Grade 4 Science Curriculum Links to Sustainability Education and Action

Topic A: Waste and Our World

Recognize that human activity can lead to the production of wastes, and identify alternatives for the responsible use and disposal of materials.

Links to Place and Nature

- What type of waste do we produce at home? At school?
- Where does our waste go?
- How can we reduce waste?
- What are the three Rs of waste reduction and what is their order of importance?

Links to Indigenous Perspectives

- See **Learn Alberta grade 4 sample lesson plan (2)** for this unit.
- How did Indigenous peoples reduce waste in their lives? How might I apply some of these practices or principles into my own life?

Links to Climate Change

- How do landfills produce greenhouse gas emissions?
- How can composting organics reduce greenhouse gas emissions?
- What other ways can reducing waste through reducing, reusing, recycling help combat climate change?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (4):** The waste we create and how we dispose of it can have a significant impact on GHG emissions (p. 46)
  - **Climate Mitigation Action Plan, Program 7: Consumption and Waste Reduction (p.47-48):** Traditionally, climate change mitigation plans address waste emissions (i.e. methane) by capturing or managing the emissions once they are created. This program attempts to take a more proactive approach to reducing these emissions by reducing the amount of waste that is created in the first place. Actions within this Program revolve around 1) reducing total waste generation in the residential and commercial sectors, 2) improving access to local food.
  - **Climate Mitigation Action Plan, Program 8: Waste Management to Minimize Greenhouse Gas Emissions (p.49):** As part of achieving our GHG emissions reduction targets, our aim is to remove as much GHG emissions as possible from the waste sector. The City's goal is to avoid landfilling all recyclables, discarded food and yard organic materials, where possible. Action within this Program: 8.1 Continue to educate and support Calgarians to divert organic waste away from landfills through Residential Green Cart Program, the disposal surcharge rates at City landfills, and as required for all industrial and commercial organizations under The City's bylaws.
- **The City's 2025 Waste Diversion Goal (6):** In 2015, City of Calgary Council approved a revised target of 70 percent waste diversion by 2025, and The City has taken steps to increase recycling, composting, and other diversion in all sectors. Specific Target: Achieve 70% waste diversion by 2025 averaged across all four sectors: Single family 70%, Multi-family 65%, Business and Organizations 75%, and Construction and Demolition 40%

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Topic B: Wheels and Levers

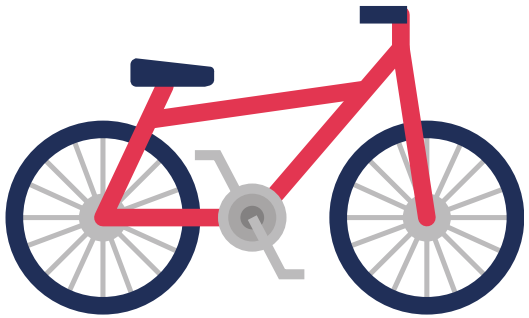
Demonstrate a practical understanding of wheels, gears, and levers by constructing devices in which energy is transferred to produce motion.

Links to Place and Nature

- What are examples of wheels and levers at home? At school? In my community?
- How do they work?
- What are they used for?

Links to Indigenous Perspectives

- How and to what extent did Indigenous peoples in my area traditionally use wheels and levers?
- Why did Indigenous peoples not use wheels before European introduction? What tools or technologies did they use instead?



Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (4):** Currently, emissions associated with transporting people and goods account for one third of Calgary's emissions (p. 40). Emissions from the transportation sector come from the use of two main transportation fuels: diesel and gasoline (p. 40). To reduce these emissions one approach is to switch to transportation modes that use less energy, such as biking.
  - **Climate Mitigation Action Plan (4), Program 5: Low or Zero-Emissions Transportation Modes (p.43-44):** It is The City's responsibility to provide transportation infrastructure for Calgarians that is convenient, affordable, attractive, and safe. High quality transit, bike, pedestrian, and car-pooling networks provide the underlying backbone of a low-carbon transportation system.
- **The City's Cycling Strategy (3):** The City has a vision to become one of the premier cycling cities in North America and is looking to make changes that will encourage more people to cycle in Calgary. There are four specific and measurable goals that indicate a shift towards a more bicycle-friendly city (p.2):
  - More people cycling
  - More bicycle infrastructure
  - Safer cycling
  - Increased satisfaction with cycling in Calgary

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Topic C: Building Devices and Vehicles that Move

Construct a mechanical device for a designated purpose, using materials and design suggestions provided. Explore and evaluate variations to the design of a mechanical device, demonstrating that control is an important element in the design and construction of that device.

Links to Place and Nature

- What are examples of devices and vehicles that move at home? At school? In my community?
- How do they work?
- What are they used for?

Links to Indigenous Perspectives

- What devices did Indigenous peoples in my area use to move themselves and their belongings?
- Why was movement important to them (i.e. nomadic lifestyle)?
- Why are Indigenous peoples no longer nomadic today?

Links to Climate Change

- How are cars and trucks typically powered?
- How do electric vehicles work?
- How are bicycles and skateboards powered?
- How do different modes of transportation contribute to climate change

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (4):** Currently, emissions associated with transporting people and goods account for one third of Calgary's emissions. Emissions from the transportation sector come from the use of two main transportation fuels: diesel and gasoline. To reduce these emissions there are three broad approaches: switch vehicle fuels to a cleaner, lower carbon vehicle fuel; switch to transportation modes that use less energy; and build city infrastructure to minimize travel distances (p. 40).
  - **Climate Mitigation Action Plan (4), Program 4: Electric and Low-Emissions Vehicles (p.41-42):** While many of the Plan's actions support the need to reduce auto travel, cars will remain part of our transportation modes. In addition, the number of transit trips will grow. Therefore, it is important that we reduce the impacts of remaining cars, buses, and trucks through cleaner vehicles and fuels. Actions within this Program relate to 1) supporting and enabling the uptake of electric vehicles, and to 2) supporting and enabling the uptake of low emissions vehicles in commercial fleets.
- **Electric Vehicle Strategy (5):** The EV Strategy was developed as part of the Climate Resilience Program, since it represents one of the greatest opportunities to reduce greenhouse gas emissions from transportation. The objectives of the EV Strategy are to (p.19):
  - respond to the growing demand for electric vehicle infrastructure and services,
  - encourage/support faster adoption of electric vehicles to aid in reducing greenhouse gas emissions,
  - align The City's approach to policies from other levels of government,
  - build partnerships across Alberta to provide an electric vehicle charging network within the province that connects to other provinces or states,
  - establish what role The City, partner organizations and the private sector should play in providing electric vehicle infrastructure and services, and
  - increase awareness and create enthusiasm amongst the public and industry about electric vehicles.
- **imagineCALGARY (2):** By 2036 there is a 50% reduction from 1990 levels in pollution (greenhouse gases) associated with automobiles. By 2036 we increase peak period transit, walking and cycling and carpool travel to downtown by 50%, 40% and 20% respectively (p. 6).

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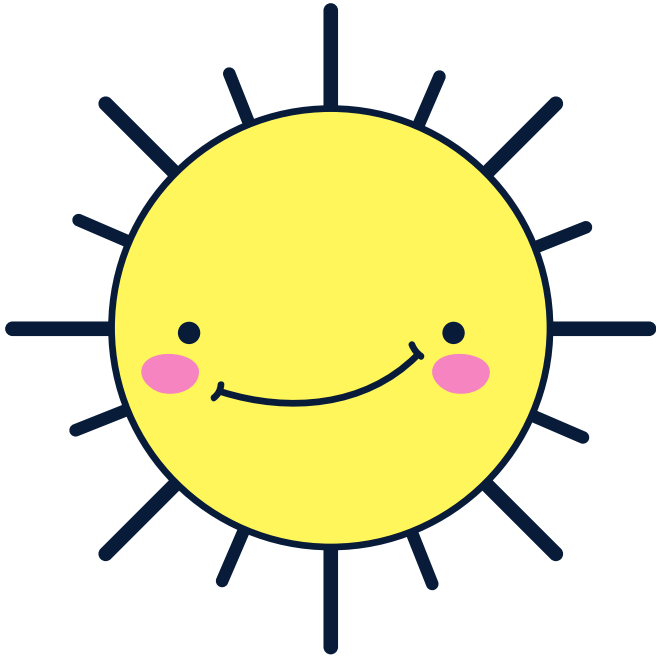
Topic D: Light and Shadows

Identify sources of light, describe the interaction of light with different materials, and infer the pathway of a light beam.

Links to Place and Nature

- How do light and shadows vary over the course of the day and with the seasons?
- How does light affect plant growth?
- Which plants found in the schoolyard, neighbourhood or nearby natural area prefer sunny vs shaded areas?



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Topic E: Plant Growth and Changes

Demonstrate knowledge and skills for the study, interpretation, propagation and enhancement of plant growth.

Links to Place and Nature

- What types of plants can be found in the schoolyard, neighbourhood or nearby natural area?
- Where do we find the greatest diversity of plants?
- What do these plants need to grow?
- How are they suited to different environments or micro-habitats?
- How are plants in our community important to humans? What services do they provide?
- What activities do we undertake in my yard, schoolyard, or community to manage plant growth?

Links to Indigenous Perspectives

- How did Indigenous peoples in my area use or grow plants?
- How was Indigenous knowledge of plants developed and passed on from one generation to the next?
- How did Indigenous peoples in my area manage plant growth? For what purposes?

Links to Climate Change

- How will local area ecosystems change as a result of climate change (e.g. grasslands migrating further north)?
- Why might some plants find it harder to grow in certain areas due to changes in water and temperature?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (4):** Per the CRS, climate change has various impacts on living things, including plants. Due to climate change we are experiencing, and will continue to experience (p. 65-72):
  - More snow in winter
  - Less rain in summer
  - More heat waves
  - Increased average annual temperature
  - More intense summer storms
  - Multi-year drought
  - Increase in pests, diseases, and invasive species due to changes in seasonality
  - Spring will arrive earlier, Summer will last longer, Fall will arrive later, and Winter will be shorter
- This will have impacts on the lifecycles of plants in Calgary.

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References

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(5) City of Calgary. (2019). Electric and Low-Emissions Vehicles Strategy [PDF]. Retrieved from https://www.calgary.ca/content/dam/www/transportation/tp/documents/strategy/electric-vehicle-strategy/electric-vehicle-strategy-report.pdf

(6) City of Calgary. (2020). Leading Calgary to zero waste. Retrieved from https://www.calgary.ca/uep/wrs/about-wrs/calgary-waste-goals.html