

Tip-Off Logic Lab

Basketball season is tipping off, and great players think before they move. Use if-then reasoning, clues and careful checking to solve each puzzle. Every player and team on this sheet is made up.

Name _____

Date _____

LOGIC TOOLKIT

If... then

If P is true, then Q must be true

Converse

"If Q, then P" is NOT always true

Contrapositive

"If not Q, then not P" is always true

Eliminate

Mark X for every choice that can't work

Check it

Test your answer against every clue



Think it through
EVERY CLUE COUNTS

ROOKIE

- 1 This rule is true: **if** a made shot is from behind the 3-point line, **then** it counts for 3 points. Tasha made a shot that counted for 2 points. What can you conclude?

- A Her shot was from behind the line.
- B Her shot was not from behind the line.
- C There is no way to tell.

WORK SPACE

Letter _____

ROOKIE

- 2 This statement is true: every player on the Comets wears team sneakers. Nico wears team sneakers. Is Nico on the Comets?

- A Yes, he must be.
- B No, he can't be.
- C There is no way to tell.

WORK SPACE

Letter _____

STARTER

- 3 Maya scored **11 points**, all on 2-point and 3-point shots. She made more 3-pointers than 2-pointers. How many 3-pointers did she make?

WORK SPACE

_____ 3-pointers

STARTER

- 4 Four players line up by height. Ari is taller than Bo. Cy is shorter than Bo. Dee is taller than Ari. Who is the **second tallest**?

WORK SPACE

PRO

- 5 A team scored **84, 88, 93, 99** and **106** points in its first five games. If the pattern continues, how many points will it score in game 6?

WORK SPACE

_____ points

PRO

- 6 Kai says, "Lu hit the buzzer-beater." Lu says, "I didn't do it." Mo says, "I didn't do it." One of them hit it, and **exactly one** of them is telling the truth. Who hit the buzzer-beater?

WORK SPACE

ALL-STAR

- 7 Before tip-off, each of the 5 starters on one team high-fives each of the 5 starters on the other team once. Then every starter high-fives each of the other starters on their own team once. How many high-fives is that in all?

WORK SPACE

_____ high-fives

CHALLENGE ★

- 8 A jersey has a two-digit number. Its digits add up to **9**. When you reverse the digits, the new number is **27 more** than the jersey number. What is the jersey number?

WORK SPACE

Four made-up starters each play a different position and wear a different number. Use the clues and the grid (O for yes, X for no) to match them up.

PG = point guard · SG = shooting guard
F = forward · C = center

- ## PLAYER

Jada

Owen

Priya

Theo

POSITION

JERSEY #

- 1
- 2
- 3
- 4
- 5

THINK DEEPER Cross out clue 2. How many different final standings fit the other three clues? _____ **standings**

Letters _____

WORK SPACE

✓ **Answer Key** (for teachers & parents)

Answers for **Tip-Off Logic Lab**. Every puzzle has exactly one answer, and every clue is needed. Ask students to explain *why* wrong choices fail; the reasoning matters more than the answer.

Page 1 Problems

- Answer: B**
Contrapositive: not 3 points, so not behind the line.
- Answer: C**
That's the converse. Players off the Comets can wear the sneakers too.
- Answer: 3 three-pointers**
 $3 \times 3 + 1 \times 2 = 11$. The other option, four 2s and one 3, has fewer 3s.
- Answer: Ari**
Tallest to shortest: Dee, Ari, Bo, Cy.
- Answer: 114 points**
Gaps grow by 1: +4, +5, +6, +7, so next is +8.
- Answer: Mo**
If Mo hit it, only Lu is telling the truth. Kai or Lu would make two truths.
- Answer: 45 high-fives**
 $5 \times 5 = 25$ across, plus 10 on each team (20).
- Answer: #36**
Digits differ by 3 ($27 \div 9$) and add to 9: 3 and 6. $63 - 36 = 27$.

A • Starting Lineup

- Answer: Jada**, point guard, #3
- Answer: Owen**, center, #32
- Answer: Priya**, shooting guard, #24
- Answer: Theo**, forward, #11

One path: Jada wears #3 (clue 2), so clue 4 makes her the point guard and the shooting guard #24. Theo is lower than Priya and Owen, so he wears #11. Owen isn't a guard, so Priya is the shooting guard (#24), Owen wears #32 and is the center (clue 1), and Theo plays forward.

Quick score

Page 1	_____ / 8
A • Lineup	_____ / 4
B • Standings	_____ / 2
C • Truth or Bluff	_____ / 3
Total	_____ / 17

Skills practiced

- Conditional statements
- Converse & contrapositive
- Deductive reasoning
- Logic grids
- Proof by contradiction
- Patterns
- Counting
- Equations

Teaching tip: In Part C, have students write each case (Truth / Bluff) in a small table before deciding. That habit carries over to proofs in high school geometry.

B • Final Standings

- Answer: Foxes, Otters, Owls, Comets, Blaze**
1st to 5th
- Answer: 3 standings**
The Blaze could also be 1st or 2nd.

C • Truth or Bluff?

- Answer: Mia**
A truth-teller can't call himself a bluffer, so Zane bluffs. Then "both bluffers" is false, so Mia tells the truth.
- Answer: Leo and Rae**
Ivy bluffs (two truth-tellers, not one).
- Answer: b and c**
(a) is the converse, (d) the inverse.