

# 2019 Iowa FFA Food Science Exam

## DO NOT WRITE ON THE EXAM

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. When a company replaces atmospheric air in a bag of potato chips with a pre-defined mixture of oxygen, carbon dioxide, and/or nitrogen to preserve product appearance and extend shelf life, they are using \_\_\_\_\_ technology.
  - a. electron beam packaging
  - b. aerobic packaging
  - c. retort packaging
  - d. modified-atmosphere packaging
2. The largest shell egg recall in U.S. history occurred this year due to \_\_\_\_\_ contamination, a pathogen that may be found in eggs.
  - a. *Listeria monocytogenes*
  - b. *Escherichia coli* O157:H7
  - c. *Salmonella enteritidis*
  - d. *Staphylococcus aureus*
3. The flavor enhancer \_\_\_\_\_ has no flavor of its own but is used in food products to help bring out the flavors already present in food.
  - a. calcium alginate
  - b. monosodium glutamate
  - c. acetic acid
  - d. sodium propionate
4. When rice grains are stored for long periods of time, they are less sticky after cooking than fresher grains of rice because \_\_\_\_\_ acts on amylose, breaking down the amylose chains.
  - a. heat
  - b. proteolysis
  - c. lactase
  - d. amylase
5. When glucose reacts chemically with oxygen, water and \_\_\_\_\_ are formed.
  - a. carbon dioxide
  - b. sucrose
  - c. fructose
  - d. ethyl alcohol
6. The protein molecules of collagen and elastin form rope-like fibers so they are considered to be \_\_\_\_\_ proteins.
  - a. globular
  - b. fibrous
  - c. denatured
  - d. coagulated

7. To make vinegar from apples takes several steps. In the first step, sugar from the fruit is converted to \_\_\_\_\_ in the presence of yeast.
- acetic acid
  - methyl alcohol
  - citric acid
  - ethyl alcohol
8. The pH of a food ingredient, measured on a scale from \_\_\_\_\_, influences the functionality of the ingredient in a food product.
- 0-1
  - 0-7
  - 0-14
  - 0-20
9. Food companies sometimes use potassium chloride instead of sodium chloride to lower the sodium content of a food product; however, potassium chloride can have a \_\_\_\_\_ aftertaste.
- bitter
  - sweet
  - sour
  - hot
10. Food ingredients that are GRAS, also known as \_\_\_\_\_, are considered safe for human consumption.
- generally realized as secure
  - generally recognized as safe
  - government recognized as safe
  - generally recognized as secure
11. \_\_\_\_\_ in eggs acts as a natural emulsifier.
- Phospholipids
  - Cholesterol
  - Albumin
  - Calcium
12. In a commercial bread operation, baked bread is conveyed to a depanner which uses suction cups and \_\_\_\_\_ to remove the baked loaf from the pan.
- plastic grips
  - vacuum pressure
  - metal tongs
  - a weighted device to rap against the pan
13. Liquid may form on the surface of pudding that has been stored refrigerated due to water leaking from the gel as it ages. This is also known as \_\_\_\_\_.
- viscosity
  - hydrolysis
  - syneresis
  - inversion

14. An alternating electric current in a(n) \_\_\_\_\_ coil produces an alternating magnetic field causing iron cooking utensils placed on the cooking surface to become hot while the surface itself remains cool. The hot cooking utensil then transmits heat to the food.
- radiation
  - convection
  - conduction
  - induction
15. When a thermometer is used to monitor product internal temperature, it should be \_\_\_\_\_ before it is used to ensure the readings are accurate.
- tared
  - calibrated
  - cleaned
  - adjusted
16. The protein found in the liquid that remains after fat and casein have been removed from milk is called \_\_\_\_\_.
- whey
  - lactose
  - curds
  - rennin
17. The chemical formula  $\text{NaHCO}_3$  represents \_\_\_\_\_.
- table salt
  - sodium bicarbonate
  - caffeine
  - sodium benzoate
18. Vitamins A, D, E, and K \_\_\_\_\_.
- are water soluble vitamins
  - usually circulate freely in the blood and cell fluids
  - are fat soluble vitamins
  - are excreted in the urine when excess amounts are present in the body
19. A(n) \_\_\_\_\_ is used in the production of peanut butter to keep the peanut oil from separating out to the top of the jar.
- blanching agent
  - anti-caking agent
  - antioxidant
  - stabilizer
20. \_\_\_\_\_ is the form of carbohydrates that is found in meat.
- Glycogen
  - Glucose
  - Myosin
  - Collagen

21. The frozen food industry was born in the 1920's when \_\_\_\_\_ invented, developed, and commercialized a method for quick-freezing food products.
- Herb Peterson
  - Francis Bacon
  - Clarence Birdseye
  - Louis Pasteur
22. The functional component \_\_\_\_\_, found in tomatoes, is associated with a reduced cancer risk of the prostate, breast, digestive tract, bladder, and skin.
- lycopene
  - acticoa
  - banaba
  - spirulina
23. Sucrose is the main disaccharide in table sugar, honey, and \_\_\_\_\_.
- agave nectar
  - maple syrup
  - barley malt syrup
  - brown rice syrup
24. The length of time required at a specific temperature to destroy 90% of a pathogen is called the \_\_\_\_\_.
- D-value
  - F-value
  - z-value
  - C-value
25. Food scientists often need to know how much solute a solution contains. What would be the mass percent of sodium chloride in a solution if 15 g of sodium chloride was dissolved in 85 g of water?
- 17.6%
  - 5.7%
  - 6.7%
  - 15.0%
26. An apple that has been peeled for processing will turn brown quickly as a result of \_\_\_\_.
- carmelization
  - the maillard reaction
  - enzymatic browning
  - bruising
27. The meat industry is regulated by the \_\_\_\_\_.
- United States Food and Drug Administration
  - United States Department of Agriculture
  - United States Environmental Protection Agency
  - Centers for Disease Control and Prevention
28. When fruits and vegetables are dehydrated, temperatures used during drying \_\_\_\_\_.
- are not high enough to kill bacteria
  - are high enough to kill bacteria
  - will cook the outside of the product
  - will lead to case-hardening and trap moisture inside the product

29. Based on the principles of HACCP, the presence of a walnut in vanilla ice cream is an example of a \_\_\_\_\_ hazard.
- biological
  - physical
  - chemical
  - non-existent
30. Carbonated colas \_\_\_\_\_.
- have an acidic pH
  - have a neutral pH
  - have a basic pH
  - have a pH similar to pure water
31. By federal law, baking powder must yield at least \_\_\_\_\_ of carbon dioxide for every 100 g of powder.
- 12 g
  - 25 g
  - 48 g
  - 61 g
32. Chicken does not discolor in the same way as ground beef because chicken muscle has less \_\_\_\_\_.
- nitrosohemochrome
  - lutein
  - myoglobin
  - astaxanthin
33. \_\_\_\_\_ is a pathogen that causes a food infection.
- Escherichia coli O157:H7
  - Staphylococcus aureus
  - Clostridium perfringens
  - Clostridium botulinum
34. To evaluate product characteristics such as flavor, texture, and shape, food scientists rely on \_\_\_\_\_ who are specialized groups of people who evaluate food samples.
- statisticians
  - biotechnologists
  - food chemists
  - sensory evaluation panelists
35. Oxidation of fat involves the loss of a \_\_\_\_\_ atom from a single-bonded carbon next to a double bond and leads to rancidity.
- oxygen
  - nitrogen
  - hydrogen
  - sulfur
36. \_\_\_\_\_ of milk is a heat treatment that destroys all pathogenic organisms but does not destroy all spoilage organisms.
- Pasteurization
  - Emulsification
  - Homogenization
  - Winterization

37. Ice at 0°C will keep food colder longer in an ice chest than water at 0°C because of \_\_\_\_\_, or the energy required to cause a phase change without a change in temperature.
- radiation
  - latent heat
  - conduction
  - surface tension
38. Papain contains three enzymes from \_\_\_\_\_ which is used as a meat tenderizer.
- pineapple
  - kiwi
  - papaya
  - mango
39. The \_\_\_\_\_ provided sweeping legislation requiring almost all foods produced in the U.S. to have labels with specific facts about nutrition labeling.
- Nutrition Labeling and Education Act of 1990
  - Food, Drug, and Cosmetic Act of 1938
  - Pure Food and Drug Act of 1906
  - Fair Packaging and Labeling Act of 1966
40. To determine when a food has been heated sufficiently during the canning process, canners check the \_\_\_\_\_ which is the last point in the food to reach the temperature considered safe for killing microorganisms in that food.
- hot point
  - center point
  - cold point
  - thermal destruction point
41. Frankfurters are an example of a \_\_\_\_\_ meat product.
- whole muscle
  - injected
  - enhanced
  - comminuted
42. Gelatin can bind \_\_\_\_\_ times its weight in water.
- 10
  - 100
  - 1,000
  - 10,000
43. To measure the sugar concentration in a beverage, food companies will measure the \_\_\_\_\_ of the solution.
- Brix value
  - water activity value
  - viscosity
  - shear stress

44. When people consume carbohydrates, digestion begins \_\_\_\_\_.
- in the mouth when amylase in saliva breaks down starch into simpler sugars
  - in the stomach when enzymes act on the starch
  - in the small intestine
  - in the esophagus when food is swallowed
45. Unripened cheese such as \_\_\_\_\_ has a high moisture content resulting in a shorter shelf life than ripened cheese.
- parmesan
  - cream cheese
  - cheddar
  - provolone
46. Food processors promote products containing omega-3 fatty acids because they \_\_\_\_\_.
- promote heart health
  - contain fewer calories than other fatty acids
  - promote eye health
  - are more economic to use as an ingredient
47. Flour with a strong \_\_\_ quality produces yeast bread with high volume and fine texture.
- gluten
  - glucose
  - starch
  - galactose
48. By \_\_\_\_\_ cacao beans, the cell walls break down, bitter-tasting compounds react with each other, and the seed temperature increases leading to biochemical changes.
- hydrolyzing
  - fermenting
  - dehydrating
  - hydrogenating
49. The spores of \_\_\_\_\_ can germinate under anaerobic conditions to produce vegetative bacteria that can grow and produce a deadly toxin if foods are not adequately heat processed during retorting.
- Clostridium perfringens*
  - Listeria monocytogenes*
  - Escherichia coli* O157:H7
  - Clostridium botulinum*
50. The process of \_\_\_\_\_ is used to add nutrients lost in processing to food at levels that are higher than what existed before the food was processed. For example, thiamin, riboflavin, niacin, folic acid, and iron are added to flour through this process.
- fortification
  - restoration
  - enrichment
  - nutrification

**Answer Key**

1. D
2. C
3. B
4. D
5. A
6. B
7. D
8. C
9. A
10. B
11. A
12. B
13. C
14. D
15. B
16. A
17. B
18. C
19. D
20. A
21. C
22. A
23. B
24. A
25. D

26. C
27. B
28. A
29. C
30. A
31. A
32. C
33. A
34. D
35. C
36. A
37. B
38. C
39. A
40. C
41. D
42. B
43. A
44. A
45. B
46. A
47. A
48. B
49. D
50. C



**2019 Iowa FFA -- Food Science and Technology CDE –  
Food Safety and Quality Practicum**

**DO NOT WRITE ON THE TEST**

**Part I: Customer Inquiry (25 Points)**

Directions: You will find 5 different scenario's on the following pages. Read through the customer letter and then select the appropriate response to each of the two concluding questions. Answers will be placed onto your score sheet.

**Scenario #1**

**June 5, 2019**

Jane Smith President  
Yummy Yogurt Company  
Anywhere, MN 56000

Dear Ms. Smith,

I am writing because I purchased 3 cartons of your strawberry yogurt on May 20 for my children at the Value Rite Supermarket in Anywhere. The expiration date on the cartons was July 30. While eating the yogurt we found small pieces of plastic in the product. We kept the remaining product and would like a refund for it. I can be reached at 555- 1212.

Thank you. Sincerely,

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Question 1: This issue represented in this scenario is a: (2 points)

- a. Food Quality Issue
- b. Food Safety Issue

Question 2: Is the concern or hazard primarily: (Select only one - 3 points)

- a. biological
- b. chemical
- c. physical

## **Scenario #2**

Rice n' Spice, Inc.  
Scranton, MN 56077

Dear Mr. Halpert,

I am writing because I purchased a box of you instant Rice n' Spice product at a local grocery store on March 20, 2019. The box had a "Use By" date of May 20, 2019. I knew I was going to use the Rice n' Spice right away. When I opened the spice pouch there were tiny little bugs, weevils I presume.

There was no way that I was going to use the spice pouch provided. I am beyond disappointed with the product that I bought. I was so disgusted when I saw the bugs in the spice pouch, and this situation has made me extremely hesitant to purchase your Rice n' Spice products ever again. I saved the remainder of the product for further investigation, and would like a refund. I have been a loyal customer for many years and I trust that you will do everything in your power to make this situation right.

Thank you for your attention to this very important matter.

Sincerely,  
Pam Beesly

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Question 3: This issue represented in this scenario is a: (2 points)

- a. Food Quality Issue
- b. Food Safety Issue

Question 4: Is the concern or hazard primarily: (Select only one - 3 points)

- a. biological
- b. chemical
- c. physical

### **Scenario #3**

Daryl Williams  
President and CEO  
Wonderfully Wheat Bread Company  
Somewhere, TX 55555

Dear Mr. Williams,

I am writing because I purchased a loaf of your "Wonderfully Wheat" bread at a grocery store in Somewhere, TX on March 30, 2019. The expiration of the bag was printed: Best by April 11, 2019. I opened the package the day of purchase. I was disgusted to find significant mold growth on several slices of bread. I was so disappointed to find the mold and expected much more from your company. I have saved the loaf of bread in case your company needs it. Your company guarantees the utmost freshness, and claims that your product is the best of the best. I definitely did not get that impression after opening the mold infested bread. While my incident did not result in illness, I have no doubt that the potential was there. I was really looking forward to your product, but there was no way I could eat that bread in the condition it was in. I trust that you will appropriately compensate me for this matter. Thank you for your attention to this very serious concern. Sincerely, Kelly Capore

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Question 5: This issue represented in this scenario is a: (2 points)

- a. Food Quality Issue
- b. Food Safety Issue

Question 6: Is the concern or hazard primarily: (Select only one - 3 points)

- a. biological
- b. chemical
- c. physical

## **Scenario #4**

TO WHOM IT CONCERN:

Last evening I opened a package of your snack raisin cinnamon bread. The package had an expiration date on the package of August 7, 2019. I noticed a very strong odor as I opened the package. The odor had a smell like bleach, but I couldn't see anything wrong with the raisin cinnamon bread or the package. I didn't eat any, but wanted to report the problem.

I have been buying these snack packs for years, but now I'm afraid that maybe someone has tampered with it and put something in it. Have you had any problems at your plant?

I have put the bread in the freezer and will be waiting to hear from you. In this day of terrorism, I become very concerned about our food.

Very Concerned,

Ed Lamb  
450 Sunblest Blvd.  
Reno, NV 89501

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Question 7: This issue represented in this scenario is a: (2 points)

- a. Food Quality Issue
- b. Food Safety Issue

Question 8: Is the concern or hazard primarily: (Select only one - 3 points)

- a. biological
- b. chemical
- c. physical

## **Scenario #5**

To Whom It May Concern:

I was just completely grossed out by one of your products. I was sitting here checking my Valentines Day list eating one of your 3 Chums candy bars when I took a bite that I thought had a lot of stringy caramel. Instead it turned out to be someone's hair reaching a good 6 inches from my mouth to the candy bar. At first I thought it was my beard, but my beard hasn't been black in a long time. It was so gross I nearly lost my dinner right there on the couch! Luckily I didn't or my wife would have killed me.

Don't your employees wear hair nets or shave their heads or something? I love those candy bars (I think you put some addictive substance in them that you don't tell anyone about!), but it will be a very long time before I will eat one again without gagging. It's a shame too, because they are good. I guess I will have to start trying out other candy bars and find a new favorite. Hope some little kid doesn't leave me any as a bribe!

Thought you should know,  
Nick Clause

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Question 9: This issue represented in this scenario is a: (2 points)

- a. Food Quality Issue
- b. Food Safety Issue

Question 10: Is the concern or hazard primarily: (Select only one - 3 points)

- a. biological
- b. chemical
- c. physical

**Key**

1. B
2. C
3. A
4. C
5. A
6. A
7. A
8. B
9. B
10. C

**2019 Iowa Food Science and Technology CDE**  
**Part II: Food Safety and Sanitation -- (5 Points per Photo, 50 Total Points Possible)**

**DO NOT WRITE ON THE TEST**

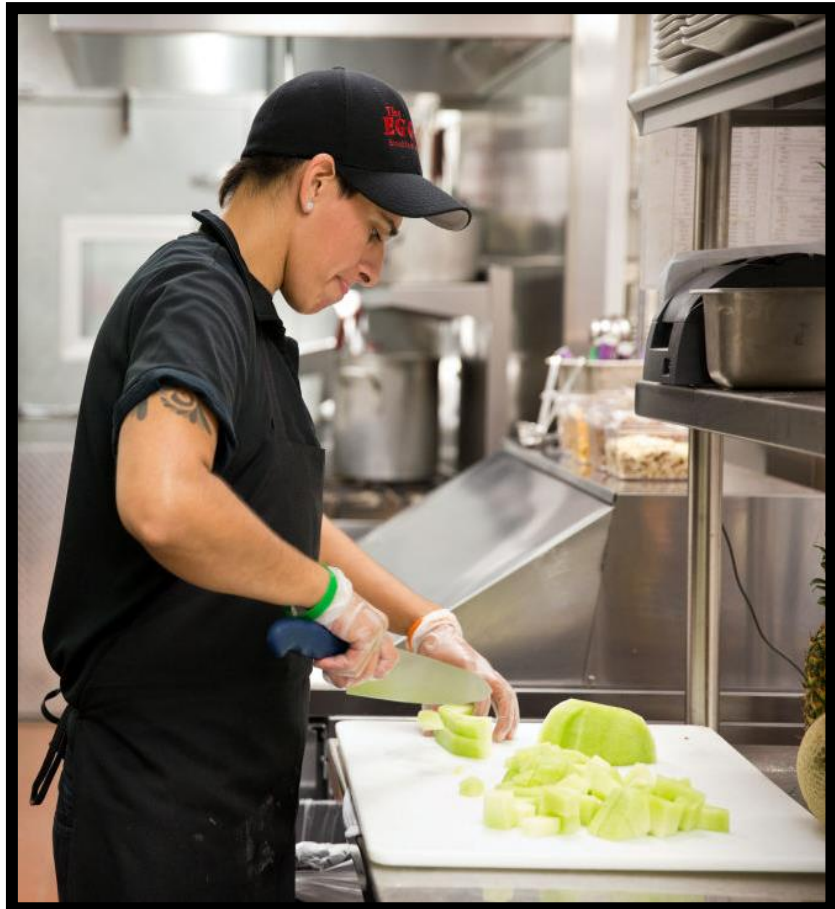
**Safety Photo 1:**

**Question 1:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 2:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

- a. Equipment, facilities, walls and floors, and overhead utilities must be dirt, dust, mold, or otherwise contamination-free
- b. All food contact surfaces shall be constructed of heavy stainless steel, or of food grade quality sanitary plastic or rubber
- c. In-use utensils shall be properly stored between uses, by keeping the handle out of the food product, on a clean sanitized surface, in clean running water or in water of at least 135 degrees F.
- d. No violation is depicted in the photo.



## Safety Photo 2:

**Question 3:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 4:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

a. All walls, ceilings, floor, and equipment exposed to foods in the processing or storage areas shall be rust-free

b. Food employees must not touch ready-to-eat foods with their bare hands

c. Food handling employees shall wear clean, impact-resistant, sanitary gloves made of impermeable plastic or rubber whenever in direct contact with foods, ingredients or containers for these foods and supplies.

d. No violation is depicted in the photo.





## Safety Photo 3:

**Question 5:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 6:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

a. Proper temperature control of processes throughout the facility is required, such as: Freezer storage temperatures

b. Frozen ingredients may be thawed prior to use, but containers cannot be dripping moisture or other liquids prior to usage

c. All packaging materials, equipment, or storage and delivery supplies must be free of dust, dirt, rust, or other possible contaminants

d. No violation is depicted in the photo.



## **Safety Photo 4:**

**Question 7:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 8:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

a. All insecure jewelry (watches, earrings, rings with stones) must not be worn to avoid the possibility that the object can fall into food, equipment, or containers.

b. All raw ingredients shall be sound and wholesome

c. All food contact surfaces shall be constructed of heavy stainless steel, or of food grade quality sanitary plastic or rubber

d. No violation is depicted in the photo.



## **Safety Photo 5:**

**Question 9:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 10:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

- a. Equipment, facilities, walls and floors, and overhead utilities must be dirt, dust, mold, or otherwise contamination-free
- b. All food contact surfaces shall be constructed of heavy stainless steel, or of food grade quality sanitary plastic or rubber
- c. Food employees must not touch ready-to-eat foods with their bare hands
- d. No violation is depicted in the photo.



## **Safety Photo 6:**

**Question 11:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 12:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

a. All walls, ceilings, floor, and equipment exposed to foods in the processing or storage areas shall be rust-free

b. Food handling employees shall wear clean, impact-resistant, sanitary gloves made of impermeable plastic or rubber whenever in direct contact with foods, ingredients or containers for these foods and supplies

c. Food employees must not touch ready-to-eat foods with their bare hands

d. No violation is depicted in the photo.





## Safety Photo 7:

**Question 13:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 14:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

- a. All chemicals used in the facility must be stored separate and apart from food and food contact surfaces.
- b. All processing room walls shall be constructed of washable, waterproof materials
- c. All packaging materials, equipment, or storage and delivery supplies must be free of dust, dirt, rust, or other possible contaminants
- d. No violation is depicted in the photo.



## **Safety Photo 8:**

**Question 15:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 16:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

- a. Food employees must not touch ready-to-eat foods with their bare hands
- b. All employees should wear hair nets, caps, and beard covers (if applicable) to avoid contamination of food, food contact surfaces, and food packaging materials.
- c. A & B
- d. No violation is depicted in the photo.



## Safety Photo 9:

**Question 17:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 18:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

a. All insecure jewelry (watches, earrings, rings with stones) must not be worn to avoid the possibility that the object can fall into food, equipment, or containers.

b. All raw ingredients shall be sound and wholesome

c. All food contact surfaces shall be constructed of heavy stainless steel, or of food grade quality sanitary plastic or rubber



d. No violation is depicted in the photo.

## Safety Photo 10:

**Question 19:** The situation depicts a violation of GMP, sanitation and/or food handling/storage. (2 points possible)

- a. Yes
- b. No

**Question 20:** Select the appropriate response that would best apply from the list of guidelines provided: (3 points possible)

- a. All raw ingredients shall be sound and wholesome and cooked to the proper temperature
- b. Food handling employees shall wear clean, impact-resistant, sanitary gloves made of impermeable plastic or rubber whenever in direct contact with foods, ingredients or containers for these foods and supplies
- c. Food employees must not touch ready-to-eat foods with their bare hands
- d. No violation is depicted in the photo.





**KEY:**

1. B
2. D
3. A
4. A
5. A
6. C
7. A
8. A
9. A
10. C
11. A
12. A
13. A
14. A
15. A
16. C
17. A
18. A
19. B
20. D

# 2019 Food Science and Technology CDE – State

## Problem Solving/Math Practicum (25 points)

### DO NOT WRITE ON THE TEST

Participants will answer a series of five mathematical calculations based on common food science themes. Questions may include nutrition calculations, ingredient quantity, cost benefit analysis, estimation of cost/margin of goods sold, conversions, processing conditions, etc. •

**Question 1.** Mona’s famous creamy asparagus soup is made in the family’s 3-gallon pot. If she adds 7 cups of heavy cream to the soup, what percentage of the soup is cream if the soup fills all 3 gallons?

- a. 5.3%
- b. 9.2%
- c. 10.4%
- d. 14.6%

**Question 2.** A formulation calls for 3.5 pounds of butter. How many ounces of butter are needed?

- a. 56 ounces
- b. 60 ounces
- c. 22 ounces
- d. 560 ounces

**Question 3.** Mary’s diet provides an average intake of 289 grams of carbohydrate, 87 grams of protein and 125 grams of fat. How many calories does she consume?

- a. 2,629 kcal
- b. 2,004 kcal
- c. 4,509 kcal
- d. 501 kcal

**Question 4.** If the amount of bacteria in a bowl of fruit can be represented by the equation  $B = 2^t$  where B represents the bacteria count in thousands and t represents the hours since refrigeration, how much bacteria can be expected three hours since refrigeration?

- a. 2,000
- b. 6,000
- c. 8,000
- d. 10,000

**Question 5.** Gina is trying to follow the recommended daily allowance for protein. She wants to eat an egg that contains 6 grams of protein, and the recommended daily allowance for protein is 46 grams. What percentage of her daily allowance for protein will she consume if she eats the egg?

- a. 13%
- b. 27.6%
- c. 60%
- d. 72.5%

## 2019 Food Science and Technology CDE – State Problem Solving/Math Practicum KEY (25 points)

Participants will answer a series of five mathematical calculations based on common food science themes. Questions may include nutrition calculations, ingredient quantity, cost benefit analysis, estimation of cost/margin of goods sold, conversions, processing conditions, etc. •

Question 1. Mona's famous creamy asparagus soup is made in the family's 3-gallon pot. If she adds 7 cups of heavy cream to the soup, what percentage of the soup is cream if the soup fills all 3 gallons?

- a. 5.3%
- b. 9.2%
- c. 10.4%
- d. **14.6%**

**Solution:**

16 cups/gallon x 3 = 48 cups  
7 cups/48 cups = .146 = 14.6%

Question 2. A formulation calls for 3.5 pounds of butter. How many ounces of butter are needed?

- a. **56 ounces**
- b. 60 ounces
- c. 22 ounces
- d. 560 ounces

**Solution:** 3.5 pounds X 16 ounces/pound = 56 ounces

Question 3. Mary's diet provides an average intake of 289 grams of carbohydrate, 87 grams of protein and 125 grams of fat. How many calories does she consume?

- a. **2,629 kcal**
- b. 2,004 kcal
- c. 4,509 kcal
- d. 501 kcal

**Solution:**

289 grams of carbohydrate x 4 kcal/gram = 1156 kcal  
87 grams of protein x 4 kcal/gram = 348 kcal  
125 grams of fat x 9 kcal/gram = 1125 kcal  
1156 + 348 + 1125 = **2629 calories**

**Question 4.** If the amount of bacteria in a bowl of fruit can be represented by the equation  $B = 2^t$  where B represents the bacteria count in thousands and t represents the hours since refrigeration, how much bacteria can be expected three hours since refrigeration?

- a. 2,000
- b. 6,000
- c. 8,000**
- d. 10,000

**solution :**  $2 \times 2 \times 2 = 8 \times 1,000 = 8,000$

**Question 5.** Gina is trying to follow the recommended daily allowance for protein. She wants to eat an egg that contains 6 grams of protein, and the recommended daily allowance for protein is 46 grams. What percentage of her daily allowance for protein will she consume if she eats the egg?

- a. 13%**
- b. 27.6%
- c. 60%
- d. 72.5%

**Solution:**

$$6/46 = .130 = 13\%$$

# **2019 Iowa FFA Food Science and Technology**

## **Product Development Marketing Scenario**

Date: March 21, 2019  
To: Product Design Group  
From: Vice President of Sales and Marketing  
Subject: Non-beef Burger Meal

Our marketing team has found an opportunity to grow the use of non-beef burger products in casual dining restaurants. We would like you to design a non-beef burger meant for a casual dining restaurant. We would like this product to represent trending flavors to help build on consumer's desire for bold and exciting flavor experiences.

As you develop your product, think about current offerings in the market and how your concept could expand them to new flavors, while showcasing the non-beef product you choose. Providing a lean, high protein non-beef product alternative is a huge opportunity for growth for casual dining restaurants. As consumers adopt more on-the-go lifestyles, their need for quick, nutritious, and exciting options has expanded. For this concept, please create something more than 500 calories, but less than 1,000 calories.

We would like to target consumers age 20-35 for this product. This group of Millennial consumers eats on the go and has a zest for new and different flavor experiences. They also have the ability to drive market growth, with over \$600 billion in spending power. This consumer segment has some unique consumer attributes including: being highly sociable, having high expectation for mobile technology as part of their brand experience, collaboration and cooperation with brands, adventurous experiences, high quality, clean label products, and being passionate about values. Please consider this consumer as you develop your product attributes, messaging, and flavors.

A Non-Beef burger must contain non-beef in some form, have high quality ingredients, and be unique in the market place. The item's ingredients can be stored refrigerated or frozen or prepared in a restaurant kitchen environment.

Product scenario summary:

Product Attributes: **Burger containing non-beef**

Target Market: **Millennial households**

Usage occasion: **Lunch**

Packaging: **Restaurant packaging**

Be prepared to present the following key information for your product:

- Product name and flavor
- Nutrition label and ingredient line including total fat and cholesterol contents.
- Cost of producing the product
- Ingredients – give some consideration to factors such as: bun/wrap, burger (pork, turkey, plant), seasonings, toppings for the burger
- Marketing plan to help promote this new product and drive sales growth, including distribution channels, consumer engagement plan, and target audience

At the CDE site, your team will present your product to the company's Executive Committee (Judges). Your presentation will last no longer than 10 minutes and you will have 5 minutes to respond to questions.

Good Luck!!!