

# Backgammon Quiz

with your *Hostess*

Jenny Quinn

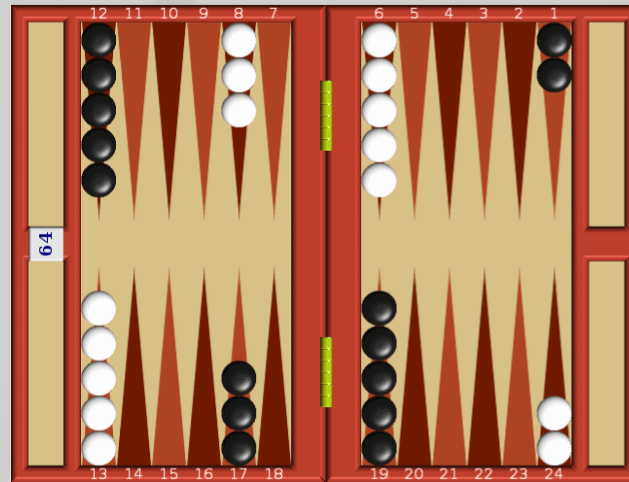
and *Backgammon Expert*

Art Benjamin

# Rules of Participation

- Individual participation (no teams please)
- There are 10 questions, some are multiple choice, some are short answer.
  - Label each question and clearly write your answer.
  - Exchange sheet with neighbors for grading.
  - Reveal and explain the answers.
- Top scorers will roll-off for the grand prize of \$200.

# Question 1

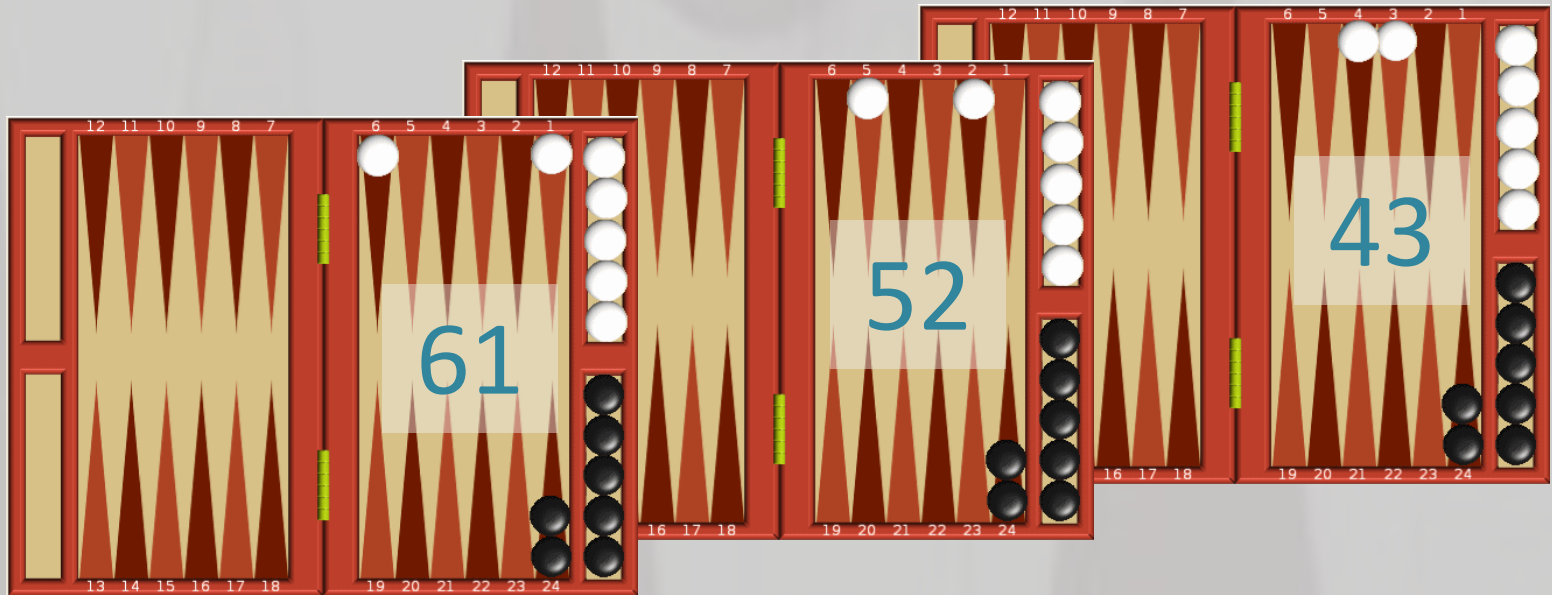


What is the minimum distance that all of the white checkers have to move to be off the board?

*Give a numerical answer.*

# Question 2

A. Which of white's bearoff positions is *most* likely to be off in one roll?



B. Which of white's bearoff positions is *least* likely to be off in one roll?

# Question 3

How many ways can 15 identical checkers be allocated among 6 points?

*Some of the points are allowed to be empty.*

a)  $6^{15}$

b)  $6^{15} / 15!$

c)  $\binom{21}{6}$

d)  $\binom{20}{5}$

e)  $\binom{20}{14}$

# Question 4

In backgammon, what is the average number of pips per roll?

*Remember that doubles count twice:*

4 pips with double 1s,

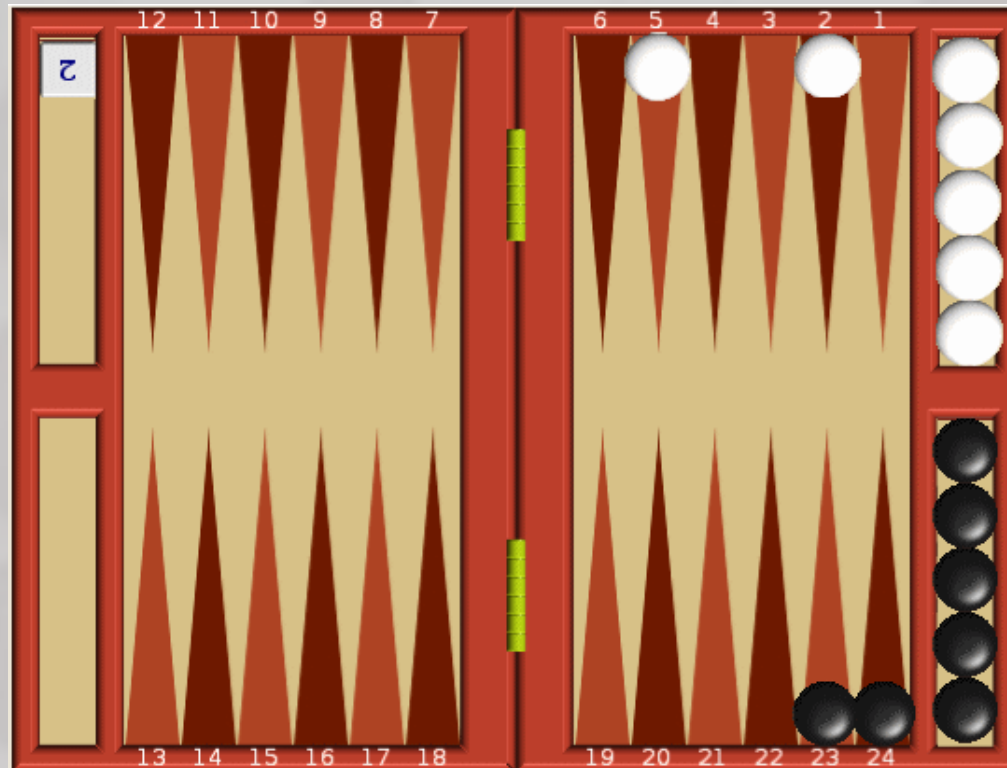
8 pips with double 2s,

⋮

24 pips with double 6s.

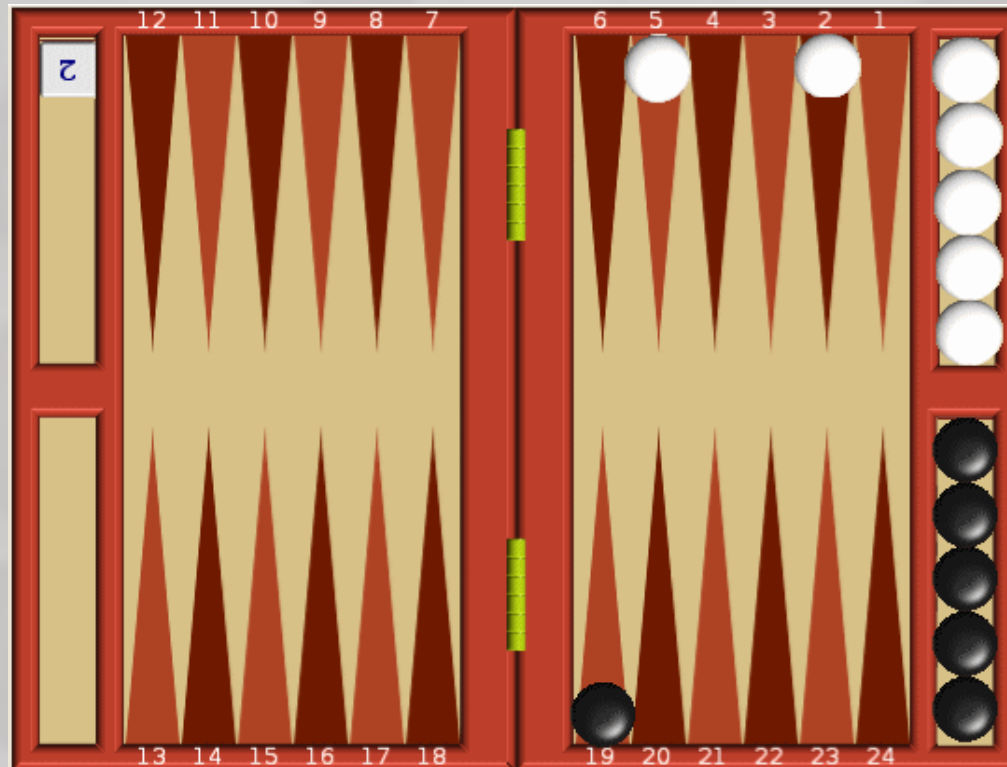
# Question 5

- A. For the given board, should white double?
- B. If white doubles, should black take?



# Question 6

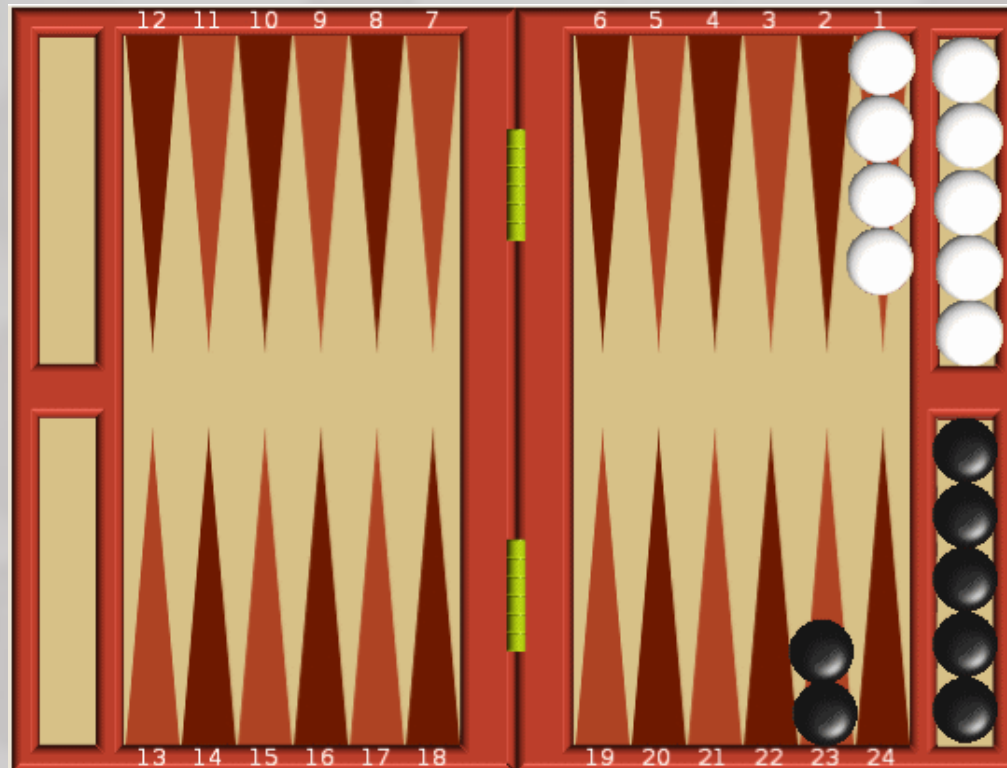
- A. For the given board, should white double?
- B. If white doubles, should black take?





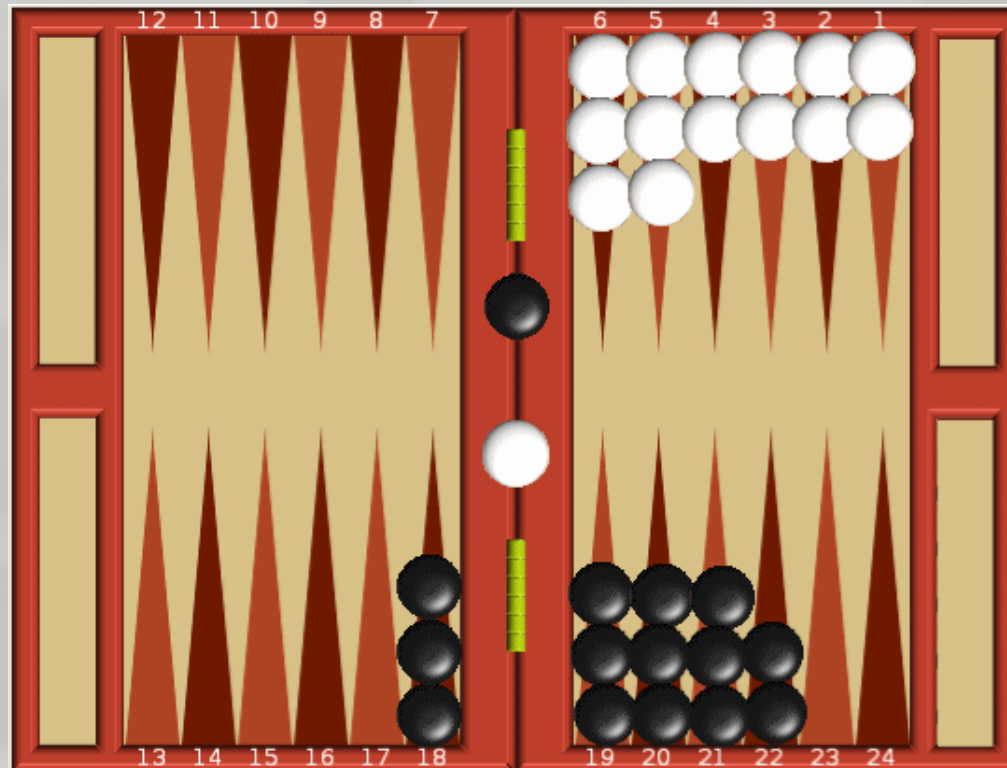
# Question 7

What are white's chances of winning?



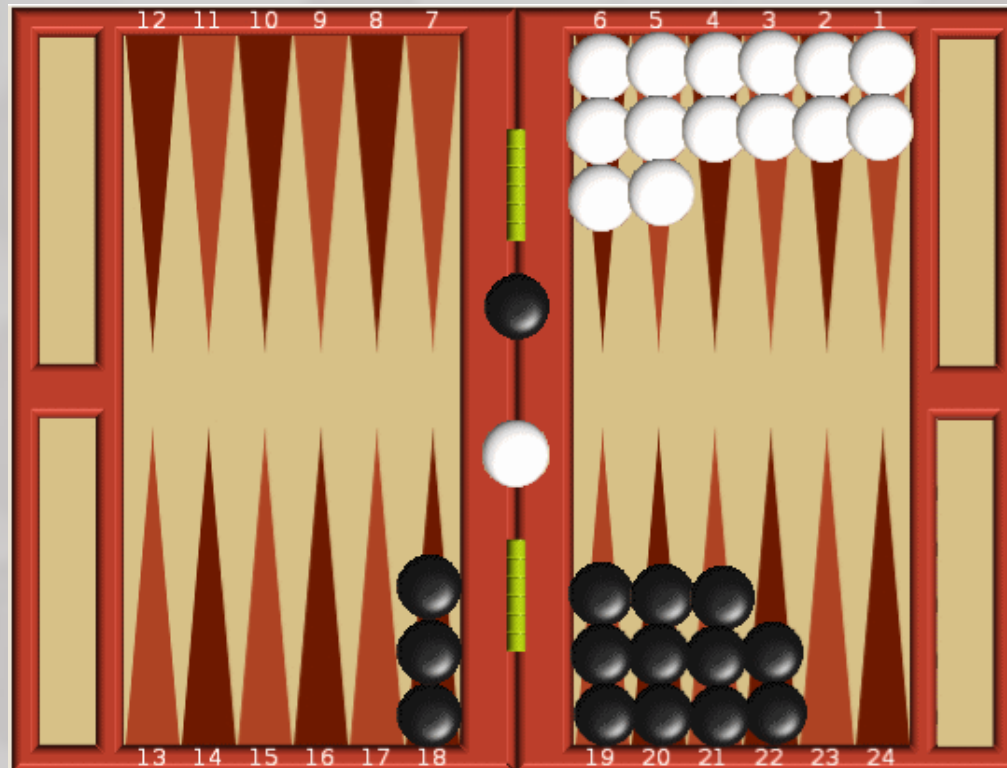
# Question 8

On average, how many rolls does it take for white to enter his checker?



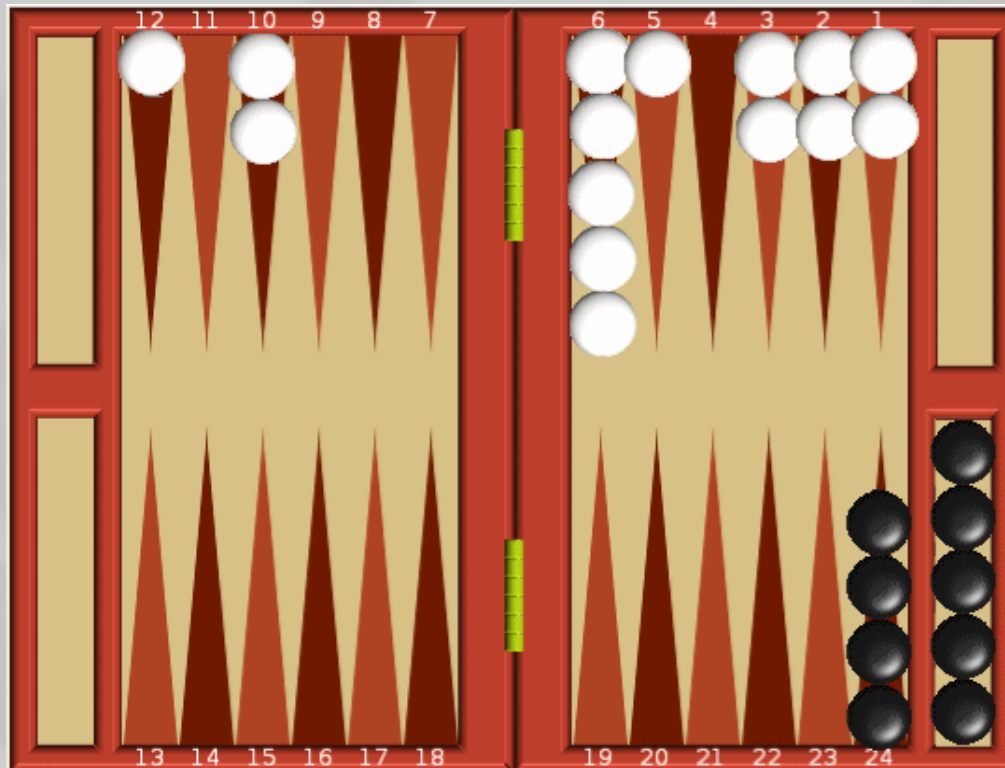
# Question 9

What is the probability that white takes 4 or more rolls to get in?



# Question 10

How should white play the roll 2-1 to maximize the chance of getting off of the gammon?



# Ready or Review?

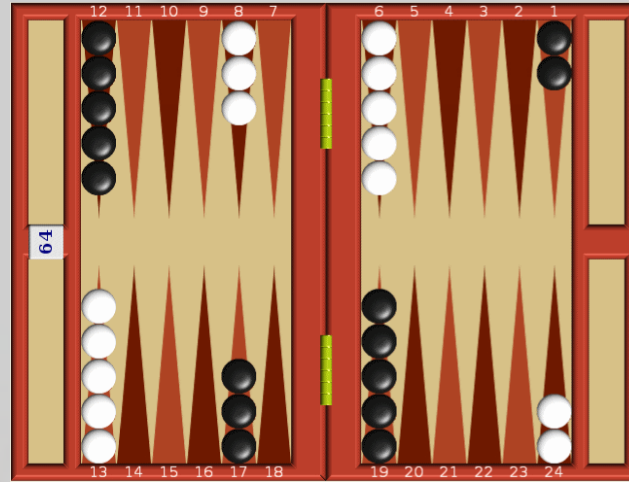
- Question 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10?

If no more questions.....

exchange with a neighbor

*(Make sure your name is on your paper!)*

# Question 1



Black checker on the 6  
levels 6 pips.  
The 8 point  
pips, and so

What is the minimum distance that all of the white checkers have to move to be off the board?

*Give a numerical answer.*

**167 pips**

(1 point)

# Question 2

A. Which of white's bearoff positions is *most* likely to be off in one roll?

15 rolls  
B: 61  
least  
(1 point)

19 rolls  
A: 52  
most  
(1 point)

17 rolls  
43

B. Which of white's bearoff positions is *least* likely to be off in one roll?

# Question 3

How many ways can 15 identical checkers be allocated among 6 points?

*Some of the points are allowed to be empty.*

a)  $6^{15}$

b)  $6^{15} / 15!$

c)  $\binom{21}{6}$

d)  $\binom{20}{5}$

e)  $\binom{20}{14}$

(1 point)



# Question 4

In backgammon, what is the average number of pips per roll?

*Remember that doubles count twice:*

4 pips with double 1s,  
8 pips with double 2s,  
⋮  
24 pips with double 6s.

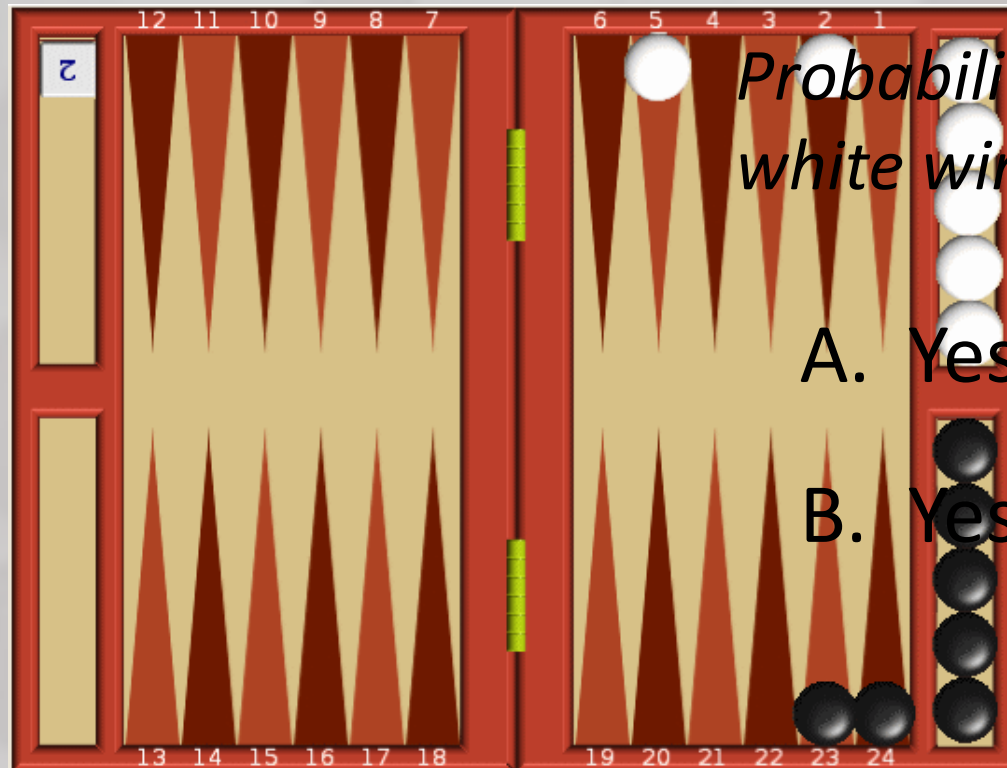
Answer:  $8 \frac{1}{6}$

*If you ignore doubles, the average role is 7. But  $\frac{1}{6}$ <sup>th</sup> of the time, because of rolling doubles, you get an additional 7.*

(1 point)

# Question 5

- A. For the given board, should white double?
- B. If white doubles, should black take?



*Probability that white wins is 19/36.*

A. Yes

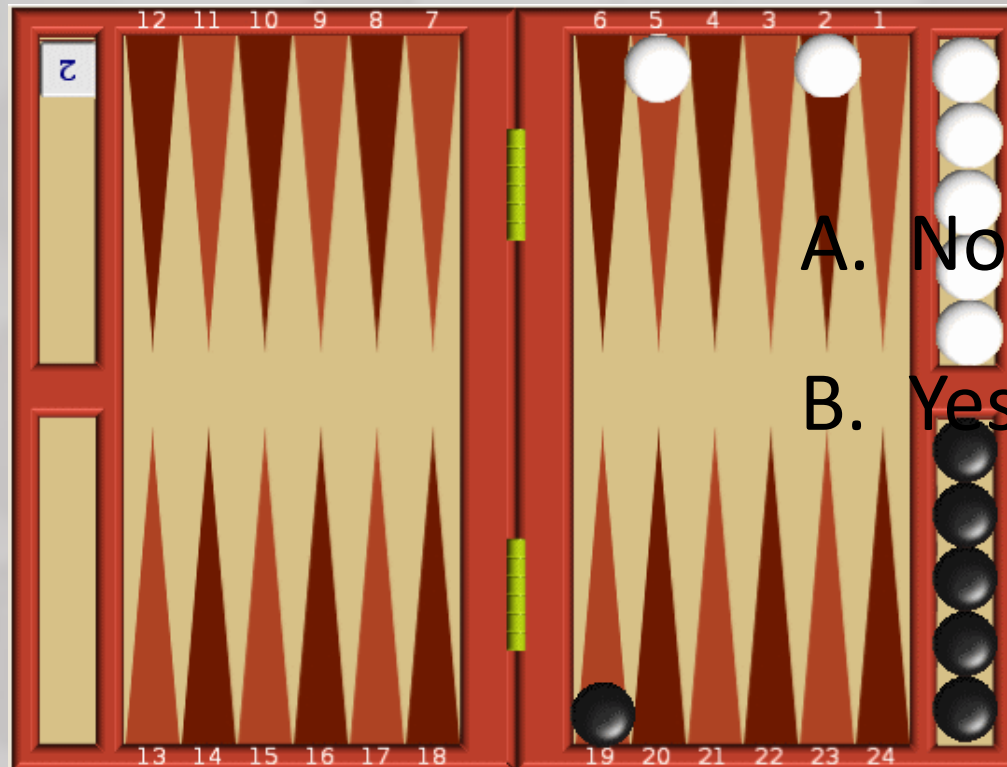
(1 point)

B. Yes

(1 point)

# Question 6

- A. For the given board, should white double?
- B. If white doubles, should black take?



A. No

(1 point)

B. Yes

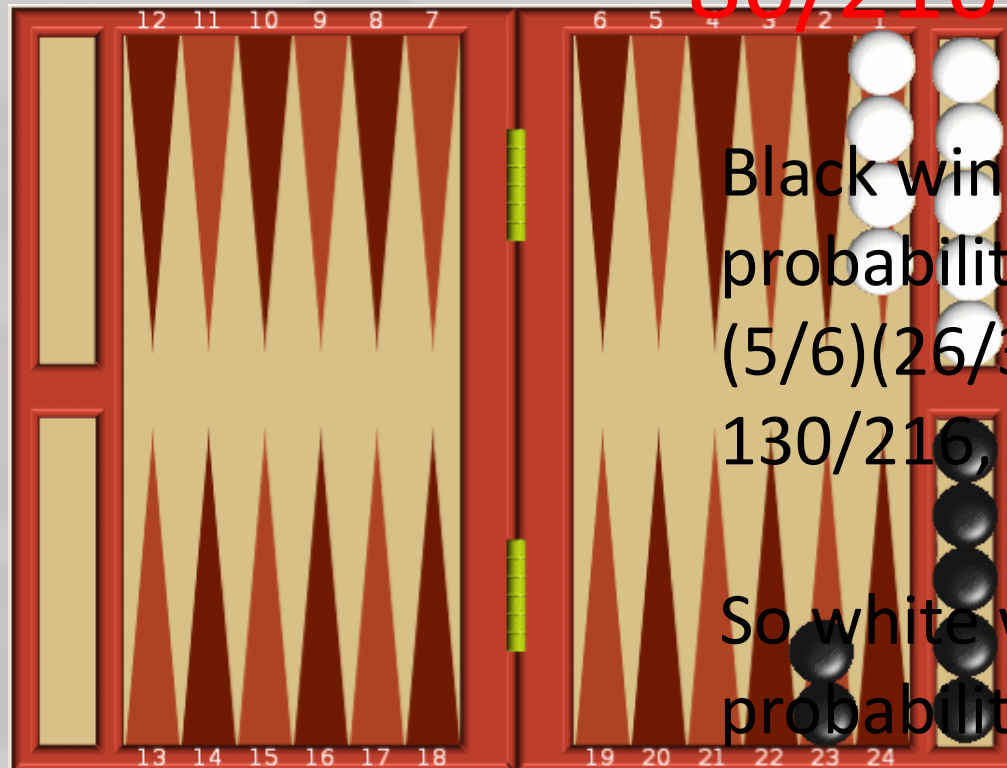
(1 point)

# Question 7

What are white's chances of winning?

$86/216$

(1 point)



Black wins with probability

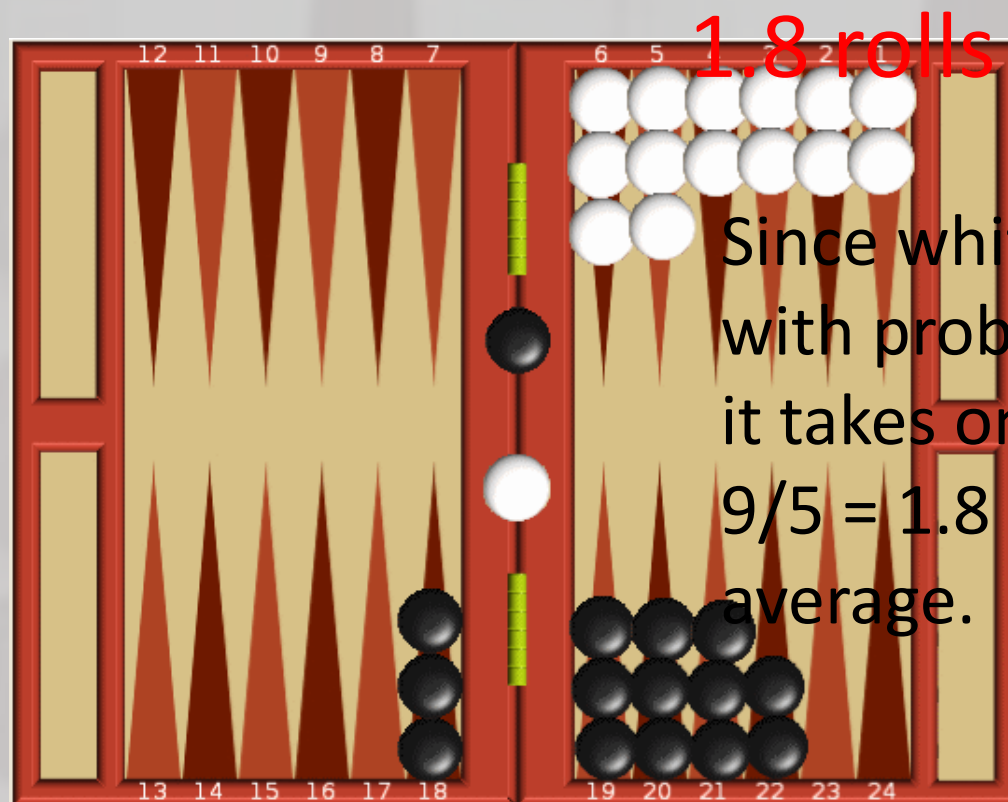
$$(5/6)(26/36) =$$

$$130/216,$$

So white wins with probability  $86/216$ .

# Question 8

On average, how many rolls does it take for white to enter his checker?

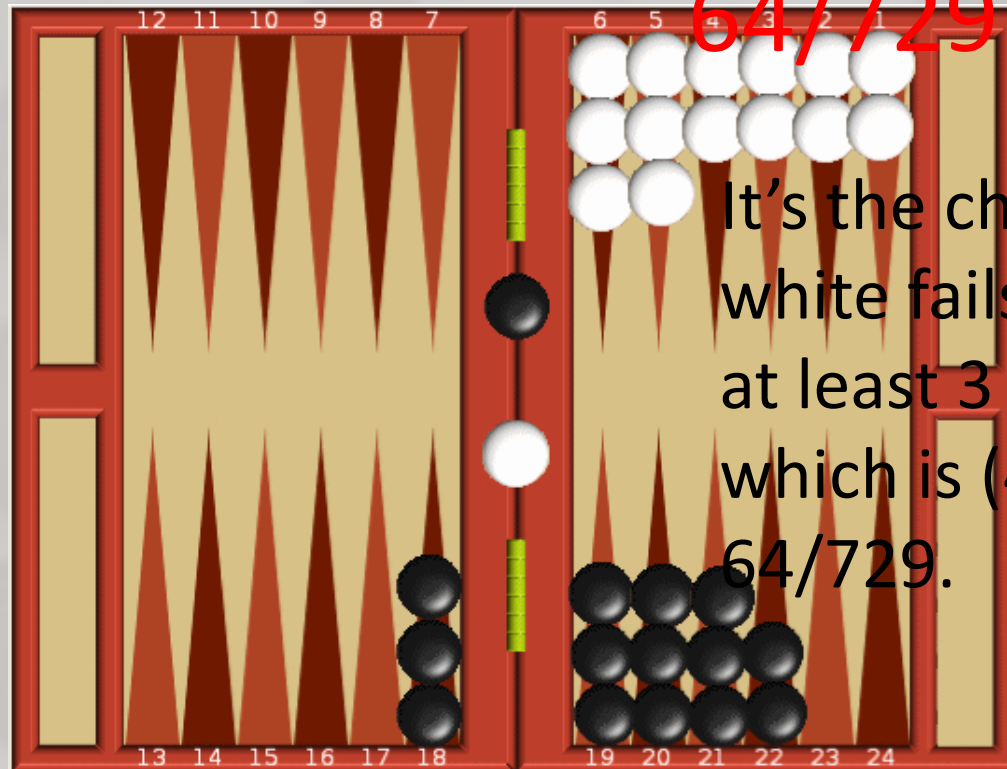


(1 point)

Since white enters with probability  $5/9$ , it takes on average  $9/5 = 1.8$  rolls, on average.

# Question 9

What is the probability that white takes 4 or more rolls to get in?

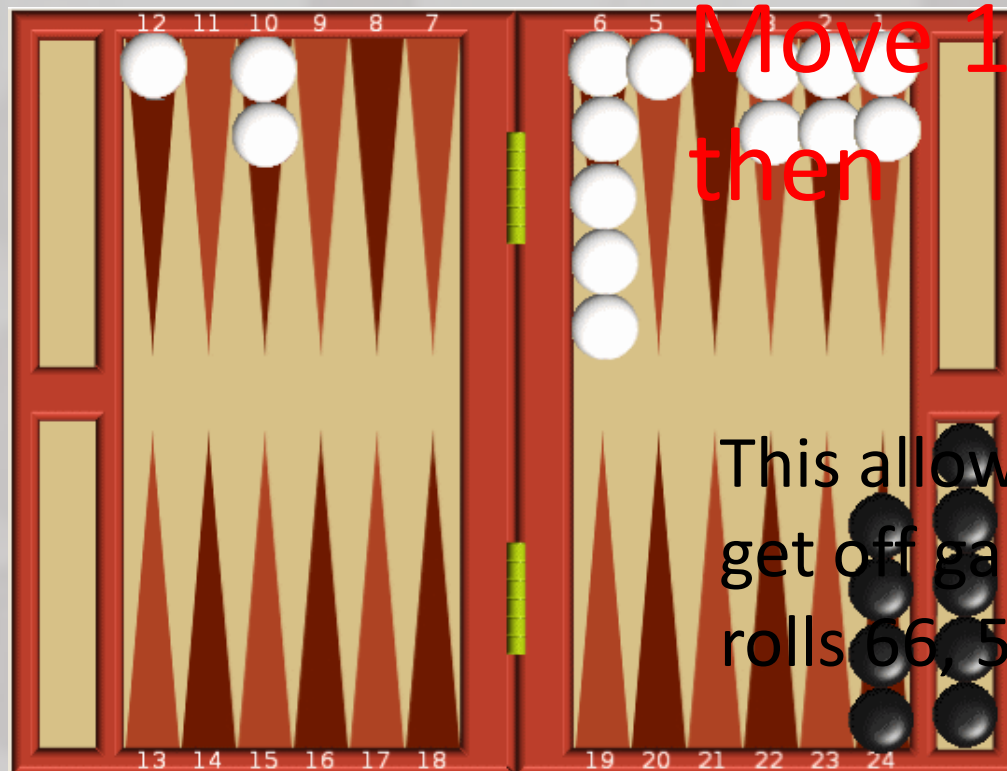


(1 point)

It's the chance that white fails to get in at least 3 times, which is  $(4/9)^3 = 64/729$ .

# Question 10

How should white play the roll 2-1 to maximize the chance of getting off of the gammon?



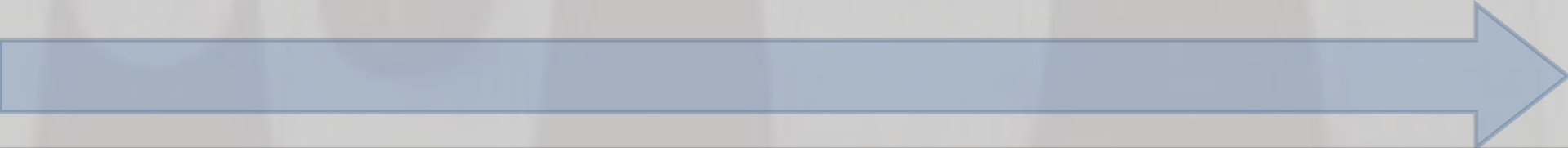
Move 12 to 10  
then 5 to 4.

(1 point)

This allows white to  
get off gammon with  
rolls 66, 55, and 44.

# Lucky 13 Anyone?

- 12
- 11
- 10
- 9
- 8
- 7
- 6





# Roll off

- In backgammon it is *sometimes* better to be lucky than skillful.

Thanks to



especially Gerard Venema