

**CHAPTER FIVE: CIRCLES**

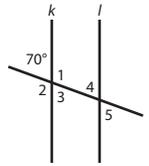
**Due Tuesday, May 23**

**5-A Congruent and Supplementary Angles**

complementary • supplementary • transversal • linear angles • vertical angles • corresponding angles • alternate exterior angles • alternate exterior angles

1 Use properties of angles to determine angle measures.

1 Given  $k$  and  $l$  are parallel in the diagram at right, state the relationship between the  $70^\circ$  angle and each of the other labeled angles, and use this to determine the measure of each labeled angle.



**5-B Components of Circles**

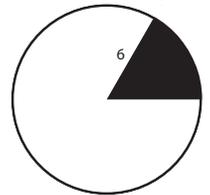
circle • radius • arc • semicircle • minor arc • major arc • sector • chord • diameter • central angle • inscribed angle • circumscribed angle • secant • tangent • normal

1 Find the measure of a circle's circumference and area based on its radius.

1 Find the circumference and area of a circle with radius 10.

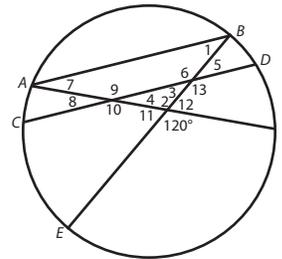
2 Find the measure of an arc and sector of a circle based on the radius and angle.

2 Find the arc length and sector area for the  $60^\circ$  angle shown at right.



3 Solve for the measure of an arc or angle in a circle.

3 Given  $\overline{AB}$  and  $\overline{CD}$  are parallel, and given  $\widehat{AE} = 72^\circ$ , find the measure of each angles 1 through 7.



**5-C Circle Theorems**

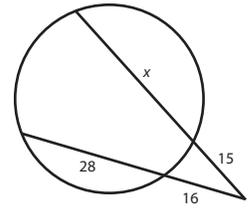
1 Sketch and label a diagram to illustrate a circle theorem.

1 Circumscribed angle theorem

2 Prove a circle theorem.

2 Circumscribed angle theorem

- ③ Use circle theorems to calculate measures of angles or lengths.  
 ③ Find the value of  $x$  in the diagram.



## CHAPTER SIX: PROBABILITY

Due Thursday, May 25

### 6-A Counting Methods

Pascal's triangle • factorial • choose • combination • sample space • fundamental counting principle • permutation

- ① Write the first  $n$  rows of Pascal's triangle.
- ② Write the  $n^{\text{th}}$  row of Pascal's triangle.
  - ② Write row 7 of Pascal's triangle.
- ③ Calculate  $n!$ 
  - ③  $5!$
- ④ Find the  $r^{\text{th}}$  element in the  $n^{\text{th}}$  row of Pascal's triangle.
  - ④ Find element 2 in row 7 of Pascal's triangle.
- ⑤ Count combinations.
  - ⑤ In how many ways can Naomi choose her 3 favorite songs from a playlist of 9 songs?
- ⑥ Find the total number of possible outcomes in a series of events.
  - ⑥ State the number of possible outcomes of the following.
    - a) Choose 3 representatives out of 9 seniors and 2 representatives out of 8 juniors.
    - b) Identify the 1<sup>st</sup> place, 2<sup>nd</sup> place, 3<sup>rd</sup> place, and 4<sup>th</sup> place finisher out of 25 racers.
- ⑦ Count permutations.
  - ⑦ In how many ways can Naomi choose her favorite, second favorite, and third favorite song from a playlist of 9 songs?
- ⑧ Find the size of a sample space by using permutations, if possible.
  - ⑧ Use combinations to express the size of the sample space for each of the following. Then rewrite the solution using permutations if possible, or explain why not.
    - a) Heather chooses her 3 favorite months.
    - b) Heather chooses her favorite, second favorite, and third favorite month.
    - c) Use a 6-sided die to choose a color for each of three teams.
    - d) Put 6 colors in a hat and draw three of them to choose a different color for each of three teams.

## 6-B Probability of a Single Event

mutually exclusive

① Read set notation.

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② State the following in words, given  $A$  is the set of aces and  $B$  is the set of black cards.

a)  $A$

b)  $U$

c)  $\emptyset$

d)  $|A|$

e)  $|U|$

f)  $A \cup B$

g)  $A \cap B$

h)  $|A \cap B|$

i)  $A'$

j)  $(A \cap B)'$

k)  $(A \cup B)'$

② Use the size of a sample space to find the probability of an event.

② Ryan draws two cards. Find the probability that...

a) the first card is a ace

b) both cards are aces

③ Find the probability of either of two events.

③ Find the probability of a card being as stated.

a) red or an ace

b) a 9 or an ace

## 6-C Conditional Probability

given • conditional probability

① Find probabilities based on given information.

① Find the following probabilities for Ryan's two cards.

a) The second card is an ace.

b) The second card is an ace, given the first card is an ace.

c) The first card is an ace, given the second card will be an ace.

② Make a table to calculate conditional probabilities for two events.

② 10% percent of the population has a certain disease. A test for this disease gives a positive result for 70% of people who have the disease and for 20% of people who do not. Show this information in a table, and use it to calculate the probabilities below.

a) a person tests positive.

b) a person has the disease and tests positive.

c) a person has the disease, given he or she tests positive.

## 6-D Probability of Specific Multiple Events

dependent events • independent events

### 1 Identify whether events are dependent or independent.

- 1 Juwan rolls three dice, checking for a 6 each time, and she draws two cards, checking for an ace each time.

### 2 Calculate the probability of multiple events.

- 2 Davin draws five cards. Calculate the probability that the first two cards are aces and the fourth card is not an ace.

## 6-E Probability of General Multiple Events

### 1 Calculate the probability of an event that can occur in different ways.

- 1 Kyley grabs 3 random pens from a drawer with 6 black pens, 4 red pens, and 1 purple pen. What is the probability that they are all the same color?

### 2 Calculate the probability of an event that can occur in different orders.

- 2 What is the probability that Kyley's 3 pens, above, are all different colors?

### 3 Calculate the probability of at least or at most $x$ out of $n$ occurrences of an event.

- 3 Find the probability that out of five 6-sided dice, at least two will roll a 6.

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## CHAPTER SEVEN: RESEARCH METHODS

Due Friday, May 26

## 7-A Samples and Populations

population • sample • sample size • random selection • sampling bias • population parameter • sample statistic • proportion • mean • standard deviation • probability • statistics

### 1 Identify samples and populations.

- 1 Brian surveys 20 random SVHS freshmen and 18 SVHS sophomores to ask whether or not they like having a weekly tutorial period.

### 2 Identify possible sources and consequences of sampling bias.

- 2 To see how long people can hold their breath, Heather times 20 students at break on how long they can hold their breath.

- ③ Label a mean, standard deviation, or proportion with the correct symbol.
- ③ Out of 25 juniors, 21 say they would rather go a week without a car than a week without a smartphone.
- ④ Distinguish between probability and statistics.
- ④ As of May 11, President Trump had a 36% approval rating among 1500 American adults.

## 7-B Statistical Conclusions

inferential statistics • hypothesis testing • null hypothesis • alternate hypothesis • one-tailed test • two-tailed test • reject the null • statistically significant • type I error • alpha • type II error • beta • power

- ① For a given prediction, identify the alternate hypothesis, the null hypothesis, and the number of tails.
- ① Solange hypothesizes that doing an additional version of the chapter review for this class increases test scores.

- ② State the meaning of a type I error and a type II error for a test.
- ② Solange hypothesizes that doing an additional version of the chapter review for this class increases test scores.

- ③ Identify factors leading to uncertainties about conclusions from statistical inference.
- ③ Solange hypothesizes that doing an additional version of the chapter review for this class increases test scores.

- ④ Calculate the standard deviation  $\sigma$  of a population.
- ④ Four random scores from a test taken by hundreds of people are 80, 92, 71, and 93.

- ⑤ Estimate the standard deviation of a population based on sample data.
- ⑤ Four random test scores on a test were 80, 92, 71, and 93.

## 7-C Experiments and Quasi-Experiments

independent variable • factor • level • experimental group • control group • placebo • dependent variable • operational definition • experimental design • random assignment • quasi-experimental design • correlational design • factorial design • causal relationship • affect • effect

- ① Identify an experiment or quasi-experiment's independent and dependent variables, and state the levels or operational definitions.
- ① Shannon predicts that starting each day with five minutes of yoga increases math grades and also causes students to be more interested in school, especially among girls.

- ② Distinguish between experimental, quasi-experimental, and correlational research designs.
  - ② Shannon predicts that starting each day with five minutes of yoga will increase math grades and also cause students to be more interested in school, especially among girls.
  
- ③ Interpret significant results with or without causation as appropriate.
  - ③ Wang and Kenny (2013) found that the more teenagers were harshly verbally disciplined by their parents, the more depressed and aggressive they tended to be.
  
- ④ Distinguish between *affect* and *effect* meaning *influence*.
  - ④ Even though people may seem to be un\_\_ffected, the things we say can have big \_\_ffects on others. Likewise, the way we say things can \_\_ffect others, whether or not we realize the \_\_ffect we are having.

## 7-D Confounds

extraneous variable • random error • confounding variable • systematic error

Last year, I hypothesized that if I gave a surprise pizza party it would result in higher grades for the students. I brought in pizza, candy and drinks for everyone in fifth period Statistics & Research Methods but not for third period Statistics & Research Methods. The following week I compared scores on the chapter test between the two periods.

- ① Identify possible confounding variables resulting from preexisting differences between participants in different conditions.
  - ①
  
- ② Identify possible confounding variables resulting from to differences in the procedure between different conditions.
  - ②
  
- ③ Identify possible confounding variables resulting from differences in timing or other environmental factors between different conditions.
  - ③
  
- ④ Identify possible extraneous variables that are not likely to be confounding.
  - ④
  
- ⑤ Explain the possible effects of specific extraneous and confounding variables on a study.
  - ⑤

## 7-E Between-Participants and Within-Participants Designs

between-participants design • within-participants design • sequence effects • counterbalancing

In the reverse Stroop test, participants are timed in matching 20 colored words to boxes of the same color, and, separately, in matching 20 colored words to boxes of the color stated.

① Outline how a given hypothesis could be tested with either a between-participants design or a within-participants design.

①

② Identify possible order effects with a given within-participants design.

②

③ State how a given within-participants design could make use of counterbalancing, and discuss how effective this would be.

③

④ Determine whether or not a within-participants design is appropriate.

④ Matt hypothesizes that right-handed people can kick harder with their right leg than with their left leg.

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## CHAPTER EIGHT: SPREADSHEETS

Due Tuesday, May 30

### 8-A Formatting and Formulas

see [ewyner.com/sheetstutorial](http://ewyner.com/sheetstutorial)

① Format cells, rows, and columns.

② Identify a function's arguments.

③ Copy formulas into additional cells.

④ Use basic one-argument functions such as *sum*, *average*, and *count*.

⑤ Use functions with criterion arguments such as *if*, *countif*, and *sumif*.

⑥ Use data-lookup functions such as *vlookup* and *hlookup*.

⑦ Use data validation to ensure valid data entry.

⑧ Find and use a function appropriate for a given purpose.

⑨ Apply conditional formatting based on specified criteria.

⑩ Protect cells, rows, columns, and sheets from loss of functionality due to user error.

## 8-B Graphs

data • level of measurement • nominal • ordinal • interval • ratio • time plot • scatter plot • bar graph • circle graph • histogram

### 1 Classify data by level of measurement.

1 For each of the following variables, give a possible way it could be measured and what level of measurement applies.

- a) color                                      b) temperature                                      c) distance                                      d) iPad capacity

### 2 Choose an appropriate type of graph for a data set.

2 Choose and justify an appropriate type of graph to display results for each of the following.

- a) What are kids' favorite seasons?
- b) How much do adults pay for food each month?
- c) How much rainfall has Scotts Valley had in each of the past 30 years?

### 3 Make a circle graph by hand.

3 Out of 70 kids, 31 preferred chocolate, 26 preferred strawberry, and 13 preferred vanilla.

### 4 Make a time plot, scatter plot, or bar graph by hand.

4 Make up realistic data and create each of the following:

- a) a time series plot showing Alex's height through age 15
- b) a scatter plot showing how long 25 kids of different ages could hold their breath
- c) a bar chart comparing teenagers by gender on whether or not they regularly play video games

### 5 Use a spreadsheet to make a graph.

**9-A Normal Distributions**

normal distribution • standardized score (z score)

- ① Convert a raw score  $x$  to a standardized score  $z$ .
  - ① Calculate the  $z$  score a 25-year-old man weighing 75 kg, given  $\mu = 77$  kg and  $\sigma = 13$  kg.
- ② Find the area under the normal curve between two  $z$  scores.
  - ② Find the area under the normal curve between  $-0.81$  and  $1.06$ .
- ③ Calculate normal probabilities or percentages from raw scores.
  - ③ On a test with normally distributed scores with  $\mu = 139$  and  $\sigma = 48$ , what percent of scores are between 100 and 190?

**9-B The Central Limit Theorem**

law of large numbers • sampling distribution • standard error • central limit theorem

- ① Use the law of large numbers to determine whether a given sample statistic is more likely to occur in a small sample or a large sample.
  - ① Is Trump more likely to have a favorable approval rating in a random sample of 20 California voters or in a random sample of 200 California voters?
- ② Calculate normal probabilities or percentages for samples.
  - ② On a test with normally distributed scores with  $\mu = 140$  and  $\sigma = 55$ , what percent of random 4-score averages are between 195 and 230?

**9-C PValues** $p$  value

- ① Calculate and interpret a  $p$  value for a simple event, and relate it to a null hypothesis.
  - ① Matt predicts that four coins will all land on tails, and they do.
- ② Use a  $p$  value to make a hypothesis or statistical conclusion if appropriate.
  - ② The average semester grade in Statistics last spring was  $\bar{x}_1 = 87.8\%$  with  $s_1 = 7.96\%$  for the 31 girls and  $\bar{x}_2 = 78.0\%$  with  $s_2 = 8.19\%$  for the 38 boys. The  $p$  value for these statistics is  $p = .000002$ .
- ③ Use a  $p$  value to make a statistical conclusion about a test.
  - ③ Calder hypothesizes that there are more Democrats than Republicans in Scotts Valley. In his random sample, there are 18 Democrats and 10 Republicans. He calculates  $p = .065$ .

4 Do a z test for a within-participants design.

4 Mitchell is testing the idea of interference limiting memory. He gives participants a minute to memorize a list of 20 words before giving them a recall test on these words. He then repeats this with a new list of 20 words.

1. He predicts that people will do worse the second time because the words on the first list are interfering with memory of the second list.

Participant #:	1	2	3	4	5	6	7	8
# correct in round one	12	14	13	18	11	19	16	15
# correct in round two	10	11	13	12	13	15	12	14

9-D Types of Statistical Tests

1 Select an appropriate statistical test for a research hypothesis.

1 Do high school students spend more time on their phones than college students do?

2 Use a calculator to do a statistical test.

2 Does number of absences help predict semester grade in math? The current grade and number of spring semester absences for January through April of eight random Statistics students are shown below.

# of absences	4	3	8	5	2	2	7	3	8	2
current grade	94	90	72	76	89	83	82	82	95	74

9-E Spreadsheet Data Analysis

index

1 Calculate values of an index as an operational definition of a conceptual variable.

1 Use an index to rate applicants for a leadership scholarship.

2 Use a spreadsheet to do a t test of two means or of a mean difference.

2 From a sample of 11 students in the same math class, 5 are randomly assigned to review class notes for at least 10 minutes each night after class throughout one chapter. The scores for that chapter's test are compared.

study condition:	88	84	94	96	91				
control condition:	92	71	90	76	82	81			

3 Use a spreadsheet to do an r test of a correlation.

3 The literacy rates (x) and life expectancies (y) are shown below for nine random nations.

literacy rate (%):	97	89	92	90	91	72	74	85	55
life expectancy (years):	75	72	73	73	75	73	64	72	65