7. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carr8 (s)-1.6 7i out. Students should be abl (s)-1.6 7 to d8 (s)-st8 ((n)12 (g)6.1 (u8 (s)-s)

8. Science, systems, and patterns. A (7 (h)-rg s)-s)-1.6 (ys)e1.6 (t)2.7 (e)9 (m)8.8 (s)-1.6 (s)-1.2 (a)4.1 (r)4.6 (n)9 (ph)2 1 (s)-1.6 (i)5. Changend constancy occur 8 17.1 (n s)-1.6 (ys)10.5 (t)2.6 (e)9.1 (m)8.8 (s)-1.6 (a)2.1 (s)-1.6 (pa)2 (t)2.7 (t)2.6 (e)9.1 (r)4.6 (ns)-1.6 (make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understand8 (s)-ng the (de)9.1 (a)2 (s)-1.6 (h)12.2 (o)4.2 (a)2 (s)-1.6 (e)9 (s)d)14.4 (e)9 s)- aystem 8 (s)-n terms of 8 (s)-ts compo component relate t each other, t the whole, and to the external envirnment

9. Students are encouraged to part8 ((c)6.4 (8 ((pa)2.1 (t)2.7 (e)9 (8 (s)-n e)9 s)-x)4.2 (t)2.7 (e)9 (nde)9 (d l (s)-e)9 (a)2.1 (r)4.6 (n8 (and other l 3.1 (e)7 (ad)-2.1 (e)7 (r)2.6 (s)-3.6 (h)-2.1 (i 3.1 (p)-2.1 (or)2.6 (e)7 (x)2.3 (t)0.6 (r)2.6 (ac)4.3 (u)-2.1 (r)2.6 (r)2.6 (i 3.1 (c)

(b) Knowledge and Skills Statements

(1) The stude demonstrates profess8 (s)-onal ((s)-1.6 (t)2.7 (a)2.1 (nda)2.1 (r)4.6 (d)12 (s)-1.6 (/ (4 (e)9 s)-m)8.8 (pl (s)-o)1.9 (ya)2.1

(A) appy 8 -0.9 (n)-6.serprsonl -0.9 (co)-4.1 (m)2.8 (m)2.8 (u)-6.s8 -0.9 (ca)-3.9 (t)-3.4 (8 -0.9 (o)-4.1 (n)-6.2 (s)-7.6 (k)-3.8 (8 -0.

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(i) exp8 -0.9 (n)-6.2 (t)-3.3 (h)-6.2 (e)3 (v)-6.8 (a)-3.9 (l)-1 (u)-6.s of collabrationthnh wrkpace

(8 -0.9 (i)-1 ())]TJ/TT1 1 Tf0 Tc 0 Tw 1.072 0 Td( )Tj/TT0 1 Tf0.003 Tc 1.807 0 Td[(r)2.6 (e)7ogn8 3 (z)0.5heale of col -9 (l)3.sorat8 3.

(C) examinhmprtanf time mangen to su 8 -15.9 (n)-9 shrkforc;

(i) examinhmprtanf time mangen to su 8 -15.9 (n)-9 shrkforc

(D) ident8 (.1 (f)8.8 (y w)9.2 (o)1.8 (r)4.6 (k)2.2 (e)9 (t)2.7 (h8 (s)-c)6.3 (s)-1.6 (a)2.1 (nd pr)4.6 (o)1.9 (f)8.8 (e)-3 (s)-1.6 (s)-1.6 (8 (s)-o)1.9

s)- pl-1 (v)-6.8 (8 -0.9 (n)-6.s)-g s8 -0.9 (l)-0.9 (l)-1 (s)-7.6dinh wrkpace

1 Tf0 Tc 0 Tw 1.072 0 Td( )Tj/TT0 1 Tf-0.001 Tc 0.004 Tw 1.807 0 Td[(d)-6.ss8 -0.9 (b)-6.2 (e)3.1 (cr)-1.4 (8 -0.9 (t)-3.3 (i)-1 (ca)-3.9 (l)]TJ0 Tc 0 Tw 6.386 0 T

Tf-0.004 Tc 0.007 Tw 0.735 0 Td[(ex)-4.7 (p)-9 sorr anfession in foodcen

TT0 1 Tf-0.004 Tc 0.007 Tw 1.807 0 Td[(ex)-4.7 (p)-9 sorrfession inodcience

(2)

(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;

(i) collect quantitative data using the International System of Units (SI)

(ii) collect quantitative data using the United States customary units

(iii) collect qualitative data as evidence

(F) organize quantitative and qualitative data using lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports;

(i) organize quantitative data using lab reports

(ii) organize quantitative using labeled drawings

(iii) organize quantitative data using graphic organizers

(iv) organize quantitative data using journals

(v) organize quantitative data using summaries

(vi) organize quantitative data using oral reports

(vii) organize quantitative data using technology-based reports

(viii) organize qualitative data using lab reports

(ix) organize qualitative data using labeled drawings

(x) organize qualitative data using graphic organizers

(xi) organize qualitative data using journals

(xii) organize qualitative data using summaries

(xiii) organize qualitative data using oral reports

(xiv) organize qualitative data using technology-based reports

(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and

(i)

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;

(i) analyze data by identifying significant statistical features

(ii) analyze data by identifying patterns

(iii) analyze data by identifying sources of error

(iv) analyze data by identifying limitations

(C) use mathematical calculations to assess quantitative relationships in data; and

(i) use mathematical calculations to assess quantitative relationships in data

(D) evaluate experimental and engineering designs.

(i) evaluate experimental designs

(ii) evaluate engineering designs

(4) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories;

(i) develop explanations supported by data consistent with scientific ideas

(ii) develop explanations supported by data consistent with scientific principles

(iii) develop explanations supported by data consistent with scientific theories

(iv) develop explanations supported by models consistent with scientific ideas

(v) develop explanations supported by models consistent with scientific principles

(vi) develop explanations supported by models consistent with scientific theories

(vii) propose solutions supported by data consistent with scientific ideas

(viii) propose solutions supported by data consistent with scientific principles

(ix) propose solutions supported by data consistent with scientific theories

(x) propose solutions supported by models consistent with scientific ideas

(xi) propose solutions supported by models consistent with scientific principles

(xii) propose solutions supported by models consistent with scientific theories

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(i) communicate explanations individually in a variety of settings

(ii) communicate explanations individually in a variety of formats

(iii) communicate explanations collaboratively in a variety of settings

(iv) communicate explanations collaboratively in a variety of formats

(v) communicate solutions individually in a variety of settings

(vi) communicate solutions individually in a variety of formats

(vii) communicate solutions collaboratively in a variety of settings

(viii) communicate solutions collaboratively in a variety of formats

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(i) engage respectfully in scientific argumentation using applied scientific explanations

(ii) engage respectfully in scientific argumentation using applied scientific empirical evidence

(5) The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student;

(i) analyze scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(ii) analyze scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(iii) analyze scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(iv) analyze scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(v) evaluate scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(vi) evaluate scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(vii) evaluate scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(viii) evaluate scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(ix) critique scientific explanations and solutions by using empirical evidence so as to encourage critical thinking by the student

(x) critique scientific explanations and solutions by using logical reasoning so as to encourage critical thinking by the student

(xi) critique scientific explanations and solutions by using experimental testing so as to encourage critical thinking by the student

(xii) critique scientific explanations and solutions by using observational testing so as to encourage critical thinking by the student

(A) research and investigate resource use, sustainability, and conservation in food production such as with water, land, and oceans;

(i) research resource use in food production

(ii) research sustainability in food production

(iii) research conservation in food production

(iv) investigate resource use in food production

(v) investigate sustainability in food production

(vi) investigate conservation in food production

(B) analyze the effect of food on the decomposition cycle, including composting, recycling, and disposal; and

(i) analyze the effect of food on the decomposition cycle, including composting

(ii) analyze the effect of food on the decomposition cycle, including recycling

(iii) analyze the effect of food on the decomposition cycle, including disposal

(C) demonstrate appropriate methods for sorting and disposing of food waste, including fats and oils, and packaging waste from food production.

(i) demonstrate appropriate methods for sorting food waste, including fats

(ii) demonstrate appropriate methods for sorting food waste, including oils

(iii) demonstrate appropriate methods for disposing of food waste, including fats

(iv) demonstrate appropriate methods for disposing of food waste, including oils

(v) demonstrate appropriate methods for packaging waste from food production

(7) The student analyzes the role of acids and bases in food science. The student is expected to:

(A) evaluate physical and chemical properties of acids and bases; and

(i) evaluate physical properties of acids

(ii) evaluate physical properties of bases

(iii) evaluate chemical properties of acids

(iv) evaluate chemical properties of bases

(B) analyze the relationship of pH to the properties, safety, and freshness of food.

(i) analyze the relationship of pH to the properties of food

(ii) analyze the relationship of pH to the safety of food

(iii) analyze the relationship of pH to the freshness of food

(8) The student evaluates the principles of microbiology and food safety practices. The student is expected to:

(A) investigate the properties of microorganisms that cause food spoilage;

(i) investigate the properties of microorganisms that cause food spoilage

(B) compare food intoxication and food infection;

(i) compare food intoxication and food infection

(C) examine methods to destroy or inactivate harmful pathogens in foods;

(i) examine methods to destroy or inactivate harmful pathogens in foods

(D) compare beneficial and harmful microorganisms, including lactic acid bacteria, acetic acid bacteria, various baking

(C) analyze chemical and physical changes in food; and

(i) analyze chemical changes in food

(ii) analyze physical changes in food

(D) use chemical symbols, formulas, and equations in food science such as oxidation of sugars in a cut apple or fermentation in the production of yogurt.

(i) use chemical symbols in food science

(ii) use chemical formulas in food science

(iii) use chemical equations in food science

(10) The student analyzes solutions, colloids, solids, gels, foams, and emulsions in food science. The student is expected to:

(A) identify the solvent and solute in various solutions such as brines;

(i) identify the solvent in various solutions

(ii) identify the solute in various solutions

(B) compare unsaturated, saturated, and supersaturated solutions, including their effects on boiling and freezing points in food preparation such as when making candy or ice cream;

(i) compare unsaturated, saturated, and supersaturated solutions, including their effects on boiling points in food preparation

(ii) compare unsaturated, saturated, and supersaturated solutions, including their effects on freezing points in food preparation

(C) calculate the concentration of a solution using mass percent such as the concentration of sugar needed for crystallization;

(i) calculate the concentration of a solution using mass percent

(D) describe the properties of colloidal dispersions such as gelatin, mayonnaise, or milk;

(i) describe the properties of colloidal dispersions

(E) differentiate between and give examples of temporary, semi-permanent, and permanent emulsions;

(i) differentiate between temporary, semi-permanent, and permanent emulsions

(ii) give examples of temporary emulsions

(iii) give examples of semi-permanent emulsions

(iv) give examples of permanent emulsions

(F) investigate the relationships between the three parts of a permanent emulsion; and

(i) investigate the relationships between the three parts of a permanent emulsion

(G) create temporary, semi-permanent, and permanent food emulsions.

(i) create temporary food emulsions

(ii) create semi-permanent food emulsions

(iii) create permanent food emulsions

(11) The student analyzes the functions of enzymes in food science. The student is expected to:

(A) describe the role of enzymes as catalysts in chemical reactions of food, including cheese-making, the enzymatic tenderization of meat, and oxidation of sugars in fruit;

(i) describe the role of enzymes as catalysts in chemical reactions of food, including cheese-making

(ii) describe the role of enzymes as catalysts in chemical reactions of food, including the enzymatic tenderization of meat

(iii)

(i)

(B) identify various leavening agents and describe their functions in food production;

(i) identify various leavening agents

(ii) describe [leavening agents'] functions in food production

(C) use chemical equations to describe how acids act as leavening agents;

(i) use chemical equations to describe how acids act as leavening agents

(D) conduct laboratory experiments with various types and amounts of leavening agents to compare the doughs and batters produced; and

(i) conduct laboratory experiments with various types of leavening agents to compare the doughs produced

(ii) conduct laboratory experiments with various types of leavening agents to compare the batters produced

(iii) conduct laboratory experiments with various amounts of leavening agents to compare the doughs produced

(iv) conduct laboratory experiments with various amounts of leavening agents to compare the batters produced

(E) create baked products using various leavening agents.

(i) create baked products using various leavening agents

(14) The student explores the roles of food additives. The student is expected to:

(A) evaluate the various types of food additives such as incidental, intentional, natural, and artificial;

(i) evaluate the various types of food additives

(B) investigate the various functions of food additives such as preserving food, increasing nutritive value, and enhancing sensory characteristics; and

(i) investigate the various functions of food additives

(C) research local, state, national, and international agencies involved in regulating food additives.

(i) research local agencies involved in regulating food additives

(ii) research state agencies involved in regulating food additives

(iii) research national agencies involved in regulating food additives

(iv) research international agencies involved in regulating food additives

(15) The student analyzes the effects of heat energy transfer in food production. The student is expected to:

(A) analyze the relationship between molecular motion and temperature;

(i) analyze the relationship between molecular motion and temperature

(B) compare heat transfer processes, including conduction, convection, and radiation;

(i) compare heat transfer processes, including conduction, convection, and radiation

(C) demonstrate methods for controlling fat oxidation;

(i) demonstrate methods for controlling fat oxidation

(20) The student evaluates the properties of water and their effects on food production. The student is expected to:

(A) identify the properties of water, including as a solvent or medium, and its effects on food production; and

(i) identify the properties of water, including as a solvent or medium

(ii) identify [water's] effects on food production

(B) compare the effects of hard and soft water on food production.

(i) compare the effects of hard and soft water on food production

(21) The student explains nutritional aspects of food production. The student is expected to:

(A) describe how variations in human digestion and metabolism affect dietary modifications;

(i) describe how variations in human digestion affect dietary modifications

(ii) describe how variations in human metabolism affect dietary modifications

(B) identify common and special dietary modifications such as for food allergies, intolerances, or muf-3.3 (o)-4Tj/2 (t)-3r8(t)-3r8

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(24) The student analyzes food preservation processes. The student is expected to:

(A) describe the benefits of food preservation;

(i) describe the benefits of food preservation

(B) compare various methods of household and commercial dehydration, canning, and freezing; and

(i) compare various methods of household and commercial dehydration

(ii) compare various methods of household and commercial canning

(iii) compare various methods of household and commercial freezing

(C) create a food product using a selected preservation method.

(i) create a food product using a selected preservation method