

NAME (Print!):

KEY

Quiz 5

Problem 1, 8 points: How many strings of six lowercase letters of the English alphabet (21 consonants and 5 vowels) contain

- (1) exactly one vowel?
- (2) exactly two vowels?
- (3) at least one vowel?
- (4) at least two vowels?

Justify your answer.

(1) $6 \cdot 5 \cdot 21^5$
↑ ↑ ↑
choice of spot choice of vowel consonants in 5 spots

(2) $\binom{6}{2} 25 \cdot 21^4$
↑ ↑
spots vowels

(3) $26^6 - 21^6$
↑ ↑
all no vowels

(4) $26^6 - 21^6 - 6 \cdot 5 \cdot 21^5$
↑ ↑ ↑
all no vowels exactly 1 vowel

Problem 2, 2 points: What is the minimum number of students, each of whom comes from one of 50 states, who must be enrolled in a university to guarantee that there at least 100 who come from the same state?

$$50 \cdot 99 + 1$$