

Navigating the Revised Science Curriculum

Document 1: A General Overview (Draft: May 2016)

A Science Implementation Tool

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*Created By
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What are the Foundations of Science in the Revised Curriculum?

1. ***Science focuses on the processes and thinking skills involved in science.*** These processes are detailed by the new Curricular Competences and increase in complexity from K-12.
2. ***Science is experiential and hands-on.*** Experiments, simulations, models, and field trips create powerful learning opportunities that inspire both curiosity and in-depth understanding.
3. ***Science will create and maintain scientific curiosity.*** This may involve guiding kids through different levels of inquiry or allowing students to research and develop understanding of areas of interest.
4. ***Real scientists make and share observations in a variety of ways.*** Students will share observations orally, pictorially, in writing, and potentially using technology. Observations will develop to include both qualitative and quantitative findings.
5. ***Science helps students find various patterns in the living and the non-living world.*** When a scientist finds a pattern, they can create assumptions or predictions about the real world that deepen our understanding. Patterns can be classified in a variety of ways; for example: quantitative (numeric), spatial, [causal](#), qualitative, or a combination of these categories.
6. ***Science will create links across the curriculum wherever possible.*** This could be across grades in combined classes (*see suggested links in document 2*) or across topics such as math or social studies. Real scientists, often use tables, graphs, and equations to record and summarize data. Math is a perfect cross-curricular link.

When asked 'what do students need entering grade 8 science, Burnaby Science Department Heads consistently respond 'scientific curiosity, familiarity with the [scientific method](#), and being able to create and interpret graphs'. Although important, scientific content knowledge for K-7 is a lower priority than the science curricular competencies.

7. ***Science will begin to integrate digital technology where possible to enhance learning.*** This could mean using technology to create scientific portfolios or document work. This could also mean learning about or using new scientific technology.
8. ***Science will begin to integrate [Aboriginal](#) perspectives to enhance understanding.*** This may mean bringing in presenters or using literature, for example, to add a layer of understanding, or complexity to a unit.

With these ideas in mind, the science implementation committee has worked through the revised curriculum in order to create a working document. This is not meant to be a prescription for teaching, but instead should be looked on as a tool to help support your science planning and to help you create 'vertical integration' across the curriculum.

The Big Ideas

Our Rationale

The *Big Ideas* are composed of four main categories and build on each other each year. The four main categories in science are *Biology*, *Chemistry*, *Physics*, and *Earth and Space*. We have created this document to highlight the similarities between grade levels and identify the progression along the K-7 continuum.

How To Use this Grid

- This grid vertically represents the progression in *Big Ideas* across the grades
- For combined classes, highlight the *Big Ideas* to help develop a single unit that integrates multiple ideas or to help plan the best flow throughout the year
- For a single grade class, look across the *Big Ideas* to determine the best flow for your year and what ideas might fit together

We Asked an Expert!

We asked one of the authors of the new science curriculum why/how the Big Ideas were developed. Their response was that when you read the Big Ideas in each category from K-12, you will have a paragraph that explains the history of the category. This explains the development of the Big Ideas, but not necessarily why topics moved grades. Rest assured that *Light and Sound* at the Grade 1 level would look different and be more basic than *Light and Sound* at the Grade 4 level.... You know the comprehension level of your kids and just have fun learning the topic yourself. It will take a few years to really develop your personal understanding, so give yourself a break.

Big Ideas by Grade Level

Grade	Biology	Chemistry	Physics	Earth & Space
K	Plants and animals have observable features.	Humans interact with matter every day through familiar materials.	The motion of objects depends on their properties.	Daily and seasonal changes affect all living things.
1	Living things have features and behaviours that help them survive in their environment.	Matter is useful because of its properties.	Light and sound can be produced and their properties can be changed.	Observable patterns and cycles occur in the local sky and landscape.
2	All living things have a life cycle.	Materials can be changed through physical and chemical processes.	Forces influence the motion of an object.	Water is essential to all living things, and it cycles through the environment.
3	Living things are diverse, can be grouped, and interact in their ecosystems.	All matter is made of particles.	Thermal energy can be produced and transferred.	Wind, water, and ice change the shape of the land.
4	All living things and their environment are interdependent.	Matter has mass, takes up space, and can change phase.	Energy comes in a variety of forms that can be transferred from one object to another.	The motion of Earth and the moon cause observable patterns that affect living and non-living systems.
5	Multicellular organisms have organ systems that enable them to survive and interact within their environment.	Solutions are homogeneous mixtures.	Machines are devices that transfer force and energy.	Humans use earth materials as natural resources.
6	Multicellular organisms rely on internal systems to survive, reproduce, and interact with their environment.	Everyday materials are often homogeneous solutions and heterogeneous mixtures.	Newton's three laws of motion describe the relationship between force and motion.	The solar system is part of the Milky Way, which is one of billions of galaxies.
7	The theory of evolution by natural selection provides an explanation for the diversity and survival of living things.	Elements consist of one type of atom, and compounds consist of atoms of different elements chemically combined	The electromagnetic force produces both electricity and magnetism.	Earth and its climate have changed over geological time.

The Curricular Competences

Our Rationale

The science implementation committee started looking across the Curricular Competencies and noticed incredible overlap and links across the grades. In particular the competencies are nearly identical for the grade groupings of 1-2, 3-4, 5-6, and 7-8. These groupings provide students two years to master skills along the continuum and allow teachers to explore skills in depth. We as a committee, also noticed the Curricular Competencies were organized by headings that outline the scientific inquiry process. We believe these headings could be easily used to create rubrics or develop both school and personal teaching goals for students. We have created this document to highlight the similarities and identify the progression along the K-7 continuum.

How To Use this Grid

- Each page vertically represents the Scientific Inquiry Processes from K-7
- Bolded words or phrases represent new competencies introduced at that grade level
- Non-bolded words or phrases are an exact repeat of a competency from *at least* the previous grade level

The Scientific Inquiry Process

1. Questioning & Predicting
2. Planning & Conducting
3. Processing & Analyzing Data & Information
4. Evaluating (*Begins Gr. 1*)
5. Applying and Innovating
6. Communicating

A [horizontal K-7 flow chart](#) of the Curricular Competencies that includes additional key questions is also available on the district science blog. We suggest you use the flow chart included in this document as a starting point.

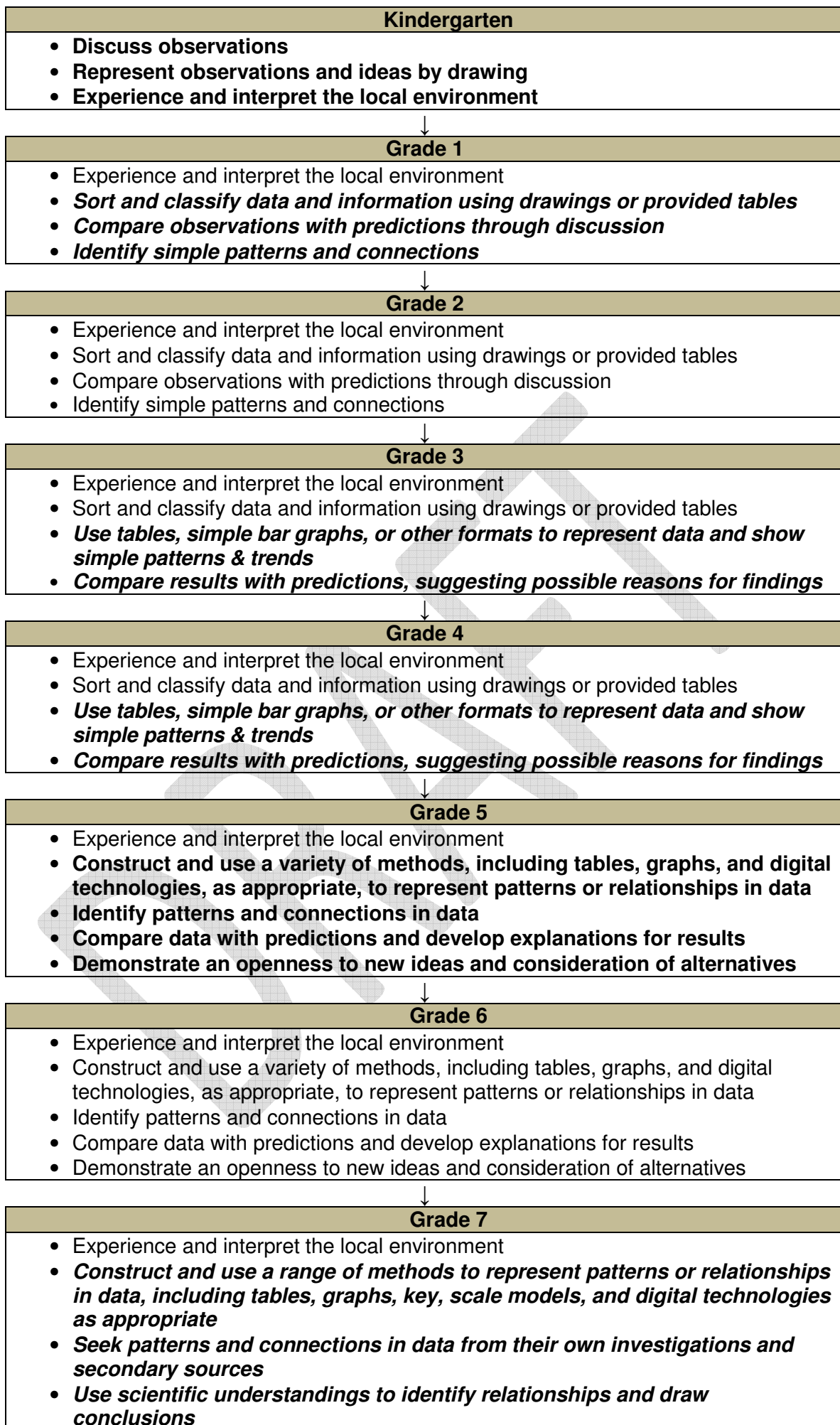
Questioning & Predicting Competencies

Kindergarten
<ul style="list-style-type: none">• Demonstrate curiosity and a sense of wonder about the world• Observe objects and events in familiar contexts• Ask simple questions about familiar objects and events
↓
Grade 1
<ul style="list-style-type: none">• Demonstrate curiosity and a sense of wonder about the world• Observe objects and events in familiar contexts• Ask simple questions about familiar objects and events• Make simple predictions about familiar objects and events
↓
Grade 2
<ul style="list-style-type: none">• Demonstrate curiosity and a sense of wonder about the world• Observe objects and events in familiar contexts• Ask simple questions about familiar objects and events• Make simple predictions about familiar objects and events
↓
Grade 3
<ul style="list-style-type: none">• Demonstrate curiosity and a sense of wonder about the world• Observe objects and events in familiar contexts• Identify questions about familiar objects and events that can be investigated scientifically• Make predictions based on prior knowledge
↓
Grade 4
<ul style="list-style-type: none">• Demonstrate curiosity and a sense of wonder about the world• Observe objects and events in familiar contexts• Identify questions about familiar objects and events that can be investigated scientifically• Make predictions based on prior knowledge
↓
Grade 5
<ul style="list-style-type: none">• Demonstrate a sustained curiosity about a scientific topic or problem of personal interest• Make observations in familiar or unfamiliar contexts• Identify questions to answer or problems to solve through scientific inquiry• Make predictions about the findings of their inquiry
↓
Grade 6
<ul style="list-style-type: none">• Demonstrate a sustained curiosity about a scientific topic or problem of personal interest• Make observations in familiar or unfamiliar contexts• Identify questions to answer or problems to solve through scientific inquiry• Make predictions about the findings of their inquiry
↓
Grade 7
<ul style="list-style-type: none">• Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest• Make observations aimed at identifying their own questions about the natural world• Identify a question to answer or a problem to solve through scientific inquiry• Formulate alternative “If...then...” hypotheses based on their questions• Make predictions about the findings of their inquiry

Planning & Conducting Competencies

Kindergarten
<ul style="list-style-type: none">• Make exploratory observations using their senses• Safely manipulate materials• Make simple measurements using non-standard units
↓
Grade 1
<ul style="list-style-type: none">• Make & record observations• <i>Safely manipulate materials to test ideas and predictions</i>• Make and record simple measurements using informal or non-standard methods
↓
Grade 2
<ul style="list-style-type: none">• Make & record observations• Safely manipulate materials to test ideas and predictions• Make and record simple measurements using informal or non-standard methods
↓
Grade 3
<ul style="list-style-type: none">• Suggest ways to plan & conduct an inquiry to find answers to their questions• Consider ethical responsibilities when deciding how to conduct an experiment• Safely use appropriate tools to make observations and measurements, using formal measurements and digital technology as appropriate• Make observations about living and non-living things in the local environment• Collect simple data
↓
Grade 4
<ul style="list-style-type: none">• Suggest ways to plan & conduct an inquiry to find answers to their questions• Consider ethical responsibilities when deciding how to conduct an experiment• Safely use appropriate tools to make observations and measurements, using formal measurements and digital technology as appropriate• Make observations about living and non-living things in the local environment• Collect simple data
↓
Grade 5
<ul style="list-style-type: none">• Explore and pose questions that lead to investigations• With support, plan appropriate investigations to answer their questions or solve problems they have identified• Decide which variable should be changed and measured for a fair test• Choose appropriate data to collect to answer their questions• Observe, measure, and record data, using appropriate tools, including digital technologies• Use equipment and materials safely, identifying potential risks
↓
Grade 6
<ul style="list-style-type: none">• Explore and pose questions that lead to investigations• With support, plan appropriate investigations to answer their questions or solve problems they have identified• Decide which variable should be changed and measured for a fair test• Choose appropriate data to collect to answer their questions• Observe, measure, and record data, using appropriate tools, including digital technologies• Use equipment and materials safely, identifying potential risks
↓
Grade 7
<ul style="list-style-type: none">• Collaboratively plan a range of investigation types, including field work and experiments, to answer their questions or solve problems they have identified• Measure and control variables through fair tests• Observe, measure, and record data and quantitative, using equipment, including digital technologies, with accuracy appropriate to the task• Ensure that safety and ethical guidelines are followed in their investigations

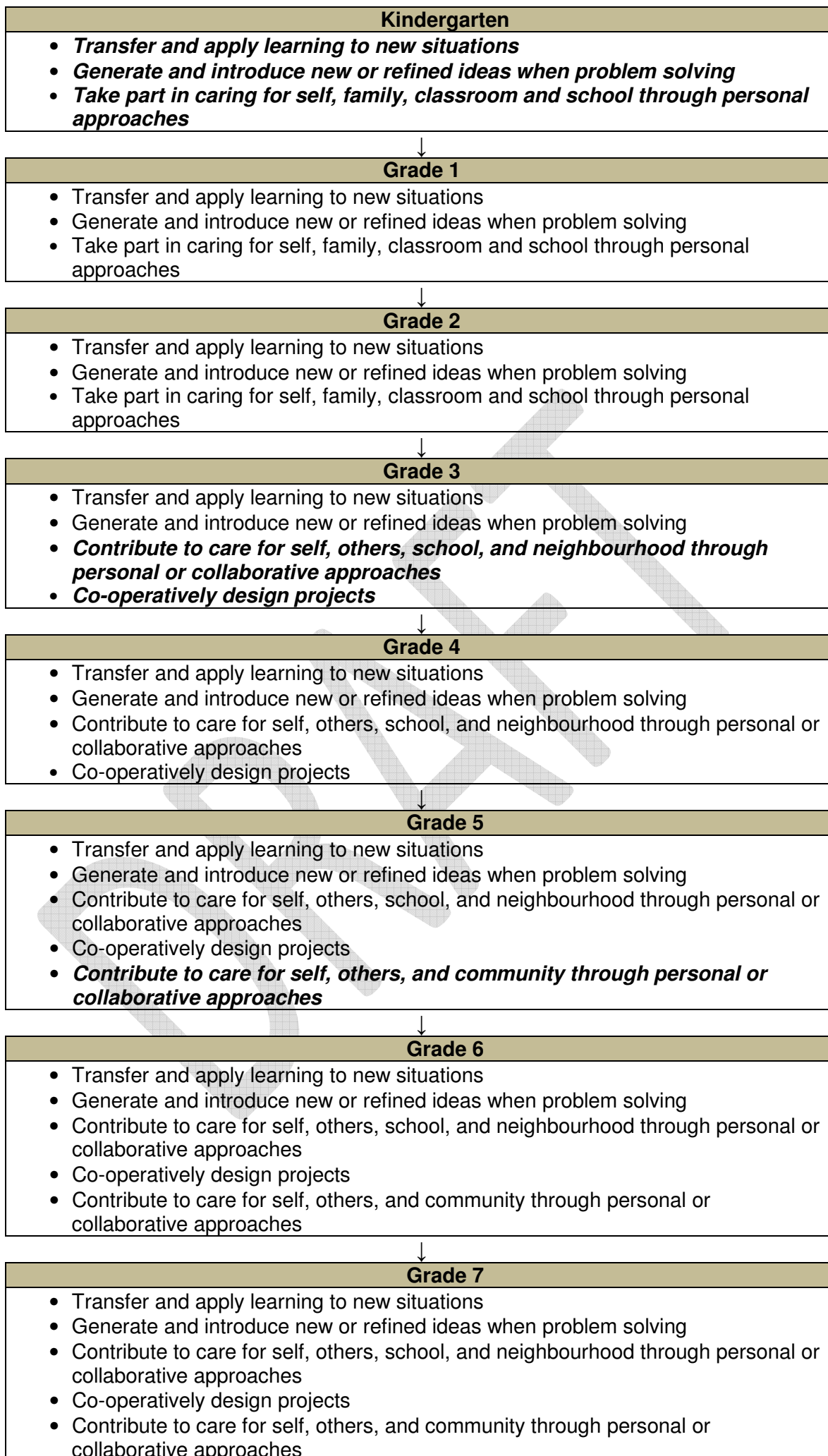
Processing and Analyzing Data and Information Competencies



Evaluating Competencies

Kindergarten
Grade 1
<ul style="list-style-type: none">• Compare observations with those of others• Consider some environmental consequences of their actions
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Grade 2
<ul style="list-style-type: none">• Compare observations with those of others• Consider some environmental consequences of their actions
↓
Grade 3
<ul style="list-style-type: none">• Make simple inferences based on their results & prior knowledge• Reflect on whether an investigation was a fair test• Demonstrate an understanding and appreciation of evidence• Identify some simple environmental implications of their and others' actions
↓
Grade 4
<ul style="list-style-type: none">• Make simple inferences based on their results & prior knowledge• Reflect on whether an investigation was a fair test• Demonstrate an understanding and appreciation of evidence• Identify some simple environmental implications of their and others' actions
↓
Grade 5
<ul style="list-style-type: none">• Evaluate whether their investigations were fair tests• Identify possible sources of error• Suggest improvements to their investigation methods• Identify some of the assumptions and given information in secondary sources• Demonstrate an understanding and appreciation of evidence• Identify some of the social, ethical, and environmental implications of the findings from their own and others' investigations
↓
Grade 6
<ul style="list-style-type: none">• Evaluate whether their investigations were fair tests• Identify possible sources of error• Suggest improvements to their investigation methods• Identify some of the assumptions and given information in secondary sources• Demonstrate an understanding and appreciation of evidence• Identify some of the social, ethical, and environmental implications of the findings from their own and others' investigations
↓
Grade 7
<ul style="list-style-type: none">• Experience and interpret the local environment• Reflect on their investigation methods, including the adequacy of controls on variables and the quality of the data collected• Identify possible sources of error and suggest improvements to their investigation methods• Demonstrate an awareness of assumptions and identify information given and bias in their own work and secondary sources• Demonstrate an understanding and appreciation of evidence (qualitative and quantitative)• Exercise a healthy, informed skepticism and use scientific knowledge and findings for their own investigations to evaluate claims in secondary sources• Consider social, ethical, and environmental implications of the findings from their own and others' investigations

Applying & Innovating Competencies



Communicating Competencies

