

## **Study Guide for Exam 2**

Overall, make sure you understand the topics and problems below and all homework problems.

### **Definitions and Formulas**

1. Empirical probability
2. Mutually exclusive events
3. Independent events
4. Theoretical probability
5. Curve, Simple and Closed
6. Convex and Concave figures
7. Polygon and Regular Polygon
8. Polyhedron

### **Formulas**

1. The Addition Principle of Counting
2. The Multiplicative Principle of Counting
3. Combination
4. Permutation
5. Probability of Complementary Events
6. Expected value of an experiment
7. Sum of the measures of the exterior angles of a polygon
8. Sum of the measures of the interior angles of a polygon
9. Euler's Formula for Polyhedra

### **Probability**

1. Be able to analyze a given experiment and identify the different outcomes and the whole sample space.
2. Understand how to set up an experiment to calculate empirical probability.

3. Be able to relate empirical probability to statistics.
4. Know how to use a two-stage experiment to determine compound probability with events A and B.
5. Know the difference between an experiment with order where you count with a permutation and one without order where you count with a combination.
6. Recognize situations where it may be better to use complementary events to solve a problem.

### **Geometric Figures**

1. Be able to apply the Vertical-Angles Theorem, the Corresponding-Angles Property, and the Alternate-Interior-Angles Theorem.
2. Be able to determine if a point is in the interior or the exterior of a simple closed curve.
3. Know how to calculate the total turn of a closed curve or draw a closed curve for a given turn.
4. Know the different prefixes for polygons with 3 to 10 sides or polyhedra with 4 to 10 faces.
5. Be able to explain the concept of a vertex, edge, or face of a polyhedron to your students. (You do not need a formal definition.)
6. Understand the differences and similarities of the different types of triangles and quadrilaterals.
7. Be able to draw or identify different types of pyramids and prisms.
8. Know the names of the 5 regular polyhedra and the number and names of the face polygons which make up each polyhedron.

## Exercises

- For each part, name the regular polygon with the stated property.
  - The central angle has measure  $36^\circ$ .
  - The exterior angles each measure  $45^\circ$ .
  - The interior angles each measure  $140^\circ$ .
- There are 37 people applying for a job.
  - How many ways can the company rank the set of 37 applicants.
  - Suppose the company is going to hire the top 5 applicants. The top applicant will earn a salary of \$75,000. The second best applicant will earn \$70,000. The third best will earn \$65,000 and similarly for the fourth and fifth. How many ways can the company hire 5 people?
  - Suppose each of the 5 hires will earn the same amount of money. How many ways can the company choose their top 5 applicants?
- What is the relationship between a curve, a simple curve, and a closed curve? Give examples of each.
- Draw a straight angle.
  - Draw a oblique pentagonal prism.
  - Draw a concave decagon.
  - Draw an equilateral right triangle
  - Draw a sexogonal pyramid.
  - Draw a reflex angle.
- Allow 5 digit numbers beginning with zeros.
  - How many 5 digit numbers can be formed allowing repetition?
  - How many 5 digit numbers can be formed without repetition?
  - How many 5 digit numbers can be formed using the numbers 1,1,2,7,7?
  - How many 5 digit numbers can be formed using at least two 2's and allowing repetition?
- Is a circle a polygon? Why or why not?
- Josh has made the following statements about rectangles, squares, rhombuses, and trapezoids.
  - Rectangles are always squares.

- Rhombuses are never squares.
- Trapezoids are sometimes squares.

- (a) Which statements are correct and which are incorrect?
- (b) How would you explain to Josh the relationships between rectangles, squares, rhombuses, and trapezoids?
8. You want to test your skill at a carnival game. The first game you see is a bean bag game. You must toss your bean bag onto a painted board with a bullseye. 5% of the board is black, 10% is red, and 15% is blue. You win \$3 if your bag lands on the black dot in the middle. You win \$2 if your bag lands in the red ring and \$1 if your bag lands in the blue ring. You lose the \$2 you paid to play if the bag lands anywhere else. Assuming it is equally likely for your bag to land at any spot on the board, what is the expected value of this game?
9. The next game you see is a basketball toss. You must try for a basket two times. If you make both, you win \$10. If you make one, you win \$5. If you miss both, you win nothing. Suppose you are pretty good at basketball, and you have a 75% chance of making a basket on any shot. If it costs \$7 to play, what is the expected value of this game?
10. If your goal is to make money, which game would you rather play? Explain.
11. Draw a curve whose amount of total turn is
- (a)  $-360^\circ$
  - (b)  $+1080^\circ$
  - (c)  $0^\circ$

Assign a positive measure to counterclockwise turning.