

2019 Food Science and Technology Career Development Event

OBJECTIVE TEST: INSTRUCTIONS

Welcome to the Food Science Career Development Event!

1. DO NOT TURN THIS PAGE UNTIL YOU GET INSTRUCTION FROM THE MONITOR
2. Enter all the required information on the scantron where it says name, team name, team code
3. There are 50 questions
4. You have 60 minutes total to complete the test
5. Check your test booklet have 50 questions
6. Darken the correct answer with a #2-pencil. Make sure you darken the bubble completely with the #2-pencil



Correct



Wrong



Wrong

7. In case you finish early, please remain seated until the other participants completely finish. You will be dismissed as a group

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1. FSMA is an acronym for:
 - A. Food System and Maintenance Act
 - B. Food Safety Modernization Act**
 - C. Food Safety and Microbiology Act
 - D. Food Safety and Meat Adulteration Act
 - E. None of the above
2. _____ (GMP) are procedures that have been developed to ensure safe and wholesome food production as well as safe working environment
 - A. Gross manufacturing production
 - B. Good Mass Production
 - C. Great Manufacturing Policy
 - D. Good Manufacturing Practices**
 - E. All of the above
3. The fats that are generally solid and have no double bonds
 - A. Unsaturated fatty acids
 - B. Saturated fatty acids**
 - C. Essential fatty acids
 - D. Omega fatty acids
 - E. Polyunsaturated fatty acids
4. The red color of fresh beef is due to a protein called:
 - A. Myosin
 - B. Myoglobin**
 - C. Mitosis
 - D. Maltose
 - E. Lactose
5. A _____ is the amount of energy equal to the quantity of heat necessary to raise the temperature of 1 gram of water to 1 °C
 - A. Joule
 - B. Watt
 - C. Amp
 - D. Calorie**
 - E. None of the above

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6. _____ are the building blocks of starch
- A. Glucose**
 - B. Fatty acids
 - C. Peptide
 - D. Amino acids
 - E. Lipids
7. Pasteurization of milk is
- A. The process that kills all pathogenic microorganisms in milk**
 - B. The process that reduces fat globule size in milk
 - C. The process that separates cream from the skim milk
 - D. The process that add fat into milk
 - E. None of the above
8. Type of fat present in chocolate is the primary reason for health concern. Which statement best describes the type of fat present in chocolate?
- A. Cacao butter contains predominant unsaturated fatty acids, but they are heart healthy
 - B. Cacao butter contains predominant saturated fatty acids, but they are heart healthy
 - C. Cacao butter contains predominant saturated fatty acids, but they are not heart healthy**
 - D. None of the above
9. COOL is an acronym related to:
- A. Cold products
 - B. Country of origin labeling of food products**
 - C. Food ingredient
 - D. Coloring compound
 - E. Cooked food products
10. Name the pigment that gives red color to salmon:
- A. Astaxanthin**
 - B. Marigold
 - C. Grass
 - D. None of the above
11. An antioxidant is a compound that:
- A. Limits lipid oxidation**
 - B. Increase alkaline nature
 - C. Increase oxidation
 - D. Retain moisture
 - E. Acidulant

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12. FDA food laws are found in which Title of the Code of Federal Regulations?
- A. Title 7
 - B. Title 8
 - C. Title 20
 - D. Title 21**
 - E. Title 22
13. Milk sugar is _____
- A. Glucose
 - B. Fructose
 - C. Lactose**
 - D. Sucrose
 - E. Maltose
14. Which of the following is a fermented product from soybean?
- A. Swiss cheese
 - B. Kefir
 - C. Tofu**
 - D. American cheese
 - E. Navy bean
15. FSIS stands for:
- A. Food Safety and Inspection Administration
 - B. Food Safety and Inspection Service**
 - C. Fiber Safety and Inspection Service
 - D. Food And Drug Administration
 - E. Food Safety and Inspection Safety
16. The Delaney Clause passed in 1958 states that
- A. Preservatives cannot be used in meat products
 - B. No hormones can be added to food
 - C. Pesticides must be regulated
 - D. Synthetic compounds can be added to food
 - E. Chemical additive that induce cancer should not be added in food**
17. GMO stands for:
- A. General Molecular Operations
 - B. Genetically Modified Organisms**
 - C. Genetically Mapping Operations
 - D. General Mechanisms of
 - E. None of the above

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18. With regards to characteristics of brewer's yeast which of the following statement is correct
- A. Yeast should be sensitive to alcohol
 - B. It should convert glucose to alcohol very rapidly**
 - C. It should not be genetically stable
 - D. None of the above
19. The USDA recommend safe minimum internal temperature for ground beef is
- A. 140 °F
 - B. 150 °F
 - C. 160 °F**
 - D. 190 °F
 - E. 200 °F
20. Mesophilic microorganisms will
- A. Grow like thermophiles
 - B. Grow at very high temperatures
 - C. Grow at low temperatures
 - D. Grow well at moderate temperature**
 - E. None of the above
21. Non-calorigenic artificial sweetener indicates:
- A. Natural sugar which can provide sweetness and calories
 - B. Natural sugar which can provide sweetness and non-calorigenic
 - C. Artificial sugar which can provide sweetness and calories
 - D. Artificial sugar which can provide sweetness and non-calorigenic**
 - E. Fatty acid
22. Five taste stimuli are:
- A. Sweet, sour, bitter, salty, umami**
 - B. Sweet, sour, bitter, salty, astringent
 - C. Sweet, sour, flavor, salty, astringent
 - D. Sweet, bubbly, flavor, salty, astringent
 - E. Sweet, bitter, fizz, salty, umami
23. An example of simple carbohydrate would be
- A. Fatty acids
 - B. Starch
 - C. Cellulose
 - D. Carboxylic acid
 - E. Glucose**

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24. Enzymatic browning is seen in:
- A. Freshly cut apple**
 - B. Freshly cut beef
 - C. Cooked steak
 - D. All of the above
 - E. None of the above
25. A foam is a stable mixture of _____ and _____
- A. Oil and water
 - B. Water and water
 - C. Oil and gas
 - D. An emulsion is related to nutritional quality
 - E. None of the above**
26. Total counts of microorganism used as an indication of sanitary quality
- A. SPC – Standard Plate Count
 - B. PPC – Potential Plate Count
 - C. SPC – Sanitary Plate Count
 - D. SCP – Standard Counts Plated
 - E. All of the above
27. Fat is removed to make skim milk. What will be the nutritional issue associated with removal of fat?
- A. Loss of fat soluble vitamins**
 - B. Loss of water soluble vitamins
 - C. Loss of calcium
 - D. Loss of proteins
 - E. None of the above
28. Imagine you ate low calorie pizza which contained 1 g of fat, 1 g of carbohydrate, and 1 g of protein. What will be the total calories from this food?
- A. 36 kilocalories
 - B. 68 kilocalories
 - C. 108 kilocalories
 - D. 48 kilocalories
 - E. 17 kilocalories**

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29. The process in which a substance goes from a solid state to a gaseous state is called
- A. Evaporation
 - B. Radiation
 - C. Freezing
 - D. Sublimation**
 - E. Condensation
30. Agar and carrageenan are derived from _____
- A. Collagen
 - B. Jello
 - C. Seaweed**
 - D. Fungi
 - E. Plant gums
31. A solution with a pH of _____ is considered alkaline
- A. 12**
 - B. 7
 - C. 5
 - D. 1
 - E. 4
32. _____ organized the “poison squad”
- A. Louis Pasteur
 - B. The Jungle
 - C. Rosa Parks
 - D. Theodore Roosevelt
 - E. Harvey Wiley**
33. Which of the following best describes rancidity in food?
- A. Oxidation of protein
 - B. Oxidation of fat**
 - C. Oxidation of carbohydrates
 - D. Oxidation of amino acids
 - E. None of the above
34. Which of the following is an artificial fat?
- A. Aspartame
 - B. Sucralose
 - C. Olestra**
 - D. Splenda
 - E. None of the above

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35. Which term refers to the folding and manipulating of dough to achieve the proper consistency?
- A. Reduction rolling
 - B. Gluten
 - C. Kneading**
 - D. Cooling
 - E. Docking
36. The pink pigment in meat that is created during the cure process is:
- A. Nitrosohemochrome**
 - B. Myoglobin
 - C. Metmyoglobin
 - D. Oxymyoglobin
 - E. Carboxymyoglobin
37. Name the microorganism used in bread making
- A. *Lactobacillus thermophilus*
 - B. *Clostridium perfringens*
 - C. *Saccharomyces cerevisiae***
 - D. *Escherichia coli*
 - E. *Listeria monocytogenus*
38. Reduction is the process in which
- A. An electron is gained**
 - B. An electron is lost
 - C. No change in electron
 - D. Neutron is lost
 - E. Neutron is gained
39. Disease causing microorganisms are called
- A. Pathogens**
 - B. Pests
 - C. Spoilage organism
 - D. All of the above
 - E. None of the above
40. The NELA allows _____ types of health claims on a food label
- A. 3
 - B. 7**
 - C. 12
 - D. 8
 - E. 15

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41. The pancreas releases _____
- A. Bile acids
 - B. Red blood cells
 - C. Insulin**
 - D. Thyroid
 - E. Bolus
42. Name the protein present in milk
- A. Myoglobin
 - B. Catalyst
 - C. Casein**
 - D. Calcium
 - E. Calpines
43. The amount of carbohydrate required to produce 44 calories of energy
- A. 44 calories ÷ 4 calories = 11 g carbohydrate**
 - B. 44 calories x 4 calories = 176 g carbohydrate
 - C. 88 calories ÷ 4 calories = 12 g carbohydrate
 - D. 88 calories x 9 calories = 396 g carbohydrate
 - E. None of the above
44. _____ is the enzyme that breaks down starch
- A. Lactase
 - B. Lipase
 - C. Amylase**
 - D. Protease
 - E. Lactose
45. Statement A: Bacterial growth is an example of biological spoilage
Statement B: Freezer burn or dehydration is an example of physical spoilage
- A. Statement A is correct
 - B. Statement B is correct
 - C. Both statements are wrong
 - D. Both statements are correct**
46. The amino acids that body cannot synthesis and need to be obtained through the diet
- A. Saturated amino acid
 - B. Unsaturated amino acids
 - C. Non-essential amino acids
 - D. Essential amino acids**
 - E. None of the above

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47. The term 12D is associated with
- A. Pasteurization
 - B. Radiation
 - C. Canning**
 - D. Aerobic packaging
 - E. Microwave
48. Botulism is due to:
- A. Clostridium**
 - B. E coli
 - C. Listeria
 - D. Salmonella
 - E. None of the above
49. A non-nutritive substance/GRAS substance added intentionally to improve quality and shelf-life of food is called:
- A. Food safety
 - B. Food additives**
 - C. Food contaminant
 - D. Food technology
 - E. None of the above
50. What is the recommended pH level in canned foods to limit the risk of food pathogens?
- A. Less than 4.6**
 - B. 6.4
 - C. 7
 - D. 8
 - E. 7.4

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MATH PRACTICUM

Please read each of the five product specification compliance and mark your answers in the *scantron section* **Problem Solving/ Math Practicum**. Total points for this section is 25. ***This is an individual event! No talking!***

Math practicum #1

Consider one slice of pizza contains 5 g of fat, 4 g of protein, and 3 g of carbohydrate. What will be the total calories in two slices of pizza?

- a. 37 calories
- b. 73 calories
- c. 93 calories
- d. 146 calories**
- e. 164 calories

Math practicum #2

A food processor is using an automated salsa-filling machine. The capacity of each jar is 16 oz. The accuracy of filling the jar is ± 0.5 oz. In case if you want to make sure each jar is filling 14 oz, what should be the set volume level for the machine?

- a. 14.0 oz
- b. 13.5 oz
- c. 14.5 oz**
- d. 15.0 oz
- e. 16.0 oz

Math practicum #3

Consider you added 6 g of sugar in 10 fluid ounce of sweet tea mixture. What will be the percentage of sugar in half cup of sweet tea? [Consider one fluid ounce is 30 mL and one cup contains 200 mL]

- a. 2%**
- b. 6%
- c. 10%
- d. 60%
- e. 100%

Math practicum #4

The relationship between protein and nitrogen content is 6.25. For example for each gram of nitrogen, there will be 6.25 g protein. Consider nitrogen content in 30 g soy flour is 10 g. What will be the protein content in soy flour?

- a. 6.25 g
- b. 62.5 g**
- c. 10.0 g
- d. 16.2 g
- e. 20.6 g

Math practicum #5

Overrun in ice is the amount of air incorporated into the ice cream mixture. Overrun is expressed in percentage and it calculated as $[(\text{final volume} - \text{initial volume}) \div \text{initial volume}]$. Consider the initial volume of ice cream mixture was 100. After incorporating air, the volume was 125. What will be the overrun of the ice cream mixture?

- a. 1.25%
- b. 0.25%
- c. 25.0%**
- d. 50.0%
- e. 125%

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CUSTOMER INQUIRY

Please read each of the five customer inquiries. For each inquiry, you must indicate:

1. If the complaint is related to a food safety or food quality problem (2 *points*).
2. If the hazard is primarily biological, chemical, or physical (3 *points*).
3. Please mark your answers on the scantron section "Customer Inquiry"
4. Each question is worth 5 points. Total points from this section is 25

This is an individual event! No talking allowed!

Scenario #1 SAFETY, PHYSICAL

To whom it may concern:

I am writing because I purchased a container of peanut butter at the grocery store in Somewhere, OK on April 24, 2015. I consumed approximately half of the container when I found numerous pieces of wood chips. I didn't consume any of the remaining peanut butter. I find this to be a very serious problem and expect that you will correct it immediately. I saved the remainder of the product and would like a refund.

Thank you for your attention to this very important matter.

Sincerely
Not Satisfied

Scenario #2 SAFETY, CHEMICAL

Dear Cookie Lady,

We purchased a high energy bar made up of whey protein and butter. My child is allergic to almonds. There was no allergen label on the package. When we opened the package, I noticed that there were pieces of almonds. If my child had eaten it, I am afraid to think about the situation.

I hope you will not repeat this again.

Upset Mom

Scenario #3 QUALITY, CHEMICAL enzymatic browning

Dear Customer Service,

We purchased your French fries for a picnic. When the kids were enjoying them, we noticed that French fries were brown. Interestingly, those French fries were still within the expiry date.

I am really disappointed with your product.

Sincerely,
Disappointed customer

Scenario #4 SAFETY, PHYSICAL

Last month, I bought four chubs of ground beef at Oklahoma Groceries in Oklahoma. After 2 days of storage in my refrigerator, I opened the ground beef packages, and I noticed plastic wires/strings inside of the chub. I was really disappointed.

Angry Customer

Scenario #5 SAFETY, BIOLOGICAL

Dear Mr. Apple,

We purchased a 32 oz container of your tomato ketchup that had a use by date of April 27, 2016. When we popped the seal, we noticed there was greenish mold growing inside the lid. I am upset that I wasn't able to enjoy my purchase.

Sincerely
Customer

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PRODUCT SPECIFICATION COMPLIANCE

Please read each of the five product specification compliance and mark your answers in the *scantron section* **Product Specification Compliance**. Total points for this section is 25

This is an individual event! No talking!

Product specification compliance #1

A food processor makes canned salsa with following ingredients: Tomato, acetic acid, bell peppers, black pepper, and garlic. The final pH of Salsa was 6.2. Since Salsa contains acetic acid, the processor thinks, he does not have to concern about pH. Do you think the food processor is in compliance with food safety laws?

- a. pH is not critical in this product
- b. Processor is in compliance with food safety laws
- c. Processor is not in compliance with food safety laws**

Product specification compliance #2

A food processor makes cooked hamburger patties. The internal cooked temperature of the patties was 140 °F. The processor thinks that since he/she is freezing the patties, internal cooked temperature is not a critical control point. Do you think the food processor is in compliance with food safety laws?

- a. Food safety compliance is not related to the current scenario
- b. Processor is in compliance with food safety laws
- c. Processor is not in compliance with food safety laws**

Product specification compliance #3

A food processor makes morning snacks. The weight printed on the packet was 8 oz. Just of curiosity you weighed the weight of the sample and the weight was 6 oz (assuming your scale is accurate and calibrated the scale using NIST standards). Do you think the food processor is in compliance with product specification?

- a. Product compliance is not related to the current scenario
- b. Processor is in compliance with food laws
- c. Processor is not in compliance with food laws**

Product specification compliance #4

Nutritional label of chocolate chip cookies is indicated. Do you think the food processor is in compliance with food labeling laws?

- a. Food labeling compliance is not related to the current scenario
- b. Processor is in compliance with food laws
- c. **Processor is not in compliance with food laws**

Nutrition Facts			
Serving Size		Servings per Container	
Amount per serving			
Calories		Calories from Fat	
% Daily value*			
Total Fat			
Saturated Fat			
Trans Fat			
Polyunsaturated Fat			
Monounsaturated Fat			
Cholesterol			
Sodium			
Total Carbohydrate			
Dietary Fiber			
Sugars			
Protein			
Vitamin A		Vitamin C	
Calcium		Iron	
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your caloric needs:			
Calories		2,000	2,500
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrates		300g	375g
Dietary Fiber		25g	30g
Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4			

Product specification compliance #5

A food manufacturer processes both raw chicken and fresh green salad in the same processing room. Do you think the food processor is in compliance with food safety laws?

- a. Food safety compliance is not related to the current scenario
- b. Processor is in compliance with food safety laws
- c. **Processor is not in compliance with food safety laws**

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FOOD PRODUCT DEVELOPMENT SCENARIO

Instructions: This is a team event. Total time allotted for the product development is 60 minutes.

Total time for oral presentation is 10 minutes and 10 minutes for questions and answers.

Scenario: Obesity is a major problem in the US. Although there are several reasons for the increase in overall rate, increased intake of calories also can be attributed to a higher rate of obesity. You and your team are in charge of creating a healthy lunch for teenagers (age group 13-18 years old). The product should be refrigerated or shelf stable so it can be sold in grocery stores or convenient stores. Additionally, it should be affordable and attractive. Carefully consider the healthy lifestyle trend and how this product may be striking to such a consumer.

The ideal considerations for this product are:

1. Healthy
2. Lower amount of calories
3. Attractiveness to teenagers

Given this scenario, you should develop as a team:

1. Healthy lunch marketed towards families with teenagers between 13-18 years old. Take into account concerns about fat content and the teenager's eagerness to consume an attractive product.
2. You need to select 6-8 ingredients from a total of 15 given ingredients and you need to make a lunch based on the selected 6-8 ingredients.
3. Limit the total calories to 250-300
4. Create a front display (Label) and mock package (container) on the poster sheet available.
5. Create a nutritional panel and an ingredient statement on the sheet provided. The nutritional panel should contain all the relevant information. A spread sheet of ingredient information is included in this packet.

Pricing Strategy

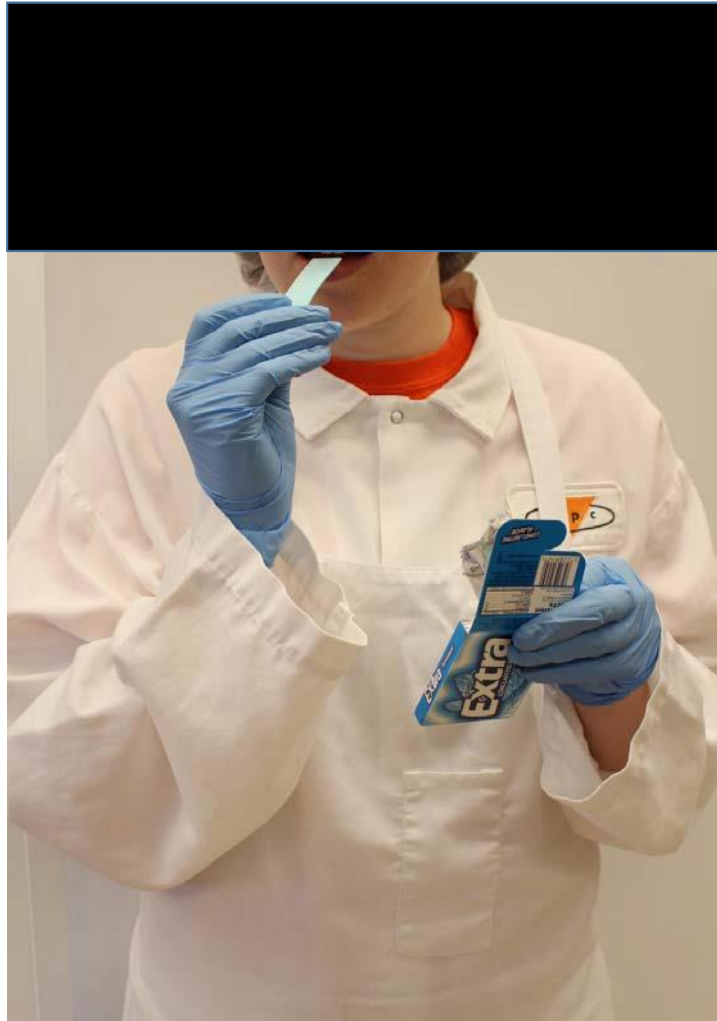
Pricing strategy is vital in the placement of your product. You need to demonstrate that this is a nutritional and quality product that is attractively priced to be competitive with other healthy drink products. This means a price around \$3-6. This target price does not include a standard store mark-up of 20%. After financial analysis of the product, the following base price for your product was determined:

Product costs:	\$0.30
Distribution:	\$0.18
Promotion:	\$0.11
“Shelf” maintenance:	\$0.01

These costs estimates do not include ingredient costs. Each ingredient used will add to the cost of the product since the ingredients have to be purchased elsewhere and assembled into the final product. The ingredient costs per serving size are listed in the information included in this packet.

Good Luck!!

Question 1



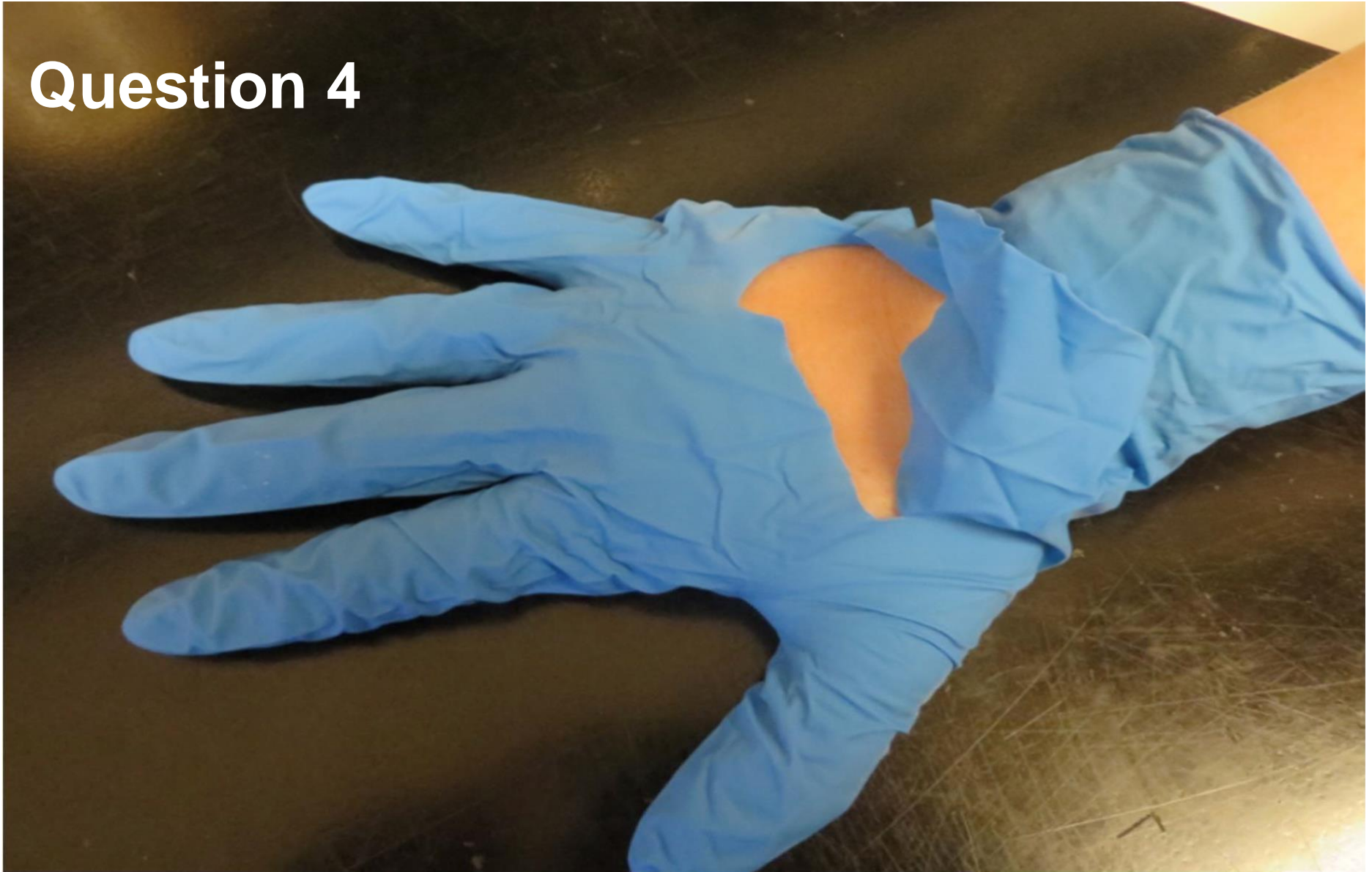
Question 1



Question 2



Question 4



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SANITATION PRACTICUM

11. No food in the locker rooms
12. Wear hairnets properly
13. Don't contaminate your uniform
14. Don't touch your face while at workplace.
15. Don't touch your hair during work.
16. Wash hands thoroughly with soap and hot water
17. Don't use broken gloves
18. No jewelry in work place
19. Wear proper footwear
20. Don't contaminate food contact surfaces
21. Chewing gum not allowed
22. Rust on the food processing equipment
23. Unsanitary measuring device
24. Food processing equipment in an unsanitary condition
25. Raw/cooked cross contamination

Recourses courtesy: Jason
Young and Dr. Muriana, FAPC,
Oklahoma State University

Examples of hazards

Food Safety Hazard

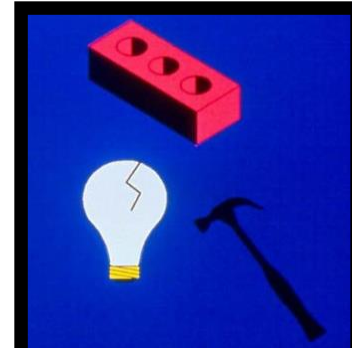
Definition of a 'Food Safety Hazard':

Any biological, chemical, or physical property that may cause a food to be unsafe for human consumption.

Food Safety Hazards

Types of Hazards:

1. Physical



2. Chemical



3. Microbiological



Physical Hazards

- Metal
- Glass
- Wood
- Stones
- Bones
- Paint chips
- Plastic (gloves, packaging)
- Pens, pencils
- Thermometers
- Tools, nuts and bolts, etc.
- Meat hooks, hard hats, tools...



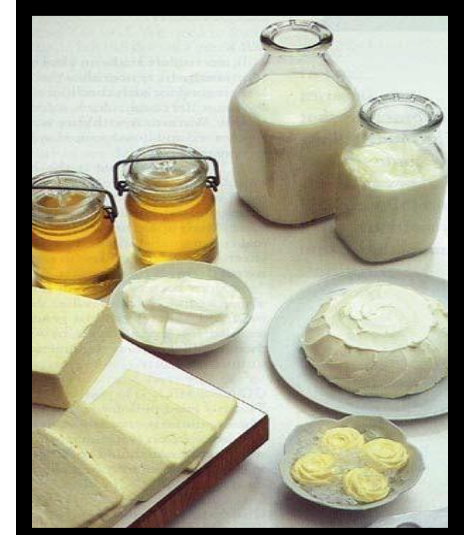
Chemical Hazards

• Naturally occurring

- Aflatoxin, mycotoxins (cereal grains)
- Allergens (when unlabeled)

• Added chemicals

- Pesticides, fertilizers, antibiotic residues, cleaners, sanitizers, grease..etc.



Hazardous Chemicals Used in Food Processing

<u>Point of Use:</u>	<u>Types of Chemicals:</u>
• Growing crops	→ Pesticides, herbicides, defoliants
• Raising livestock	→ Growth hormones, antibiotics
• Production	→ Food additives, processing aids
• Plant maintenance	→ Lubricants, paints
• Plant sanitation	→ Cleaners, sanitizers, pesticides

Biological Hazards

- **Microorganisms:**

- Organisms such as bacteria, parasites, viruses, yeasts, and molds

- **Foodborne Pathogens:**

- A microorganism found in food that is capable of producing illness through ingestion of the organism and/or its toxin.

- Infection
- Intoxication
- Toxicoinfection



Preventive Measures:

- Physical, chemical, or other factors that can control an identified health hazard
- More than one preventive measure may be required
- More than one hazard may be controlled by one preventive measure
- Listing of the hazards and preventive measures helps to determine Critical Control Points

Biological Hazards & Their Sources

Microorganisms are Everywhere!

All pathogens are hazards!

- **Raw materials**
 - Raw plant and animal food
 - Contaminated processed food
- **Environment**
 - Air, water, food processing equipment
- **Employees**



Chemical Hazards & Their Sources

Raw materials:

Pesticides

plant materials

Antibiotics

improper withdrawal time in meat and dairy ~~stock~~

Hazardous chemicals

improper processing, environmental contamination

Processing:

Direct food additives

excessive quantities used in ~~formulas~~

Processing aids

improper use and quantities

Building / Equipment Maintenance

Paints

chipping from poor maintenance of building or equipment

Coatings

chipping from poor maintenance, removal from friction

Lubricants

excessive use, lack of drip pans, improper cleaning

Sanitation

Pesticides

improper use, rodents

Cleaners

inadequate rinsing procedures

Sanitizers

improper use and quantities, improper time after sanitation

Chemical Hazard Control Measures

- **Source Control**

- Vendor certification
- Raw material testing

- **Production Control**

- Proper use & application of food additives
 - Approved chemicals
 - Proper formulation and quantities used
 - Proper handling and storage

- **Labeling Control**

- Finished product properly labeled with ingredients & known allergens

Physical Hazards & Their Sources:

Metal bolts, nuts, screws, screens/sieves, steel wool, metal

Glass light bulbs, watch crystals, thermometers, insect bulbs

Wood crates, pallets, equipment bracing, overhead ~~studs~~

Insects environment, bug lights, incoming ingredients

Hair meat ingredients, employees, clothing, rodents

Mold inadequate cleaning of equipment

Rodent droppings inadequate cleaning of ~~equipment~~

Gum, wrappers poor employee practices

Physical Hazards & Their Sources:

- Dirt, rocks** raw materials, poor employee practices
- Paint flakes** equipment, overhead structures
- Jewelry, buttons** poor employee practices
- Carcass tags** slaughter house
- Hypodermic needles** veterinarian
- Bullets/shot/BBs** animals shot in ~~the~~
- Feathers** poor sanitation
- Grease** poor equipment maintenance program
- Gasket materials** inadequate equipment preventive maintenance