

**PROBLEMS**

**Problem 1.** There are 9 apparently identical balls, except that one is heavier than the other 8. What is the smallest number of balance scale weighings required to ensure identification of the “odd” ball?

- (A) 9                      (B) 3                      (C) 4                      (D) 1                      (E) 2

**Problem 2.** A kitchen pantry has five shelves, each containing a specific kind of food. The spices are on the shelf directly below the vegetables, the fruits are above the bread, and the vegetables are 3 shelves below the cereals. Which kind of food is on the third shelf?

- (A) vegetables              (B) fruits              (C) bread              (D) cereals              (E) spices

**Problem 3.** At Hope Middle School, Mr. Eye, Mr. Love and Mr. Problems teach science, mathematics, and history—but not necessarily in that order. The history teacher, who was an only child, has the least experience. Mr. Problems, who married Mr. Eye’s sister, has more experience than the science teacher. Who teaches science?

**Problem 4.** Five coins look the same, but one is a counterfeit coin with a different weight than each of the four genuine coins. Using a balance scale, what is the least number of weighings needed to ensure that, in every case, the counterfeit coin is found and is shown to be heavier or lighter?

- (A) 5                      (B) 4                      (C) 3                      (D) 2                      (E) 1

**Problem 5.** A centipede climbs a 40-foot tree. Each day he climbs 5 feet, and each night he slides down 2 feet. In how many days will the centipede reach the top of the tree?

- (A) 14                      (B) 13                      (C) 12                      (D) 8                      (E) 20

**Problem 6.** Adam, Ben, Charles, David and Ed were waiting in line. Adam is between Ben and Chase. Ben is between David and Adam. Ed is also between David and Adam. Ben is between David and Ed. Who is in the middle of the line?

(A) Adam      (B) Ben      (C) Charles      (D) David      (E) Ed

**Problem 7.** Five cards are lying on a table as shown. Each card has a letter on one side and a whole number on the other side. Jane said, “If a vowel is on one side of any card, then an even number is on the other side.” Mary showed Jane was wrong by turning over one card. Which card did Mary turn over?

3
---

4
---

6
---

P
---

Q
---

(A) 5                      (B) 4                      (C) 3                      (D) 2                      (E) 1

**Problem 8.** A centipede crawl a tree 75-inches high, starting from the ground. Each day it crawls 5 inches, and each night it slides down 4 inches. When will it first reach the top of the tree?

(A) 15                      (B) 18                      (C) 19                      (D) 72                      (E) 71.

**Problem 9.** There are 4 cards on the table with the symbols  $a$ ,  $b$ , 4, and 5 written on their visible sides. What is the smallest number of cards we need to turn over to find out whether the following statement is true: “If an even number is written on one side of a card then a vowel is written on the other side?”

**Problem 10.** Each of the cards shown below has a number on one side and a letter on the other. How many of the cards must be turned over to prove the correctness of the statement: Every card with a vowel on one side has a prime number on the other side.

A
---

B
---

E
---

4
---

5
---

6
---

8
---

(A) 7                      (B) 6                      (C) 5                      (D) 4                      (E) 3

**Problem 11.** Three kids are playing pitcher, catcher and infielder. Sam is not the catcher. The infielder lives next to Sam. The catcher and John go to the same school. What position does Alex play?

**Problem 12.** Cookies were missing, taken by either Alex, Bob, or Charles. Each person said:

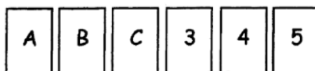
Alex: I did not take the cookies.

Bob: Charles took the cookies.

Charles: That is true

If at least one of them lied and at least one told the truth, who took the cookies?

**Problem 13.** Each of the cards shown has a number on one side and a letter on the other. How many of the cards must be turned over to prove the correctness of this statement for these cards: “If a card has a vowel on one side, then it has a prime number on the other side?”



(A) 2

(B) 3

(C) 4

(D) 5

(E) 6

**Problem 14.** If all alligators are ferocious creatures and some creepy crawlers are alligators, which statement(s) must be true?

I. All alligators are creepy crawlers.

II. Some ferocious creatures are creepy crawlers.

III. Some alligators are not creepy crawlers.

(A) I only

(B) II only

(C) III only

(D) II and III only

(E) None must be true

**Problem 15.** A number of bacteria are placed in a container. One second later each bacterium divides into two, the next second each of the resulting bacteria divided in two again, et al. After one minute the container is full. When was the container half full?

(A) 58

(B) 59

(C) 60

(D) 120

(E) 119

**Problem 16.** If the two statements below are true, which of the following statements must also be true?

(1) Alex sometimes goes to adventure movies.

(2) Betsy never goes to comedy movies.

I. Alex never goes to comedy movies.

II. Betsy sometimes goes to adventure movies.

III. Alex and Betsy never go to comedy movies together.

(A) I only      (B) II only      (C) III only      (D) I and III      (E) II and III

**Problem 17.** The four children in the Jones family are Alex, Bob, Cathy, and Debra. Bob is neither the youngest nor the oldest. Debra is one of the two younger children. Cathy is the oldest child. Alex is often taking care of his younger brother and sister. Who is the youngest child?

(A) Bob      (B) Debra      (C) Alex      (D) Cathy  
(E) It cannot be determined from the information

**Problem 18.** Sam is not a member of the math club, then from which of the following statements can it be determined whether or not Sam is in the science club?

(A) Anyone in the math club is not in the science club.  
(B) No one is in both the math club and the science club.  
(C) Anyone who is not in the math club is not in the science club.  
(D) Everyone in the math club is in the science club.  
(E) Some people who are not in the math club are not in the science club.

**Problem 19.** If the statement “If a number is in list  $A$ , it is not in list  $B$ ” is true, which of the following statements must also be true?

(A) If a number is not in list  $A$ , it is in list  $B$ .  
(B) If a number is not in list  $B$ , it is in list  $A$ .  
(C) If a number is in list  $B$ , it is not in list  $A$ .  
(D) If a number is in list  $B$ , it is in list  $A$ .  
(E) If a number is in list  $A$ , it is also in list  $B$ .

**Problem 20.** The Hope Middle School has three clubs: math, reading, and writing. Five students from a family each participated in one club only. The statements below are about what these five students participated. If  $n$  is the number of students who participated in the reading club, which of the following statements is true?

The first student participated in the math club.

The second student did not participate in the math club.

The third student participated in the reading club.

The fourth student participated in the same club as the first student.

The fifth student participated in the same club as the second student.

- (A)  $n$  must be 1.    (B)  $n$  must be 2.    (C)  $n$  must be 3.    (D)  $n$  must be 1 or 2.  
(E)  $n$  must be 1 or 3.

**Problem 21.** If the statement “Some integers in set  $X$  are odd” is true, which of the following must also be true?

- (A) If an integer is odd, it is in set  $X$ .                      (B) If an integer is even, it is in set  $X$ .  
(C) All integers in set  $X$  are odd.                              (D) All integers in set  $X$  are even.  
(E) Not all integers in set  $X$  are even.

**Problem 22.** If all boys in the math club are good at math. Which of the following statements must be true?

- (A) No boy whose math is not good is a member of the math club.  
(B) All boys whose math is good are members of the math club.  
(C) All boys who are not members of the math are not good at math.  
(D) Every member of the math club whose math is good is a boy.  
(E) There is one boy in the math club whose math is not good.

**Problem 23.** At Hope High School, some members of the math club are on the science team and no members of the science team are 9th graders. Which of the following must also be true?

- (A) No members of the math club are 9th graders.  
(B) Some members of the math club are 9th graders.

- (C) Some member of the math club are not 9th graders.
- (D) More 9th graders are on the science team than are in the math club.
- (E) More 9th graders are in the math club than are on the science team.

**Problem 24.** The teacher whispers positive integer  $A$  to Anna,  $B$  to Brett, and  $C$  to Chris. The students don't know one another's numbers but they do know that the sum of their numbers is 14. Anna says, "I know that Brett and Chris have different numbers". Then Brett says, "I already knew that all three of our numbers were different". Finally, Chris announces, "Now I know all three of our numbers". What is the product  $ABC$ ? (Mathcounts)