

## Football Field Mathematics

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### ADDITIONAL PROBLEMS

Suppose that you are a Detroit Lions player, defending goal A, attempting to move the ball to goal B. Let  $A_{\text{initial}}$  (or  $B_{\text{initial}}$ ) be the initial position of the ball,  $G$  be the yards gained,  $L$  be the yards lost, and  $A_{\text{final}}$  (or  $B_{\text{final}}$ ) be the final position of the ball on the field. Explain how to find the following.

5. Find the final position of the ball, given the initial position  $A_{\text{initial}}$  and  $G$ . There are 4 cases to consider:
  - a. If  $\text{initial} + G < 50$ , then the final position of the ball is \_\_\_\_\_.
  - b. If  $\text{initial} + G = 50$ , then the final position of the ball is \_\_\_\_\_.
  - c. If  $\text{initial} + G > 50$ , then the final position of the ball is \_\_\_\_\_.
  - d. If  $\text{initial} + G = 100$ , then the final position of the ball is \_\_\_\_\_.
6. Compute the loss,  $L$ , given the initial position  $B_{\text{initial}}$  and final position  $B_{\text{final}}$ . (See problem 3d.)
7. Find the gain  $G$ , given the initial position  $A_{\text{initial}}$  and final position  $B_{\text{final}}$ . (See problem 3c.)

### SOLUTIONS

Note: For some of these entries, other methods may also be used.

1. The length of the punt was 66 yards.
2. The ball was placed at the Lions' 21-yard line (A21).

3.

Initial Position	Yards Gained (G)	Yards Lost (L)	Final Position
a. A20	10		A30
b. B45	5		B40
c. A35	25		B40
d. B23		8	B31
e. A10	30		A40
f. B28		25	A47

4. The final position of the ball is  $B_{(\text{initial} - G)}$ , which is goal A when  $G = \text{initial}$ .
5.
  - a. If  $\text{initial} + G < 50$ , then the final position of the ball is  $A_{(\text{initial} + G)}$ .
  - b. If  $\text{initial} + G = 50$ , then the final position of the ball is 50.
  - c. If  $\text{initial} + G > 50$ , then the final position of the ball is  $B_{[100 - (\text{initial} + G)]}$ .
  - d. If  $\text{initial} + G = 100$ , then the final position of the ball is goal B.
6. The loss is  $\text{final} - \text{initial}$ .
7. The gain is  $100 - (\text{initial} + \text{final})$ .