Mathematics 9

Financial Literacy Supplement

NOVA SCOTIA
NOUVELLE-ÉCOSSE

2022

Please note: This document contains links to various resources that are external to government. These links have been provided for convenience and do not constitute an endorsement by the Department of Education and Early Childhood Development of the content, policies, or products of the referenced websites. The department does not control the referenced websites and subsequent links, and is not responsible for the accuracy, legality, or content of those websites. Referenced website content may change without notice.

Regional Education Centres and educators are required under the Department's Public School Programs Network Access and Use Policy to preview and evaluate sites before recommending them for student use. If an outdated or inappropriate site is found, please report it to curriculum@novascotia.ca

Mathematics 9 - Financial Literacy Supplement

Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

Table of Contents

Introduction

Learners need to understand the importance of being financially literate in their everyday lives to achieve financial sustainability. The Department of Education and Early Childhood Development has created the following resources to support teachers as they engage with Financial Literacy concepts in relation to mathematics curriculum outcomes. This can be used to provide opportunities for grade nine students to develop the skills and knowledge necessary to make smart financial choices and be better prepared to plan and manage their money and financial affairs.

To prepare learners to make informed financial decisions and deepen their understanding of mathematical concepts, learners will be introduced to:

- meeting financial goals
- working within a budget
- evaluating future earning potential
- making informed financial decisions

Learning experiences have been designed to support the Grade 9 Mathematics curriculum by providing opportunities to engage learners with financial literacy through identified outcomes. In consideration of the uniqueness of each individual class, it will be necessary to modify the learning experiences to engage learners in a culturally and linguistically responsive way. Each learning experience is guided by an overarching question and follows a framework outlined in the Supporting Learning in Mathematics document. The opening, lesson, and closing of each learning experience may take place in one class or over multiple days based on the scaffolding necessary for students.

Outcomes

N03 Students will be expected to demonstrate an understanding of rational numbers by comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.

- Can You Buy a Car?
- Saving for Post-Secondary Education
- Greenhouses of the Future

G01 Students will be expected to determine the surface area of composite 3-D objects to solve problems

- Greenhouses of the Future

PR01 Students will be expected to generalize a pattern arising from a problem-solving context using a linear equation and verify by substitution.

- Making Money on Social Media

PR02 Students will be expected to graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.

- Deal Or No Deal? Choosing a Cell Phone Plan

Can you buy a car?

Outcome

N03 - Students will be expected to demonstrate an understanding of rational numbers by comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.

Guiding question

How can you plan for financial goals?

Connection to financial literacy

Explore ways to meet financial goals

Overview

Learners consider short term financing with simple interest as a means for achieving a financial goal (buying a car). They compare multiple financing plans in order to select one that works within their budget.

Opening

Guiding question

- *How do you set a financial goal?*

The learning experience can open with a discussion about learners' experiences saving for a purchase. Potential questions to guide this discussion

- *What are your sources of income?*
- *What have you saved up to buy?*
- *How long did it take?*
- *How much did you save each month/week?*

Learners are presented with the scenario of buying a vehicle and then research the cash price of a vehicle they would like to purchase. Using a goal date of two years, learners determine how much they will need to save each month to purchase that vehicle.

If the monthly savings is unreasonable for the vehicle of their choice, learners can then calculate how much money they would be willing/able to save each month and look for vehicles at this price point (still with a goal date of two years).

Learners can then take time to consider other ways to purchase a vehicle.

- *What can be changed to make your goal possible?*
- *What percentage of your income are you willing to set aside for your financial goals?*
- *What are other ways to achieve financial goals, when saving is not an option?*

If not suggested by the class, financing should be presented as an option to buy now and pay later.

Lesson

Guiding question

- *What are the factors that impact financing? How do interest rates impact the price of the vehicle?*

The teacher can explain that financing is a loan from a financial institution, and it includes an *interest rate* and a *term.* Learners can share their understanding of these terms. Discussion questions could include

- *What is an interest rate?*
- *Why would someone choose to buy a vehicle when they have to pay interest?*
- *Why do some companies charge interest?*
- *Why would someone choose short term vs long term financing?*

As a class, learners select a used car to finance as an example. The teacher should set the interest rate to a reasonable, contemporary value. As a class, learners calculate the interest that would be paid on a vehicle and the total cost on a 2-year term.

Used car search engines, magazines or websites of local dealerships could be used to find an example vehicle.

Next, in small groups, learners calculate the total cost and monthly payments over different terms. Each group should be given a different term and once they have made their calculations, learners can discuss the differences in the monthly payments and total cost as a class.

Learners could engage in further conversation to think critically about the following:

- *Why might you make a down payment?*
- *How does the term impact the monthly payment? The total cost?*

Formative assessment opportunity
Observations: *Interest calculations*

Guiding question

- *How do you determine the best purchase plan for your finances?*

Learners can select another used vehicle or one from the previous activity and compare a variety of financing plans. This can be done by looking up the rates of local dealerships, or using predetermined values prepared by the teacher (*see sample calculation table at the end of this learning experience*).
Learners calculate the interest, total cost and monthly payments then decide and justify which financing option they will choose.

Summative assessment
My plan - Calculations of interest and monthly payments for each plan - Justification of chosen plan

Closing

Guiding question

- *How can you plan for financial goals?*

In small groups, learners can discuss the decision-making process as well as the calculations. They may also choose to share their justifications or discuss the scenarios that might lead to a different decision (i.e., bigger down payment, smaller monthly payments).

Reflection questions

- *What do you know about financing that you didn't know before?*
- *How will knowledge of interest impact your purchasing decisions?*
- *What are the advantages and disadvantages to a longer term?*
- *What factors go into deciding to make a purchase through financing?*
- *How will you determine the best purchase plan for your finances?*

Additional Resources

Potential Mathematics Extensions:

- Create a budget
- Discuss hidden costs (insurance, maintenance, etc.) and other considerations (safety, environment) of vehicle ownership
- Use spreadsheet software for interest rate calculations and comparison
- Connect to outcome PR01
- Graph total cost vs time
- Determine the linear equation that represents the cost

Potential extensions with other subjects:

- *Citizenship 9 (Personal financial management)*
    - *Investigate the impact of informed financial choices on personal goals*

Resources

- myBlueprint - budgeting and saving for post-secondary education
    - Can be accessed through the GNSPES launch page →
- Junior Achievement - budgeting

Sample Car Purchase Options

Option 1 2009 Volkswagen Jetta AS IS 381,765 km **$4800** Colour White 4 dr 2.0T TDI DSG Comfortline Diesel fuel	**Option 2** 2007 Honda Civic LX Power Windows, Alloy Wheels, Keyless entry, AC 343,539 km **$2364** Engine 1.8L; 4 cylinder Transmission Automatic Colour Grey City Fuel Economy 8.2L/100km Hwy Fuel Economy 5.7L/100km
Option 3 2006 Toyota Prius Hybrid Alloy wheels, Power Windows, Security System As Traded 289,113 km **$3990** Gasoline Hybrid Colour Silver	**Option 4** 2002 Honda 4 wheeler 450 foreman 8209 km **$4500** Good condition; works well

Sample Organizer

Vehicle	***2009 Volkswagen Jetta***	**Your Choice**		
Purchase Price	*$4800*			
Down payment	*($1000)*			
Price - down payment	*$3800*			
Interest Rate	*4.99%*	*3.75%*	*4.99%*	*4.99%*
Term of Loan (years)	*2*	*3*	*4*	*3*
Simple Interest I=Prt	*(3800)(0.0499)(2) =$379.24*			
Price to Finance	*$4179.24*			
Monthly Payment	*$174.14*			
Grand Total (down payment + price to finance)	*$5179.24*			

Saving for Post-Secondary Education

Outcome

N03 - Students will be expected to demonstrate an understanding of rational numbers by comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers

Guiding question

How can you plan for financial goals?

Connection to financial literacy

Engage in savings practices that will help achieve financial goals.

Overview

First, learners explore the costs of post secondary education then determine how much they will need to save each month to pay for the first year at their chosen institution.

Learners then calculate weekly earnings and deductions for a minimum wage worker to determine the number of hours they would need to work each week to meet their savings projections. For the purposes of this learning experience, all earnings (net pay) go to savings.

However, depending on time constraints, a deeper exploration into budgeting can be done where learners decide/calculate how much they are willing/able to save each pay.

Check out myBlueprint for information on post-secondary

Allowances/assumptions:

- *Minimum wage is set at $13.60, the NS value in Oct 2022*
- *Combined federal and provincial tax rate of 23.79% for the first $25 000.*

Opening

Guiding question

- *How do you set a financial goal?*

By the end of this learning experience, learners will:

- Perform operations on rational numbers in decimal form (Calculate gross and net earnings)
- Compare earnings to a savings target and modify their plan to meet a financial goal

Learners are presented with the scenario of saving for post secondary studies and then use myBlueprint (icon on the GNSPES landing page) to research the costs of the institutions or programs they would like to pursue. Learners should consider tuition, as well as other costs such as accommodations, books, etc. This research can be done individually, or in small groups based on similar post secondary interests. Learners can share their findings with the class and discuss how they plan to save for post-secondary education. To stimulate this discussion, learners may consider the following:

- *How can you plan for financial goals?*
- *How do you set a financial goal?*

Using the number of pay periods from now until they plan to enroll, learners calculate how much they will need to set aside as savings each pay. The teacher should model a sample student and savings goal on the board that can be used throughout this learning experience.

To vary the complexity of this task, learners can use an average number of hours per week or consider the summer and school year separately.

Lesson

Guiding question

- *What factors do you need to consider when saving?*

For more on jobs, check out educational partners like Junior Achievement and Let's Talk Science

This part of the learning experience can begin with a discussion on typical jobs for teens.

- *Where can teens get jobs?*
- *How much do those jobs pay?*

Using the savings for the sample student in the opening of the learning experience, the class calculates the number of hours needed to work each pay period (at minimum wage) to meet the goal.

If not mentioned during the preceding discussions and calculations, the teacher can explain the difference between gross and net pay. Learners should discuss the impact that deductions will have on their savings plan:

- *What factors do you need to consider when saving?*
- *How do deductions affect the number of hours you need to work?*

To simplify calculations, EI and CPP and other deductions are ignored, though these should be acknowledged.

Recognizing that the working hours calculated in the first part of the learning experience do not account for deductions, learners estimate the hours needed each month to meet the savings goal of the sample student and calculate the earnings, as a class. Then, using a base tax rate of 23.79%, the class calculates the net pay for the sample student.

Learners compare the new earnings with the savings goal and discuss if further modifications are necessary.

Formative assessment opportunity
Observations: calculations of earnings and deductions

Guiding question

- *How can you plan for financial goals?*

Following the model that was calculated as a class, learners can each decide on a number of working hours that they find reasonable, then calculate their bi-weekly earnings using a wage of $13.60/hour and a base tax rate of 23.79%.

If the net pay is not enough to meet the savings goal, learners will modify their savings plan accordingly.

Summative assessment opportunity
Product: Postsecondary savings calculations - *A calculation sheet can be provided as a support, where necessary (sample in appendix).*

Closing

Guiding question

- *How can you plan for financial goals?*

Based on their calculations, students can discuss what they have learned about setting and planning for financial goals and saving. Learners can also discuss ways to modify their saving plans to achieve their financial goals.

Reflection questions

- *How can you achieve your financial goals?*
    - *What modification(s) will you need to make?*
- *What factors do you need to consider when saving for a major purchase?*
    - *How much money is needed?*
    - *How long will you save?*
    - *How much can you afford to save?*

Additional Resources

Potential Mathematics Extensions:

- Creating and maintaining a budget
- Detailed calculation of earnings (summer vs school year)
- Tax returns and basic personal amount
    - Lesson plan: Completing a basic tax return – Learn about your taxes - Canada.ca
- PR01 - Graph savings over time

Potential extensions with other subjects:

- *Citizenship 9 (Financial Citizenship)*
    - *Investigate personal financial management practices, including short- and long-term goal setting*
    - *Investigate the purpose, value, and types of taxation*

Resources

- myBlueprint - budgeting, career opportunities and saving for post-secondary education
    - Also an icon on the GNSPES launch page
- Junior Achievement - budgeting and career opportunities

SAMPLE CALCULATION SHEET

Tuition	Accommodations	Other (transportation, food, books, etc)	1st year expenses

**pay period is every two weeks*

1st year expenses	# of pay periods	Required savings per pay

Hours worked	Gross pay	Deductions	Net pay

Net pay (actual savings)	Goal (required savings)	Goal met (yes/no)

If the savings are not enough, what changes could be made to meet the financial goal?

Possible modification:

Possible modification:

Greenhouses of the Future

Outcome

Guiding question

Connection to financial literacy

9G01 Students will be expected to determine the surface area of composite 3-D objects to solve problems.

N03 - Students will be expected to demonstrate an understanding of rational numbers by comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.

How can an understanding of 3-D objects and surface area help you to predict the costs involved in a building project?

Explore ways to accurately predict the costs of materials in a renovation or building project and to stay within a budget.

Overview

Hope Blooms is a not-for-profit organization that empowers youth through social enterprise. They have a Youth Urban Agriculture program that allows youth to grow organic food and they have an award-winning, off-the-grid greenhouse located in Halifax.

In this learning experience, learners imagine that Hope Blooms is expanding their programs across Nova Scotia and they are tasked with planning and building a new greenhouse in their school community. Learners propose a possible design for their greenhouse and determine the surface area in order to calculate the costs of building materials.

Opening

Guiding question

- *What are some 3-D objects and how can they form 3-D composite objects?*

By the end of this Learning Experience, learners will:

- Identify 3-D objects
- Describe strategies to determine surface area of composite 3-D objects
- Apply strategies to determine surface area to solve a given problem involving surface area of a composite 3-D object.

The teacher may introduce the learning experience by showing the following video of the Hope Blooms greenhouse construction.

Hope Blooms Greenhouse - Build Right Nova Scotia(3 mins)

As a class, learners can examine the image of the Hope Blooms greenhouse. The teacher can invite learners to describe the shapes they see in the greenhouse and the strategies that they might use in order to determine the surface area.

The teacher may use the following questions for discussion:

- *What shapes do you see?*
- *What do you notice about the shape of the greenhouse?*
- *Do you notice any 3-D objects within the whole structure?*
- *What is a 3-D composite object?*

The teacher can model how to draw a rectangular prism. They may demonstrate the 2-D net that makes up the 3-D object. Learners may then create their own rectangular prism. As a class, they can determine the surface area of the object that they have created.

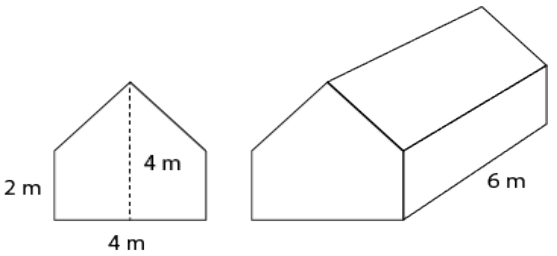
Formative assessment opportunity
Observations/Conversations - *Are students able to identify right cylinders, right rectangular prisms, and right triangular prisms and determine the surface area of a 3-D object?*

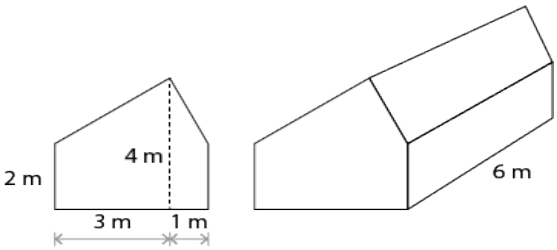
Lesson

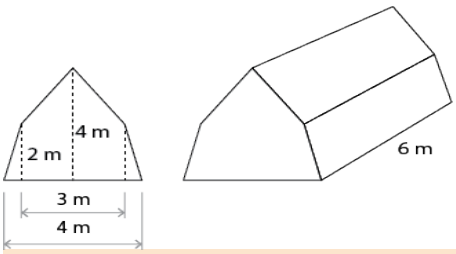
Guiding question

- *How do you determine the surface area of composite 3-D objects?*

Prefabricated Greenhouses
In small groups, learners determine the surface area of one of the given composite objects as seen below.







Note: Students will need to use the sum of squares theorem ($a^2 + b^2 = c^2$) to find some of the dimensions of the greenhouses.

**feel free to modify the values to your specific context however all students in a class should use the same values*

When finished, the learners may be asked to share the process that they used to determine the surface area of their object.

Formative assessment opportunity
Observations/Conversations - The teacher can circulate to offer feedback on student strategies to determine the level of understanding.

DIY Greenhouse
Either individually or in small groups, learners will then design their own greenhouses that incorporate 2 or more 3-D objects into a building. The teacher may want to set parameters for learners if needed (size, shape, etc.). Learners will be asked to calculate the surface area of the greenhouse that they design.

SketchUp or Tinkercad provide opportunities for technology

Formative assessment opportunity
Observations- The teacher can circulate and offer feedback on their strategies used.

Guiding question

- *How do you use the surface area of composite 3D objects to determine the cost of building materials?*

Learners will decide on the materials (glass, plastic, plywood, etc.) to cover the entire surface of their greenhouse. Then, learners use their surface area calculations to create a quote for these materials. Possible questions for learners to consider:

- *Are there areas of overlap that impact calculations?*
- *What are the benefits and drawbacks of various materials?*

Depending on the time frame of this project as well as the resources available, learners can consult a variety of sources to determine the cost of building materials. The teacher may want to provide specific parameters or a budget that learners must work within. Alternatively, the teacher may provide a list of potential materials with the prices.

Teachers may wish to show examples of building materials quotes by using online quote generators.

Formative assessment opportunity
Conversations: *How do you determine the costs of a building project?*

Summative assessment opportunity
Calculation of surface area and itemized quote for materials.

Closing

Guiding question

- *How do you use the surface area of composite 3-D objects to determine the cost of a building project?*

Reflection questions

These questions can be used as a consolidation of learning but may also identify gaps that require further explicit instruction, directed support or opportunities for learners to demonstrate understanding of the outcomes.

- *How did you determine the costs of your greenhouse?*
- *What were the challenges in determining surface area of composite 3-D objects?*
- *What is the relationship between costs and surface area? How did this impact your decisions?*

Formative assessment opportunity
Conversations: Reflection questions

Additional Resources

Potential Mathematics Extensions:

- Explore garden yields of various crops
- Unit conversion for measurements and/or building materials
- Review of approximate square roots of positive rational numbers (N06)

Potential extensions with other subjects:

- *Citizenship 9 (Service Learning)*
    - *Implement a service learning plan (build a greenhouse)*
    - *Organizing a grand opening event for the new greenhouse or visit a local greenhouse*
- *Technology Education 9 (Drafting)*
    - *Create a model or 3D printing prototype*
    - *Construct the designed greenhouse*
- *English or French Language Arts (Speaking - Community pitch)*
    - *Community pitch to share student designs with judges through a means of their choosing (gallery walk, elevator pitch, etc.)*

Resources

- NS Department of Agriculture:
    - Agricultural Career Exploration Program - Government of Nova Scotia, Canada
    - Career Case game - Government of Nova Scotia, Canada
    - Visit a virtual farm with Journey 2050 - Government of Nova Scotia, Canada
- 3D Design Software | 3D Modeling on the Web | SketchUp
- Tinkercad | Create 3D digital designs with online CAD | Tinkercad

Sample Greenhouse Project Organizer

Customer Name:
Project:
Date:
Total Budget allocated for this project:

Sketch/Image of planned project:

Calculation of surface area:

Determine the materials necessary and their associated costs.

Material	Quantity Required	Price	Cost ($)
Taxes			
Delivery cost *(if applicable)*			
Other costs *(please specify)*			
TOTAL MATERIALS COST			

Making money on social media

Outcome

PR01 Students will be expected to generalize a pattern arising from a problem-solving context using a linear equation and verify by substitution.

Guiding question

How can mathematics help you to understand your future earning potential?

Connection to financial literacy

Evaluate future earning potential in a non-traditional commission based career.

Overview

In this learning experience, learners will generalize a pattern using a linear equation and use this information to evaluate earning potential for a career as a vlogger on social media.

Opening

Guiding question

- *What are the different ways that you can earn money?*

By the end of this learning experience, learners will:

- Create a linear equation based on a pattern in a table of values
- Solve a problem using a linear equation

To begin, learners watch the following video about employment income:
Employment Income | FinLit 101 (3:38)

In response to the video, learners can discuss future careers that they may be interested in pursuing. The teacher may support this discussion by posing questions such as:

- *What types of careers interest you?*
- *What are the different ways that individuals earn money in their careers?*
- *What are the benefits and drawbacks to having a salary vs earning a commission?*
- *What value do you place on tips and/or bonus opportunities for your future earnings?*

The conversation can be extended to non-traditional careers and various internet platforms by considering the following questions:

- *What are some non-traditional careers that appeal to you?*
- *Can you identify any well-known individuals who have made a career out of posting videos on an online platform? How much money do they earn?*
- *What is the earning potential for a career as a vlogger?*

Lesson

Guiding question

- *How can you use patterns and equations to solve a problem about future earning potential?*

The teacher can explain that online video sharing websites use advertising and viewing statistics to determine earnings. Each platform uses their own method to determine earnings and it varies depending on the situation.

Learners consider the following:

It is estimated that for every 1000 views, the vlogger may earn $4.00. How much will the vlogger earn per single view?

**feel free to modify the values to your specific context however all students in a class should use the same values*

Once learners have established that the earnings per view is quite small, they will construct a table of values of the earnings based on the number of views. They will describe the pattern that they observe.

Number of Views	Earnings ($)

In small groups, learners will use the table of values to write an equation that relates the earnings (E) to the number of views (v) and verify the equation by substituting values from the table of values into their equation.

Learners will then use the equation to determine the following:

- *What are the earnings when there are 10000 views?*
- *What are the earnings when there are 50000 views?*
- *How many views would be required to earn $200 in a single day?*

The teacher can circulate and offer the groups feedback on their strategies.
When finished, learners will share their findings and explain how they arrived at their solutions.

Formative assessment opportunity
Observations/ Conversations - *Creation of an equation and correct use of the equation to solve problems.*

Next, individual learners or pairs will create a new equation for a new start up video sharing company called *ViewTube*. Learners will then estimate projected earnings in this new scenario (see sample organizer). Alternatively, learners may have video sharing channels of their own or have a favorite channel. In this case, they could use actual viewing data.

Formative assessment opportunity
Conversations - The teacher will continue to monitor student understanding.

Summative assessment opportunity
Conversation, observation and/or product - *Creation of a linear equation and calculations.*

Closing

Learners will engage in a class discussion about their earning potential for a career as a ViewTuber. Each group/individual should have the opportunity to communicate their findings. Learners will use their equations and calculations to explain their earning potential.

Reflection questions

- *Are you surprised by the money you could earn as a vlogger? Why or why not?*
- *Are there other careers where income is based on performance? What are the benefits and drawbacks to being paid on commission?*
- *Can you think of any other situations where understanding a pattern will help you to make future decisions?*
- *How can understanding linear relations help you plan for your future earnings?*
- *As vloggers gain viewers, their earnings may increase in a non-linear pattern. What do you think a graph of a rapidly increasing income would look like?*

Additional Resources

Potential Mathematics Extensions:

- Use a spreadsheet to create a graph of the earnings based on the number of views and interpolate and extrapolate information from the graph.
- Discuss extrapolation and interpolation and the situations where they can be used.
- Use online analytic calculators to incorporate authentic data.

Potential extensions with other subjects:

- *Citizenship 9 (Financial Citizenship, Digital Citizenship)*
    - *Career exploration and entrepreneurship*
    - *Analyse how social and mass media impact the awareness of certain issues*
- *Technology Education 9 (Fundamentals of Technology education)*
    - *Explore digital literacy and the world of online advertising and promotion*

- *English and French Language Arts (Media Literacy)*
    - *Invite local vloggers to share their experiences*

Additional Resources:

- Entrepreneurship: The Spirit of Adventure | Canadian Foundation for Economic Education
- Canadian Foundation for Economic Education (cfee.org)

Sample Organizer

<table>
<tr><td colspan="2">If I were a ViewTuber, I would create a ViewTube channel about _____ and my channel name would be _____.

I estimate that my ViewTube channel will have _____ views per day on average.</td></tr>
<tr><td>ViewTube is trying to build their business to compete with popular existing companies. They are offering to pay $2.50 per 500 views. Determine the earnings per view.</td><td>Estimate your monthly earnings based on your average views per day. Explain your thinking.</td></tr>
<tr><td>Create an equation to determine your daily earnings (E) based on the number of views that you estimated above (v).</td><td>Estimate your projected yearly earnings . Explain your thinking.</td></tr>
<tr><td colspan="2">How much money would you like to earn per year? How many views per day would be required to reach your earning goal? What factors could contribute to your level of success as a ViewTuber?</td></tr>
</table>

Deal or No Deal? Choosing a Smartphone Plan

Outcome

PR02 Students will be expected to graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.

Guiding question

How can mathematics help you to understand your financial options?

Connection to financial literacy

Evaluate the costs, risks, benefits, and limitations to make a major purchasing decision.

Overview

In this learning experience, learners will create and analyze graphs of linear relations to make financial spending decisions. Learners will collaborate to determine the best smartphone plan for them.

Prior to this learning experience, learners will have

- described patterns in graphs of linear relations and matched graphs to linear relations
- used Desmos or other technology

Opening

Guiding question

- *What support(s) can you use to help make a major financial decision?*

To begin, as a class, learners can discuss the factors that affect individuals when planning to make a major purchase. The teacher may support this discussion by posing questions such as:

- What factors affect teen purchases?
- How can you locate accurate information to investigate options to meet your needs?
- What is the difference between a need and a want?
- What would be important to you in order to choose a new smartphone plan?

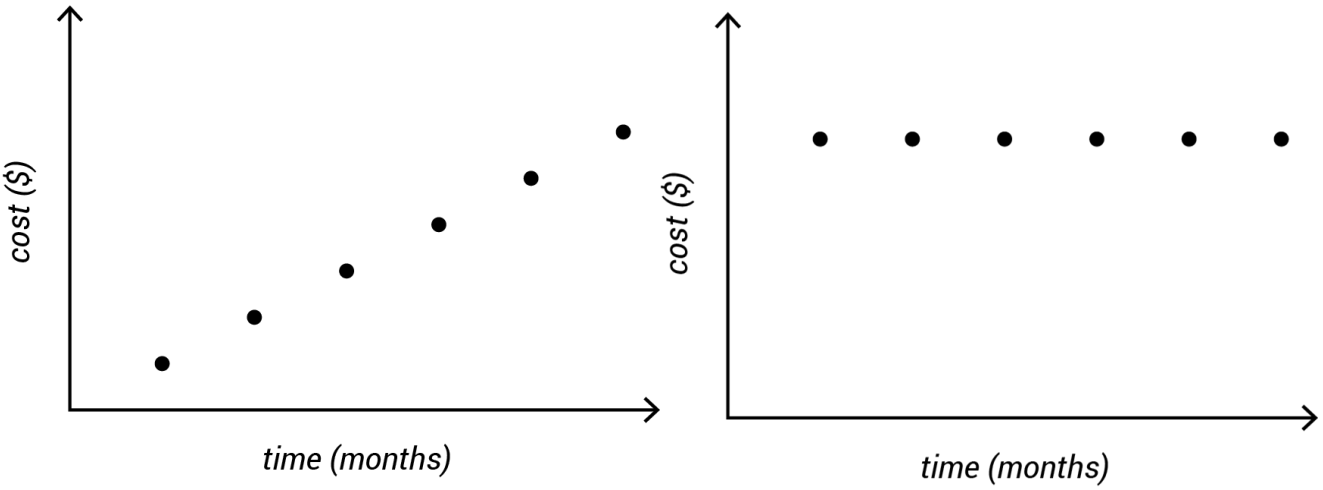
Learners can view the following video to extend their discussion.
https://finlit101.ca/en/topic/smartphones-and-plans 3:39

The teacher may support this discussion with further questioning:

- After watching the video, are there additional factors that you would need to consider in order to make a good, informed decision?

The teacher may share the following graphs and ask learners what they notice about the patterns. They may use the following questions to guide their discussion:

- What are the similarities and differences between the two graphs?
- Why are the data points separated and not connected?
- When should data points be connected?
- What do each of the graphs represent?



Formative assessment opportunity
Observations- *interpretation of graphs*

Lesson

Guiding question

- *How can you use graphs to inform financial decisions?*

As a class, the teacher will model graphing the equation of a line using the following scenario. This could be done using a spreadsheet program, graphing calculator or Desmos. The teacher will determine how much scaffolding is necessary for their learners.

> A local retail store is offering a special deal on the purchase of a tablet. They are advertising the tablet for 12 monthly payments of only $75.00 (tax included) with no money down. The regular purchase price is $500 plus 15% HST.

**feel free to modify the values to your specific context however all students in a class should use the same values*

The teacher will facilitate the creation of a *table of values*. The teacher can explain the difference between a *dependent and independent variable* and ask the learners to identify the variables in this scenario.

Next, learners will use the data to *create a graph* and an *equation* to represent the data. Learners will examine the data, equation and graph to deduce whether the relationship is linear or nonlinear.

The learners can then interpolate and extrapolate values from the graph. The teacher may support this with questions such as:

- *How much has the customer spent after 6 months?*
- *If the customer has only saved $400, during which month will they run out of money?*

Finally, the learners will determine the total cost of the purchase if paid in monthly installments. They will compare the total price when the tablet is paid by monthly installments versus the total price when the tablet is paid in full at the time of purchase.

Formative assessment opportunity
Observations- *Creation and analysis of the graph to determine cost*.

In groups, learners will use the following information to determine which plan they would rather choose. This may be done in a variety of ways including collaboration on whiteboards, pencil and paper and by using technology.

WOULD YOU RATHER?	
Option A ● Upfront cost for latest phone is $1000.00 ● The monthly charge is $50.00 ● Unlimited calls ● 15 GB data ● 128 GB of storage ● Save $45 on set up cost if you activate online ● Comes with data overage protection	Option B ● Upfront cost for latest phone is $300.00 ● The monthly charge is $100.00 ● Unlimited calls ● 15 GB data ● 128 GB of storage ● Get $25 in bonus credits when you get a friend to sign up
Which option do you choose? Justify your choice using a graph.	

The teacher can circulate and offer the groups feedback on their strategies.

Formative assessment opportunity
Conversations - *What strategy and mathematical reasoning will help you justify your decision?*

Summative assessment opportunity
Conversation, observation and/or product - *Creation of the graph and analysis of the linear relation.*

Closing

Learners will engage in a class discussion about the plan that they chose. Each group should have the opportunity to communicate their findings. Learners will use their graphical analysis to justify their thinking as they discuss the benefits and drawbacks of each of the plans.

Reflection Questions

- *Does the cost of the purchase surprise you? Why or why not?*
- *Can you think of any other situations where you could use your understanding of linear relations to make good spending decisions?*
- *How can understanding linear relations help you get a good deal on a smartphone plan?*

Additional Resources

Potential Mathematics Extensions:

- Analyze Statistics Canada data
  - Usage data by age, gender, etc.
  - **Repair or Replace: What are Canadians doing with their old cell phones and computers?**
- Evaluate the benefits and drawbacks of using a prepaid plan as compared to a pay as you go plan
- Determine the number of hours and hourly wage of part-time work that would be required to earn enough to make the payments
- Research authentic options for smartphone plans using a internet sources

Potential extensions with other subjects:

- *Citizenship 9 (Financial Citizenship)*
  - Discuss how credit history impacts obtaining a smartphone plan
- *Healthy Living 9 (Healthy Communities)*
  - Discuss inequality and social stigma regarding smartphones
- *Technology Education 9 (Ethics and Environmental Responsibility)*
  - Evaluate the benefits and drawbacks of society's reliance on smartphones

Additional Resources:

- Desmos | Let's learn together.
- Canadian Foundation for Economic Education (cfee.org)