HB

93

<TARGET><BILL>HB 93</BILL><SUBJECT>HB
93</SUBJECT><COMM>HEDC27</COMM></TARGET>

27-LS0227\I
Mischel
2/23/11

CS FOR HOUSE BILL NO. 93(EDC)

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTY-SEVENTH LEGISLATURE - FIRST SESSION

BY THE HOUSE EDUCATION COMMITTEE

Offered:
Referred:

Sponsor(s): REPRESENTATIVES GUTTENBERG, Kerttula, Kawasaki

A BILL

FOR AN ACT ENTITLED

"An Act relating to school gardens, greenhouses, and farms."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*** Section 1.** AS 14.30.375(a) is amended to read:

(a) A school district may authorize **a nonprofit corporation to operate** or **may** operate a school garden, greenhouse, or farm. **A nonprofit corporation authorized under this section must contribute to the operation of each school garden, greenhouse, or farm matching funds in an amount that is equal to or greater than one-half percent of the state aid received by the school district under AS 14.17.400 for the school each year.** The garden, greenhouse, or farm must be used for educational purposes and for growing fruits and vegetables for consumption by the students through the school district's meal and snack program.

*** Sec. 2.** AS 14.30.375(b) is amended to read:

(b) If a school district **authorizes or** operates a school garden, greenhouse, or farm, the district **or the authorized nonprofit corporation** shall give students representing student organizations, including vocational programs, the opportunity to

be involved in the operation of the school garden, greenhouse, or farm.

* **Sec. 3.** AS 14.30.375(d) is amended to read:

(d) If a school district **authorizes or** operates a school garden, greenhouse, or farm, the excess fruit and vegetables may be sold.

* **Sec. 4.** AS 14.30.375 is amended by adding new subsections to read:

(e) If a school district authorizes a nonprofit corporation to operate a school garden, greenhouse or farm under this section, the school district shall apply for a grant under AS 14.30.377 to provide funds to the nonprofit corporation for the operation of each school garden, greenhouse, or farm.

(f) In this section, "nonprofit corporation" means a corporation that qualifies for exemption from taxation under 26 U.S.C. 501(c) (Internal Revenue Code).

* **Sec. 5.** AS 14.30 is amended by adding a new section to article 7 to read:

Sec. 14.30.377. State grant for operation of a school garden, greenhouse, or farm. (a) A school district may apply to the department on a form approved by the department for a state grant for the operation of one or more school gardens, greenhouses, or farms under AS 14.30.375.

(b) The department shall award a grant to a school district in an amount that is not more than $10,000 for each school at which a garden, greenhouse, or farm will be operated each year.

(c) The department may not, in a fiscal year, award grants for the operation of more than five gardens, greenhouses, or farms that were not previously the subject of a grant award under this section.

(d) A school district is eligible to receive a grant under this section if the district provides proof satisfactory to the department that a school or an approved nonprofit entity provides matching funds in an amount that is equal to or greater than the grant amount.

(e) The department may adopt regulations necessary to implement this section.

* **Sec. 6.** The uncodified law of the State of Alaska is amended by adding a new section to read:

GRANTS FOR SCHOOL GARDENS, GREENHOUSES, AND FARMS. Notwithstanding the limitation placed on the number of new grants awarded for the operation

of a school garden, greenhouse, or farm under AS 14.30.377(c), added by sec. 5 of this Act, the department may award grants for the operation of not more than 10 gardens, greenhouses, or farms in fiscal year 2012.

ALASKA STATE LEGISLATURE

SESSION:
Alaska State Capitol, Room 418
Juneau, AK 99801
(907) 465-4457 Office
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(800) 928-4457 Toll Free

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Representative David Guttenberg

House Bill 93: School Gardens
Sponsor Statement

House Bill 93 creates a grant program for non-profits who operate school gardens at public schools and have raised operation funding in their communities. It would allow the state to provide an additional ½ of one percent of state aide to a school for the purposes of supporting a non-profit run school garden, farm or greenhouse.

This legislation makes recognition of Alaska's problems with obesity and food security. By teaching young Alaskans how to grow their own healthy food in their own communities we can begin to ease both problems.

Even if every school in Alaska found non-profits to manage gardens, greenhouses or farms, the cost to the state would be minimal and the benefits would be astronomical.

Representative.David.Guttenberg@legis.state.ak.us
http://guttenberg.akdemocrats.org

FISCAL NOTE

STATE OF ALASKA
2011 LEGISLATIVE SESSION

Fiscal Note Number
Bill Version: **HB93**
() Publish Date

Identifier (file name) HB93-EED-TLS-2-10-2011
Title: "An Act relating to school gardens, greenhouses, and farms."
Sponsor: Representatives Guttenberg & Kerttula
Requester: House Education Committee

Dept. Affected: Education & Early Development
Appropriation: Teaching & Learning Support
Allocation: Student & School Achievement
OMB Component Number: 2796

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	Appropriation Required	Information					
OPERATING EXPENDITURES	**FY 2012**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**
Personal Services	32.0						
Travel							
Contractual							
Supplies							
Equipment							
Land & Structures							
Grants & Claims	5,351.1						
Miscellaneous							
TOTAL OPERATING	**5,383.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
CAPITAL EXPENDITURES							
CHANGE IN REVENUES							

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts							
1003 GF Match							
1004 GF	5,383.1						
1005 GF/Program Receipts							
1037 GF/Mental Health							
Other Interagency Receipts							
TOTAL	**5,383.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Estimate of any current year (FY2011) cost

POSITIONS

Full-time							
Part-time							
Temporary							

Why this fiscal note differs from previous version

Prepared by: Cynthia Curran, Director — Phone 465-2857
Division: Teaching & Learning Support — Date/Time 2/10/2011 2:25PM
Approved by: Michael Hanley, Commissioner — Date 2/10/2011

(Revised 12/29/2010 OMB)

FISCAL NOTE

STATE OF ALASKA **BILL NO.** HB93
2011 LEGISLATIVE SESSION

Analysis

The attached spreadsheet includes the FY2012 projected state entitlement under AS 14.17.400 with the calculation for allocations based on one-half percent of state aid to be authorized under the proposed amended Section 1. AS 14.30.375 (a). The proposed amendment would generate $5,351.1 under this legislation.

A unit within the Division of Teaching & Learning Support would be responsible for developing an application process and administering the grant program. This unit is nearly 100% funded through federal programs and must code their time to the appropriate funding source for activities. Based on .25 FTE, the activities of administering this program would be approximately $32.0.

Department of Education and Early Development
HB93 Proposed Allocations

School District	FY12 PROJECTED Total State Entitlement	HB93 FY12 PROJECTED @.5%
Alaska Gateway	7,006,626	35,033
Aleutian Region	1,366,274	6,831
Aleutians East	5,272,685	26,363
Anchorage	307,010,379	1,535,052
Annette Island	2,247,075	11,235
Bering Strait	27,466,427	137,332
Bristol Bay	1,852,688	9,263
Chatham	2,812,111	14,061
Chugach	2,312,876	11,564
Copper River	6,871,999	34,360
Cordova	3,371,706	16,859
Craig	4,832,300	24,162
Delta/Greely	10,211,507	51,058
Denali	5,237,098	26,185
Dillingham	5,905,442	29,527
Fairbanks	111,683,595	558,418
Galena	19,413,209	97,066
Haines	3,089,485	15,447
Hoonah	1,809,531	9,048
Hydaburg	1,054,592	5,273
Iditarod Area	5,440,002	27,200
Juneau	39,430,210	197,151
Kake	1,326,673	6,633
Kashunamiut	3,494,947	17,475
Kenai Peninsula	72,282,474	361,412
Ketchikan Gateway	17,312,351	86,562
Klawock	1,875,810	9,379
Kodiak Island	23,988,015	119,940
Kuspuk	6,292,706	31,464
Lake & Peninsula	8,996,251	44,981
Lower Kuskokwim	57,418,665	287,093
Lower Yukon	28,874,243	144,371
Mat-Su	135,873,821	679,369
Nenana	7,019,280	35,096
Nome	8,188,733	40,944
North Slope	13,627,513	68,138
Northwest Arctic	29,223,116	146,116
Pelican	432,056	2,160
Petersburg	5,577,973	27,890
Pribilof	1,320,080	6,600
Saint Mary's	3,195,710	15,979
Sitka	11,461,673	57,308
Skagway	398,019	1,990
Southeast Island	4,485,593	22,428
Southwest Region	9,373,257	46,866
Tanana	967,428	4,837
Unalaska	3,793,096	18,965
Valdez	4,226,234	21,131
Wrangell	3,854,512	19,273
Yakutat	1,433,547	7,168
Yukon Flats	7,135,624	35,678
Yukon/Koyukuk	11,276,286	56,381
Yupiit	6,587,717	32,939
Mt. Edgecumbe	3,211,093	16,055
TOTALS:	1,070,222,313	5,351,112

FISCAL NOTE

STATE OF ALASKA
2011 LEGISLATIVE SESSION

Fiscal Note Number
Bill Version: **CSHB93(EDC)**
() Publish Date

Identifier (file name) HB093CS-EED-TLS-2-25-11
Title "An Act relating to school gardens, greenhouses, and farms."
Sponsor Reps. Guttenburg, Kerttula,Kawasaki
Requester House Education Committee

Dept. Affected EED
Appropriation Teaching and Learning Support
Allocation Student and School Achievement
OMB Component Number 2796

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	Appropriation Required	Information					
OPERATING EXPENDITURES	**FY 2012**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**
Personal Services	10.6		10.6	10.6	10.6	10.6	10.6
Travel							
Services							
Commodities							
Capital Outlay							
Grants	100.0		150.0	200.0	250.0	300.0	350.0
Miscellaneous							
TOTAL OPERATING	**110.6**	**0.0**	**160.6**	**210.6**	**260.6**	**310.6**	**360.6**
CAPITAL EXPENDITURES							
CHANGE IN REVENUES							

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts							
1003 GF Match							
1004 GF	110.6		160.6	210.6	260.6	310.6	360.6
1005 GF/Program Receipts							
1037 GF/Mental Health							
Other (please identify)							
TOTAL	**110.6**	**0.0**	**160.6**	**210.6**	**260.6**	**310.6**	**360.6**

Estimate of any current year (FY2011) cost _____

POSITIONS

Full-time							
Part-time							
Temporary							

Why this fiscal note differs from previous version (if initial version, please note as such)

The funding mechanism for this version has changed from .5% of the State Aid under AS 14.17.400 per district to $10.0 per grant award with a limit of 10 schools in FY12 and a limit of 5 new schools per year on a statewide basis thereafter. The cost to develop a competitive grant application process and the administration of the grants has been reduced to an amount based on work by an existing Education Specialist II dedicated to the program.

Prepared by Cynthia Curran, Director — Phone 465-2857
Division Teaching and Learning Support — Date/Time 2/26/11 3:04 PM
Approved by Mike Hanley — Date 2/26/2011
Commissioner

(Revised 1/27/2011 OMB)

FISCAL NOTE

STATE OF ALASKA
2011 LEGISLATIVE SESSION

BILL NO. CSHB93(EDC)

Analysis

Under section 14.30.377 of the Committee Substitute, the department may award grants for operations of not more than 10 gardens, greenhouses, or farms in FY12. In subsequent fiscal years the department shall grant to a school district not more than an amount of $10,000 to each school at which a garden, greenhouse or farm (under AS 14.30.375) will be operated each year. The department may not award grants for the operation of more than five gardens, greenhouses, or farms that were not previously the subject of a grant award under the section.

A unit within the Division of Teaching & Learning Support would be responsible for developing an application process and administering the grant program. This unit is nearly 100% funded through federal programs and must code their time to the appropriate funding source for activities. Based on .12 FTE, the activities of administering this program would be approximately $10.6.

[redacted]OUSE COMMITTEE REPOR[redacted]

(7)
Date Referred to Committee: January 18, 2011 **FURTHER REFERRALS: Finance**

Date of Committee Action: 2/25/11

The EDUCATION Committee considered: **HB 93**

HOUSE BILL NO. 93
"An Act relating to school gardens, greenhouses, and farms."
HB 93 SCHOOL GARDENS, GREENHOUSES, AND FARMS

Recommends it be replaced with [ ] HCS *or* [ ] CS for House Bill 93 (EDC)
For Senate Bills with new title: [ ] Technical Title [ ] New Title: HCR_____ **[ ] Same Title [ ] New Title**

[ ] attach amendments
[ ] add new referral to _____Committee
[ ] Letter of Intent_____Committee

List of Abbrev for Depts.:
ADM
CED
COR
CRT
EED
DEC
DFG
GOV
DHS
LWF
LAW
LEG
MVA
DNR
DPS
REV
DOT
UA

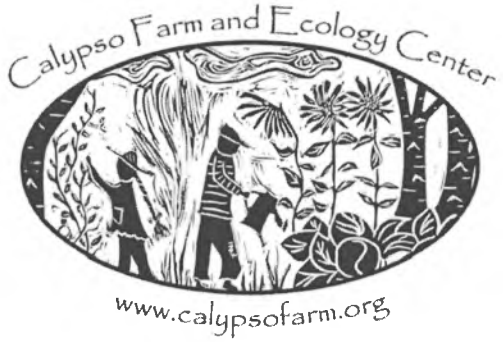
NEW FISCAL NOTES
*FN# is assigned by Chief Clerk's Office

*FN#	List by Dept(s):	Fiscal	Indet.	Zero
	EED	✓		

PREVIOUS FISCAL NOTES

FN#	List by Dept(s):	Fiscal	Indet.	Zero

Signing with recommendations	Printed Last Name	DP	DNP	NR	AM
Sharon Cissna	Sharon Cissna	✓			
Peggy Wilson	WILSON				✓
Paul Seaton	SEATON	✓			
	FEIGE		✓		
Chair:	Dicke	✓			
Chair:					



PO Box 106
Ester, Alaska 99725
907-451-0691 (phone/fax)

February 1, 2011

Chairman Alan Dick
House Education Committee
State Capitol
Juneau, AK 99801

Dear Chairman,

We at Calypso Farm and Ecology Center (Calypso) are thrilled at the prospect of House Bill 93 and what it could mean for Alaska! Our Schoolyard Garden Initiative (SGI) and Engaging Alaskan Teens in Gardening program (EATinG) have been very successful in the past eight years, producing food for the community, creating jobs for teenagers, involving community businesses and volunteers, and encouraging healthier eating habits. We know other Alaskan communities can benefit from implementing a model similar to ours, and think the incentive of matching legislative funds could really drive this process.

Calypso's SGI is currently the only nationally recognized Farm-to-School effort in the State of Alaska. It is an innovative community food program which creates school gardens that function as experiential learning environments – reaching well over 2,500 students during the school year – where students make a concrete connection to where food comes from and have the opportunity to harvest and eat fresh food from their schoolyards. During summer months, the EATinG program kicks in and the school gardens are maintained by local teenagers who plant, maintain, and harvest each of 6 school gardens, sell the vegetables throughout the summer at local farm-stands, and assist in teaching home gardening workshops to aspiring gardeners in the community and garden lessons to younger children in the fall. In exchange for their work, each Student Gardener takes home a weekly supply of vegetables and receives a monetary stipend at the end of the season. For most, this is their first job experience, and they gain excellent job readiness skills, develop a work ethic, contribute to meeting the community's need for food, and grow the local economy.

In Alaska, there are currently 7 schools in the program, with many other communities – such as, Soldotna, Kenai, Haines, and Juneau – who have indicated interested in replicating Calypso's model program or creating something similar. The growth of these programs has happened slowly, not exactly keeping pace with demand. Calypso would like to see schools throughout Alaska offering these programs and help non-profit farms statewide build similar programs, but funding can be an obstacle.

Calypso works hard each year to raise funds through soliciting contributions from corporations, local service clubs, and our members, as well as at our annual auction, special dinner events, a community-wide celebration of the programs. We also send targeted appeal mailings and apply for foundation grants. Most, recently, we were awarded a legislative grant. And we could grow more. That will require stable and diverse funding, including matching funds from the state, which is why Calypso strongly supports HB93. The matching funds incentive will provide a much-needed to boost to schools and groups on the cusp of starting a garden, greenhouse, or farm.

Below are some quick bits of information that, when you multiply them by the potential implied in HB93, would have a huge impact on youth and their families in Alaska:

- **In 2010 the school gardens produced over 10 tons of vegetables.**
- **In 2011 Calypso will engage over:**
    - **120 teenagers in EATinG**
    - **1,500 elementary school children** who will benefit by having school gardens to learn and play in
    - **300 low-income community members** who are expected to purchase food from the neighborhood farm stands associated with each garden. Five of the six schools are within walking distance of low-income housing and two of the schools are federally recognized as Title I Schools (serving youth from low-income families).

At Calypso, we've seen a tremendous impact on our community when there were just five schools engaged in SGI and EATinG. We know the exponential potential HB93 could have on our local area, let alone every community in our great state. If passed, the long-term outcomes of this legislation could include: healthier youth and families; improved local food economies and better food security; enhanced access to local foods for those using WIC, Senior Coupons and Food Stamp benefits; increased jobs in the agriculture sector; and strong workforce development.

At Calypso, we fully appreciate your time and consideration of this important bill and encourage all Alaskans to rally behind its possibilities to improve every community.

Sincerely,

Laenne K. Thompson

Laenne K. Thompson, *Calypso Farm Development Director*
fundcalypso@gmail.com
(907) 451-0691

Chairman Alan Dick, House Education Committee

Please support and help pass HB 93 that **will pave the way for more communities to tap into state funds for programs similar to Calypso's Schoolyard Garden Initiative and Engaging Alaska Teens in Gardening program.**

This bill is a long-term investment in Alaska because it offers a percentage of annual operating support for a school garden/greenhouse/farm, rather than offering funds for just one year.

The matching requirement is a way for the state to ensure the communities' commitment to each project.

In sum, this is unique and will actually have a long-lasting impact and would solidify Calypso's and **other community future school garden/greenhouse/farm projects.**

I am trying to get school gardens going in the Central Kenai Peninsula and urge your support for this bill. Calypso's inspirational message last fall was the impetus for our Garden Club to start school gardens.

Please play a leading role in the national surge for more local food production. Help young Alaskans learn how to grow more of their own food.

This is the equivalent of teaching kids who then taught their families to "Stop, Drop & Roll" in fire emergencies. "Learn, Plant and Grow Locally." HB 93 is part of a serious and sincere effort to wake all of us up to Alaska's need to get growing.

Most sincerely,

Marion Nelson
President & Program Chair
Central Peninsula Garden Club
(over 200 members)
907 283 4632

Dear Sir,

I am writing to ask you to support HB 93. As our garden committee chairman I have worked diligently to promote and start the garden at Randy Smith Middle School. This project has had universal support from the staff and students as they easily see the win/ win/ win benefits of it.

Teachers support the garden as an educational resource that can support curricula in several disciplines. Special education and intensive resource teachers support it as more hands on and real world opportunities for their students. Staff in general support it as a way to enhance the nutrition and quality of food in our lunch program. Our cooking staff support it an opportunity to use the freshest ingredients in the food they prepare. Students know it is a work opportunity in the summer and a chance to be hands-on in bringing food to their own table. Parents are excited to see it becoming a reality for the same reasons as everyone else.

The role Calypso Farms plays in helping school gardens get started is invaluable, from guiding infrastructure development, working with district administration and facilities, physical labor, and plant materials to education support. They have developed an initiative that really works in our community and can serve as a role model in others. Passing House Bill 93 will insure that Calypso Farms is able to keep running this important program with more schools and reach more students farther into the future. Thank you very much for your consideration and support.

Sincerely,

Katherine Helmuth

Randy Smith Middle School
Fairbanks, AK
458-7600

February 7, 2011

Chairman Alan Dick
House Education Committee
State Capitol
Juneau, AK 99801

Dear Chairman Dick:

I am writing this letter in support of House Bill 93. I am an elementary school teacher in Fairbanks, and have the privilege of utilizing a school garden as part of my daily work with students. The Pearl Creek Community Garden (my school garden) is one of several under the umbrella of the Calypso Schoolyard Garden Initiative. I am an active member of the school's Garden Committee, and I have seen firsthand what an effective teaching tool the garden can be. Our students plant seeds for the garden in the spring, as well as turn the soil and help prepare the beds. We also use the garden throughout the late summer and early fall for classroom activities and learning across all the academic curricula. Classrooms compost vegetable matter throughout the school year to help build our garden soil. The garden has become an important part of our school identity - for students, staff, and families.

The garden touches our larger school community in other ways. It provides young people with meaningful summer work and lifelong knowledge and skills, encourages interest in agricultural professions, brings fresh vegetables to the tables of many families as well as our students, and creates a beautiful space for the community. HB 93 would provide stability in funding which would help school gardens plan for growth and improvements as they are needed, ensuring that the gardens continue to employ our youth and have the resources necessary to supply the locally-grown food that more and more people in Alaska are demanding.

Here in the Forty-ninth State, we pride ourselves on our ability to live off the beautiful land around us. School gardens provide a means for Alaskan children and families to learn about sustainable food production, healthy choices, and responsible employment. I urge you to give HB 93 the highest possible consideration!

Sincerely,

Jacqueline M. Martin

Jacqueline M. Martin

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Sincerely,

Katherine Helmuth

Randy Smith Middle School
Fairbanks, AK
458-7600

Chairman Alan Dick, House Education Committee

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I am trying to get school gardens going in the Central Kenai Peninsula and urge your support for this bill. Calypso's inspirational message last fall was the impetus for our Garden Club to start school gardens.

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This is the equivalent of teaching kids who then taught their families to "Stop, Drop & Roll" in fire emergencies. "Learn, Plant and Grow Locally." HB 93 is part of a serious and sincere effort to wake all of us up to Alaska's need to get growing.

Most sincerely,

Marion Nelson
President & Program Chair
Central Peninsula Garden Club
(over 200 members)
907 283 4632

Introduction to Science Performance Standards

(Grade Level Expectations)

The Alaska Science Performance Standards/Grade Level Expectations (PSGLEs) have been developed for grades 3 through 11 in fulfillment of the No Child Left Behind Act of 2001 (NCLB) requirements.

This document is intended to provide a road map for the development of assessment items as well as the basis upon which school districts refine, align, and develop their science curriculum. The content described by the PSGLEs does not represent the entire science curriculum for a grade or course. Nor does it represent the final word on the science content that is presented since one of the basic understandings in science is that our knowledge continues to grow and change as we gather more evidence about a subject. The PSGLEs indicate core content to be mastered by the end of a given grade. Science content can be added and enriched as appropriate for a district program, school, or student. It may be necessary to introduce some skills at an earlier grade in order for students to achieve mastery at a given level. Similarly, skills will need to be maintained after mastery has occurred at a given grade level.

The Alaska Science PSGLEs are aligned to the Alaska Science Content Standards. The Content Standards were revised in 2003 to align with the National Science Education Standards. Participants in the development of the PSGLEs actively researched the concepts and skills contained within this document.

References

National Research Council (U.S.). (1996). *National Science Education Standards: Observe, interact, change, learn*. Washington, DC: National Academy Press.

Project 2061 (American Association for the Advancement of Science). (2001). *Atlas of science literacy*. Washington, DC: American Association for the Advancement of Science: National Science Teachers Association.

The Science Content Standards are grouped into seven strands, A-1 through G-1.

Each PSGLE includes a bolded statement called the "stem." Each stem is the same or similar across the grades for a given PSGLE and is meant to communicate the main curriculum and instructional focus of the PSGLE across the grades.

A1—Science as Inquiry and Process

SA Students develop an understanding of the processes and applications of scientific inquiry.
SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.
SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.
SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of the processes of science by	**The student demonstrates an understanding of the processes of science by**	**The student demonstrates an understanding of the processes of science by**
[3] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating	[4] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*	[5] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*
[3] SA1.2 observing and describing their world to answer simple questions	[4] SA1.2 observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate	[5] SA1.2 using quantitative and qualitative observations to create their own inferences and predictions
The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**
[3] SA2.1 answering "how do you know?" questions with reasonable answers	[4] SA2.1 supporting their ideas with observations and peer review (L)	[5] SA2.1 supporting their statements with facts from a variety of resources and by identifying their sources (L)
The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by	**The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by**	**The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by**
[3] SA3.1 observing local conditions that determine which plants and/or animals survive (L)	[4] SA3.1 identifying the local limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive (L)	[5] SA3.1 identifying the limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive

The number in brackets indicates the grade level.

PSGLEs repeated with no changes across grade levels are marked with asterisks to indicate that the PSGLE assumes increasing complexity to indicate growth in the PSGLE.

Note: Items differentiated with an "i.e." indicate that statewide assessment items may be written only to the content contained within the statement in the parentheses. Items differentiated with an "e.g." do not limit assessment items to that content, but indicate examples of content that may be used in statewide assessment items.

Some PSGLEs have been identified as Local. They are for local assessment and will not be on a state assessment.

The number indicates the Content Standard and the Grade Level Expectation number; thus PSGLE [4] SA3.1 represents Content Standard SA3, and the first PSGLE for that Content Standard for grade 4.

Differences between grade levels are underlined.

Participants in the development of the PSGLEs actively researched the concepts and skills contained within this document.

References

National Research Council (U.S.). (1996). *National Science Education Standards: Observe, interact, change, learn.* Washington, DC: National Academy Press.

Project 2061 (American Association for the Advancement of Science). (2001). *Atlas of science literacy.* Washington, DC: American Association for the Advancement of Science: National Science Teachers Association.

A1—Science as Inquiry and Process

SA Students develop an understanding of the processes and applications of scientific inquiry.

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and that local applications provide opportunity for understanding scientific concepts and global issues.

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of the processes of science by	**The student demonstrates an understanding of the processes of science by**	**The student demonstrates an understanding of the processes of science by**
[3] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating	[4] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*	[5] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*
[3] SA1.2 observing and describing the student's own world to answer simple questions	[4] SA1.2 observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate	[5] SA1.2 using quantitative and qualitative observations to create inferences and predictions
The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**
[3] SA2.1 answering "how do you know?" questions with reasonable answers	[4] SA2.1 supporting the student's own ideas with observations and peer review (L)	[5] SA2.1 supporting the student's own statements with facts from a variety of resources and by identifying their sources (L)
The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by	**The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by**	**The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by**
[3] SA3.1 observing local conditions that determine which plants and/or animals survive (L)	[4] SA3.1 identifying the local limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive (L)	[5] SA3.1 identifying the limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive

** Same concept at a higher level*

B1— Concepts of Physical Science

SB Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB1 Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.

SB2 Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.

SB3 Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.

SB4 Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of the structure and properties of matter by	**The student demonstrates an understanding of the structure and properties of matter by**	**The student demonstrates an understanding of the structure and properties of matter by**
[3] SB1.1 classifying matter according to physical properties (i.e., color, size, shape, weight, texture, flexibility)	[4] SB1.1 identifying and comparing the characteristics of gases, liquids, and solids	[5] SB1.1 comparing models that represent matter as solids, liquids, or gases and the changes from one state to another (L)
The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by	**The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by**	**The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by**
[3] SB2.1 classifying materials as insulators or conductors (i.e., fur, metal, wood, plastic) and identifying their applications	[4] SB2.1 investigating the effectiveness of different insulating and conducting materials with respect to heat flow and record the results (L)	[5] SB2.1 classifying the changes (i.e., heat, light, sound, and motion) that electrical energy undergoes in common household appliances (i.e., toaster, blender, radio, light bulb, heater)
The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by	**The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by**	**The student demonstrates understanding of the interactions between matter and energy and the effects of these interactions on systems by**
[3] SB3.1 recognizing that temperature changes cause changes in phases of substances (e.g., ice changing to liquid, water changing to water vapor, and vice versa)	[4] SB3.1 explaining that temperature changes cause changes in phases of substances (e.g., ice changing to liquid water and liquid water to water vapor)	[5] SB3.1 identifying physical and chemical changes based on observable characteristics (e.g., tearing paper vs. burning paper)
The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by	**The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by**	**The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by**
[3] SB4.2 recognizing that objects can be moved without being touched (e.g., using magnets, falling objects, static electricity)	[4] SB4.1 simulating that changes in speed or direction of motion are caused by forces (L)	[5] SB4.1 investigating that the greater the force acting on an object, the greater the change in motion will be (L)

SB4.1 is not addressed until grade 4.

C1—Concepts of Life Science

SC Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.

SC1 Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution.

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by	**The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by**	**The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by**
[3] SC1.1 sorting Alaskan plants and/or animals using physical characteristics (e.g., leaves, beaks) {L} [3] SC1.2 describing how some traits (e.g., claws, teeth, camouflage) of living organisms have helped them survive as a species	[4] SC1.1 showing the relationship between physical characteristics of Alaskan organisms and the environment in which they live [4] SC1.2 describing fossil evidence (e.g., casts, track ways, imprints, etc.) of extinct organisms	[5] SC1.1 contrasting inherited traits (e.g., flower color, number of limbs) with those that are not (riding a bike, scar from an accident) [5] SC1.2 making reasonable inferences about fossil organisms based on physical evidence
The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by	**The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by**	**The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by**
[3] SC2.1 sorting animals and plants into groups based on appearance and behaviors [3] SC2.2 observing and comparing external features of plants and of animals that may help them grow, survive, and reproduce	[4] SC2.1 choosing appropriate tools (i.e., hand lens, microscopes, ruler, balance) to examine the basic structural components (e.g., stems, leaves, fish scales, wings) of living things [4] SC2.2 describing the basic characteristics and requirements of living things	[5] SC2.1 identifying and sorting animals into groups using basic external and internal features [5] SC2.2 explaining how external features and internal systems (i.e., respiratory, excretory, skeletal, circulatory, and digestive) of plants and animals may help them grow, survive, and reproduce [5] SC2.3 recognizing that organisms are composed of cells
The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by	**The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by**	**The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by**
[3] SC3.1 identifying and sorting examples of living and non-living things in the local environment {L} [3] SC3.2 organizing a simple food chain of familiar plants and animals {L}	[4] SC3.1 identifying examples of living and non-living things and the relationship between them (e.g., living things need water, herbivores need plants) [4] SC3.2 identifying a simple food chain of familiar plants and animals, diagramming how energy flows through it; describing the effects of removing one link	[5] SC3.1 diagramming how matter and energy are transferred within and between living and nonliving things [5] SC3.2 organizing a simple food chain of familiar plants and animals that traces the source of the energy back to sunlight

D1—Concepts of Earth Science

SD Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.

SD1 Students develop an understanding of Earth's geochemical cycles.

SD2 Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.

SD3 Students develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system.

SD4 Students develop an understanding of the theories regarding the evolution of the universe.

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of geochemical cycles by	**The student demonstrates an understanding of geochemical cycles by**	**The student demonstrates an understanding of geochemical cycles by**
[3] SD1.1 recognizing that most rocks are composed of combinations of different substances [3] SD1.2 describing the water cycle to show that water circulates through the crust, oceans, and atmosphere of Earth	[4] SD1.1 describing that most smaller rocks come from the breaking and weathering of larger rocks as part of the rock cycle [4] SD1.2 recognizing the physical properties of water as they relate to the rock cycle	[5] SD1.1 observing a model of the rock cycle showing that smaller rocks come from the breaking and weathering of larger rocks and that smaller rocks (e.g., sediments and sands) may combine with plant materials to form soils (L)
The student demonstrates an understanding of the forces that shape Earth by	**The student demonstrates an understanding of the forces that shape Earth by**	**The student demonstrates an understanding of the forces that shape Earth by**
[3] SD2.1 identifying and comparing a variety of Earth's land features (i.e., rivers, deltas, lakes, glaciers, mountains, valleys, and islands)	[4] SD2.1 observing models of how waves, wind, water, and ice shape and reshape the Earth's surface by eroding rock and soil (L) [4] SD2.2 identifying causes (i.e., earthquakes, tsunamis, volcanoes, floods, landslides, and avalanches) of rapid changes on the surface	[5] SD2.1 describing how wind and water tear down and build up the Earth's surface resulting in new land formations (i.e., deltas, moraines, and canyons)
The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by	**The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by**	**The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by**
[3] SD3.1 using recorded weather patterns (e.g., temperature, cloud cover, or precipitation) to make reasonable predictions (L)	[4] SD3.1 recognizing changes to length of daylight over time and its relationship to seasons [4] SD3.2 observing that heat flows from one object to another (L)	[5] SD3.1 observing a model that shows how the regular and predictable motion of the Earth and moon determine the apparent shape (phases) of the moon over time (L) [5] SD3.2 comparing heat absorption and loss by land and water

The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by	**The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by**	**The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by**
[3] SD4.1 recognizing that objects appear smaller the farther away they are	[4] SD4.1 recognizing that stars are like the sun but are so far away that they look like points of light	[5] SD4.1 distinguishing among stars, planets, moons, comets, and meteors (L)
[3] SD4.2 recognizing that objects have properties, locations, and movements that can be observed and described	[4] SD4.2 recognizing that objects have properties, locations, and movements that can be observed and described*	[5] SD4.2 recognizing that the Earth is in regular and predictable motion and this motion explains the length of a day and a year
[3] SD4.3 recognizing and using appropriate instruments of magnification (e.g., binoculars and telescopes) (L)	[4] SD4.3 recognizing and using appropriate instruments of magnification (e.g., binoculars and telescopes)* (L)	[5] SD4.3 recognizing and using appropriate instruments of magnification (e.g., binoculars and telescopes)* (L)

** Same concept at a higher level*

E1—Science and Technology

SE Students develop an understanding of the relationships among science, technology, and society.

SE1 Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

SE2 Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

SE3 Students develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by	**The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by**	**The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by**
[3] SE1.1 identifying local problems and discussing solutions (L)	[4] SE1.1 recognizing that tools (e.g., spear, hammer, hand lens, kayak, computer) and processes (e.g., drying fish, sewing, photography) are an important part of human cultures	[5] SE1.1 identifying a community problem or issue and describing the information needed to develop a scientific solution (L)
The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by	**The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by**	**The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by**
[3] SE2.1 identifying local tools and materials used in everyday life (L)	[4] SE2.1 identifying the function of a variety of tools (e.g., spear, hammer, hand lens, kayak, computer) [4] SE2.2 identifying multiple explanations (e.g., oral traditions, folklore, scientific theory) of everyday events (e.g., weather, seasonal changes) (L)	5] SE2.1 investigating a problem or project over a specified period of time and identifying the tools and processes used in that project (L) [5] SE2.2 comparing multiple explanations (e.g., oral traditions, folklore, scientific theory) of everyday events (e.g., weather, seasonal changes) (L)
The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by	**The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by**	**The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by**
[3] SE3.1 listing the positive and negative effects of a single technological development in the local community (e.g., fish trap, fish wheel, four-wheeler, computer) (L)	[4] SE3.1 listing the positive and negative effects of a scientific discovery	[5] SE3.1 describing the various effects of an innovation (e.g., snow machines, airplanes, immunizations) on the safety, health, and environment of the local community (L)

F1—Cultural, Social, Personal Perspectives, and Science

SF Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.

SF1 Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.

SF2 Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.

SF3 Students develop an understanding of the importance of recording and validating cultural knowledge.

GRADE 3

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by

[3] SF1.1-SF3.1 exploring local or traditional stories that explain a natural event (L) Cross referenced with SA3.1.

GRADE 4

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by

[4] SF1.1-SF3.1 connecting observations of nature to a local or traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) (L) Cross referenced with SA3.1.

GRADE 5

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by

[5] SF1.1-SF3.1 telling a local or traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) and relating it to a scientific explanation*(L) Cross referenced with SA3.1.

G1–History and Nature of Science

SG Students develop an understanding of the history and nature of science.

SG1 Students develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge.

SG2 Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.

SG3 Students develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).

SG4 Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

GRADE 3	GRADE 4	GRADE 5
[3] SG 1.1**	[4] SG 1.1**	[5] SG 1.1**

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding of the bases of the advancement of scientific knowledge by	**The student demonstrates an understanding of the bases of the advancement of scientific knowledge by**	**The student demonstrates an understanding of the bases of the advancement of scientific knowledge by**
[3] SG2.1 comparing the results of multiple observations of a single local event (L)	[4] SG2.1 recognizing the need for repeated measurements	[5] SG2.1 reviewing and recording results of investigations into the natural world

GRADE 3	GRADE 4	GRADE 5
[3] SG 3.1**	[4] SG 3.1**	[5] SG 3.1**

GRADE 3	GRADE 4	GRADE 5
The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by	**The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by**	**The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by**
[3] SG4.1 asking questions about the natural world	[4] SG4.1 using an account of a discovery to recognize that an individual's (e.g., George Washington Carver, Marie Curie) curiosity led to advancements in science	[5] SG4.1 investigating that scientists' curiosity led to advancements in science (L)

**"Most of the historical benchmarks do not appear until high school." (Project 2061 [American Association for the Advancement of Science], 2001, p. 129)

Project 2061 (American Association for the Advancement of Science). (2001). *Atlas of science literacy.* Washington, DC: American Association for the Advancement of Science: National Science Teachers Association.

A1—Science as Inquiry and Process

SA Students develop an understanding of the processes and applications of scientific inquiry.

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and that local applications provide opportunity for understanding scientific concepts and global issues.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates an understanding of the processes of science by	**The student demonstrates an understanding of the processes of science by**	**The student demonstrates an understanding of the processes of science by**
[6] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*	[7] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*	[8] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*
[6] SA1.2 collaborating to design and conduct simple repeatable investigations (L)	[7] SA1.2 collaborating to design and conduct simple repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings (L)	[8] SA1.2 collaborating to design and conduct repeatable investigations, in order to record, analyze (i.e., range, mean, median, mode), interpret data, and present findings (L)*
The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**
[6] SA2.1 identifying and differentiating fact from opinion	[7] SA2.1 identifying and evaluating the sources used to support scientific statements	[8] SA2.1 recognizing and analyzing differing scientific explanations and models
The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by	**The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by**	**The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by**
[6] SA3.1 gathering data to build a knowledge base that contributes to the development of questions about the local environment (e.g., moose browsing, trail usage, river erosion) (L)	[7] SA3.1 designing and conducting a simple investigation about the local environment (L)	[8] SA3.1 conducting research to learn how the local environment is used by a variety of competing interests (e.g., competition for habitat/resources, tourism, oil and mining companies, hunting groups) (L)

** Same concept at a higher level*

B1—Concepts of Physical Science

SB Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB1 Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.

SB2 Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.

SB3 Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.

SB4 Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates understanding of the structure and properties of matter by	**The student demonstrates understanding of the structure and properties of matter by**	**The student demonstrates an understanding of the structure and properties of matter by**
[6] SB1.1 using models to represent matter as it changes from one state to another	[7] SB1.1 using physical properties (i.e., density, boiling point, freezing point, conductivity) to differentiate among and/or separate materials (i.e., elements, compounds, and mixtures)	[8] SB1.1 using physical and chemical properties (i.e., density, boiling point, freezing point, conductivity, flammability) to differentiate among materials (i.e., elements, compounds, and mixtures)
The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by	**The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by**	**The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by**
[6] SB2.1 recognizing that energy can exist in many forms (i.e., heat, light, chemical, electrical, mechanical)	[7] SB2.1 explaining that energy (i.e., heat, light, chemical, electrical, mechanical) can change form	[8] SB2.1 identifying the initial source and resulting change in forms of energy in common phenomena (e.g., sun to tree to wood to stove to cabin heat)
The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by	**The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by**	**The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by**
[6] SB3.1 recognizing that most substances can exist as a solid, liquid, or gas depending on temperature	[7] SB3.1 recognizing that most substances can exist as a solid, liquid, or gas depending on the motion of their particles	[8] SB3.1 exploring changes of state with increase or decrease of particle speed associated with heat transfer (L) [8] SB3.2 exploring through a variety of models (e.g., gumdrops and toothpicks) how atoms may bond together into well defined molecules or bond together in large arrays (L)
The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by	**The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by**	**The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by**
[6] SB4.2 stating that every object exerts gravitational force on every other object [6] SB4.3 making waves move through a variety of media (L) *SB4.1 is not addressed in grade 6.*	[7] SB4.1 illustrating that unbalanced forces will cause an object to accelerate [7] SB4.2 recognizing that electric currents and magnets can exert a force on each other [7] SB4.3 describing the characteristics of a wave (i.e., amplitude, wavelength, and frequency)	[8] SB4.1 demonstrating (L) and explaining circular motion [8] SB4.2 describing the interactions between charges

C1—Concepts of Life Science

SC Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.

SC1 Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution.

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by	**The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by**	**The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by**
[6] SC1.1 recognizing sexual and asexual reproduction [6] SC1.2 recognizing that species survive by adapting to changes in their environment	[7] SC1.1 comparing and contrasting sexual and asexual reproduction [7] SC1.2 describing possible outcomes of mutations (i.e., no effect, damage, benefit)	[8] SC1.1 describing the role of genes in sexual reproduction (i.e., traits of the offspring)
The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by	**The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by**	**The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by**
[6] SC2.1 using a dichotomous key to classify animals and plants into groups using external or internal features [6] SC2.2 identifying basic behaviors (e.g., migration, communication, hibernation) used by organisms to meet the requirements of life [6] SC2.3 describing the levels of organization within a human body (i.e., cells, tissues, organs, systems)	[7] SC2.1 describing the basic structure and function of plant and animal cells [7] SC2.2 identifying the seven levels of classification of organisms [7] SC2.3 identifying and describing the functions of human organs (i.e., heart, lungs, brain)	[8] SC2.1 placing vertebrates into correct classes of taxonomy based on external, observable features [8] SC2.2 explaining that most organisms utilize inherited and learned behaviors to meet the basic requirements of life [8] SC2.3 describing the functions and interdependence of human body systems (i.e., circulatory, respiratory, nervous)
The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by	**The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by**	**The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by**
[6] SC3.1 recognizing that organisms can cause physical and chemical changes (e.g., digestion, growth, respiration, photosynthesis) to matter and recognizing the importance of energy transfer in these changes [6] SC3.2 organizing a food web using familiar plants and animals	[7] SC3.1 recognizing and explaining that organisms can cause physical and chemical changes (e.g., digestion, growth, respiration, photosynthesis) to matter and recognizing and explaining the importance of energy transfer in these changes [7] SC3.2 classifying organisms within a food web as producers, consumers, or decomposers	[8] SC3.1 stating that energy flows and that matter cycles but is conserved within an ecosystem [8] SC3.2 organizing a food web that shows the cycling matter

D1—Concepts of Earth Science

SD Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.

SD1 Students develop an understanding of Earth's geochemical cycles.

SD2 Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.

SD3 Students develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system.

SD4 Students develop an understanding of the theories regarding the evolution of the universe.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates an understanding of geochemical cycles by	**The student demonstrates an understanding of geochemical cycles by**	**The student demonstrates an understanding of geochemical cycles by**
[6] SD1.1 exploring the rock cycle and its relationship to igneous, metamorphic, and sedimentary rocks (L)	[7] SD1.1 describing the rock cycle and its relationship to igneous, metamorphic, and sedimentary rocks	[8] SD1.1 making connections between components of the locally observable geologic environment and the rock cycle (L)
[6] SD1.2 identifying the physical properties of water within the stages of the water cycle	[7] SD1.2 explaining the water cycle's connection to changes in the Earth's surface	[8] SD1.2 applying knowledge of the water cycle to explain changes in the Earth's surface
The student demonstrates an understanding of the forces that shape Earth by	**The student demonstrates an understanding of the forces that shape Earth by**	**The student demonstrates an understanding of the forces that shape Earth by**
[6] SD2.1 describing the formation and composition (i.e., sand, silt, clay, organics) of soils	[7] SD2.1 identifying strategies (e.g., reforestation, dikes, wind breaks, off road activity guidelines) for minimizing erosion	[8] SD2.1 interpreting topographical maps to identify features (i.e., rivers, lakes, mountains, valleys, islands, and tundra)
[6] SD2.2 identifying and describing its layers (i.e., crust, mantle, core)	[7] SD2.2 describing how the movement of the tectonic plates results in both slow changes (e.g., formation of mountains, ocean floors, and basins) and short-term events (e.g., volcanic eruptions, seismic waves, and earthquakes) on the surface	[8] SD2.2 using models to show the relationship between convection currents within the mantle and the large-scale movement of the surface (L)
[6] SD2.3 describing how the surface can change rapidly as a result of geological activities (i.e., earthquakes, tsunamis, volcanoes, floods, landslides, avalanches)		
The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by	**The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by**	**The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by**
[6] SD3.1 connecting the water cycle to weather phenomena	[7] SD3.1 describing the weather using accepted meteorological terms (e.g., pressure systems, fronts, precipitation)	[8] SD3.1 recognizing the relationship between the seasons and Earth's tilt relative to the sun and describing the day/night cycle as caused by the rotation of the Earth every 24 hours
[6] SD3.2 identifying that energy transfer is affected by surface conditions (e.g., snow cover, asphalt, vegetation) and that this affects weather	[7] SD3.2 recognizing the relationship between phase changes (i.e., sublimation, condensation, evaporation) and energy transfer	[8] SD3.2 recognizing types of energy transfer (convection, conduction, and radiation) and how they affect weather

The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by	The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by	The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by
[6] SD4.1 contrasting characteristics of planets and stars (i.e., light reflecting, light emitting, orbiting, orbited, composition)	[7] SD4.1 comparing and contrasting characteristics of planets and stars (i.e., light reflecting, light emitting, orbiting, orbited, composition)	[8] SD4.1 creating models of the solar system illustrating size, location/position, composition, moons/rings, and conditions (L)
[6] SD4.2 defining a light year	[7] SD4.2 using light years to describe distances between objects in the universe	[8] SD4.2 comparing the brightness of a star to its distance and size

E1—Science and Technology

SE Students develop an understanding of the relationships among science, technology, and society.

SE1 Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

SE2 Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

SE3 Students develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by	**The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by**	**The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by**
[6] SE1.1 recognizing that technology cannot always provide successful solutions for problems or fulfill every human need	[7] SE1.1 describing how public policy affects the student's life (e.g., public waste disposal) (L)	[8] SE1.1 describing how public policy affects the student's life and participating diplomatically in evidence-based discussions relating to the student's community (L)
The student demonstrates an understanding that solving problems involves different ways of thinking by	**The student demonstrates an understanding that solving problems involves different ways of thinking by**	**The student demonstrates an understanding that solving problems involves different ways of thinking by**
[6] SE2.1 identifying and designing a solution to a problem [6] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate a question or problem (L)	[7] SE2.1 identifying, designing, testing, and revising solutions to a local problem (L) [7] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate a question or problem* (L)	[8] SE2.1 identifying, designing, testing, and revising solutions to a local problem* (L) [8] SE2.2 comparing the student's work to the work of peers in order to identify multiple paths that can be used to investigate and evaluate potential solutions to a question or problem (L)
The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by	**The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by**	**The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by**
[6] SE3.1 describing the various effects of an innovation on a global level	[7] SE3.1 recognizing the effects of a past scientific discovery, invention, or scientific breakthrough (e.g., DDT, internal combustion engine)	[8] SE3.1 predicting the possible effects of a recent scientific discovery, invention, or scientific breakthrough (L)

** Same concept at a higher level*

F1—Cultural, Social, Personal Perspectives, and Science

SF Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.

SF1 Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.

SF2 Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.

SF3 Students develop an understanding of the importance of recording and validating cultural knowledge.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by	**The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by**	**The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by**
[6] SF1.1-SF3.1 telling a local or traditional story that explains a natural event (e.g., animal adaptation, weather, rapid changes to Earth's surface) and relating it to a scientific explanation* (L). Cross referenced with SA3.1.	[7] SF1.1-SF3.1 investigating the basis of local knowledge (e.g., describing and predicting weather) and sharing that information (L). Cross referenced with SA3.1.	[8] SF1.1-SF3.1 describing how local knowledge, culture, and the technologies of various activities (e.g., hunting, fishing, subsistence) influence the development of scientific knowledge (L). Cross referenced with SA3.1.

** Same concept at a higher level*

G1—History and Nature of Science

SG Students develop an understanding of the history and nature of science.

SG1 Students develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge.

SG2 Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.

SG3 Students develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).

SG4 Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

GRADE 6	GRADE 7	GRADE 8
The student demonstrates an understanding of the bases of the advancement of scientific knowledge by [6] SG1.1** [6] SG2.1 recognizing differences in results of repeated experiments	**The student demonstrates an understanding of the bases of the advancement of scientific knowledge by** [7] SG1.1** [7] SG2.1 explaining differences in results of repeated experiments	**The student demonstrates an understanding of the bases of the advancement of scientific knowledge by** [8] SG1.1** [8] SG2.1 describing how repeating experiments improves the likelihood of accurate results
See [6] SE 3.1	**The student demonstrates an understanding that scientific knowledge is ongoing and subject to change by** [7] SG3.1 revising a personal idea when presented with experimental/observational data inconsistent with that personal idea (e.g., the rates of falling bodies of different masses) (L)	**The student demonstrates an understanding that scientific knowledge is ongoing and subject to change by** [8] SG3.1 revising a personal idea when presented with experimental/observational data inconsistent with that personal idea (e.g., the rates of falling bodies of different masses)* (L)
[6] SG4.1**	[7] SG4.1**	[8] SG4.1**

** Same concept at a higher level*

**"Most of the historical benchmarks do not appear until high school." (Project 2061 [American Association for the Advancement of Science], 2001, p. 129)

Project 2061 (American Association for the Advancement of Science). (2001). *Atlas of science literacy.* Washington, DC: American Association for the Advancement of Science: National Science Teachers Association.

A1—Science as Inquiry and Process

SA Students develop an understanding of the processes and applications of scientific inquiry.

SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.

SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and that local applications provide opportunity for understanding scientific concepts and global issues.

GRADE 9	GRADE 10	GRADE 11
The student demonstrates an understanding of the processes of science by	**The student demonstrates an understanding of the processes of science by**	**The student demonstrates an understanding of the processes of science by**
[9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating*	[10] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, analyzing data, developing models, inferring, and communicating	[11] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, analyzing data, developing models, inferring, and communicating*
[9] SA1.2 hypothesizing, designing a controlled experiment, making qualitative and quantitative observations, interpreting data, and using this information to communicate conclusions	[10] SA1.2 reviewing pertinent literature, hypothesizing, making qualitative and quantitative observations, controlling experimental variables, analyzing data statistically (i.e., mean, median, model), and using this information to draw conclusions, compare results to others, suggest further experimentation, and apply student's conclusions to other problems (L)	[11] SA1.2 recognizing and analyzing multiple explanations and models, using this information to revise student's own explanation or model if necessary (L)
The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**	**The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by**
[9] SA2.1 formulating conclusions that are logical and supported by evidence	[10] SA2.1 examining methodology and conclusions to identify bias and determining if evidence logically supports the conclusions	[11] SA2.1 evaluating the credibility of cited sources when conducting the student's own scientific investigation (L)
		The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by
		[11] SA3.1 conducting research and communicating results to solve a problem (e.g., fish and game management, building permits, mineral rights, land use policies) (L)

**Same concept at a higher level*

B1—Concepts of Physical Science

SB Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB1 Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.

SB2 Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.

SB3 Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.

SB4 Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.

GRADE 9	GRADE 10	GRADE 11
The student demonstrates an understanding of the structure and properties of matter by	**The student demonstrates an understanding of the structure and properties of matter by**	**The student demonstrates an understanding of the structure and properties of matter by**
[9] SB1.1 describing atoms and their base components (i.e., protons, neutrons, electrons)	[10] SB1.1 using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)	[11] SB1.1 predicting the properties of an element (i.e., reactivity, metal, non-metal) using the periodic table and verifying the predictions through experimentation (L)
The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by	**The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by**	**The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by**
[9] SB2.1 applying the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings [9] SB2.2 recognizing simple electrical circuits	[10] SB2.1 examining energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy	[11] SB2.1 demonstrating energy (e.g., nuclear, electromagnetic, chemical, mechanical, thermal) transfers and transformations by comparing useful energy to total energy (entropy) (L)
The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by	**The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by**	**The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by**
[9] SB3.1 recognizing that a chemical reaction has taken place [9] SB3.2 explaining that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system [9] SB3.3 recognizing that atoms emit and absorb electromagnetic radiation	[10] SB3.1 describing the behavior of electrons in chemical bonding [10] SB3.2 recognizing that radioactivity is a result of the decay of unstable nuclei [10] SB3.3 comparing the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)	[11] SB3.1 predicting how an atom can interact with other atoms based on its electron configuration and verifying the results (L) [11] SB3.2 researching applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (i.e., $E=MC^2$) (L)

The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by

[9] SB4.1 explaining the relationship of motion to an object's mass and the applied force

[9] SB4.2 recognizing that the gravitational attraction between objects is proportional to their masses and decreasing with their distance

[9] SB4.3 describing the interactions of waves (i.e., reflection, refraction, wave addition)

The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by

[10] SB4.1 recognizing that when one thing exerts a force on another, an equal amount of force is exerted back on it

[10] SB4.2 explaining that different kinds of materials respond to electric and magnetic forces (i.e., conductors, insulators, magnetic, and non-magnetic materials)

The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by

[11] SB4.1 conducting an experiment to demonstrate that when one thing exerts a force on another, an equal amount of force is exerted back on it (L)

[11] SB4.2 conducting an experiment to explore the relationship between magnetic forces and electric forces to show that they can be thought of as different aspects of a single electromagnetic force (e.g., generators and motors) (L)

C1—Concepts of Life Science

SC Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.

SC1 Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution.

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

GRADE 9	GRADE 10	GRADE 11
The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by	**The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by**	**The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by**
[9] SC1.1 recognizing that all organisms have chromosomes made of DNA and that DNA determines traits	[10] SC1.2 explaining how the processes of natural selection can cause speciation and extinction	[11] SC1.1 relating the structure of DNA to characteristics of an organism
[9] SC1.2 using probabilities to recognize patterns of inheritance (e.g., Punnett Squares)	[10] SC1.3 examining issues related to genetics (L)	[11] SC1.2 researching how the processes of natural selection cause changes in species over time (L)
[9] SC1.3 inferring evolutionary pathways from evidence (e.g., fossils, geologic samples, recorded history)	*SC1.1 is not addressed in grade 10.*	
The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by	**The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by**	**The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by**
[9] SC2.1 describing and comparing the characteristics of phyla/divisions from each kingdom	[10] SC2.1 describing the structure-function relationship (e.g., joints, lungs)	[11] SC2.1 describing the structure-function relationship*
[9] SC2.3 stating the function of major physiological systems (i.e., circulatory, excretory, digestive, respiratory, reproductive, nervous, immune, endocrine, musculoskeletal, and integumentary)	[10] SC2.2 explaining that cells have specialized structures in which chemical reactions occur	[11] SC2.2 describing the learned behaviors (e.g., classical conditioning, imprinting, trial and error) that are utilized by living organisms to meet the requirements of life
SC2.2 is not addressed in grade 9.	[10] SC2.3 explaining the functions of organs of major systems (i.e., respiratory, digestive, circulatory, reproductive, nervous, musculoskeletal, and excretory)	[11] SC2.3 describing the functions and interdependencies of the organs within the immune system and within the endocrine system
	[10] SC2.4 tracing the pathways of the digestive, circulatory, and excretory systems	

** Same concept at a higher level*

The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by

[9] SC3.1 describing the carbon and nitrogen cycle within an ecosystem and how the continual input of energy from sunlight keeps the process going (L)

[9] SC3.3 identifying dynamic factors (e.g., carrying capacity, limiting factors, biodiversity, and productivity) that affect population size

SC3.2 is not addressed in grade 9.

The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by

[10] SC3.1 relating the carbon cycle to global climate change

[10] SC3. 2 exploring ecological relationships (e.g., competition, niche, feeding relationships, symbiosis) (L)

The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by

[11] SC3.1 relating the carbon cycle to global climate change*

[11] SC3.2 analyzing the potential impacts of changes (e.g., climate change, habitat loss/gain, cataclysms, human activities) within an ecosystem

** Same concept at a higher level*

D1—Concepts of Earth Science

SD Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.

SD1 Students develop an understanding of Earth's geochemical cycles.

SD2 Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.

SD3 Students develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system.

SD4 Students develop an understanding of the theories regarding the evolution of the universe.

GRADE 9	GRADE 10	GRADE 11
The student demonstrates an understanding of geochemical cycles by	**The student demonstrates an understanding of geochemical cycles by**	**The student demonstrates an understanding of geochemical cycles by**
[9] SD1.1 using a model to demonstrate the rock cycle (L)	[10] SD1.1 using a model to explain the processes (i.e., formation, sedimentation, erosion, reformation) of the rock cycle	[11] SD1.1 creating a model to demonstrate the rock cycle (L)
[9] SD1.2 applying knowledge of the water cycle to explain changes in the Earth's surface*	[10] SD1.2 describing their interrelationships (i.e., water cycle, carbon cycle, oxygen cycle)	[11] SD1.2 integrating knowledge of the water cycle and biogeochemical cycling to explain changes in the Earth's surface (L)
The student demonstrates an understanding of the forces that shape Earth by	**The student demonstrates an understanding of the forces that shape Earth by**	**The student demonstrates an understanding of the forces that shape Earth by**
[9] SD2.1 recognizing the dynamic interaction of erosion and deposition including human causes	[10] SD2.1 recognizing the dynamic interaction of erosion and deposition including human causes*	[11] SD2.1 recognizing the dynamic interaction of erosion and deposition including human causes*
[9] SD2.2 describing how the theory of plate tectonics explains the dynamic nature of its surface	[10] SD2.2 describing how the theory of plate tectonics explains the dynamic nature of its surface*	[11] SD2.2 describing how the theory of plate tectonics explains the dynamic nature of its surface*
The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by	**The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by**	**The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by**
[9] SD3.1 recognizing the effect of the moon and sun on tides	[10] SD3.1 describing causes, effects, preventions, and mitigations of human impact on climate	[11] SD3.1 describing causes, effects, preventions, and mitigations of human impact on climate*
[9] SD3.2 explaining the phenomena of the aurora		[11] SD3.2 exploring causes and effects related to phenomena (e.g., the aurora, solar winds, Coriolis Effect) (L)

** Same concept at a higher level*

The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by	**The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by**	**The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by**
[9] SD4.1 recognizing that a star changes over time	[10] SD 4.1 recognizing phenomena in the universe (i.e., black holes, nebula)	[11] SD4.1 describing phenomena in the universe (i.e., black holes, nebula)
[9] SD4.2 explaining that the position of stars changes in the expanding universe	[10] SD 4.2 explaining that the position of stars changes in the expanding universe*	[11] SD4.2 using evidence to explain how the position of stars changes in the expanding universe
[9] SD4.4 identifying the Big Bang Theory	[10] SD 4.4 describing the Big Bang Theory	[11] SD4.4 describing the Big Bang Theory and exploring the evidence that supports it (L)

SD4.3 is not continued in 9-11.

** Same concept at a higher level*

E1—Science and Technology

SE Students develop an understanding of the relationships among science, technology, and society.

SE1 Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

SE2 Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

SE3 Students develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.

GRADE 9	GRADE 10	GRADE 11
The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by	**The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by**	**The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by**
[9] SE1.1 recognizing that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska)	[10] SE1.1 identifying that progress in science and invention is highly interrelated to what else is happening in society	[11] SE1.1 researching how social, economic, and political forces strongly influence which technology will be developed and used (L)
The student demonstrates an understanding that solving problems involves different ways of thinking by	**The student demonstrates an understanding that solving problems involves different ways of thinking by**	**The student demonstrates an understanding that solving problems involves different ways of thinking by**
[9] SE2.1 questioning, researching, modeling, simulating, and testing a solution to a problem (L)	[10] SE2.1 questioning, researching, modeling, simulating, and testing multiple solutions to a problem (L)	[11] SE2.1 questioning, researching, modeling, simulating, and testing multiple solutions to a problem* (L)
The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by	**The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by**	**The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by**
[9] SE3.1 predicting and evaluating the possible effects of a recent scientific discovery, invention, or scientific breakthrough (L)	[10] SE3.1 researching a current problem, identifying possible solutions, and evaluating the impact of each solution (L)	[11] SE3.1 researching a current problem, identifying possible solutions, and evaluating the impact of each solution* (L)

** Same concept at a higher level*

F1—Cultural, Social, Personal Perspectives, and Science

SF Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.

SF1 Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.

SF2 Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.

SF3 Students develop an understanding of the importance of recording and validating cultural knowledge.

GRADE 9

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by

[9] SF1.1-SF3.1 describing the scientific principles involved in a subsistence activity (e.g., hunting, fishing, gardening) (L). Cross referenced with SA3.1.

GRADE 10

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by:

[10] SF1.1-SF3.1 analyzing the competition for resources by various user groups to describe these interrelationships. Cross referenced with SA3.1.

GRADE 11

The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by

[11] SF1.1-SF3.1 investigating the influences of societal and/or cultural beliefs on science (L). Cross referenced with SA3.1.