EXAM 5 REVIEW SHEET
Part I Questions

1. Which of the following could *not* be the probability that event A occurs?
    (1) $\frac{3}{5}$ (2) 0.49   (3) 1.25   (4) $\frac{1}{2}$

2. The following table shows the results of a survey of people in terms of what type of breakfast they prefer. Based on the table, what is the probability that a person picked at random is over 40 and eats eggs for breakfast?
    (1) 0.32   (3) 0.63
    (2) 0.47   (4) 0.82

	Eats Cereal	Eats Eggs
40 and under	23	17
Over 40	21	29

3. If a standard six sided die is rolled once, what is the probability that the number rolled is either an even or a multiple of 3?
    (1) $\frac{1}{6}$ (2) $\frac{1}{2}$ (3) $\frac{5}{6}$ (4) $\frac{2}{3}$

4. Prime numbers are positive integers that are only divisible by 1 and themselves, i.e. the set $\{2, 3, 5, 7, ...\}$. If a random number is generated from 1 to 20, what is the probability that it is *not* prime?
    (1) 0.2   (2) 0.5   (3) 0.6   (4) 0.8

5. Of all the tourists who visit Florida, 38% of them will visit an amusement park and 54% will visit a beach. If 22% will visit both an amusement park and a beach, then what percent will visit either a park or a beach?
    (1) 16%   (2) 70%   (3) 30%   (4) 92%

6. If a restaurant is chosen at random in Rhinebeck then there is an 84% chance that it is open on Sunday and a 42% chance that it is open on Monday. If there is a 96% chance it is open on either Sunday or Monday, what is the probability that it is open both days?
    (1) 30%   (2) 38%   (3) 44%   (4) 50%

7. A single standard six-sided die is rolled. What is the probability the roll is a multiple of three given that it is an even number?
    (1) $\frac{1}{6}$ (2) $\frac{1}{3}$ (3) $\frac{1}{2}$ (4) $\frac{5}{6}$

8. The probability on any given work day that Kirk gets less than five hours of sleep the night before and doesn't shave is 0.65. If there is a 0.80 probability on any given day that he doesn't shave and a 0.70 probability he gets less than five hours of sleep, then what is the probability he doesn't shave given that he got less than five hours of sleep?
    (1) 0.73   (2) 0.78   (3) 0.81   (4) 0.93

9. If two events, A and B, are independent then which of the following statements is always true about their probabilities?
    (1) $P(\text{A or B}) = P(A) + P(B)$ (3) $P(\text{A and B}) = P(A) \cdot P(B)$
    (2) $P(A) + P(B) = 1$ (4) $P(B) = \frac{1}{P(A)}$

10. A die is rolled three times and a curious pattern emerges. On the first roll, the number is greater than 3. On the second roll, the number is greater than 4, and on the third roll, the number is greater than 5. If all three rolls are independent, what is the probability that this occurs?
    (1) $\frac{1}{36}$ (2) $\frac{1}{9}$ (3) $\frac{1}{8}$ (4) $\frac{1}{12}$

11. Subjects in a sleep study are separated by age into two groups. This separation is done to observe which of the following types of variability?
    (1) Measurement   (2) Natural   (3) Induced   (4) Sample

12. In which of the following cases would a survey be more appropriate than an experimental study?
    (1) A study to determine how age affects the number of hours of sleep a person gets.
    (2) A study to determine the most popular show on television on a given night.
    (3) A study to determine the commute time to work based on geographic location.
    (4) A study to determine if a particular drug lowers cholesterol.

13. On the first day of a small local fair, 55 children, 20 adults, and 25 senior citizens were admitted. If children's tickets cost $5.00 each, adult tickets cost $8.00 each and senior citizen tickets cost $6.00 each, what was the mean ticket price for all 100 people who entered?
    (1) $6.35   (2) $5.20   (3) $5.85   (4) $6.33

14. In which of the following situations is a survey least likely to contain bias?
    (1) surveying a sample of people leaving a concert about their favorite musicians
    (2) surveying the members of a basketball team to determine the average height of high school boys
    (3) surveying people leaving a grocery store about their political party affiliation
    (4) surveying teenagers who use social networking websites about their favorite communication methods

15. In a survey of 236 freshmen, it was found that 151 of them owned cell phones. Which of the following is closest to the proportion of freshmen who do not own cell phones?
    (1) 0.21   (2) 0.36   (3) 0.43   (4) 0.64

16. Students did poorly on a recent test, so their teacher decided to add 6 points to each student's grade. Which of the following statistical measures would not be affected by the addition of these points?
    (1) the mean   (2) the first quartile   (3) the median   (4) the standard deviation

17. In 2013, the mean gas mileage for cars was 27.6 miles per gallon. If the distribution of gas mileage in cars is normal with a standard deviation of 3.8 miles per gallon, then what percent of cars had gas mileages between 20 and 30 miles per gallon?
(1) 28%   (2) 56%   (3) 71%   (4) 98%

18. The gestation time (number of days before birth) for cows is normally distributed with a mean of 284 days and a standard deviation of 12 days. At a local ranch, over the course of a year there are 820 calf births. Of these, how many would be expected to have a gestation time less than 270 days?
(1) 12   (2) 78   (3) 100   (4) 237

19. A value's percentile rank is the percent of a data set that lies at or below it. On a standardized test where the scores were normally distributed, Jeremy's score was 1.75 standard deviations above the mean. Which of the following is closest to his percentile rank?
(1) 54th   (2) 67th   (3) 83rd   (4) 96th

Part II Questions

20. In a local neighborhood, there are nine total children who range in age from three years old to eleven. Their names, genders, and ages are shown below arranged in alphabetical order.
    (a) If a child is chosen at random, what is the probability they are a girl?
    (b) What is the probability that a child chosen at random will have a name beginning with an E given they are a girl?
    (c) If a child is chosen at random, what the probability they are either a girl or older than 6?
    (d) If a child is chosen at random, is the child being less than 7 independent of the child's gender? Explain how you arrived at your answer.

Name	Gender	Age
Evie	Girl	7
Elliette	Girl	8
Luca	Boy	6
Max	Boy	11
Niko	Boy	5
Phoebe	Girl	3
Rosie	Girl	7
Zeke	Boy	7
Zoe	Girl	6

21. Fraz is running a science fair experiment where mice run through a maze with 4 turns. At each turn, the mouse can take a right or a left. A mouse will find an exit if they either take two rights followed by two lefts or a left followed by two rights and then a left again. Assuming that each turn is independent of all previous ones, what it the probability that a mouse will find an exit. Show how you arrived at your answer.

22. A school system did not use up all of its snow days and will get four of them back as vacation days, either in April or in May. A survey was done amongst the student body to determine the preference for which month to have the days off. The results are presented below arranged by class.
    (a) What percent of the students preferred having the days off in April? Round to the nearest percent.
    (b) If a student from this survey was chosen at random, what is the probability they would be an upperclassman (11th or 12th) and preferred having days off in May?
    (c) If a student is chosen at random, what is the probability that they are a 10th grader given that they preferred to have the days off in April?
    (d) Is the preference for the month independent of the grade of the student? Explain how you made your determination.

	April	May
9th Grade	166	64
10th Grade	160	96
11th Grade	124	117
12th Grade	88	132

23. In a survey of 500 high school students, 85% said they liked pizza while 68% said they liked hot dogs and 61% reported liking both. How many students in the survey reported liking neither pizza nor hot dogs? Show how you arrived at your answer.

24. Mr. Richmond's traffic engineering class is trying to determine people's attitudes towards their evening commute. Students in his class decide to stop drivers on their way home to conduct this survey. Why would this survey method introduce bias into their results?

25. At a local PTA meeting, a sample of parents were surveyed to determine how many children they currently had attending school. Their results are shown in the frequency table on the right:

Determine the mean, median, and standard deviation for this sample. Round any non-integer answers to the nearest tenth.

Determine how many of the 55 families surveyed have a number of children that was within one standard deviation of the mean. Show your analysis.

Number of Children	Number of Families
1	16
2	24
3	8
4	3
5	2
7	2

26. The scores on a standardized test that Jeremy took were normally distributed with a mean of 82 and a standard deviation of 5. On the test, Jeremy scored a 90.
    (a) What percent of students scored better than Jeremy on this test? Round to the nearest tenth of a percent.
    (b) If Lisa took the same test, at a different time, and the scores were again normally distributed with a mean now of 83 and a standard deviation of 6.4, then what score, to the nearest integer, would make her percentile rank the same as Jeremy's? Show how you arrived at your answer.

27. Environmental engineers are trying to determine the characteristic fuel economy of cars on the road today. They surveyed 250 drivers about their cars and found the following distribution of fuel efficiencies as rated by the miles per gallon that a given car used while driving on the highway.

Find the mean and standard deviation for this sample of cars. Round both answers to the nearest *hundredth* of a mile per gallon.

Determine the percent of these cars that fall within one standard deviation of the mean. Would this sample be well modeled by a normal distribution? Explain your response.

Fuel Efficiency (mpg)	Number of Cars
12	2
16	5
18	20
19	35
22	68
26	52
29	30
32	18
45	5