

Part 4 Practice Free Response

2011 Form A #2

1. The table below shows the political party registration by gender of all 500 registered voters in Franklin Township.

PARTY REGISTRATION–FRANKLIN TOWNSHIP

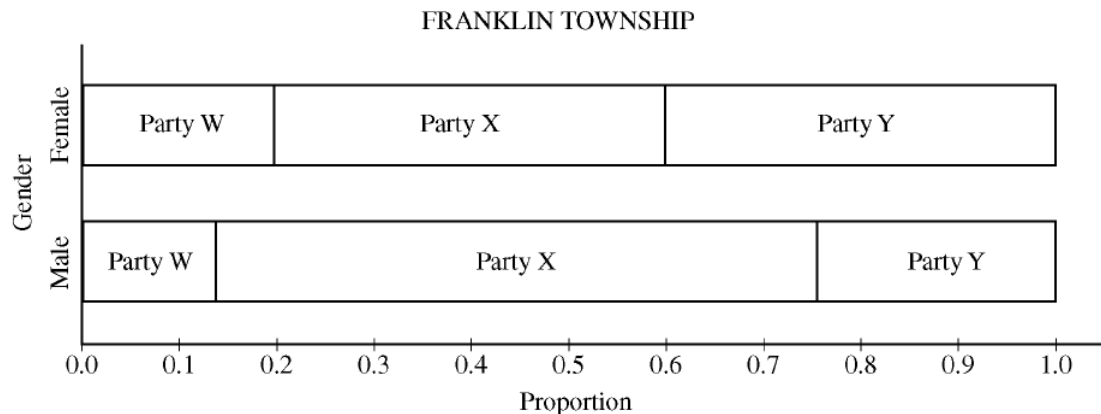
| | Party W | Party X | Party Y | Total |
|--------|---------|---------|---------|-------|
| Female | 60 | 120 | 120 | 300 |
| Male | 28 | 124 | 48 | 200 |
| Total | 88 | 244 | 168 | 500 |

(a) Given that a randomly selected registered voter is male, what is the probability that he is registered for Party Y?

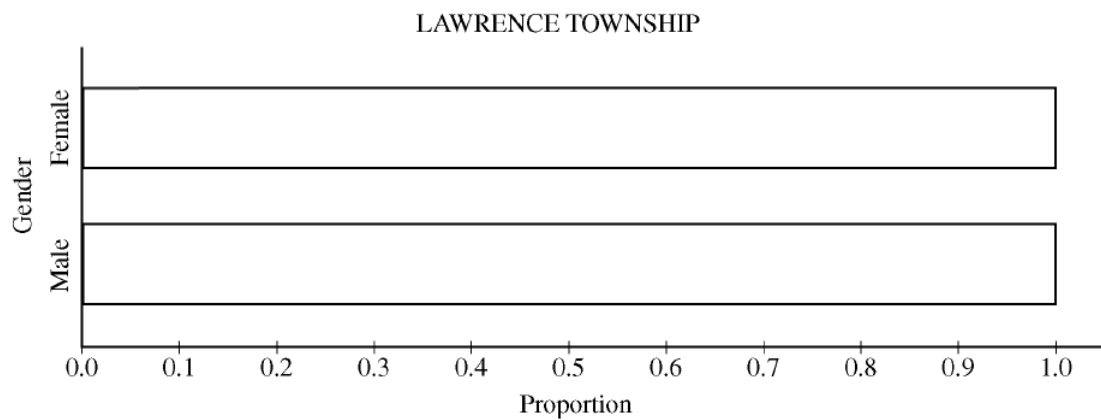
(b) Among the registered voters of Franklin Township, are the events “is a male” and “is a registered for Party Y” independent? Justify your answers based on probabilities calculated from the table above.

(c) One way to display the data in the table is to use a segmented bar graph. The following segmented bar graph, constructed from the data in the party registration – Franklin Township table, shows party-registration distributions for males and females in Franklin Township.

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In Lawrence Township, the proportions of all registered voters for Parties W, X, and Y are the same as for Franklin Township, and party registration is independent of gender. Complete the graph below to show the distributions of party registration by gender in Lawrence Township.



2010 Form B #3

3. A test consisting of 25 multiple-choice questions with 5 answer choices for each question is administered. For each question, there is only 1 correct answer.

(a) Let X be the number of correct answers if a student guesses randomly from the 5 choices for each of the 25 questions. What is the probability distribution of X ?

This test, like many multiple-choice tests, is scored using a penalty for guessing. The test score is determined by awarding 1 point for each question answered correctly, deducting 0.25 point for each question answered incorrectly, and ignoring any question that is omitted. That is, the test score is calculated using the following formula.

$$\text{Score} = (1 \times \text{number of correct answers}) - (0.25 \times \text{number of incorrect answer}) + (0 \times \text{number of omits})$$

For example, the score for a student who answered 17 questions correctly, answered 3 questions incorrectly, and omits 5 questions is

$$\text{Score} = (1 \times 17) - (0.25 \times 3) + (0 \times 5) = 16.25$$

(b) Suppose a student knows the correct answers for 18 questions, answers those 18 questions correctly, and chooses randomly from the 5 choices for each of the other 7 questions. Show that the expected value of the student's score is 18 when using the scoring formula above.

(c) A score of at least 20 is needed to pass the test. Suppose a student knows the correct answer for 18 questions, answers those 18 questions correctly, and chooses randomly from the 5 choices for each of the other 7 questions. What is the probability that the student will pass the test?