

MATERIAL REFERENCE: Theme 1 (Using Math to Reason and Answer Questions). Units 1 (A, C, D through example 8, E), 5 (C and E) and 7 (A, B and C)

The following document outlines the knowledge presented in Theme 1 that is likely to be seen on your upcoming test. It is listed in the order of the text (not necessarily the order presented in class or on the test). **Blue items (marked CT) are critical thinking questions** and **red items (marked SA) are short answer**. You will either be provided with an example problem or will be referred to a list of book exercises for an example problem; either way, be sure to completely familiarize yourself with different types of problems addressing the same outcome.

Your instructor may not assess all outcomes as they appear here, but will not add any questions without written notice to you.

LEARNING OUTCOMES:

1. **Identify Fallacies (Unit 1A) SA.** You will be provided a statement, and asked to choose from a list the type of fallacy (or whether the statement is a logical argument).

Consider the argument “Obesity among Americans has increased steadily, as has the sale of video games. It follows that video games are compromising the health of Americans.” Would you consider this to be: a) a logical argument b) a fallacy of limited choice c) a fallacy of circular reasoning d) a fallacy of false cause e) a fallacy of hasty generalization

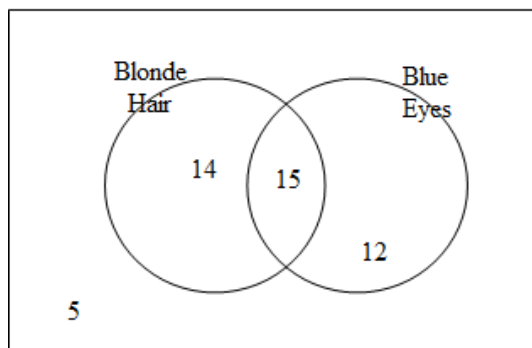
2. **Analyze Fallacies (Unit 1A exercises 11-20) CT.** You will be provided an example fallacy and asked to identify the premise(s) and conclusion, describe how the fallacy occurs, and make up another argument that exhibits the same fallacy.

My father never went to college, so I suppose I won’t either. Identify the premise and conclusion of the argument. Briefly describe how the fallacy occurs. Make up an argument that exhibits the same fallacy.

3. **Interpret Venn Diagrams (Unit 1C exercises 7-10, 59-60, 63-64) SA.** You will be provided a Venn diagram with two or more sets and asked to identify a subset or relationship.

The following Venn diagram represents the characteristics for an extended family, the Hancock’s. How many in the family do not have blonde hair?

Hancock Family



4. Use Venn Diagrams to Analyze Relationships (Unit 1C exercises 65-71, you generate table) CT. You will be provided with a relationship among groups and asked to construct a Venn diagram to answer a question (or questions) about the relationship among sets.

In a trial of a new vaccine, 100 people were given the vaccine and 50 were given a placebo. Of those given the medicine, 80 never developed symptoms. Of those given the placebo, 10 never developed symptoms. Make a Venn diagram summarizing the results. How many people who received the vaccine did not improve?

5. Inductive and Deductive Arguments (Unit 1D exercises 23-36) CT. You will be provided with a premise(s) and conclusion and asked to discuss its validity/truth, and assess the strength (inductive) or use a Venn diagram to determine validity (deductive).

Consider the following deductive argument: All Labrador's love to swim. Rex loves to swim. Rex is a Labrador. Discuss the truth of the premises. Draw a Venn diagram that represents the relationships between the sets, and put an "X" where Rex belongs in the diagram. State whether the argument is valid and sound.

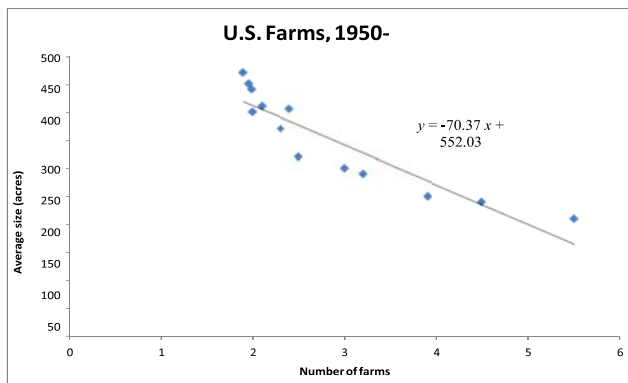
6. Interpret and generate frequency tables, bar graphs, pie charts, histograms and line charts (Unit 5C exercises 27-33) CT. Given a frequency table, make a rough sketch of the *most appropriate* type of graph or chart to represent the data, and explain why that graph or chart best represents it.

The following data represents the monthly overhead costs for a small town business owner. Make a rough sketch of the most appropriate type of graph, and explain why that graph best represents it.

Category	Cost
<i>Rent on shop</i>	\$2200
<i>Salaries</i>	\$3750
<i>Janitorial</i>	\$250
<i>Insurance</i>	\$1200
<i>Taxes</i>	\$1500
<i>Merchandise</i>	\$2750

7. Use correlation to describe relationships between two data variables (Unit 5E, Mini Project 5) CT. Given a scatterplot with a trendline and correlation coefficient, identify the variables being compared, discuss whether you think there is a strong or weak correlation (and whether positive or negative), and whether you suspect there is causality between the variables.

Consider the scatterplot below. Identify the two variables being compared. Discuss the potential correlation between these variables (use descriptors such as strong or weak, negative or positive, and be sure to incorporate the correlation coefficient). Discuss whether you believe there is causality between the variables. Be sure to explain your reasoning.



8. Compute Theoretical Probability (Unit 7A exercises 19-28 and 49-67 as appropriate) SA. Determine the theoretical probability of an outcome or event.
What is the theoretical probability of drawing a face card (jack, queen, or king) from a standard deck of cards?
9. Compute Relative Frequency Probability (Unit 7A exercises 29-32 and 49-67 as appropriate) SA. Use the relative frequency method to determine the likelihood of an event.
What is the relative frequency probability (aka experimental probability) if you pick 75 names from a list and 50 are female?
10. Computing Probability (Unit 7B exercises 13-32 and 33-56) SA. Determine the probability of an event in different scenarios, such as dependent/independent, either/or or at least once.
Find the probabilities:
- *Getting rain at least once in six days if the probability of rain on each single day is 0.2*
 - *Drawing either a red 6 or black 8 on one draw from a regular deck of cards.*
 - *Drawing at least one king when you draw a card from a standard deck 20 times (replacing the card each time you draw)*