

Game 22 – Refinery

A refinery has four different processing units—F, H, P and W—and each unit has both an upper outflow and a lower outflow. Some of the outflows are directed to a gasoline tank, while others are not. The following conditions apply:

Exactly three of the outflows lead to the gasoline tank.

The lower outflow of both W and H do not flow to the gasoline tank.

If one of the outflows of a unit leads to the gasoline tank, the other one does not.

If the lower outflow of P does not lead to the gasoline tank, neither does the upper outflow of F.

1. If neither outflow of F leads to the gasoline tank, which one of the following could be two outflows that lead to the gasoline tank?

- A. the lower outflow of W and the upper outflow of H
- B. the upper outflow of W and the lower outflow of P
- C. the upper outflow of W and the lower outflow of H
- D. the lower outflow of H and the upper outflow of P
- E. the lower outflow of H and the upper outflow of W

2. Which of the following must be false?

- A. The upper outflows of both F and P lead to the gasoline tank.
- B. The upper outflows of both F and H lead to the gasoline tank.
- C. The upper outflows of both P and W lead to the gasoline tank.
- D. The lower outflows of both F and P lead to the gasoline tank.
- E. The upper outflows of both F and W lead to the gasoline tank.

3. If the lower outflow of P does not lead to the gasoline tank, each of the following could also be an outflow that leads to the gasoline tank EXCEPT

- A. the upper outflow of F
- B. the lower outflow of F
- C. the upper outflow of H
- D. the upper outflow of P
- E. the upper outflow of W

4. If the upper outflow of F leads to the gasoline tank, which one of the following could be true?

- A. The lower outflow of F leads to the gasoline tank.
- B. The upper outflow of H leads to the gasoline tank.
- C. The lower outflow of P does not lead to the gasoline tank.
- D. The upper outflow of P leads to the gasoline tank.
- E. The lower outflow of W leads to the gasoline tank.

5. If the upper outflow of H does not lead to the gasoline tank, which one of the following is a pair of outflows that also could not lead to the gasoline tank?

- A. upper W and lower P
- B. upper W and upper P
- C. lower F and lower P
- D. upper F and upper P
- E. upper F and lower F

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1. B
2. A
3. A
4. B
5. D

This is a game of groups–of slots over which a limited number of elements will be allocated.

On Question 1, you can deduce that the three outflows to the gasoline tank must be spread out between H, P and W. This eliminates four answer choices, combined with the fourth rule and its implications.

Question 2 is a matter of deducing that if the upper outflow of P leads to the gasoline tank, the lower does not—which means the upper outflow of F can't either. Likewise, you get to the answer of Question 3 from the "if then" rule. If the lower P outflow doesn't lead to the gasoline tank, neither does answer A.

Question 4 is (mostly) based on the inference that if the upper F outflow leads to the gasoline tank, so does the lower outflow of P. (This is the contrapositive of the "if, then" rule) With this and other deductions you can exclude the four wrongs answers.

For Question 5, you can deduce that the other three units must each have an outflow leading to the gasoline tank. For W, this is the upper outflow (because the lower one can't be under the rules), which eliminates two answers. The other two are based on the rules that no two outflows of the same unit can lead to the gasoline tank rule, and on the "if then" rule about P and F.