

Answer: _____

30. You should track the opponent's threats by:

Answer: _____

Match each question to its answer

1. If you cannot block both ends of an open three, the correct earlier lesson is to: →

2. A threat you make forces the opponent to: →

3. Making threats that force blocks lets you: →

4. The safest board for you is one where the opponent has: →

5. Blocking and threatening are two sides of: →

(A) no open threats

(B) control the flow of the game

(C) have prevented the open three from forming

(D) respond (block) instead of building freely

(E) reading lines on the grid

4. computer science

Circle the correct answer

31. A game is "solved" when we know the result assuming:
(A) perfect play by both sides (B) random play (C) only the opening (D) fast play
32. Connect-4, with perfect play, is a:
(A) first-player win (B) draw (C) never-ending game (D) second-player win
33. Gridley's role is to:
(A) explain how games get solved and how the ideas connect (B) only play Connect-4 (C) avoid strategy (D) flip discs
34. To solve Connect-4, researchers explored the game's:
(A) colours (B) game tree of possible move sequences (C) physical board only (D) a single game
35. The winning first move in perfect Connect-4 is to play:
(A) the center column (B) any column (C) the leftmost column (D) a corner column
36. A game with a SMALLER game tree is:
(A) easier to solve (B) harder to solve (C) not a game (D) impossible

Write the answer

37. Tic-tac-toe, with perfect play, is a:
Answer: _____
38. A perfect Connect-4 computer going first will:
Answer: _____
39. "Perfect play" means each move is:
Answer: _____
40. Solving a game connects to the CS idea of:
Answer: _____

Match each question to its answer

1. Even though Connect-4 is solved, people still play it because: →
2. Chess and Go are NOT solved because: →
3. The bigger the branching factor, the: →
4. Connect-4 being a first-player win shows that a game can be: →
5. A common way to solve games is to work: →

- (A) larger and harder-to-search the tree
 - (B) unfair with perfect play (first mover advantage)
 - (C) backward from known end positions
 - (D) their game trees are far too large
 - (E) playing well is still fun and challenging for humans
-

5. connection

Circle the correct answer

41. In Gomoku, you win by making a line of:

- (A) five in a row (B) four in a row (C) six in a row (D) three in a row

42. Gomoku is played by placing stones on:

- (A) only the center (B) the intersections of a grid (C) in columns that drop (D) only the edges

43. Unlike Connect-4, Gomoku stones:

- (A) can be placed anywhere empty (no gravity) (B) drop to the bottom (C) move each turn (D) must stack

44. Rowan's connection primitive in Gomoku is:

- (A) making boxes (B) capturing (C) extending a line toward five (D) flipping stones

45. A winning Gomoku line can be:

- (A) horizontal, vertical, or diagonal (B) diagonal only (C) horizontal only (D) vertical only

46. The free board makes Gomoku have:

- (A) fewer moves (B) more possible moves than Connect-4 (C) only vertical wins (D) no moves

Write the answer

47. Because there is no gravity, defending in Gomoku means watching:

Answer: _____

48. Free-style Gomoku (no restrictions), with perfect play, is a:

Answer: _____

49. Because free Gomoku favors the first player, competitive versions:

Answer: _____

50. A stone placed to extend a line of three toward five creates a:

Answer: _____

Match each question to its answer

1. Gomoku and Connect-4 share the primitive of: →
2. The main difference between four-in-a-row and five-in-a-row games is: →
3. Because you place freely, forks (double threats) in Gomoku are: →
4. To defend Gomoku well you must: →
5. A stone in the center of the board is strong because it: →

- (A) connecting a line
 - (B) very common and powerful
 - (C) can be part of lines in all directions
 - (D) the length of the winning line and the free board
 - (E) scan all directions for the opponent's growing lines
-

6. tactics

Circle the correct answer

51. An "open three" in Gomoku is three in a row with:
(A) both ends blocked (B) a gap in the middle (C) both ends open (empty) (D) one end blocked
52. An "open four" (four in a row, both ends open) is:
(A) a draw (B) harmless (C) easy to block (D) unstoppable — it wins next move
53. Twain's forcing sequences use open threes to:
(A) make boxes (B) end the game early (C) flip discs (D) force the opponent to keep blocking
54. If you make an open three, the opponent should:
(A) block one end before it becomes an open four (B) pass (C) make their own three (D) ignore it
55. A "double three" (two open threes at once) is powerful because it:
(A) blocks itself (B) is harmless (C) is one threat (D) creates two threats the opponent can't both stop
56. A "forcing move" is one that:
(A) can be ignored (B) ends your turn (C) flips discs (D) makes a threat the opponent must answer

Write the answer

57. Chaining forcing moves (each an open three) lets you:

Answer: _____

58. An open four beats a simple four (one end blocked) because:

Answer: _____

59. The difference between an open three and a closed three (one end blocked) is:

Answer: _____

60. Recognizing open threes/fours is an example of:

Answer: _____

Match each question to its answer

1. To WIN with forcing sequences you usually aim to end on: →

2. If the opponent ignores your open three, you can: →

3. A defender facing a long forcing sequence should look for a block that: →

4. Open threes are the building blocks of: →

5. An open four cannot be stopped because blocking one end: →

(A) leaves the other end to complete five

(B) make an open four and win

(C) also creates their own threat (counter-force)

(D) forcing sequences and forks

(E) a double threat (open four or double three)

7. connection

Circle the correct answer

61. In Hex, you win by building an unbroken chain of your pieces connecting:

(A) any two pieces (B) four in a row (C) the center to a corner (D) your two opposite edges of the board

62. Hex is played on a board of:

(A) hexagons (six-sided cells) (B) circles (C) squares (D) triangles

63. A famous fact about Hex is that it:

(A) never ends (B) always ends in a draw (C) can never end in a draw (D) has no winner

64. Rowan's connection primitive in Hex is:

(A) flipping (B) building a path from one edge to the other (C) capturing (D) making boxes

65. Blocking your opponent in Hex is the same as:

(A) nothing (B) trying to connect your own edges (they cross) (C) flipping discs (D) making boxes

66. Why can't Hex be a draw?

(A) players share pieces (B) the two players' connections would have to cross, so exactly one succeeds (C) the board is too small (D) there are no edges

Write the answer

67. With perfect play, the FIRST player in Hex can:

Answer: _____

68. To reduce the first-player advantage, Hex often uses the:

Answer: _____

69. A Hex chain wins if it touches:

Answer: _____

70. Because a draw is impossible, every finished Hex game has:

Answer: _____

Match each question to its answer

1. Hex is a pure __ game (no capturing, no luck): →

2. The connection primitive links Hex to Connect-4 and Gomoku because all three ask you to: →

3. In Hex, playing in the CENTER early is strong because it: →

4. Because blocking and connecting are the same in Hex, a single move can: →

5. The proof that Hex has no draws is an example of: →

(A) helps connect toward both edges

(B) connection

(C) build a connected structure across the board

(D) mathematical reasoning about a game

(E) advance your path AND block the opponent

8. tactics

Circle the correct answer

71. A "bridge" in Hex is:

(A) a broken chain (B) a single cell (C) a safe two-cell connection that can't be cut in one move (D) a capture

72. Rowan and Twain in this kit combine:

(A) only dice (B) only boxes (C) only flipping (D) building connections (paths) with blocking the opponent

73. A bridge is safe because if the opponent plays one of its two cells, you:

(A) pass (B) lose the link (C) play the other to keep the connection (D) must give up

74. Using bridges lets you connect stones:

(A) with fewer moves and less risk of being cut (B) more slowly (C) never (D) only in the center

75. Blocking the opponent in Hex means:

(A) removing their stones (B) flipping their stones (C) building your own path across their intended route (D) passing

76. Because there are no draws, the whole game is a fight over:

(A) who has more stones (B) who flips more (C) who completes their crossing connection first (D) luck

Write the answer

77. A strong Hex move often does two things:

Answer: _____

78. Recognizing bridge patterns is an example of:

Answer: _____

79. The center of the Hex board is valuable because it:

Answer: _____

80. A "ladder" in Hex is a forced sequence where:

Answer: _____

Match each question to its answer

1. An "escape" or "ladder escape" is a stone placed to: →
 2. Bridges reduce risk because a single opponent move: →
 3. Efficient Hex play means connecting with: →
 4. Since connecting and blocking are the same, a defensive Hex player is really: →
 5. Planning several moves ahead in Hex helps you: →
 - (A) still trying to connect their own edges
 - (B) cannot break the two-cell connection
 - (C) help a ladder connect instead of failing
 - (D) safe patterns (bridges) rather than fragile single links
 - (E) set up bridges and ladder escapes in advance
-

9. territory

Circle the correct answer

81. In Reversi/Othello, you place a disc so that it:
(A) reaches an edge (B) connects four in a row (C) outflanks (traps) a line of enemy discs between it and another of your discs (D) makes a box
82. When you outflank enemy discs, those discs:
(A) become blank (B) stay the same (C) are removed (D) flip to your colour
83. Flank's signature is:
(A) making boxes (B) connecting a line (C) building a path (D) flanking a line of enemy discs and flipping them
84. A legal Reversi move MUST:
(A) flip at least one enemy disc (B) flip zero discs (C) reach the center (D) make four in a row
85. The game ends when:
(A) the board is half full (B) time runs out (C) someone connects four (D) neither player can make a legal (flipping) move
86. The winner of Reversi is the player with:
(A) a line of four (B) a connected path (C) the most discs of their colour at the end (D) the first flip

Write the answer

87. Flanking can happen along:

Answer: _____

88. A single Reversi move can flip discs in:

Answer: _____

89. Having the MOST discs in the MIDDLE of the game is:

Answer: _____

90. The outflank-and-flip primitive is DIFFERENT from connection because it:

Answer: _____

Match each question to its answer

1. If you cannot flip any disc, you must: →

2. Reversi rewards thinking about: →

3. A disc on a CORNER is special because it: →

4. Reversi is also known as: →

5. The starting position has: →

(A) can never be flipped (see next kit)

(B) four discs (two each) in the center

(C) Othello

(D) pass (skip your turn)

(E) which flips help you LATER, not just now

10. territory

Circle the correct answer

91. A disc in a CORNER of the Othello board:

(A) is removed (B) can never be flipped (C) is worthless (D) flips every turn

92. A disc that can never be flipped for the rest of the game is called:

(A) frontier (B) empty (C) unstable (D) stable

93. Flank (in this kit) shows that the strongest squares to take are:

(A) the center only (B) full columns (C) random squares (D) the corners (and stable edges)

94. Why are corners so valuable in Othello?

(A) they are stable AND help stabilize nearby edge discs (B) they end the game (C) they flip the most (D) they are in the middle

95. The squares NEXT to a corner (X-squares/C-squares) are risky because playing there can:

(A) give the opponent access to the corner (B) flip nothing (C) win instantly (D) end the game

96. A common Othello mistake is to:

(A) take a corner early (B) pass often (C) play the center (D) grab many discs but hand the opponent a corner

Write the answer

97. Stable discs matter because at the END of the game they:

Answer: _____

98. Recognizing stable vs flippable discs is an example of:

Answer: _____

99. Edges are more stable than the center because edge discs:

Answer: _____

100. The safest place of all is the:

Answer: _____

Match each question to its answer

1. Once you own a corner, you can often build: →

2. A disc is UNSTABLE if: →

3. Good Othello players judge a position by: →

4. Playing an X-square (diagonally next to an empty corner) is usually: →

5. Corners are permanent because outflanking needs a disc on BOTH sides, and a corner: →

(A) has no outside square to be flanked from

(B) a mistake (it can give up the corner)

(C) a chain of stable discs along the edges

(D) the opponent could still flip it later

(E) stable discs, not the current raw count

11. territory

Circle the correct answer

101. "Mobility" in Othello means:

(A) the number of discs (B) how fast you play (C) the board colour (D) how many legal moves you have

102. Having MORE mobility than your opponent is good because it:

(A) always loses (B) gives you better choices and can force them into bad moves (C) means fewer discs (D) is irrelevant

103. Flank (mid-game) shows that owning FEWER discs mid-game can be good if it:

(A) means more discs (B) always loses (C) keeps your mobility high and the opponent's low (D) ends the game

104. A counterintuitive Othello idea is that having FEWER discs mid-game can:

(A) end the game (B) always lose (C) break the rules (D) increase your mobility (evaporation strategy)

105. If the opponent runs OUT of good moves, they may be forced to:

(A) win (B) flip your corner (C) give up a corner or make a weak move (D) pass forever

106. Mobility connects to the endgame idea of:

(A) forcing the opponent to move (zugzwang-like) (B) the opening only (C) luck (D) disc count only

Write the answer

107. Frontier discs (next to empty squares) affect mobility because they:

Answer: _____

108. Reasoning about mobility over many moves is an example of:

Answer: _____

109. "Territory" thinking in Othello means valuing:

Answer: _____

110. A player with high mobility can usually:

Answer: _____

Match each question to its answer

1. Low mobility is dangerous because it can force you to: →

2. The disc count in the MIDDLE of an Othello game is: →

3. Good mid-game play often means: →

4. Mobility and stability together tell you a position is strong when you have: →

5. Forcing the opponent to reduce YOUR flips while keeping THEIR options low is: →

- (A) keeping your discs compact and your options open
 - (B) a poor predictor of the winner
 - (C) play an X-square and hand over a corner
 - (D) high mobility now and stable discs for the end
 - (E) good mobility management
-

12. territory

Circle the correct answer

111. In Dots and Boxes, you complete a box by drawing:
(A) its fourth side (B) a diagonal (C) its first side (D) any line
112. When you complete a box, you:
(A) end your turn (B) claim it AND take another turn (C) pass (D) lose a turn
113. Oddwin's signature is:
(A) connecting a line (B) building a path (C) counting parity and chains (who moves last) (D) flipping
114. You should AVOID drawing the THIRD side of a box because it:
(A) ends the game (B) is illegal (C) claims the box (D) gives the opponent an easy box (the 4th side)
115. A "safe" move is one that draws a side WITHOUT:
(A) passing (B) using a diagonal (C) making any box have three sides (D) claiming a box
116. When all safe moves run out, a player is FORCED to:
(A) open a box/chain for the opponent (B) pass (C) draw a diagonal (D) win

Write the answer

117. The winner is the player who claims:
Answer: _____
118. A "chain" is:
Answer: _____
119. Once you open a chain for the opponent, they can usually:
Answer: _____
120. The player forced to open the FIRST long chain is usually:
Answer: _____

Match each question to its answer

1. Dots and Boxes is really a battle over: →
2. The primitive in Dots and Boxes is: →
3. Drawing a line that leaves a box with two sides is: →
4. The number of long chains and their parity often decides: →
5. If you must give away boxes, a smart idea (next kit) is to: →

- (A) usually safe
 - (B) the winner of a Dots-and-Boxes game
 - (C) who is forced to open chains (parity)
 - (D) sacrifice a small chain to keep control (the double-cross)
 - (E) parity / who-moves-last (with a bit of territory)
-

13. parity

Circle the correct answer

121. "Parity" in Dots and Boxes is about whether a count is:
(A) red or blue (B) big or small (C) odd or even (D) fast or slow
122. The "chain rule" is a guideline about:
(A) flipping discs (B) trying to make the number of long chains match a target parity
(C) drawing diagonals (D) connecting four
123. Oddwin's whole method is:
(A) counting chains + parity to force the opponent to open first (B) connecting lines
(C) building paths (D) flipping
124. The player who is forced to OPEN the first long chain usually:
(A) is unaffected (B) claims all boxes (C) loses the chain battle (D) wins
125. The chain rule (a common version) says: the first player wants the number of long chains to be:
(A) matched to a parity depending on the board (e.g., related to the number of dots)
(B) always zero (C) always even, never odd (D) always three
126. A "long chain" is a chain of:
(A) one box (B) exactly two boxes (C) three or more boxes (D) only diagonal boxes

Write the answer

127. Parity reasoning is an example of:

Answer: _____

128. If you count the chains early, you can:

Answer: _____

129. Whoever is NOT forced to open the first long chain can often:

Answer: _____

130. The chain rule connects Dots and Boxes to checkers because both use:

Answer: _____

Match each question to its answer

1. Counting parity means counting the number of moves/chains and checking if it is:

→

2. If getting the right parity requires one more (or fewer) chain, you can: →

3. A player who wins the parity battle will: →

4. The reason parity matters is the extra-turn rule, which makes: →

5. Long chains are the key to parity because short chains (1-2 boxes): →

(A) join or split chains with your safe moves

(B) force the opponent to open first

(C) odd or even relative to whose turn it is

(D) don't allow the controlling double-cross

(E) whole chains fall to whoever the opener gives them to

14. tactics

Circle the correct answer

131. The "double-cross" (all-but-two) is when, given a long chain, you take all boxes EXCEPT:

(A) all of them (B) none (C) the last two, leaving them for the opponent (D) the first two

132. Leaving the last two boxes forces the opponent to:

(A) pass forever (B) take those two and then OPEN the next chain (C) skip a turn (D) win

133. Oddwin's master move is:

(A) connecting a line (B) sacrificing two boxes to keep control of the chains (C) flipping (D) taking every box greedily

134. The double-cross trades a small loss (two boxes) for:

(A) a bigger loss (B) nothing (C) control of who opens the next chain (usually a bigger win) (D) a draw

135. If you GREEDILY take every box in a chain, you must then:

(A) open the next chain yourself (losing control) (B) win (C) pass (D) take another chain free

136. The double-cross only works on chains of length:

(A) 1 (B) 2 (C) 0 (D) 3 or more (long chains)

Write the answer

137. The double-cross is an example of:

Answer: _____

138. After you double-cross one chain, the opponent opens the next, and you can:

Answer: _____

139. The double-cross is the payoff of winning the:

Answer: _____

140. On the VERY LAST chain, you should:

Answer: _____

Match each question to its answer

1. The double-cross shows that in Dots and Boxes, taking FEWER boxes now can: →

2. A player who doesn't know the double-cross will often: →

3. The two sacrificed boxes are called: →

4. The double-cross keeps the opponent in a loop of: →

5. For a double-cross to net a gain, the chains you control must be: →

(A) big enough that two sacrificed boxes are worth the control

(B) grab everything and then lose control

(C) the all-but-two (hard-hearted handback)

(D) win more boxes overall

(E) opening chains for you to control

15. transfer

Circle the correct answer

- 141.** Connect-4, Gomoku, and Hex all share the primitive of:
(A) dice (B) parity (C) connection (building a line/path) (D) flipping ownership
- 142.** Reversi/Othello's core primitive is:
(A) flipping ownership (territory) (B) connection (C) parity (D) five in a row
- 143.** Dots and Boxes' core primitive is:
(A) flipping (B) connection (C) parity / who-moves-last (D) five in a row
- 144.** Gridley's "five games, four ideas" lesson is that different games:
(A) are all luck (B) have nothing in common (C) reuse the same core ideas (transfer) (D) are all identical
- 145.** The "fork" (two threats at once) appears in:
(A) only Connect-4 (B) no games (C) Connect-4 AND Gomoku (both connection games) (D) only Dots and Boxes
- 146.** The idea "make a gain that can't be undone" appears in Othello as:
(A) bridges (B) open fours (C) stable discs / corners (D) chains

Write the answer

- 147.** Recognizing that games share primitives is an example of:

Answer: _____

- 148.** The "who-moves-last" (parity) idea appears in BOTH:

Answer: _____

- 149.** A "safe two-way connection" idea (the bridge in Hex) is like the "open-both-ends" idea in:

Answer: _____

- 150.** Spotting the shared primitive lets you:

Answer: _____

Match each question to its answer

1. Hex's "blocking = connecting" duality is a special case of: →
2. The four big ideas across GridForge are roughly: →
3. When you meet a NEW grid game, a smart first question is: →
4. Transfer is powerful because ideas learned in one game: →
5. The fork in Connect-4 and the double-three in Gomoku are: →

- (A) which known primitive does this use?
 - (B) the connection primitive
 - (C) the same idea (two unstoppable threats)
 - (D) connection, forks/threats, flipping/territory, and parity
 - (E) often work in many others
-

16. mastery synthesis

Circle the correct answer

151. Connect-4 is won by:
(A) four in a row (B) making boxes (C) flipping discs (D) five in a row
152. A "fork" wins because the opponent has:
(A) a free win (B) one move but two threats (C) no threats (D) two moves
153. Connect-4, with perfect play, is a:
(A) never-ending game (B) draw (C) second-player win (D) first-player win
154. Gomoku is won by:
(A) parity (B) four in a row (C) flipping discs (D) five in a row
155. An "open four" in Gomoku is:
(A) unstoppable (wins next move) (B) a draw (C) harmless (D) easy to block
156. Hex can never end in a:
(A) win (B) loss (C) first move (D) draw

Write the answer

157. A Hex "bridge" is:
Answer: _____
158. In Reversi/Othello you win by having:
Answer: _____
159. A corner in Othello:
Answer: _____
160. "Mobility" in Othello means:
Answer: _____

Match each question to its answer

1. In Dots and Boxes, completing a box lets you: →
 2. You should avoid drawing the __ side of a box: →
 3. "Parity" in Dots and Boxes decides: →
 4. The "double-cross" means leaving the last __ boxes of a chain: →
 5. Connect-4, Gomoku, and Hex share the primitive of: →
 - (A) who is forced to open the first chain
 - (B) claim it and move again
 - (C) two
 - (D) third
 - (E) connection
-

Riddle & Joke Break

Guess the answer, then check the key!

161. In Connect Four, you need to line up how many discs to win?
162. In Gomoku, how many stones in a row do you need to win?
163. In Dots and Boxes, when you complete the fourth side of a box, what happens?
164. In Reversi, you have 3 pieces in a corner-safe spot and your opponent has 5 elsewhere. Can your opponent flip your corner pieces?
165. You have three discs in a horizontal row in Connect Four with open spots on both ends. Why is this dangerous for your opponent?
166. In Hex, can a game ever end in a tie?
167. Your opponent has three in a row in Connect Four with one open end. What must you do this turn?
168. In Dots and Boxes, you're forced to draw the third side of a box. What does that hand your opponent?
169. Why did the Connect Four player love vertical thinking?
170. Why did the strategy game player always plan ahead?
171. Why did the Dots and Boxes player avoid the third side?
172. Why did the Reversi piece keep changing its mind?
173. Why did the Gomoku stone feel unstoppable?
174. Why did the Hex player love bridges?

Fun Facts

- Did you know? Connect Four is "solved" -- computers proved that if the first player drops in the center column and plays perfectly, they can always win! Most humans don't play perfectly, so it's still fun.
 - Did you know? Reversi (also called Othello) is easy to learn but hard to master -- there are about 10 to the 28th power possible games, far more than there are stars in our galaxy!
 - Did you know? In Hex, mathematicians proved that the FIRST player can always win with perfect play -- but on big boards nobody knows the exact winning strategy, so it stays a great challenge!
 - Did you know? Hex was invented independently by two people -- the poet-mathematician Piet Hein in 1942 and the famous game theorist John Nash a few years later. Great ideas often arrive twice!
 - Did you know? Dots and Boxes looks like a children's game but has deep strategy - the "chain rule" and the "double-cross" involve counting parity, and experts play it very seriously!
 - Did you know? A "double threat" -- setting up two ways to win at once -- is the single most powerful idea in almost every grid game, because your opponent can only block one thing per turn!
 - Did you know? In Reversi/Othello, corners are the most valuable squares because a corner piece can never be flipped -- there's no square beyond it to sandwich it!
 - Did you know? "Thinking ahead" in games is called lookahead. Strong human players see about 3-5 moves ahead, while chess computers can see 20 or more -- but seeing further only helps if you evaluate each position well!
-

Answer Key

1. A — four of your discs in a row
2. B — the lowest empty slot
3. A — horizontal, vertical, OR diagonal
4. D — extending a chain toward the winning connection
5. C — drop one disc into any non-full column
6. C — full

7. is part of the most possible four-in-a-rows
8. block the open end
9. the opponent can complete four on either side
10. after that slot is filled
Matching (connection): $1 \rightarrow B, 2 \rightarrow C, 3 \rightarrow A, 4 \rightarrow E, 5 \rightarrow D$
11. C — two winning threats at once
12. D — only one move to stop two threats
13. B — creating two threats at once (the fork)
14. B — open on both ends
15. D — prevent the opponent from setting up two threats
16. C — block the fork-setup square
17. not a real fork
18. looks a move ahead to set two threats
19. using structure/regularity (MP.8)
20. two simultaneous threats
Matching (tactics): $1 \rightarrow C, 2 \rightarrow B, 3 \rightarrow D, 4 \rightarrow E, 5 \rightarrow A$
21. C — the opponent (or you) completing a winning line
22. B — block the open end
23. B — build your threats AND read the opponent's
24. D — block that win (unless you can win first)
25. D — one block can't stop both ends
26. B — noticing the opponent's lines before they complete
27. loses, because two threats remain
28. the most dangerous threat first
29. especially good
30. scanning rows, columns, and diagonals for their discs
Matching (defense): $1 \rightarrow C, 2 \rightarrow D, 3 \rightarrow B, 4 \rightarrow A, 5 \rightarrow E$
31. A — perfect play by both sides

32. A — first-player win
33. A — explain how games get solved and how the ideas connect
34. B — game tree of possible move sequences
35. A — the center column
36. A — easier to solve
37. draw
38. win with correct play
39. optimal against the opponent's best replies
40. searching a space of possibilities
Matching (computer science): $1 \rightarrow E, 2 \rightarrow D, 3 \rightarrow A, 4 \rightarrow B, 5 \rightarrow C$
41. A — five in a row
42. B — the intersections of a grid
43. A — can be placed anywhere empty (no gravity)
44. C — extending a line toward five
45. A — horizontal, vertical, or diagonal
46. B — more possible moves than Connect-4
47. lines in every direction across the whole board
48. first-player win
49. add opening restrictions to balance it
50. growing threat
Matching (connection): $1 \rightarrow A, 2 \rightarrow D, 3 \rightarrow B, 4 \rightarrow E, 5 \rightarrow C$
51. C — both ends open (empty)
52. D — unstoppable — it wins next move
53. D — force the opponent to keep blocking
54. A — block one end before it becomes an open four
55. D — creates two threats the opponent can't both stop
56. D — makes a threat the opponent must answer
57. steer the game toward a winning fork

58. the simple four can be blocked at its one open end
59. the open three still threatens; the closed one is much weaker
60. reading structure/patterns (MP.8)
Matching (tactics): $1 \rightarrow E, 2 \rightarrow B, 3 \rightarrow C, 4 \rightarrow D, 5 \rightarrow A$
61. D — your two opposite edges of the board
62. A — hexagons (six-sided cells)
63. C — can never end in a draw
64. B — building a path from one edge to the other
65. B — trying to connect your own edges (they cross)
66. B — the two players' connections would have to cross, so exactly one succeeds
67. force a win
68. swap rule (pie rule)
69. both of your assigned edges continuously
70. exactly one winner
Matching (connection): $1 \rightarrow B, 2 \rightarrow C, 3 \rightarrow A, 4 \rightarrow E, 5 \rightarrow D$
71. C — a safe two-cell connection that can't be cut in one move
72. D — building connections (paths) with blocking the opponent
73. C — play the other to keep the connection
74. A — with fewer moves and less risk of being cut
75. C — building your own path across their intended route
76. C — who completes their crossing connection first
77. extends your connection and blocks the opponent's
78. using structure (MP.8)
79. offers the most flexible connections toward both edges
80. players repeatedly respond along a line
Matching (tactics): $1 \rightarrow C, 2 \rightarrow B, 3 \rightarrow D, 4 \rightarrow A, 5 \rightarrow E$
81. C — outflanks (traps) a line of enemy discs between it and another of your discs
82. D — flip to your colour

83. D — flanking a line of enemy discs and flipping them
84. A — flip at least one enemy disc
85. D — neither player can make a legal (flipping) move
86. C — the most discs of their colour at the end
87. any direction — horizontal, vertical, or diagonal
88. several directions at once
89. not necessarily good (they can be flipped back)
90. changes ownership of pieces instead of building a line
Matching (territory): $1 \rightarrow D, 2 \rightarrow E, 3 \rightarrow A, 4 \rightarrow C, 5 \rightarrow B$
91. B — can never be flipped
92. D — stable
93. D — the corners (and stable edges)
94. A — they are stable AND help stabilize nearby edge discs
95. A — give the opponent access to the corner
96. D — grab many discs but hand the opponent a corner
97. are guaranteed to count for you
98. using board structure (MP.7)
99. can be flipped from fewer directions
100. corner
Matching (territory): $1 \rightarrow C, 2 \rightarrow D, 3 \rightarrow E, 4 \rightarrow B, 5 \rightarrow A$
101. D — how many legal moves you have
102. B — gives you better choices and can force them into bad moves
103. C — keeps your mobility high and the opponent's low
104. D — increase your mobility (evaporation strategy)
105. C — give up a corner or make a weak move
106. A — forcing the opponent to move (zugzwang-like)
107. create squares where the opponent can play
108. using regularity/structure (MP.8)

109. control of good squares over sheer disc count
110. wait to take corners on good terms
Matching (territory): $1 \rightarrow C, 2 \rightarrow B, 3 \rightarrow A, 4 \rightarrow D, 5 \rightarrow E$
111. A — its fourth side
112. B — claim it AND take another turn
113. C — counting parity and chains (who moves last)
114. D — gives the opponent an easy box (the 4th side)
115. C — making any box have three sides
116. A — open a box/chain for the opponent
117. the most boxes
118. a line of boxes that can be taken one after another
119. take the whole chain in one turn (each box gives another move)
120. at a disadvantage
Matching (territory): $1 \rightarrow C, 2 \rightarrow E, 3 \rightarrow A, 4 \rightarrow B, 5 \rightarrow D$
121. C — odd or even
122. B — trying to make the number of long chains match a target parity
123. A — counting chains + parity to force the opponent to open first
124. C — loses the chain battle
125. A — matched to a parity depending on the board (e.g., related to the number of dots)
126. C — three or more boxes
127. using odd/even structure in repeated reasoning (MP.8)
128. steer safe moves to reach a winning parity
129. use the double-cross to keep control
130. parity/tempo to force the opponent to move badly
Matching (parity): $1 \rightarrow C, 2 \rightarrow A, 3 \rightarrow B, 4 \rightarrow E, 5 \rightarrow D$
131. C — the last two, leaving them for the opponent
132. B — take those two and then OPEN the next chain

- 133. B — sacrificing two boxes to keep control of the chains
- 134. C — control of who opens the next chain (usually a bigger win)
- 135. A — open the next chain yourself (losing control)
- 136. D — 3 or more (long chains)
- 137. sacrificing a little to control parity (MP.8)
- 138. double-cross again, keeping control chain after chain
- 139. parity battle (being NOT forced to open first)
- 140. take ALL of it (no need to sacrifice)
Matching (tactics): $1 \rightarrow D, 2 \rightarrow B, 3 \rightarrow C, 4 \rightarrow E, 5 \rightarrow A$
- 141. C — connection (building a line/path)
- 142. A — flipping ownership (territory)
- 143. C — parity / who-moves-last
- 144. C — reuse the same core ideas (transfer)
- 145. C — Connect-4 AND Gomoku (both connection games)
- 146. C — stable discs / corners
- 147. transfer — applying an idea from one context to another
- 148. Dots and Boxes AND checkers endgames
- 149. Connect-4/Gomoku (two ways to win)
- 150. learn a new game faster by reusing what you know
Matching (transfer): $1 \rightarrow B, 2 \rightarrow D, 3 \rightarrow A, 4 \rightarrow E, 5 \rightarrow C$
- 151. A — four in a row
- 152. B — one move but two threats
- 153. D — first-player win
- 154. D — five in a row
- 155. A — unstoppable (wins next move)
- 156. D — draw
- 157. a safe two-cell connection
- 158. the most discs at the end

- 159. can never be flipped (stable)
- 160. how many legal moves you have
Matching (mastery synthesis): $1 \rightarrow B$, $2 \rightarrow D$, $3 \rightarrow A$, $4 \rightarrow C$, $5 \rightarrow E$
- 161. Four! It's right there in the name -- four in a row horizontally, vertically, or diagonally.
- 162. Five! That's why it's also called "five in a row."
- 163. You claim the box AND take another turn! Completing a box always earns an extra move.
- 164. Not the true corner piece! A piece in the actual corner can never be flipped, because flipping needs a piece on both ends of a line.
- 165. Because it's a double threat -- they can only block one end, and you win on the other!
- 166. No! In Hex, exactly one player always completes a connection across the board -- a draw is mathematically impossible.
- 167. Block the open end! Otherwise they connect four and win next move.
- 168. A free box! Drawing the third side lets them complete the fourth and claim it.
- 169. Because sometimes the win is right above you!
- 170. Because thinking one move deep is thinking one move short!
- 171. Because giving away a box is a hard line to draw!
- 172. Because it kept getting flipped!
- 173. Because it was one away from five in a row!
- 174. Because a good connection is worth building!

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