

RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

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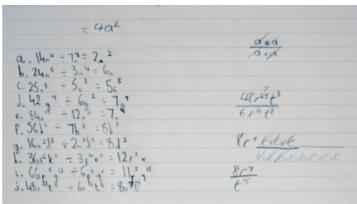
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The author of this website and the university that hosts this site acknowledge with respect the Lekwungen peoples on whose traditional territory we stand and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.

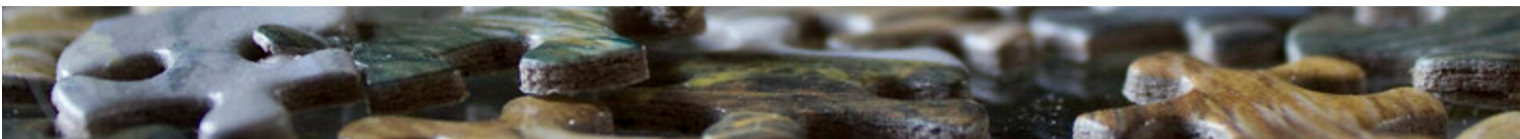
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BC's Foundations of Mathematics and Pre-Calculus 10

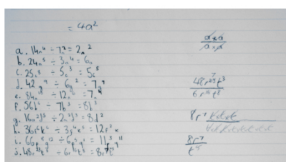
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NUMERICAL REASONING



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Home

How to Use this Resource

00.01.00 Where do I start?

(approximately 1 minute reading)

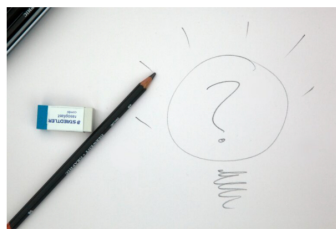


Photo by [Mark Fletcher-Brown](#) on [Unsplash](#)

Read through the elements in this module, do the activity under 'How can I maximize my efforts?' and download the Tracking and Information Booklet.

Do the activities in the suggested numerical order or just do the final summative task in every area to confirm you know the material:

- the first two numbers refer to the module,
- the second two numbers refer to the topic with learning engagements leading towards a summative task,
- the last two numbers refer to the learning engagements/activities that have an order for the skills to be developed.

The first module, this one, is 00.01.xx. There is only one topic and task, so the middle two numbers are 01. The first bit of information which is the introduction to the topic will be considered to have 00 as the last two numbers. Unless otherwise stated, the complexity of the tasks and the complexity of the learning engagements increase as the number increases.

As the information in the modules build on informative in previous modules, it is suggested that you do the modules in the following order:

- How to Use this Resource (00)
- Numerical Reasoning (01)
- Abstract Reasoning (02)
- Thinking with Models (03)
- Spatial Reasoning (04)
- Reasoning with Data (05)

00.01.01 How long will it take?

(approximately 1 minute reading)

The suggested times included in the Tracking and Information Booklet and listed on the website are general guidelines. You may take longer or shorter, depending on your current ability, how efficiently the linked application is working, your interest in the task, and your willingness to become more adept at some of the more mechanical procedures.



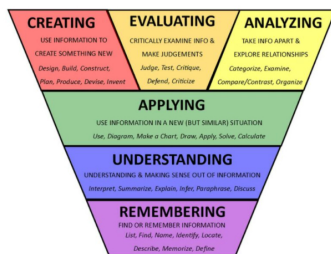
via GIPHY. created by Feliks Tomasz Konczakowski



00.01.02 What level of understanding will I gain?

(approximately 1 minute reading)

In general, the goal in each module is for you to reach the top levels of Bloom's Taxonomy. The links will help you remember, understand and apply and the final task will help you create, evaluate or analyze.



00.01.03 How can I best make use of the videos?

(approximately 1 minute reading and a 5 minute video)

A video is different from a live lecture in many ways, so take advantage of the opportunity to:

- stop and rewind,
- take notes,
- listen more than once,
- replay the sections you found confusing or new,
- stop and try the example yourself before the explanation,
- stop and try the example yourself after the explanation,
- use the settings cog to slow down the speaker,
- use the settings cog to add the automatic text generator,
- if you are using it as a review of something you know, use the settings to speed up the speaker or scroll through to get to the 'good parts',

Or, in other words, treat it like a favourite movie or YouTube video.



Video on 'How to Effectively Watch Videos for Learning' by ['Anyone Can Be A Math Person'](#)

00.01.04 What is the difference between Hints and Keys?

(approximately 1 minute reading)

For some activities, hints will be included in the resource or in the Tracking and Information Booklet. Keys or Rubrics to assess your tasks will be found in each module. It is suggested that you look at the hints to help you complete the tasks rather than look at the key or rubric before you are finished. Sometimes a rubric will be posted as a Hint. In this case, there will still be another, more clear rubric posted to help you evaluate how well you did.

00.01.05 Do I need to document my learning?

(approximately 1 minute reading)



Photo by [Sean Greyson](#) on [Unsplash](#)

Yes. The evidence you gather may be required by your school to prove you have learned the material and are ready to take British Columbia's Pre-Calculus 11. In British Columbia, you are allowed to 'challenge' a high school course by [showing evidence of prior learning \[website\]](#).

Take screenshots of quizzes you have completed. Save copies of work you do on tasks. Post these into the Tracking and Information Booklet. Save your work and your booklet in a folder

on your computer. Alternatively, you may choose to print out much of your work or save it as a pdf.

Need help with screenshots? Check out this blog post written by Melanie Pinola, David Murphy and Emily Long: "[How to take a screenshot or picture of what's on your computer screen](#)" ([web page](#)) to document your learning. There is also a [Chrome extension called Go Full Page which will create a pdf of your entire page \[webpage\]](#).

00.01.06 What is the Tracking and Information Booklet?

(approximately 2 minutes)

This booklet will help you plan your time, track your progress, provide some general formulas and notes, and help you decide what to include as evidence of your learning. Download and possibly print the tracking and information booklet. The choice to use a booklet instead of a login system is for your privacy. Fill out the booklet as though it is how you will get paid for a job. Be honest. When items take more or less time than expected, note why. If you choose not to do everything in a module, note why. Download the booklet and print it or fill in your copy digitally. If you choose to print the booklet, you will need to add blank pages to add your comments or print one sided so you have comment space. Place your pages in a binder so you can add printouts that document and provide evidence of your work.

Information and Tracking Booklet pdf

[Information and Tracking Booklet Google Doc](#)

00.01.07 How is my privacy protected?

(approximately 1 minute)



"Login Key" by [Got Credit](#) is licensed under [CC BY 2.0](#)

None of the activities or links in this resource required a login when the resource was created.

- Do not log in to anything.
- If you want to ensure you are not being tracked by a website, copy the link and access the resource through an incognito

window.

- If the activity or link requests a login or any information, do not provide it with any information. Some sites might look like you need to sign in, but you can actually do the activity without signing in and having your work traced.
- Do not click on any popups
- If asked to supply a name, as in Kahoot!, do not use any form of your own name.

00.01.08 How can I maximize my efforts?

(approximately 2 minutes reading plus a 20 minute activity)

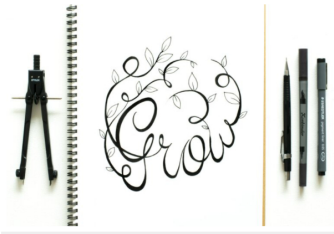


Photo by [LUM3N](#) on [Unsplash](#)

No one is watching, so try the activities. Be willing to learn from your mistakes. Take the time to figure out why you made the mistake, what it was, and possibly make a list of your mistakes so you regularly check for them until you no longer make that type of mistake. Licensed London, England taxi drivers, who must learn the complex and irregular layout of London's streets as well as the locations of thousands of places of interest, take

between 3 and 4 years to complete a set of examinations to earn their license. They make a lot of mistakes over those years. A study of their brains showed that the hippocampus, the area specializing in acquiring and using spatial information, grew significantly during those 3 to 4 years. Your efforts will pay off.

spatial information, grew significantly during those 3 to 4 years. Your efforts will pay off.

Even short amounts of daily practice can initiate changes in your brain. Developing a growth mindset, an attitude that you can and will get better at mathematics, will enable you to achieve accuracy after mistakes more quickly than students with a fixed mindset (a negative mindset where you think this is all too difficult and are not wanting to put in the time to read and learn because it is challenging). The neural mechanisms associated with awareness of errors in growth mindset individuals allows them to rebound from mistakes more efficiently and rapidly than those that have a fixed and negative mindset about mathematics.

Do this activity and post it in your Tracking and Information Booklet or above your regular work area (or in the cover of your computer) to remind you how mistakes cause your brain to grow and make you more capable of learning.



*'MyBrain' by CTrades is licensed under
CC BY-SA 2.0*

1. Crumple up a piece of paper
2. Unfold the paper and trace all the lines using different colored pens, markers, crayons and/or colored pencils.
3. Label the paper 'My Brain'



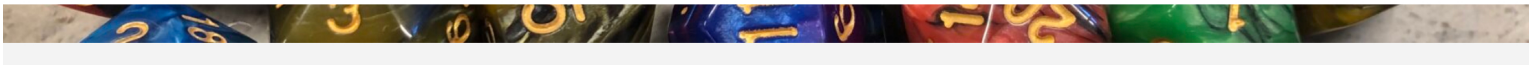
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BC's Foundations of Mathematics and Pre-Calculus 10

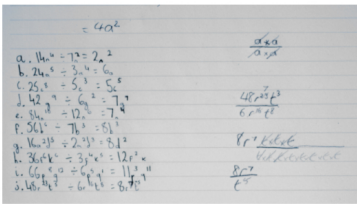
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NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

Numerical reasoning looks at the relationships between numbers and how to use them in calculations and approximation. Many everyday tasks require number sense. (How long does it take me to walk to school so what time should I leave?). The first three tasks are review of content that should have already been covered. Tasks 01.04 and 01.05 include both review content and new content for BC's FMP 10 course.



01.01 What do I need to review?

CTRADES
FEBRUARY 4, 2021

NO COMMENTS

01.01.01 How well do I know my basic math? (approximately 1 minute reading and as much time as you want playing) Photo by James Pond...

[Read More](#)



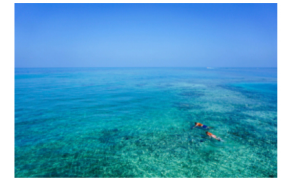
01.02 How does the Wizarding World financial system compare to the rest of the world?

CTRADES
FEBRUARY 4, 2021

NO COMMENTS

01.02.01 How do Wizarding World currencies compare? (approximately 1 minute reading and 15 minutes of work) The Image "Mar 10 2011 [Day 129] 'Galleon, Sickle,...

[Read More](#)



01.03 How can I make sure I snorkel and dive safely?

CTRADES
FEBRUARY 4, 2021

NO COMMENTS




(approximately 5 minutes reading and 2 minutes doing the exercise) Photo by Dan Gold on Unsplash Snorkelling is an activity that involves floating along the...

[Read More](#)



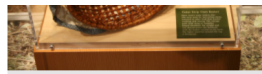


01.04 How do I think like a mathematician?




 [CTRADES](#)
 FEBRUARY 4, 2021
·
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(5 minutes reading and 20 minutes for each activity) Photo by Michael Dziedzic on Unsplash Many students think they 'are not good at math'. When...

[Read More](#)



01.05 How can I calculate a project's supplies accurately?

 [CTRADES](#)
 FEBRUARY 4, 2021
·
 NO COMMENTS

(5 minutes reading this part of the post only) "Cedar Basket" by born1945 is licensed under CC BY 2.0 When someone says they are a weaver, immediately an image...

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BC's Foundations of Mathematics and Pre-Calculus 10

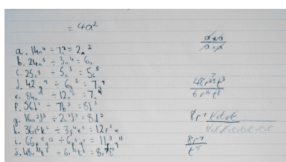
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NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

01.01 What do I need to review?

conversions, decimals, factors, fractions, operations, percentages, PersonalAwarenessFacet1, PersonalAwarenessFacet2, PersonalAwarenessProfile, prime, ReasMod01, remember, squares

01.01.01 How well do I know my basic math?

01.01.02 How can I learn more about squares and cubes?

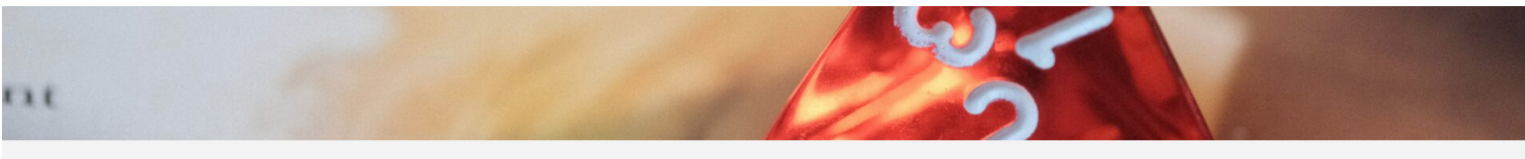
01.01.03 How can I review order of operations?

< 01.02 How does the Wizarding World financial system compare to the rest of the world?

02.05 How is interest calculated? >

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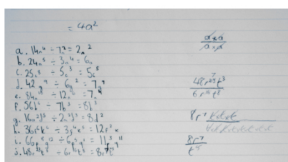




NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

01.01 What do I need to review?

conversions, decimals, factors, fractions, operations, percentages, PersonalAwarenessFacet1, PersonalAwarenessFacet2, PersonalAwarenessProfile, prime, ReasMod01, remember, squares

01.01.01 How well do I know my basic math?

(approximately 1 minute reading and as much time as you want playing)



Photo by [James Pond](#) on [Unsplash](#)

If any of your basic math skills are weak, this game is an enjoyable and quick way (2 minutes a game) to practice. Click on the image below to play the game.

Suggested skills that will help you in this course are:

- Multiplication M.18. Recognize square numbers (up to 15^2)
- Multiplication M.19. Recognize Cube numbers (up to 10^3)
- Fractions of Numbers FN.9. Harder multi-part fraction of up to 100 (e.g. $4/7$ of 49)
- Convert Fractions to Decimals CFD.4 Harder Multi-part Fractions (e.g. $2/3$, $5/6$, $3/8$)
- Convert Fractions to Percentages CFP.4 Harder Multi-part Fractions (e.g. $2/3$, $5/6$, $3/8$)
- Multiples, Factors, Prime, Square and Cube Numbers:
 - MFPSC.1. Multiples of up to 12
 - MFPSC.2. Factors of numbers up to 40
 - MFPSC.3. Prime numbers
 - MFPSC.4. Square numbers



Image links to web page of *Maths Invaders game*

01.01.02 How can I learn more about squares and cubes?

(approximately 10 minutes)

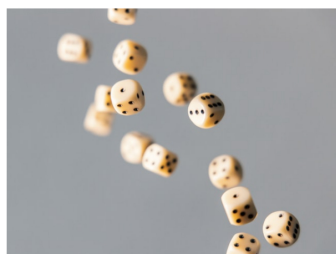


Photo by [Riho Kroll](#) on [Unsplash](#)

If you need some review on squares and cubes, read and work through this online 'book': <https://flexbooks.ck12.org/cbook/ck-12-interactive-middle-school-math-8-for-ccss/section/10.1/> [online book]



(approximately 20 minutes playing)



Photo by [Tim Rebkavets](#) on [Unsplash](#)

This game is great to review your order of operations using numbers! Scroll down the page till you see this image:

Read the directions to see how to use it.



Image links to [Royal Rescue game webpage](#)

[< 01.02 How does the Wizarding World financial system compare to the rest of the world?](#)

[02.05 How is interest calculated? >](#)

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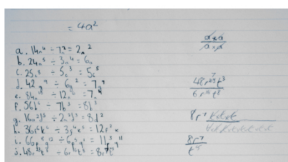
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THINKING WITH MODELS



Numerical Reasoning

01.02 How does the Wizarding World financial system compare to the rest of the world?

CommunicatingFacet2, CommunicatingFacet3, CommunicatingProfile, ComRep06, ConRfct02, ConRfct03, ConRfct04, ConRfct06, conversions, CriticalThinkingFacet1, CriticalThinkingFacet2, CriticalThinkingProfile, decimals, factors, finance, fractions, GCF, LCM, number lines, percents, prime, ReasMod05, ReasMod09, ReasMod13, ReasMod14, USolve01, USolve02, USolve03, USolve09, USolve10

01.02.01 How do Wizarding World currencies compare?

01.02.02 How do Wizarding World currencies compare with Muggle currencies?

01.02.03 How can I easily show the comparative value of individual currencies?

01.02.04 When can students go to Hogsmeade?

01.02.05 How do I decide on tips and dividing shared meals?

01.02.06 What is gross and net pay?

01.02.07 Can I afford Hogwarts school supplies?

Featured Image by [Tuyen Vo](#) on [Unsplash](#)

< 01.03 How can I make sure I snorkel and dive safely?

01.01 What do I need to review? >

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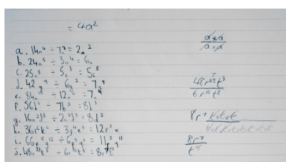




NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

01.02 How does the Wizinging World financial system compare to the rest of the world?

CommunicatingFacet2, CommunicatingFacet3, CommunicatingProfile, ComRep06, ConRfct02, ConRfct03, ConRfct04, ConRfct06, conversions, CriticalThinkingFacet1, CriticalThinkingFacet2, CriticalThinkingProfile, decimals, factors, finance, fractions, GCF, LCM, number lines, percents, prime, ReasMod05, ReasMod09, ReasMod13, ReasMod14, USolve01, USolve02, USolve03, USolve09, USolve10

01.02.01 How do Wizinging World currencies compare?

(approximately 1 minute reading and 15 minutes of work)



Galleon, Sickle and Knut

The Image "Mar 10 2011. [Day 129] 'Galleon, Sickle, and Knut (Front)'" by James Seattle is licensed under CC BY 2.0

The Wizinging World in Great Britain has a different monetary system. They use a set of coins instead of any paper type of bills.

Hagrid explains there are 29 knuts to a sickle and 17 sickles to a galleon. Create a table comparing the coins to each other. Show representations as fractions, decimals and percentages.

Table Layout Suggestion

One Knut is:			
Fraction	Decimal	Percentage	
			of 1 Knut
			of 1 Sickle
			of 1 Galleon

One Sickle is:			
Fraction	Decimal	Percentage	
			of 1 Knut
			of 1 Sickle
			of 1 Galleon

One Galleon is:			
Fraction	Decimal	Percentage	
			of 1 Knut
			of 1 Sickle
			of 1 Galleon

Hint

One Knut is:			
Fraction	Decimal	Percentage	
			of 1 Knut
1/29	0.03448	3.40%	of 1 Sickle
			of 1 Galleon

One Sickle is:			
Fraction	Decimal	Percentage	
			of 1 Knut
1	1	100%	of 1 Sickle
			of 1 Galleon

One Galleon is:			
Fraction	Decimal	Percentage	
			of 1 Knut
17	17	1700%	of 1 Sickle
			of 1 Galleon

Key

One Knut is:			
Fraction	Decimal	Percentage	
			of 1 Knut
1/29	0.03448	3.40%	of 1 Sickle
			of 1 Galleon

Fraction	Decimal	Percentage	
1	1	100%	of 1 Knut
1/29	0.03448	3.44%	of 1 Sickle
1/493	0.00202	0.20%	of 1 Galleon

One Sickle is:			
Fraction	Decimal	Percentage	
29	29	2900%	of 1 Knut
1	1	100%	of 1 Sickle
1/17	0.05882	5.88%	of 1 Galleon

One Galleon is:			
Fraction	Decimal	Percentage	
493	493	49300%	of 1 Knut
17	17	1700%	of 1 Sickle
1	1	100%	of 1 Galleon

01.02.02 How do Wizarding World currencies compare with Muggle currencies?

(approximately 1 minute reading and 15 minutes working)



“Diagon Alley” by Brett Kiger is licensed under CC BY-NC-ND 2.0

Can you afford to go to Diagon Alley? If the approximate value of a Galleon is “About five Great British pounds, though the exchange rate varies!” according to [J. K. Rowling \[web page\]](#), explore the value of one of each coin in two other currencies using a [historical currency convertor site \[web page\]](#) and the Galleon worth £4.93 (GPD, Great Britain Pound Sterling).

Express your final comparisons using decimals and round answers to 2 decimals. **Hint:** you might choose to do one currency, check the answer, and then do another currency. Your [Key \[web page\]](#) uses the date December 5, 2010.

Suggested currencies include:

- Argentine Peso,
- Australian Dollar,
- Bangladeshi Taka,
- Brazilian Real,
- Canadian Dollar,
- Danish Krone,
- Euro,
- Hong Kong Dollar,
- Indian Rupee,
- Japanese Yen,
- Korean Won,
- Philippine Peso,
- Russian Ruble,
- Serbian Dinar,
- South African Rand,
- Swedish Krona,
- Swiss Franc,
- Thai Baht,
- Turkish Lira,
- US Dollar.

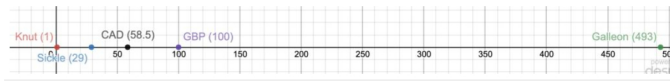
01.02.03 How can I easily show the comparative value of individual currencies?

(approximately 1 minute reading and 10 minutes working)



“Charmed number line” by albedo20 is licensed under CC BY-NC-ND 2.0

Plot the Wizarding World coins on a number line as well as the single bill of the the Great British Pound Sterling GBP and the Canadian Dollar CAD from the chart that was the Key in 01.02.02. **Hint:** Remember that you need to be able to plot up to around 500 Knuts, as that is the value of your Galleon, so divide your number line into suitable distances. Suggested amount is 50 Knuts per centimeter.



01.02.04 When can students go to Hogsmeade?

(approximately 1 minute reading, 20 minutes for first question and 5 minutes for second)



"Wizards World of Harry Potter – Hogsmeade & Hogwarts sign" by Doug Kline is licensed under CC BY-NC 2.0

Hogsmeade trips were on different weekends in different years. For many years, the schedule was decided by the whim of one of the professors. Some years there were 4 trips and some years significantly less. If, in the year 2006, the trips were only allowed on Saturdays that had a calendar day number with a multiple of 11, what Saturdays might students be able to go to Hogsmeade? Give your answer using the date.

If you need [a review on Lowest Common Multiple](#), [this article](#) explains LCM.

This [PowerPoint](#), created by Meagan Byrd, provides a review and some review questions on Lowest Common Multiple and Greatest (or Highest) Common Factor. This is a [pdf version of the PowerPoint](#).

Hint for Hogsmeade trips in 2006

You can find [the calendar day number on this website](#) to check if you were correct.

Key for Hogsmeade trips in 2006

Hogsmeade trips would be on Saturday, March 18, Saturday, June 3 and Saturday, November 4th.

Lowest Common Multiple of 11 and 7 (because there are seven days in a week) is 77.

The next multiple would be $2 \times 7 \times 11$ which is 154.

The next multiple would be $3 \times 7 \times 11$ which is 231.

The next multiple would be $4 \times 7 \times 11$ which is 308.

There is no need for any other multiples because that would be over 365 days in a year.

Looking at [the calendar day number on this website](#), you can see the dates, but Saturday, August 19 is during the summer holidays in the UK.

Sharing Candy you bought at Hogsmeade.

If you buy 126 jelly slugs and 24 chocolate frogs while there, what is the largest number of people you can share with, giving everyone an equal share? How many other groupings could you share with equally? Remember to keep a share for yourself.

Key for sharing candy

You can share with 5 other people, for a total of 6 people, counting yourself

Factor 126 and 24.

$126 = 2 \times 3 \times 3 \times 7$ and $24 = 2 \times 2 \times 2 \times 3$

Greatest (or Highest) Common Factor is $2 \times 3 = 6$

01.02.05 How do I decide on tips and dividing shared meals?

(approximately 1 minute reading and 10 minutes working)



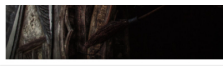
"The Wizarding World of Harry Potter: The Three Broomsticks" by Scott Smith (SRisonS) is licensed under CC BY-NC-ND 2.0

You and four friends share a meal at [The Three Broomsticks \[web page\]](#) in Orlando, Florida.

You split:

- The Great Feast (\$60.99),
- two Butterbeer™ Potted Cream (\$5.79 each) for dessert.

You also each had a Butterbeer™ (\$7.99 each for a total)



You also each had a butterbeer™ (\$7.99 each for any type).

You need to leave a 15% to 20% tip and you are also charged 7% tax on your meal.

Calculate the tax and a tip that will enable you to split the bill evenly using the

American money system.

Hint

Calculate the tax first. Then calculate a tip on the original bill without tax. Add the bill, the tax and the tip and round it to an amount divisible by 5. Choose 15% if your service was adequate and up to 20% if your service was good or if you sat at your table longer than you probably should have. Note that many restaurants include a suggested tip that is calculated using the original bill with tax.

Key

Total bill before taxes or tip: $\$60.00 + (2 \times \$5.79) + (5 \times \$7.99) = \$60.00 + \$11.58 + \$39.95 = \mathbf{\$111.53}$.

Taxes: 7% of \$111.53 is \$7.8071 which would round to **\$7.81**. (Tax rounds to nearest penny)

Total bill including taxes: \$111.53 plus 7.81 is **\$119.34**.

Tip possibilities:

15% of 111.53 is 16.7295 (rounded to 16.73). Total with tax is 136.07.

16% of 111.53 is 17.8448 (rounded to 17.84). Total with tax is 137.18.

17% of 111.53 is 18.9601 (rounded to 18.96). Total with tax is 138.30.

18% of 111.53 is 20.0754 (rounded to 20.08). Total with tax is 139.42.

19% of 111.53 is 21.1907 (rounded to 21.19). Total with tax is 140.53.

20% of 111.53 is 22.306 (rounded to 22.31). Total with tax is 141.65.

If you round to \$140, you leave a nice tip and each person pays \$28. (divide by 5 to get individual amount)

01.02.06 What is gross and net pay?

(approximately 20 minutes reading)

There are no taxes in the Wizarding World. In BC, depending on your employer, you can have deductions for:

- Federal income tax
- Federal Employment Insurance premiums (EI)
- Canada Pension Plan contributions (CPP)
- Medical premiums
- Registered Retirement Savings Plan (RRSP) or a retirement plan offered by your employer or union

You can read about the [types of payroll deductions \[web page\]](#) that take place in BC.

- Compare gross and net pay by looking at the example on this page which helps you [calculate pay in different pay periods depending on your gross and net pay \[web page\]](#).

01.02.07 Can I afford Hogwarts school supplies?

(approximately 2 minutes reading and 20 minutes working)



"Destination: Hogwarts" by [Scott Smith \(SRisonS\)](#) is licensed under [CC BY-NC-ND 2.0](#)

If you were to attend Hogwarts, how much of your currency would you need to buy your supplies in Diagon Alley? You can choose to purchase only a few items, as not all links provide a price.

Hint (Prices of all items in a table)

Item	Galleons	Sickles	Knuts	Need	Total in Galleons
plain work robes	4	12	0	3	24.22
pointed hat	3	7	0	1	3.41
protective gloves	NA	NA	NA	1	
winter cloaks	8	14	0	1	8.82
pack of name tags	0	10	0	1	0.59
Standard Book of Spells (Grade 1 has no cost, but Grade 2 is this price)	1	0	0	1	1
A History of Magic	2	0	0	1	2
Magical Theory	2	0	0	1	2
A Beginner's Guide to Transformation	1	0	0	1	1
One Thousand Magical Herbs and Fungi	2	0	0	1	2
Magical Drafts and Potions	2	0	0	1	2
Fantastic Beasts and Where to Find Them	2	0	0	1	2
The Dark Forces: A Guide to Self-Protection	1	0	0	1	1
Wand	NA	NA	NA	1	
Cauldron, Pewter	15	0	0	1	15
Glass Phials Set	3	0	0	1	3
Crystal Phials Set	7	0	0	1	7
Telescope	5	0	0	1	5
Brass Scales	3	0	0	1	3
					72.94 Total Cost
					(not including gloves or a wand)

Links will take you to the Harry Potter Fandom site. This [shopping list \[web page\]](#) was found on the site. The list quotes items from [J. K. Rowlings' book, Harry Potter and the Philosopher's Stone \[web page\]](#). Your letter of acceptance states that first-year students will require:

- [Uniform](#)
 - Three Sets of [Plain work robes](#) (Black).
 - One Plain [Pointed Hat](#) (Black) for day wear.
 - One Pair of [Protective Gloves \(dragon hide or similar\)](#).
 - One [Winter Cloak](#) (Black, silver fastenings).
 - Please note that all student's clothes should carry [name-tags](#) at all times.
- Books
 - [The Standard Book of Spells, Grade 1](#) by [Miranda Goshawk](#)
 - [A History of Magic](#) by [Bathilda Bagshot](#)
 - [Magical Theory](#) by [Adalbert Waffling](#)
 - [A Beginner's Guide to Transfiguration](#) by [Emeric Switch](#)
 - [One Thousand Magical Herbs and Fungi](#) by [Phyllida Spore](#)
 - [Magical Drafts and Potions](#) by [Arsenius Jigger](#)
 - [Fantastic Beasts and Where to Find Them](#) by [Newt Scamander](#)
 - [The Dark Forces: A Guide to Self-Protection](#) by [Quentin Trimble](#)
- Other Equipment
 - 1 [Wand](#)
 - 1 [Cauldron](#) ([pewter](#), standard size 2)
 - 1 set of glass or crystal [phials](#)
 - 1 [telescope](#)
 - 1 set of [brass scales](#)
 - Students may also bring an Owl OR a Cat OR a Toad.
- PARENTS ARE REMINDED THAT FIRST YEARS ARE NOT ALLOWED THEIR OWN BROOMSTICKS.

Key:

Convert the cost of the items you are buying by multiplying the total Galleons by the cost of a Galleon in your currency as discovered in Task 01.02.02. For example, the total of all supplies except for the protective gloves and a wand would be \$72.94 Galleons times \$8.43 Canadian at the time which is \$614.88.

Featured Image by [Tuyen Vo](#) on [Unsplash](#)

[< 01.03 How can I make sure I snorkel and dive safely?](#)

[01.01 What do I need to review? >](#)

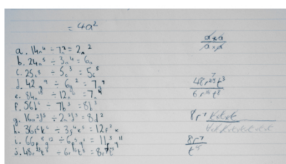
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NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

01.03 How can I make sure I snorkel and dive safely?

CriticalThinkingFacet1, CriticalThinkingProfile, integers, operations, PersonalAwarenessFacet1, PersonalAwarenessProfile, ReasMod02, ReasMod03, ReasMod06, ReasMod18, sequences, USolve03, USolve08

(approximately 5 minutes reading and 2 minutes doing the exercise)

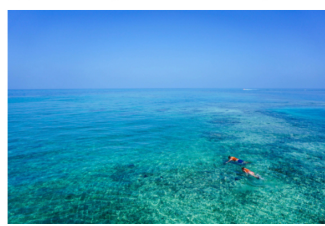


Photo by [Dan Gold](#) on [Unsplash](#)

Snorkelling is an activity that involves floating along the surface of the water and occasionally diving down to look at something. When diving, the snorkel tube fills with water so you need to hold your breath. When you surface again, you can tilt your head back shortly before reaching the surface to encourage water to drain out and you can also expel the water with a sharp exhalation. Usually,

snorkelers are in shallow reefs, less than 4 metres (approximately 13 feet) deep. Deeper reefs will require you to dive more often, which requires more fitness and skill. Due to the depths involved, the dangers are more from those around you on the surface in motorized crafts. Sun burn is often a problem as well.

Photo by [Sebastian Pena Lambarri](#) on [Unsplash](#)

Deep sea diving, also known as scuba diving, is any dive deeper than 18 metres (approximately 60 feet). As a recreational diver, you will be limited to 40 metres (approximately 132 feet). Your first deep dive should be under the supervision of a dive instructor. You can do this during your Advanced Open Water Diver course. You will be trained to dive to a depth of 30 metres.



When you scuba dive with compressed air, the air you breathe will become denser as you go deeper due to increasing pressure. you take in extra oxygen and nitrogen. This means you consume more air while deep diving compared to shallow diving. Your body uses the oxygen, but the nitrogen is dissolved into your blood, where it remains during your dive. As you swim back toward the surface after a deep dive, the water pressure around you decreases. Decompression sickness, also called the bends, is caused by a rapid decrease in the pressure that surrounds you.

In order to avoid the bends, you must plan any scuba dive BEFORE diving. There are [tables available to calculate and plan out a safe dive \[web page\]](#). The National Association of Underwater Instructors out of Florida has a set of rules to keep you safe. These include:

1. Ascend no faster than 9 meters per minute. This is 0.3 meters every two seconds. You need a timing device and a depth gauge (or a dive computer) to measure your rate of ascent. This rate will seem quite slow to you.
2. Use the deepest depth you reached during your dive to determine the dive schedule for your dive even if you spent little time at that depth and the majority of your dive at a shallower depth.
3. Always make your deepest dive first when making a series of dives. Plan each of your repetitive dives to a shallower depth than your previous dive. This might allow you to offgas nitrogen on progressively shallower dives and prevents you from carrying progressively larger amount of residual nitrogen on deeper repetitive dives.
4. Surface Interval Time (SIT) must be at least 10 minutes between dives. If your SIT is less than 10 minutes, you must consider your second dive as a continuation of the first dive. NAUI recommends a SIT of at least one hour between dives.
5. Always allow yourself enough time to make a slow, comfortable ascent with plenty of air.

If you plan the following dive, without referring to the tables, do you see any issues with the dive?



$$-8-9+7-4+3-8+3(-4+2)+2(+11-2)+5$$

Key 01.03.01

- Answer is -2. You haven't reached the top and are still underwater.
- With the frequent changes in depth, you may be not offgassing your nitrogen.
- A rapid rise at the end of your dive may mean you are coming up too fast.

If you need more review on adding, subtracting, multiply and dividing integers, you can read through [Purple Math \[web page\]](#). Alternatively, you can [go to Khan Academy to watch the video and do the examples \[web page\]](#).

If you need more practice on adding, subtracting, multiply and dividing integers, you can use some pre-made Kahoots. You do not need to sign in and you can use any name:

- [Simple Integer questions \[web page\]](#) (20 questions)
- [Word questions using integers \[web page\]](#) (15 questions)
- [Complex questions \[web page\]](#) (12 questions)
- [Complex questions including absolute value \[web page\]](#) (25 questions) *Absolute value signs show that the value will be positive, even if calculated as negative. Therefore $|5| = 5$ and $|-5| = 5$.*

If you would prefer worksheets to practice these skills, [this math drill site \[web page\]](#) has many free downloadable worksheets. The student button downloads just the question sheet and the teacher button will also download the answer key. By this point you should be able to scroll to the bottom of the page and just work on the sheets starting with 15. Challenge yourself by trying the 6 step worksheet!

01.03.02 Arithmetic Sequences

(10-15 minutes reading, thinking and doing the activity)

If you consider that you can dive safely by descending at 20 metres per minute and can only ascend at 9 metres per minute, fill in the blanks to plan a safe dive. Is this dive safe? How long will it take you to ascend safely from a dept of 30 metres?

Descend: 20, 40, 60, __, __

Ascend: 9, 18, __, __, __, __, till you reach at least the depth you descended to in the previous sequence

Key 01.03.02

Descend: 20, 40, 60, 80, 100. Since this is in metres and you are a recreational diver, you are limited to a depth of 40 metres. This is not a safe dive for you. You can only go to 40 metres maximum and in no faster than 2 minutes.

Ascend: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108. As a recreational diver, you are limited to a depth of 40 metres. Therefore, you need to ascend over 5 minutes, stopping every 9 metres if you dive to 40 metres. If you dive to 30 metres, you would stop every 9 metres to ensure you take 4 minutes to ascend.

ALWAYS USE DIVE TABLES to plan deep sea dives and dive with a professional.

Resources:

[Diveln's article \[web page\]](#) on safety when deep sea diving

[Harvard Health Publishers \[web page\]](#) information on decompression sickness

[National Association of Underwater Instructors \[web page\]](#) dive information

[< 01.04 How do I think like a mathematician?](#)

[01.02 How does the Wizarding World financial system compare to the rest of the world? >](#)

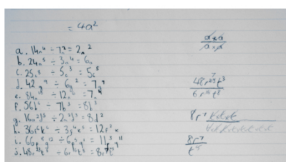
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NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

01.04 How do I think like a mathematician?

CommunicatingFacet2, CommunicatingProfile, ComRep01, ConRflct02, ConRflct03, ConRflct04, ConRflct06, CriticalThinkingFacet2, CriticalThinkingFacet4, CriticalThinkingProfile, decimals, exponents, PersonalAwarenessFacet2, PersonalAwarenessProfile, ratios, ReasMod02, ReasMod03, ReasMod04, ReasMod05, ReasMod06, ReasMod09, ReasMod16, ReasMod20, USolve01, USolve02, USolve03, USolve09, USolve10, USolve12, USolve13

(5 minutes reading and 20 minutes for each activity)



Photo by [Michael Dzedzic](#) on [Unsplash](#)

Many students think they 'are not good at math'. When they encounter something they don't know or understand, they stop. Yet most students wouldn't consider they need to give up reading an article or a book if they encounter a word they don't know. They keep reading, hoping to understand the word in context (by what is explained in the situation) or that by continuing, they will figure out the meaning. Math is the same, but students need to apply different strategies than continuing in the same single direction of reading

on. If you can't figure out what is happening in math, you might have to:

- estimate a reasonable answer
- look back over your work to see where you may have made a simple computational error
- try a different mathematical operation—there are only 4 to try (addition, subtraction, multiplication or division)
- work backwards from the answer to the question as it is probably only the first step that is new to you

01.04.01 What is the Golden Ratio?

(1 minute reading and 20 minutes doing the activity, if you have a measuring tape)

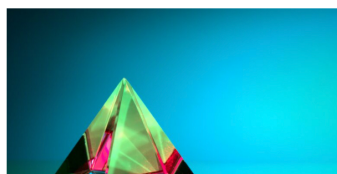


Photo by [Jovica Smileski](#) on [Unsplash](#)

[This activity \[web page\]](#) steps you through an investigation of the Golden Ratio. If the page is not accessible, [this is a pdf of the web page](#). You will need a measuring tape or a long strip of paper that you have glued together or a piece of ribbon or string. Mark on it equal divisions. (As long as the divisions are equal and small, you can measure fairly accurately. We are not

looking for inches or centimetres, just equal referents. You could use the width of one of your fingers or the side of your phone to make equal measurement marks.) You will want a sheet of graph paper if you have not printed off the Tracking and Information Booklet. You can download or make a copy of [this google doc of even squares](#). You will also want a compass if you are not completing digitally, though you could just read about this portion of the activity instead of doing it.

01.04.02 How do I convert decimals to fractions?



(1 minute reading and 20 minutes doing the activity)

Photo by [Michael Dzedzic](#) on [Unsplash](#)

The first part of this investigation you should already know. How can you edit what you do in the first section to apply to the



second section? You already know the mathematical operation you need to do. What if you manipulate the number you are using slightly? What if you test some fractions for how they convert?



Link to [Google Doc of Decimals to Fractions Investigation](#). Make your own copy. If you cannot access it, here is the [Decimals to Fractions Investigation in pdf form](#).

Link to [Google Doc of Key for Decimals to Fractions Investigation](#) and Rubric for evaluating your work. If you are having difficulty, make your window narrow (top to bottom) and look at the answers to one question at a time as your hint to continue working. If you cannot access the Google Doc, here is [Decimals to Fractions Investigation KEY in pdf form](#).

For Teachers:



IB MYP Elements



[< 01.05 How can I calculate a project's supplies accurately?](#)

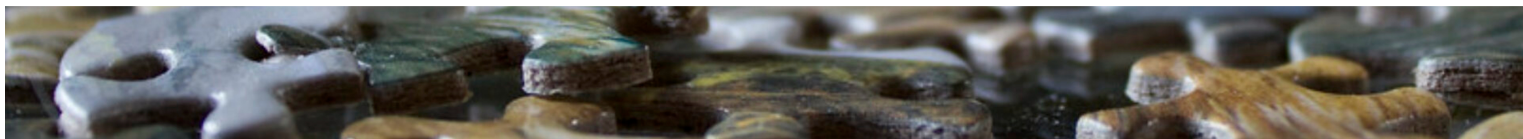
[01.03 How can I make sure I snorkel and dive safely? >](#)



RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

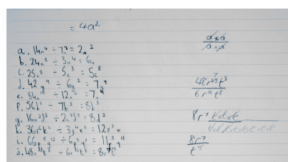
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- THINKING WITH MODELS
- SPATIAL REASONING
- REASONING WITH DATA



NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Numerical Reasoning

01.05 How can I calculate a project's supplies accurately?

CommunicatingFacet3, CommunicatingProfile, ComRep02, ComRep06, ConRfct02, ConRfct04, ConRfct05, ConRfct08, ConRfct09, ConRfct14, ConRfct10, ConRfct11, CriticalThinkingFacet4, CriticalThinkingProfile, CulturalIdentityFacet1, CulturalIdentityProfile, irrational, operations, PersonalAwarenessFacet2, PersonalAwarenessProfile, prime, ReasMod09, ReasMod13, ReasMod14, ReasMod16, ReasMod17, ReasMod19, squares, surds, USolve03, USolve08, USolve09, USolve10, USolve11, USolve12, USolve14, USolve15

(5 minutes reading this part of the post only)



"Cedar Basket" by born1945 is licensed under CC BY 2.0

When someone says they are a weaver, immediately an image of someone working a loom comes to mind. Yet, basket weaving is possibly one of the oldest human crafts. Baskets were fashioned out of whatever natural materials were found at hand: trees, bushes, vines, and grasses, and used to carry everything from food to water. Today, willow, oak, and cattails are not used nearly as often as reeds and vines bought at the store. Basket reed, also called rattan, has

largely replaced the vines and grasses used long ago.

"FMSC MarketPlace - Pine Needle Basket" by Feed My Starving Children (FMSC) is licensed under CC BY 2.0

Pine needle basketry, using needles such as the 18cm long Ponderosa pine needle, is an inexpensive hobby as much of the supplies can be picked from a tree without damaging the tree. This type of basket making was used as therapy in hospitals such as the sanatoriums, including the Kamloops sanatorium, during the tuberculosis (TB) epidemic. Treatment of TB consisted of much rest plus interesting hobbies of a non-physical nature.



"The Hollow Tree, Cathedral Grove" by glendon27 is licensed under CC BY-NC-SA 2.0

Tla'amin baskets, built with the purpose of packing food, storing goods or even as baby cribs, are [very beautiful pieces of Indigenous peoples art \[web page\]](#). Expert Tla'amin cedar root basket maker Rose Mitchell explains that production of the baskets reached its peak in the late 1800s when Sliammon women learned the art of basketry from Interior Salish women. Cedar is considered the tree of

life by the Ts'msyen people. In Sm'algyax, the Ts'msyen language, the name for cedar is smgan which means *real* or *true tree*. Traditionally, for the Ts'msyen and many other coastal First Nations_ peoples, it provided materials needed for everyday living such as clothing, shelter, transportation, storage and utensils. The inner bark of cedar was/is used to create clothing that meets many needs - soft and warm or tightly woven and waterproof when needed for the wet coastal climate. It was/is also used for spiritual and ceremonial purposes. Woven cedar is an essential component of regalia (ceremonial dress) and can take the form of hats, capes, bracelets and headbands. Woven cedar mats were also traditionally used to wrap loved ones after death before placing them in bentwood boxes.

There are two native species of cedar tree that grow in the temperate rainforests of coastal British Columbia: Yellow Cedar and Western Red Cedar. Yellow Cedar typically grows at subalpine elevations in damp coastal forests



ranging from Vancouver Island to Alaska; but it is rarely found in inland regions. Red Cedar is common both on the coast and in moist slopes and valleys of the Interior. The inner bark of both types of cedar is used for weaving. Yellow cedar was usually used for clothing worn next to the skin because it is softer. Red cedar was used for outer clothing such as rain hats and capes. Red cedar was also most commonly used for baskets and mats.

In the late spring or early summer, when the sap is running and the bark is easier to peel off, people go out to collect cedar bark. They select a tall, straight tree with few branches at the base. They thank the tree for sharing its bark and only take enough bark to meet their needs without harming the tree. Only a small amount of bark can only be harvested from each tree and each year, new trees must be found for harvesting. When it is used for clothing, the bark is separated, pounded, and shredded, to make it soft. The shreds are rolled together to the correct thickness for weaving into clothing. Bark used for weaving hats, baskets, and mats is split into thin strips.



Gathering basket from [Textile Indie](#)

Situation: You decide you want to make a basket for your teacher so they have something special to carry their laptop and supplies from class to class. There are math skills you are going to need in order to accurately calculate how much supplies you need. You want a fairly accurate answer so you don't waste money buying too much. Note that not being exact and rounding too soon creates an

unrealistic and inaccurate amount.

For example, let's say you were supposed to be charged 5.4% interest on a \$100,000 loan. You were paying monthly so the bank divided the interest by 12 months and got the answer of 0.45% for a monthly interest rate. They decided to round it to 0.5%, which means you would actually pay 6% interest over the year! After rounding, they rounded again, since they didn't want to deal with a decimal, which meant they were charging 1% a month or 12% a year! A small rounding error makes a huge difference, so it is best to deal with surds and then round your final answer.

There are many [examples of rounding errors \[web article\]](#) as well.

01.05.01 What types of numbers are used to be exact?

01.05.02 How can I calculate a project's supplies accurately?

Resources

Basket-making basics – Basketry for beginners – Homestead.org. (2020, June 23).

Homestead.org. <https://www.homestead.org/lifestyle/basket-making-basics/>

Calder, T. (2020) *Weaving our Way From Patterns to Linear Relations in a Ts'msyen Context*. Aboriginal Education Department, SD 52 (Prince Rupert). https://29ec2a20-d7c2-4c63-9e11-6a4768b6be49.filesusr.com/ugd/d810a6_dde8a7a3e72d4d608b4820697fe75f4c.pdf

Erickson, J. *Pine Needle Basketry*. (2018, June 8). Salmon Arm Arts Centre. <http://www.salmonarmartscentre.ca/wp-content/uploads/2018/08/Pine-Needle-Basketry-by-June-Erickson-2018.pdf>

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Jungic, V. (2019, January 23). *Indigenous basket-weaving makes an excellent digital math lesson*. The Conversation. <https://theconversation.com/indigenous-basket-weaving-makes-an-excellent-digital-math-lesson-110094>

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Indie. <https://www.textileindie.com/weaving-basket-guide/>

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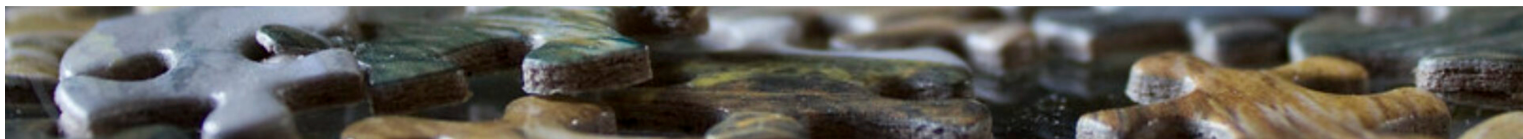
IB MYP Elements



RESOURCES FOR BC MATH 10

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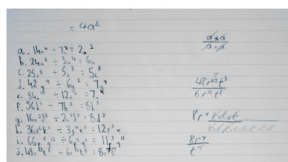
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Numerical Reasoning

01.05 How can I calculate a project's supplies accurately?

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(5 minutes reading this part of the post only)



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There are two native species of cedar tree that grow in the temperate rainforests of coastal British Columbia: Yellow Cedar and Western Red Cedar. Yellow Cedar typically grows at subalpine elevations in damp coastal forests



ranging from Vancouver Island to Alaska; but it is rarely found in inland regions. Red Cedar is common both on the coast and in moist slopes and valleys of the Interior. The inner bark of both types of cedar is used for weaving. Yellow cedar was usually used for clothing worn next to the skin because it is softer. Red cedar was used for outer clothing such as rain hats and capes. Red cedar was also most commonly used for baskets and mats.

In the late spring or early summer, when the sap is running and the bark is easier to peel off, people go out to collect cedar bark. They select a tall, straight tree with few branches at the base. They thank the tree for sharing its bark and only take enough bark to meet their needs without harming the tree. Only a small amount of bark can only be harvested from each tree and each year, new trees must be found for harvesting. When it is used for clothing, the bark is separated, pounded, and shredded, to make it soft. The shreds are rolled together to the correct thickness for weaving into clothing. Bark used for weaving hats, baskets, and mats is split into thin strips.



Gathering basket from [Textile Indie](#)

Situation: You decide you want to make a basket for your teacher so they have something special to carry their laptop and supplies from class to class. There are math skills you are going to need in order to accurately calculate how much supplies you need. You want a fairly accurate answer so you don't waste money buying too much. Note that not being exact and rounding too soon creates an

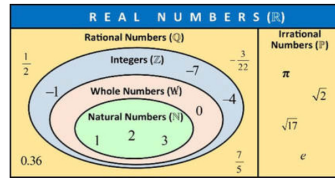
unrealistic and inaccurate amount.

For example, let's say you were supposed to be charged 5.4% interest on a \$100,000 loan. You were paying monthly so the bank divided the interest by 12 months and got the answer of 0.45% for a monthly interest rate. They decided to round it to 0.5%, which means you would actually pay 6% interest over the year! After rounding, they rounded again, since they didn't want to deal with a decimal, which meant they were charging 1% a month or 12% a year! A small rounding error makes a huge difference, so it is best to deal with surds and then round your final answer.

There are many [examples of rounding errors \[web article\]](#) as well.

01.05.01 What types of numbers are used to be exact?

(approximately 15 minutes reading, 25 minutes watching videos, and 15 minutes doing exercises)



You will need to understand about irrational numbers, surds, roots, and radicals, and how to simplify surds and radicals. What are they? The definitions of the different types of numbers that will be referred to in future math questions can be found on the [Bahamian mathematics webpage](#) from which the image on the left has been taken. The Khan Academy video (6 minutes) on the page helpful as are the notes and the slideshow at the bottom.

The worksheets do not include keys, so you may want to watch a further [Khan Academy video \(9 minutes\)](#) and do the exercises that follow. [This flexbook](#) has a very clear explanation of what irrational numbers are as well as an interactive tool to help you make sense of square roots that don't have a rational number root. This [video \(9 minutes\) from MyWhyU](#) is an entertaining explanation of the history behind the different types of numbers.

What are surds and radicals?

(approximately 1 minute reading)

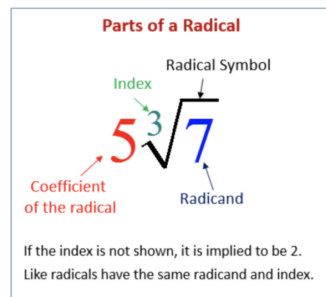


Image from <https://www.onlinemathlearning.com/adding-radicals.html>

Surds and radicals refer to the same thing – a number that does not have a rational root. They can further be qualified as entire radicals (where the numbers are all under the radical symbol or the coefficient is 1) and mixed radicals (where there are numbers under and in front of the radical symbol or the coefficient is greater than 1). The image shows a mixed radical.

Learning about surds and radicals

[Introduction to Square Roots and Cubes \(15 minutes of online video and 15 minutes of online practice questions\)](#)

OR

You may find it helpful to [review perfect squares and perfect cube roots as well as how to estimate roots \(13 minute online video\)](#).

If you do not want to watch videos and just want to read, this [article \[web page\] thoroughly covers radicals](#). (9

minutes reading)

Learning how to simplify entire radicals to mixed radicals

[Simplifying Square Roots \(3 minute online video and 5 minutes of practice questions\)](#)

[Video on how to simplify radicals \(4 minute online video\).](#)

You may need review on [factoring to be able to simplify radicals \(15 minute online video\)](#) which [completes in this two minute online video.](#)

Learning how to write a mixed radical as an entire radical

[Video on writing a mixed radical as an entire radical \(3 minute online video\).](#)

[Video on ordering radicals \(3 minute online video\).](#)

Learning how to add and subtract radicals

[Article \[web page\] on how to add and subtract radicals.](#) (approximately 2 minutes reading)

OR

[Video on adding and subtracting radicals \(4 minute online video\).](#)

Learning how to multiply and divide radicals

[Video on multiplying radicals \(4 minute online video\).](#)

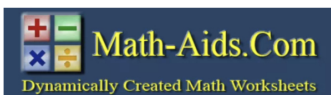
[Video on dividing radicals \(2 minute online video\).](#)

OR

This [article \[web page\]](#) explains [multiplying radicals about halfway down the page](#) and [halfway down the page of the same extended article \[web page\]](#) is an [explanation on dividing radicals.](#) (2 minute read each)

Practicing

(At least a half hour twice, though more to be sure you fully understand how to work with them)



Math Aids is a free site for worksheets on which ads pay for the free resource. Be sure to click the button to add a key. Scroll down to hit the Create it button.

- [Simplifying radicals \[web page\]](#) (You can add 4th and 5th roots)
- [Adding and Subtracting Radicals \[web page\]](#)

- [Multiplying Radicals \[web page\]](#)
- [Dividing Radicals \[web page\]](#)

Kahoot! is an online platform that allows you to test yourself. Use a false name and don't sign in as it is unnecessary.

- [Simplifying Radicals Kahoot \[web page\]](#)
- [Multiplying Radicals Kahoot \[web page\]](#)
- [Dividing Radicals Kahoot \[web page\]](#)
- [Converting Radicals Kahoot \[web page\]](#)

01.05.02 How can I calculate a project's supplies accurately?

(approximately 3 minute reading and 20 minutes calculating the answer)

After finding [this online tutorial on making a basket](#) which is 8 inches by 10 inches by 8 inches high, making a basket appears doable. You want to make the inside of the basket softer by sewing a quilted liner. How much material and how much quilt batting will you need, in square inches? Measuring the inside of the basket after completion:

- length: $7\sqrt{2}$
- width and height: $3\sqrt{7}$

Hint for Calculating Supplies

(approximately 1 minute reading)

Make a diagram to show every space that will need covering.

Remember that you will need two pieces of material to enclose the quilt batting.

Key for Calculating Basket Supplies

(approximately 3 minutes reading and deciding on your level)

[Basket Key Google Doc](#) or [Basket Key.pdf](#) .

Resources

Basket-making basics – Basketry for beginners – Homestead.org. (2020, June 23).

Homestead.org. <https://www.homestead.org/lifestyle/basket-making-basics/>

Calder, T. (2020) *Weaving our Way From Patterns to Linear Relations in a Ts'msyen Context*. Aboriginal Education Department, SD 52 (Prince Rupert). https://29ec2a20-d7c2-4c63-9e11-6a4768b6be49.filesusr.com/ugd/d810a6_dde8a7a3e72d4d608b4820697fe75f4c.pdf

Erickson, J. *Pine Needle Basketry.* (2018, June 8). Salmon Arm Arts Centre. <http://www.salmonarmartscentre.ca/wp-content/uploads/2018/08/Pine-Needle-Basketry-by-June-Erickson-2018.pdf>

First Nations Education Steering Committee. (2020) *Math First Peoples Teacher Resource Guide.* <http://www.fnesc.ca/wp/wp-content/uploads/2020/09/PUBLICATION-Math-FP-TRG-2020-09-04.pdf>

Jungic, V. (2019, January 23). *Indigenous basket-weaving makes an excellent digital math lesson.* The Conversation. <https://theconversation.com/indigenous-basket-weaving-makes-an-excellent-digital-math-lesson-110094>

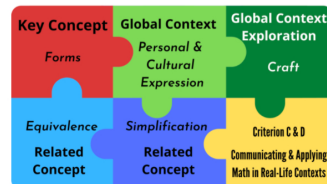
Step-by-step guide to weaving a handled basket. (2021, January 19). Textile

Indie. <https://www.textileindie.com/weaving-basket-guide/>

For Teachers:



IB MYP Elements



01.04 How do I think like a mathematician? >

Edit

RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

HOME

NUMERICAL REASONING

ABSTRACT REASONING

THINKING WITH MODELS

SPATIAL REASONING

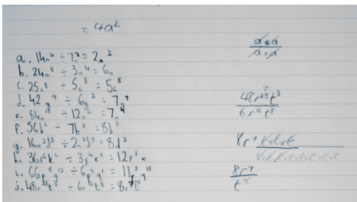
REASONING WITH DATA



NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Abstract Reasoning

Abstract reasoning uses letters and symbols to represent unknown numbers and quantities. More complex patterns can be explored through this use of symbols as many real-life situations have more than one unknown quantity (How fast I walk or hobble on crutches and the route I take both affect how long it will take me to get to school.) The first task is review of content that should have already been covered. Tasks 02.02 through 02.05 include both review content and new content for BC's FMP 10 course.



02.01 Why is algebra important?

CTRADES FEBRUARY 26, 2021

NO COMMENTS

(approximately 1 minute reading, 25 minute video, a ten minute article, a twenty minute puzzle and three ten to twenty minute review quizzes) The term...

[Read More](#)



02.02 How can I create a model of something that is very large?

CTRADES FEBRUARY 26, 2021

NO COMMENTS

(introduction = 3 minutes reading and a 7 minute video) To Scale: The Solar System from Wylie Overstreet on Vimeo. The distances between the planets...

[Read More](#)



02.03 How do I solve more complex problems mathematically?

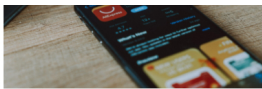
CTRADES FEBRUARY 26, 2021

NO COMMENTS

(approximately 5 minutes exploring the Geogebra app, 10 minutes reading and a 10 minute video) Photo by Matt Bowden on Unsplash Clicking on the following...

[Read More](#)



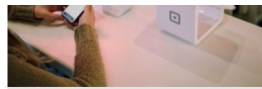


02.04 How is online data and credit card information kept safe?

[CTRADES](#) ·
 FEBRUARY 26, 2021
·
 NO COMMENTS

(approximately 1 minute reading and a 20 minute activity)
Photo by CardMapr.nl on Unsplash
Cryptography uses factoring and polynomials to build and break systems.
If...

[Read More](#)



02.05 How is interest calculated?

[CTRADES](#) ·
 FEBRUARY 26, 2021
·
 NO COMMENTS

(approximately 8 minutes reading, a 10 minute activity and a 20 minute slideshow/activity)
Photo by Christiann Koepke on Unsplash
Read this online article on how...

[Read More](#)



[Edit](#)



RESOURCES FOR BC MATH 10

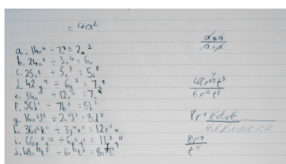
BC's Foundations of Mathematics and Pre-Calculus 10



NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Abstract Reasoning

02.01 Why is algebra important?

brackets, CommunicatingFacet3, CommunicatingProfile, ConRfct03, ConRfct04, ConRfct05, ConRfct06, CriticalThinkingFacet4, CriticalThinkingProfile, equations, exponents, factoring, operations, PersonalAwarenessFacet1, PersonalAwarenessProfile, polynomials, substitution, USolve03, USolve12, USolve13

(approximately 1 minute reading, 25 minute video, a ten minute article, a twenty minute puzzle and three ten to twenty minute review quizzes)

The term "Algebra" came from the Arabic word "Aljaber", which means "restoring the broken". The father of algebra is Alkharizmi, whose book is "Aljaber wa Almuqabala", which meant "Restoring & Balancing". It still means that today. This [25 minute online video tells about the origin of algebra and how it is used by people in their daily life.](#)

The ability to look at patterns helped puzzlers recognize that [the parachute for the Mars rover Perseverance had a code in it \[Website article\]](#). As a beginning algebra student, can you see how the code was hidden, using [binary code \[web page\]](#)?

Hint

Look at the easy to see capital letters like M, I and Y.

Hint 2

Only look at the last 5 numbers in the binary code

Solution

Although there are 7 spots for each letter on the parachute between each white section, only the last 5 digits of the binary code are shown. The first 3 digits that would show capital or lower case are just presented as beige 0s instead of orange 1s.

Simple algebra questions you should be able to solve (the checkmark will show you the answer):

1. Simplify: $18m - 2x + m + 5x + z - 30m$ ✓
2. Evaluate: $3y - 80 + 23y + 124$ for $y = -20$ ✓
3. Simplify: $81 - 6(3x + 7) - 120x$ ✓
4. Solve: $82 - 7y = 53 + 7y + 1$ ✓
5. Solve: $\frac{6x}{7} = -12$ ✓
6. Solve: $-9.6(6.7 + 1.2y) = -98.88$ ✓

7. Write an algebraic expression for “Eight times a number subtracted from eleven”

Reuse Embed

More complex algebra questions you should be able to solve:

1. Simplify: $2y^2n - 3ny + 2n^2y - ny^2 + 17yn$

2. Evaluate: $\frac{3}{5}y + \frac{y}{4} - 70$ for $y = -20$

3. Solve: $\frac{3m}{5} + \frac{1}{12}m - \frac{5}{6}m = 9$

4. Write an algebraic expression for “The difference of two consecutive even numbers”

5. Evaluate: $3w^2 + 17w + 12.5$ for $w = -12$

Reuse Embed

Challenging algebra questions you should be able to solve:

1. Simplify: $5(3x^2 - 12 + 2x) - 2(8x + 21 - 7x^2)$

2. Simplify: $(3m - 1)(2m + 5)$

3. Simplify: $(6x - 7)^2$

4. Simplify: $5y(y + 3)(y - 8)$

5. Factor completely, if possible: $35m^2w - 28mw + 14m^3$

6. Factor completely, if possible: $x^2 + 13x + 22$

7. Factor completely, if possible: $4y^2 - 121z^2$

8. Factor completely, if possible: $6x(e + 4) - 5(e + 4)$

9. Factor completely, if possible: $2m^2 - 14m + 24$

10. Factor completely, if possible: $19y^2 - 76$

11. Simplify: $\frac{35m^2p}{14mp} \times \frac{4m^3p^2}{mp}$

12. Simplify: $\frac{40x^2y - 50x^3 + 10x}{10x}$

Reuse Embed

If you have difficulty on any of the simple or more complex algebra questions, you should review and practice using the resources below. If you have difficulty with the challenging questions, the other topics will have more review at the challenging level as it is considered the simple level for BC FMP 10.

Practice Resources



Math Aids is a free site for worksheets on which ads pay for the free resource. Be sure to click the button to add a key. Scroll down to hit the Create it button. On this [Math Aids web page](#), you can choose worksheets to practice depending on which questions you had difficulty with from the above question levels:

- writing variable expressions (simple #7 and more complex #4)
- order of operations using algebra (simple #1 and more complex #1)
- evaluating expressions using algebra (simple #4 & 5 and more complex #3)
- the distributive property using algebra (simple #3 & 6)

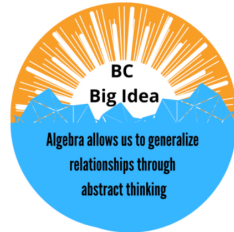
- combining like terms (simple #1 and more complex #1)

If you need more explanation than practice, look through [Khan Academy's Algebra Foundations online videos and practice elements](#). There is no need to watch every video, but you could click on the settings and watch the videos at a faster speed as a review. You could challenge the quizzes to see where you need more review. If even this seems too complicated, you may find it helpful to look at [Khan Academy's online videos and practice elements on preparing for algebra](#).

If you just want a bit more mixed practice, try these Kahoots:

- [Twelve questions at the simple and more complex level \[web page\]](#)
- [Fifteen questions at the simple and more complex level \[web page\]](#)
- [Twenty questions at the simple and more complex level \[web page\]](#)

For Teachers:



[< 02.02 How can I create a model of something that is very large?](#)

Edit

Expanded Form	Exponent Form
2×2	2^2
$2 \times 2 \times 2$	2^3
$2 \times 2 \times 2 \times 2$	2^4

02.02.01 What do I remember about exponents?

02.02.02 What do I remember about exponent properties/laws/rules?

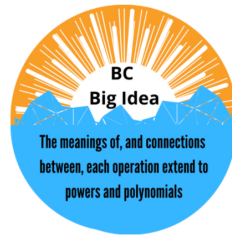
02.02.03 Am I confident using exponents in calculating money matters?

Exponent Review Games

02.02.04 How are old items dated?

02.02.05 How do I make a model of the solar system?

For Teachers:



IB MYP Elements



[< 02.03 How do I solve more complex problems mathematically?](#)

[02.01 Why is algebra important? >](#)

[Edit](#)

Expanded Form	Exponent Form
2×2	2^2
$2 \times 2 \times 2$	2^3
$2 \times 2 \times 2 \times 2$	2^4

02.02.01 What do I remember about exponents?



(approximately 20 minute review activity)

Image from Mathplanet.com.

This activity should have only one new to you idea (1c and 2c).

- make a copy of this [Google Doc of Discovering Exponents Activity](#)
- or download this [pdf of the Discovering Exponents Activity](#)

(Re)Discovering Exponents Hint 1

- compare the numerical values of 2^2 and 2^{-2} as well as 2^3 and 2^{-3}
- compare other numerical values of bases that have the same positive and negative exponent

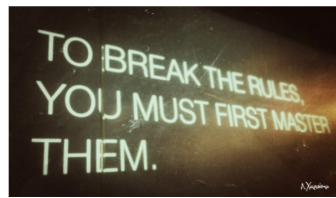
(Re)Discovering Exponents Hint 2

- look up the term [reciprocal \(website of online mathematics dictionary\)](#) to help you express the rule for negative exponents

(Re)Discovering Exponents Key

- link to a [Google Doc of the Discovering Exponents Key](#)
- or download this [pdf of the Discovering Exponents Key](#)

02.02.02 What do I remember about exponent properties/laws/rules?



(approximately 30 minute review activity or reading)

"Rules" by <http://heretakis.com> is licensed under CC BY 2.0

This activity should have only one rule new to you (#4).

- do the review activity ([Google Doc of Discovering Exponent Laws](#) or download the [pdf of Discovering Exponent Laws](#)) and check it against the [Google Doc Discovering Exponent Laws Key](#) or the

[pdf of Discovering Exponent Laws Key](#)

- or read through this [online book article on exponent laws](#)
- or read this [purplemath.com web page on exponent laws](#).

02.02.03 Am I confident using exponents in calculating money matters?

(approximately 5 minutes total reading, two activities 20 to 30 minutes each plus time to self-assess against provided Keys and Rubrics)

\$1000 a week for life or a million now?

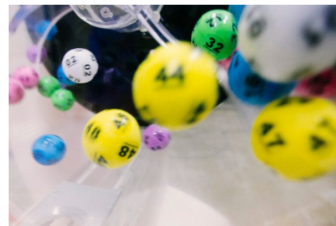


Photo by [dylan nolte](#) on [Unsplash](#)

Your parents have just won the \$1000 a week for the rest of your life jackpot. They have the choice to take the \$1000 a week or a 1 million dollar payout immediately. Which should they take? The compound interest rate (where you get paid the interest monthly and then earn interest on that interest the next month) is $A = P(1 + r/n)^{nt}$ where A is the amount at the end of a portion of time, P is the amount invested, r is the annual

interest rate in decimals (3% would be 0.03), n is the number of compounding periods per t (so monthly would be 12), and t is the time involved in years.

1. Calculate the amount they would have in 10 years if they didn't touch any of the money and earned 3.875% interest a year. (Check your math using this [online calculator](#)).
2. How much interest would there have been over 10 years?
3. Can you see how the \$1000 a week would have been calculated as an option?
4. If they had been taking out the interest every week, how much would they be removing?
5. Check your amount against current interest rates on safe investments like a fixed annuity or savings account. Check your calculations so far (see hint below)
6. How much taxes would they have to pay on \$1000 a week or the 1 million payout? See [this website to check on Canadian laws on lottery winnings](#).
7. How many debts would your family pay off with 1 million (consider mortgage, car loans, or purchases that could be made to make life easier on a day to day level).
8. Include a small portion, less than 5% to celebrate by taking a trip and/or buying new furniture and/or appliances and/or vehicles.
9. Based on your calculations and family situation, advise your parents on what you think their choice should be.

Key to #1-5

1. Total investment after 10 years at 3.875% interest:
 - $P(1 + r/n)^{nt}$
 - $1\,000\,000(1 + 0.03875/12)^{10 \cdot 12}$
 - $1\,000\,000(1 + 0.0032291667)^{120}$
 - $1\,000\,000(1.0032291667)^{120}$
 - $1\,000\,000(1.472\,373\,45)$
 - \$ 1,472,373.45
 - where you choose to round can change the amount significantly. If you used 1.003 before applying the exponent, your final answer would be over \$10,000 more!
2. Interest over 10 years if no money was removed from the account \$474, 373.45
3. How was '\$1000 a week for life' calculated? Interest divided by 10 years of 52 weeks is $\$474,373.45 / 520 = \912 a month which is approximately \$1000. Note, you could also calculate by dividing by 521.4 as the number of weeks in a year is not a whole number.
4. If the rate is still 3.875, then the calculation would be $\text{Principal} \cdot \text{rate} / 52.14$ to calculate the amount removable by week. $P \cdot r / 52.14 = \$743.19$ per week. Most banks would not calculate interest weekly, though, so the calculation should be done monthly ($P \cdot r / 12$). $P \cdot r / 12 = \$3229.17$ per month.
5. At the time of this post, Guaranteed Income Certificates (GIC) are earning only between 0.4 % and 2% a year for GICs of a minimum investment of \$1000 with an annual compound interest rate and not cashable early.

Elements for considering #7-9

Your home

- Is there a mortgage on your house?
- The size, suitability, and area your house is in and whether it would be better to move
- Whether the house you might move to would be affordable if you spent most of your million dollar payout on it
- The pleasure you would get out of a new house or upgrades to your house
- New appliances
- Furniture changes to fill a new house or to make yours more comfortable
- How long everyone currently in the house would be living in that house

Family Debts

- How much does your family owe on credit cards?
- How much does your family owe for vehicles?
- How old are your vehicles and do they need replacement soon?
- Would your family like another vehicle or a recreational vehicle?

Income

- Does the current family income cover all expenses?
- How much will further schooling cost for the young people in your home?
- Does a parent want to stop working?
- How much taxes are charged for winnings from a lottery? Does the 1 million dollar payout have a larger

tax requirement than \$1000 a year?

Age

- How old are your parents? Will the \$1000 a month be a way for them to accumulate money?

Rubric to assess #1-9

- **Limited** – You had the amounts for #1-3 correct. You considered few of the elements for #7 – 9 listed above.
- **Adequate** – You had the amounts for #1-4 correct. You considered some of the elements for #7 – 9 listed above.
- **Substantial** – You had the amounts for #1-4 correct. You considered many of the elements for #7 – 9 listed above.
- **Excellent** – You had the amounts for #1-4 correct. You considered most of the elements for #7 – 9 listed above.

Consider [this 18 year-old's choice \(website\)](#).

Chain letters!



Photo by [John McArthur](#) on [Unsplash](#)

You have received an email from a friend. It has a list of 8 names and addresses. It tells you to send \$5 to the name at the top of this list. Then you are to delete the name and address you sent money to and add your own name and address at the bottom of the list. Then send the email to 5 new friends.

1. If that process goes as planned, how much money would you expect to receive?
2. What could possibly go wrong? Explain your answer clearly.

Research 'ponzi' or 'pyramid' schemes. Is this legal? Why or why not?

Key to Chain letters

- **Limited** – You calculated #1 as 5 to any power greater than 2. You considered that not everyone contacted would send the money or send the email on to others or the email might go to Spam.
- **Adequate** – You calculated #1 as $\$5^8$ or \$390625. You considered that not everyone contacted would send the money and/or send the email on to others that not everyone contacted would send the money and/or send the email on to others and/or it is a scam/illegal because: it gives people an unrealistic expectation of what they will receive and/or it takes people's money and they may not receive any (at least 2).
- **Substantial** – You calculated #1 as $\$5^9$ or \$1953125 (or rounded it to 2 million dollars). You considered that not everyone contacted would send the money and/or send the email on to others that not everyone contacted would send the money and/or send the email on to others and/or it is a scam/illegal because: it gives people an unrealistic expectation of what they will receive and/or it takes people's money and they may not receive any (at least 3).
- **Excellent** – You calculated #1 as $\$5^9$ or \$1953125 (or rounded it to 2 million dollars). You considered that not everyone contacted would send the money and/or send the email on to others that not everyone contacted would send the money and/or send the email on to others and/or it is a scam/illegal because: it gives people an unrealistic expectation of what they will receive and/or it takes people's money and they may not receive any (at least 4).

This task is from the [Mathematics Assessment Resource Service \[web page\]](#).

Exponent Review Games

(an hour to a few hours, depending on your comfort manipulating exponents)

To ensure you can apply exponents accurately in any situation, you can review exponent laws by:

- [playing an online jeopardy styled game on exponents](#)

- [play an online battleship styled game using exponent questions to score hits](#)
- [an online quiz that you can set the parameters for](#)

Remember, a negative exponent does not mean you have a negative number. A negative exponent on a whole number or variable just means you have a number between 0 and 1, a fraction. The negative exponent translates to a positive exponent if you switch the base to its reciprocal.

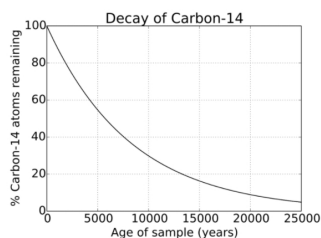
Alternatively, use the [Math Aids \[web page\] worksheets](#). Choose whether you want to practice both positive and negative exponents or just positive exponents. Be sure to click the button for an answer key.

- Exponents with Multiplication
- Exponents with Division
- Exponents with Multiplication and Division
- Powers of Products
- Powers of Quotients
- Powers of Products and Quotients
- Operations with Exponents



02.02.04 How are old items dated?

(approximately 1 minute reading, 10 minutes solving, suggested hour practicing with fractional exponents)



[ExeterPaul, CC BY-SA 3.0](#), via Wikimedia Commons

Most living things are made from Carbon-12. Carbon-14 was discovered in 1940 ([website article about Carbon-14](#)). Carbon-14 exists in extremely low levels in the tissues of recently deceased animals and plants: about one in a trillion of their carbon atoms are carbon-14. By measuring the radioactivity of the Carbon-14 in something deceased, its date of death can be calculated. The equation for radioactive decay is:



- $A = A_0 \cdot \left(\frac{1}{2}\right)^{t/h}$
- A_0 is the original amount of a radioactive substance
- A is the final amount
- h is the half life of the substance
- t is the time

If the half life of Carbon-14 is about 5730 years and a fossil currently contains 2 grams of Carbon-14, and the estimation is that it would have originally had 64 grams of Carbon-14, how old is the fossil?

Investigation of relationship between fractional exponents and radicals

(approximately 1 minute reading and a thirty minute investigation)

- Work through this investigation to try discover the relationship between fractional exponents and radicals. You can make a copy of the [Rational Exponent Investigation Google Doc](#) or download the [Rational Exponent Investigation.pdf](#).
- Check yourself against the [Rational Exponent Investigation Key Google Doc](#) or download the [Rational Exponent Investigation Key.pdf](#).



Practice using fractional exponents and radicals

(approximately 1 minute reading and 20-30 minutes of practice)

- [This website has some online questions with answers.](#)
- [Ten questions \(ranging from easy to hard\) on this website \(with answers\).](#)
- [Don't scroll down too far down this web page as these multiple choice questions have the answer and the solution worked immediately below.](#)
- [Ten questions \(ranging from easy to hard\) with solutions are found on this website.](#)

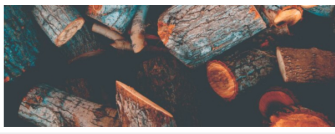


Investigation about basic logarithms that can help you solve the problem



(approximately 20 minute investigation)

Photo by [Chandler Cruttenden](#) on [Unsplash](#)



Logarithms sound difficult but actually have a simple relationship. Before starting this investigation, look up how to punch in a logarithm on your calculator. On our calculators, “log” (without any base) is taken to mean “log base 10”. So, for example “log 7” means “log₁₀7”, which should show up on

your calculator as 0.845098 . . .

- Work through this [Basic Logarithms Investigation Google Doc](#) or download the [Basic Logarithms Investigation.pdf](#).
- Self-assess through using the [Basic Logarithms Investigation KEY Google Doc](#) or download the [Basic Logarithms Investigation KEY.pdf](#).
- After completing the investigation, see how logs and exponents are connected by reading [this website](#) up to the end of “Common Logarithms: Base 10”.



Hint (substituting values into the question) to solve how old the fossil is

$$2 = 64 \cdot \left(\frac{1}{2}\right)^{t/5730}$$

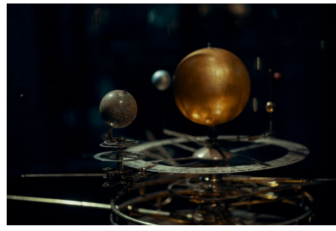
Key to how old the fossil is

$$2 = 64 \cdot \left(\frac{1}{2}\right)^{t/5730} \Rightarrow 2/64 = \left(\frac{1}{2}\right)^{t/5730} \Rightarrow 1/32 = \left(\frac{1}{2}\right)^{t/5730}$$

Adequate Level $\left(\frac{1}{2}\right)^5 = \left(\frac{1}{2}\right)^{t/5730}$ **Substantial Level** $5 = t/5730$
Excellent Level $5 \cdot 5730t = 28\ 650$ years old



02.02.05 How do I make a model of the solar system?



(approximately 1 minute reading and an hour on review if needed, then a twenty minute activity)

Image: [Ross Sneddon](#) on [Unsplash](#)

You need to be comfortable with Scientific Notation for this task. Choose your method(s) to practice for accuracy. Online practice can be done through

- [Khan Academy \[website\]](#),
- [The Astronomy Workshop online practice tool \[website\]](#).

If you need more instruction:

- this [webpage explains scientific notation and has some practice problems](#) and
- this informative [webpage with worked examples and practice examples](#) on using scientific notation in operations,
- or you can look at [this webpage which supplies an explanation with some astronomy questions](#).



You can use the [Math Aids \[web page\] worksheets](#). Be sure to click the button for an answer key.

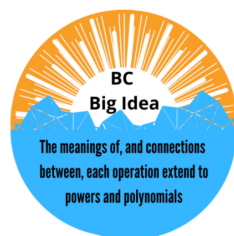
- Writing Numbers in Scientific Notation
- Operations with Scientific Notation

You have been asked to make a solar system model for science class. Utilizing scientific notation, you do the required preliminary assignment: [Solar System Model Google Doc](#) or download the [Solar System Model.pdf](#). Check your work against the [Solar System Model KEY Google Doc](#) or download the [Solar System Model KEY.pdf](#). (This assignment is based on an assignment found at [StudyLib](#).)

Suggested [online video: If the Moon were only one pixel](#)



For Teachers:



IB MYP Elements



RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

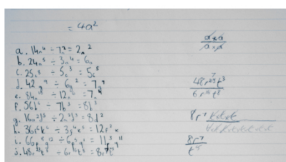
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NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Abstract Reasoning

02.03 How do I solve more complex problems mathematically?

CommunicatingFacet3, CommunicatingProfile, ComRep01, ComRep06, ConRfct01, ConRfct02, conversions, CriticalThinkingFacet1, CriticalThinkingFacet2, CriticalThinkingFacet4, CriticalThinkingProfile, equations, exponents, operations, PersonalAwarenessFacet1, PersonalAwarenessFacet2, PersonalAwarenessProfile, polynomials, ReasMod02, ReasMod03, ReasMod04, ReasMod05, ReasMod06, ReasMod07, ReasMod08, ReasMod09, ReasMod10, ReasMod11, ReasMod12, ReasMod13, ReasMod14, ReasMod15, ReasMod17, ReasMod19, ReasMod22, USolve01, USolve02, USolve03, USolve04, USolve05, USolve06, USolve09, USolve10, USolve12, USolve13, USolve14



(approximately 5 minutes exploring the Geogebra app, 10 minutes reading and a 10 minute video)

Photo by [Matt Bowden](#) on [Unsplash](#)

Clicking on the following picture will take you to a Geogebra site where you will be able to interact with this Rollercoaster. Click on the box with a dot and the letter A to move the points and watch the equation change.

☰ Geogebra
CREATE CLASS

Polynomial Roller Coaster

Author: David Weppler

Adjust the location of the zeros to create a roller coaster. It will need the first hill to be the biggest, and then have some exciting bumps near the end of the ride.

Reuse
Embed
H-P

For an introduction to why polynomials are useful, read through this [Prezi presentation \[website\]](#): click on the Play button on the slide at the top right of the screen. You have already been using polynomials in the previous set of tasks. In preparation for graphing polynomials, you need to understand how to simplify them. The combination of graphing simplified polynomials is the basis for solving many complex problems, which is illustrated beautifully [in this youtube video](#) including a clip from the movie Hidden Figures, with an introduction by Professor Alan Garfinkel and an interview with the real Katherine Johnson (watch at least 4 minutes of the 9:30 minute video. Note that although this is now done by computers, someone still has to program that computer to do the math.



02.03.01 What do I already know about polynomials?

02.03.02 What are polynomial expressions?

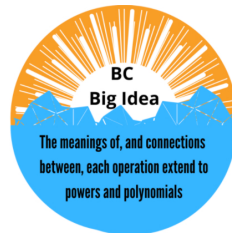
02.03.03 How do I multiply polynomials like in the Geogebra introductory activity?

02.03.04 How do you calculate gardening needs?

02.03.05 How would I do on a polynomial test?



For Teachers:



IB MYP Elements



[< 02.04 How is online data and credit card information kept safe?](#)

[02.02 How can I create a model of something that is very large? >](#)



RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

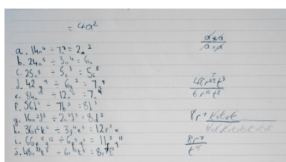
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NUMERICAL REASONING



ABSTRACT REASONING



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Abstract Reasoning

02.03 How do I solve more complex problems mathematically?

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(approximately 5 minutes exploring the Geogebra app, 10 minutes reading and a 10 minute video)

Photo by [Matt Bowden](#) on [Unsplash](#)

Clicking on the following picture will take you to a Geogebra site where you will be able to interact with this Rollercoaster. Click on the box with a dot and the letter A to move the points and watch the equation change.

☰ Geogebra
CREATE CLASS

Polynomial Roller Coaster

Author: David Weppeler

Adjust the location of the zeros to create a roller coaster. It will need the first hill to be the biggest, and then have some exciting bumps near the end of the ride.

$$f(x) = (x - 1)(x - 3)(x - 5)(x - 7)(x - 9)(x - 10)$$

$$= x^7 - 35x^6 + 480x^5 - 3250x^4 + 11189x^3 - 17835x^2 + 9450x$$

Reuse
Embed
H-P

For an introduction to why polynomials are useful, read through this [Prezi presentation \[website\]](#): click on the Play button on the slide at the top right of the screen. You have already been using polynomials in the previous set of tasks. In preparation for graphing polynomials, you need to understand how to simplify them. The combination of graphing simplified polynomials is the basis for solving many complex problems, which is illustrated beautifully in [this youtube video](#) including a clip from the movie Hidden Figures, with an introduction by Professor Alan Garfinkel and an interview with the real Katherine Johnson (watch at least 4 minutes of the 9:30 minute video. Note that although this is now done by computers, someone still has to program that computer to do the math.

02.03.01 What do I already know about polynomials?

(approximately 1 minute of reading and 10 minutes of practice)

Definitions:

- **variable:** letter that represents a number (eg. x, y, a, . . .)
- **coefficients:** the number that multiplies the variable(s) (eg. 7 in 7xy)
- **terms:** variable(s) and coefficient separated by subtraction or addition and not within brackets
- **constant:** a term without a variable – just a number (such as 4 or -3)
- **simplify:** to reduce or condense a math statement to its lowest and/or shortest equivalent form
- **expression:** a math statement of numbers and possibly variables without an equals or inequality sign, which may require simplifying
- **algebraic expression:** any expression including variables
- **equation:** a math statement of numbers and possibly variables with an equals or inequality sign, which may require simplifying and requires solving

Test yourself using [these flashcards \[website\]](#).

02.03.02 What are polynomial expressions?

(approximately 1 minute of reading, 2 10 minute investigations, and 10 minutes of definition practice)

What is the definition of polynomial expressions?

Compare the following list of polynomial expressions and non-polynomial expressions and determine a definition for polynomial expressions. Check your definition against the provided definition under the “i”. (Note: the following interactive may take extra time to load.)

<u>Polynomials</u>	<u>Non-Polynomials</u>
$x + 3$	$\frac{2}{x} + 14$
$4y^2 - 3xy$	$2y^{-3} - 3x$
$\frac{3}{4}a + b$	$5x^{3/4}$
$\sqrt{52}x^5$	$\sqrt{52}x^5$
$4x^2 - 3x + 2$	$4x^2 - 3x + 2y^{0.3}$

i

Reuse Embed

What is the degree of a polynomial expression?

Compare the following chart of polynomial expressions determine a definition for a polynomial expression degree. Check your definition against the provided definition under the “i”. (Note: the following interactive may take extra time to load.)

<u>Degree of 0</u>	<u>Degree of 1</u>	<u>Degree of 2</u>	<u>Degree of 3</u>	<u>Degree of 4</u>
3	$x + 3$	$4y^2 - 3xy$	$\sqrt{52}x^3$	$2y^4 - 3x$
19	$\frac{3}{4}a + b$	$7x^2 - 5x + 2$	$3x^2 - 5x^2y + 2y^2$	$8xy^2 + 13x^2yz + 7y^2 - 3$
243	y	$5x^2$	$xy^2 + 17y^2$	$abcd - xy + 2$

i

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Why is knowing the degree important?

The degree determines the most number of solutions for that function which informs you how many times it will cross the x-axis when graphed.

Knowing the following definitions can also be helpful.

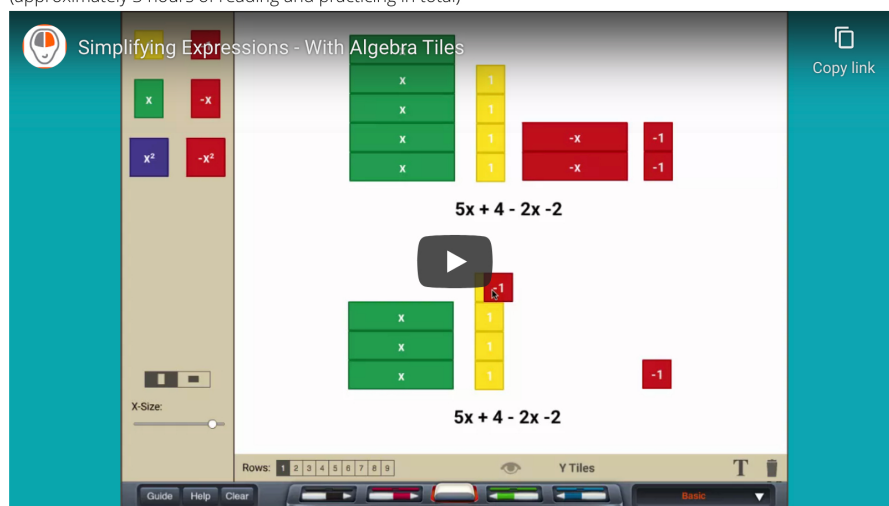
- **leading term:** the term containing the highest power of the variable or the term with the highest degree
- **leading coefficient:** the coefficient of the leading term.
- **degree 0:** a nonzero constant
- **degree 1:** a linear function
- **degree 2:** a quadratic function
- **degree 3:** a cubic function
- **degree 4:** quartic or biquadratic

[Practice finding the degree of an expression on this website \(8 questions\).](#)

If you are still unclear and want further explanation, [read this website which explains how the graphs look.](#)

02.03.03 How do I multiply polynomials like in the Geogebra introductory activity?

(approximately 3 hours of reading and practicing in total)



(Video shows how to simplify polynomials using Algebra Tiles)

In order to get to the point where you can graph a polynomial, you must be able to multiply its components and divide it into its components. There are a few different methods for multiplying polynomials.

One idea you need to remember is that manipulating terms is no different than manipulating numbers.

$$(2)(3)(4)=(6)(4) \text{ or } (2)(12)$$

but **not** $(2*3)(2*4)=(6)(8)$

SO

$$2a*3b=6ab$$

but **not** $6a*6b=36ab$

AND

$$(2)(3+4)=(2)(7)=14 \text{ or } (2*3)+(2*4)=14$$

but **not** $(2*3)(2*4)=(6)(8)=48$

SO

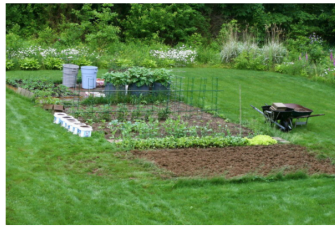
$$(2)(a+b)=2a+2b$$

but **not** $(2a)(2b)=4ab$

- Listen to the [online videos and do the exercises in this Khan Academy unit.](#) (approximately 40 minutes total)

- Read through this [OwlCation \[web page\] article and do the exercises](#) which includes the FOIL method and the grid method. (approximately 40 minutes total)
- Use this [NCTM \(National Council of Teachers of Mathematics\) online interactive to multiply using Algebra Tiles](#). Click on the 'Expand' tab to practice multiplying polynomials. Click on the paper icon to change to a suitable question for your level of understanding. (approximately 40 minutes total – try to do 20 minutes at 2 different times)
- There are special products which can be done traditionally, but can have a faster solution time if you understand them. Listen to the [online videos and do the exercises in this Khan Academy unit](#). (approximately 20 minutes total)
- A good test of your understanding through 10 questions can be found at [this MathBitsNotebook website](#). (approximately 20 minutes total)
- Further practice – create some examples for yourself and use this [online polynomials calculator](#) to check your work. (approximately 40 minutes total)

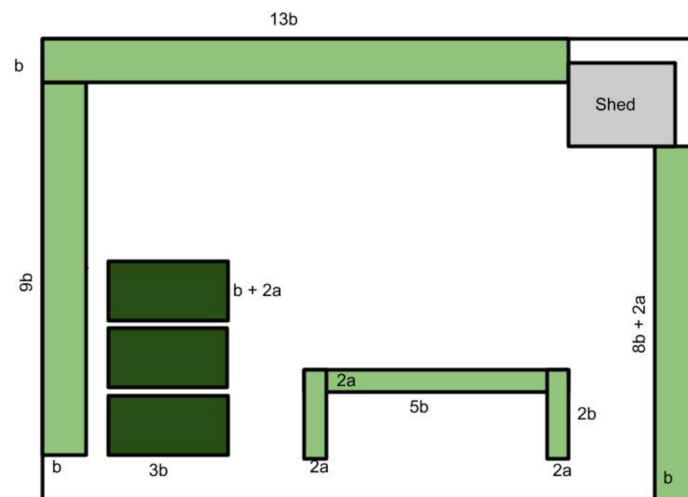
02.03.04 How do you calculate gardening needs?



(approximately 2 minutes reading and 20 minute activity)

"Mom's Vegetable Garden" by [Chiot's Run](#) is licensed under CC BY-NC 2.0

Your parents want to refresh all the garden beds. They want to add 8 cm of mulch to all the flower beds and 5 cm to the garden beds. You decide it would be a lovely combined Mother's and Father's Day gift if it isn't too expensive. You know they plan to get Magic Mulch from [Victoria Landscape \[website\]](#) because the garden beds just need a slow release fertilizer to mix in. Based on information from a number of articles, including this one on [lasagna gardening \[website\]](#), they are going to cover the soil of the flower beds with one layer of cardboard and then put down the mulch to decrease the weeds. How much mulch would you need (it is sold in cubic yards which is 3 feet by 3 feet, and each foot has 12 inches and each inch is 2.54 cm)? The garden isn't a plain rectangle so you can't use the calculator on the Victoria Landscape website. The three garden beds are the same size. To top it off, you have measured based on two toys in the backyard (a bat and an airplane) since you can't find a measuring tape and don't want to give away your surprise by asking for one. Can you create your final equation? Then you could estimate the values for 'a' (airplane) and 'b' (bat) to see if it isn't too expensive a gift, but still have the correct statements to calculate the actual needed amounts. Use the Hint and Checkpoints to check you are on the correct path as you go.



Hint 01 Initial Step

- calculate the surface area of flower beds and garden beds separately

Surface AreaLarge flower beds (left side, top, right side)

$$\begin{aligned}
 &9b(b) + 13b(b) + b(8b+2a) \\
 &= 9b^2 + 13b^2 + 8b^2 + 2ab \\
 &= 30b^2 + 2ab
 \end{aligned}$$

Small flower beds (left side, top, right side)

$$\begin{aligned}
 &2(2a)(2b) + 5b(2a) \\
 &= 4a(2b) + 10ab \\
 &= 8ab + 10ab \\
 &= 18ab
 \end{aligned}$$

Garden beds

$$\begin{aligned}
 &3(3b)(b+2a) \\
 &= 9b(b+2a) \text{ Remember, only multiply two elements at a time} \\
 &= 9b^2 + 18a
 \end{aligned}$$

All Flower Beds

$$\begin{aligned}
 &30b^2 + 2ab + 18ab \\
 &= 30b^2 + 20ab
 \end{aligned}$$

When calculating your mulch needs, convert your depth of mulch from cm to inches to start.

Mulch calculations

$$8 \text{ cm} = 3.15 \text{ inches (flower beds)}$$

$$5 \text{ cm} = 1.97 \text{ inches (garden beds)}$$

Garden beds + All Flower Beds

$$\begin{aligned}
 &1.97(9b^2 + 18a) + 3.15(30b^2 + 20ab) \\
 &= 17.73b^2 + 35.46a + 94.5b^2 + 63ab \\
 &= 112.23b^2 + 63ab + 35.46a
 \end{aligned}$$

————— This is in cubic inches. You estimate the bed to be 30 inches long and the airplane to be 10 inches long. How many cubic yards of mulch do you need? Is that too much to pay for a Mother's and Father's Day combined gift for your parents?

Estimation

$$\begin{aligned}
 &112.23b^2 + 63ab + 35.46a \\
 &\text{If } a = 10 \text{ and } b = 30 \\
 &112.23(30^2) + 63(10)(30) + 35.46(10) \\
 &= 112.23(900) + 63(300) + 354.6 \\
 &= 101007 + 18900 + 354.6 \\
 &= 120261.6 \text{ cubic inches}
 \end{aligned}$$

A cubic yard is 36 inches by 36 inches by 36 inches. so is 46656 cubic inches.

120261.6 divided by 46656= 2.578 yards.

As Victoria Landscape will only deliver by the yard, you would need about 3 yards plus delivery fees. That is an expensive gift.



02.03.05 How would I do on a polynomial test?

(approximately 30 minutes)

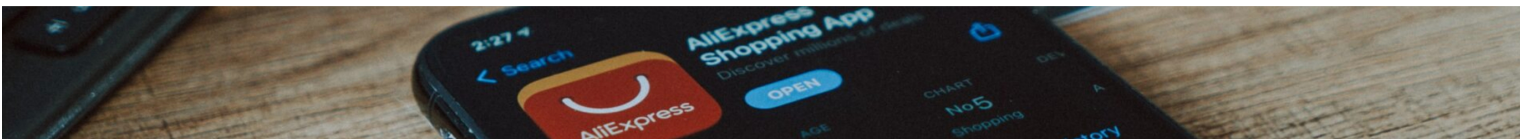
This quiz has 4 levels of questions: simple, more complex, challenging and challenging in an unfamiliar situation.

Access the [Polynomial Quiz Google document](#) or download the [Polynomial Quiz.pdf](#)

RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

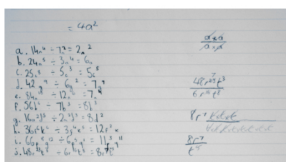
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NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Abstract Reasoning

02.04 How is online data and credit card information kept safe?

ComRep01, ComRep06, ConRfct01, ConRfct02, ConRfct03, ConRfct04, ConRfct05, ConRfct06, CriticalThinkingFacet1, CriticalThinkingFacet2, CriticalThinkingProfile, CulturalIdentityFacet1, CulturalIdentityFacet2, CulturalIdentityFacet3, CulturalIdentityProfile, equations, exponents, factoring, factors, finance, formulae, integers, operations, PersonalAwarenessFacet2, PersonalAwarenessFacet3, PersonalAwarenessProfile, polynomials, prime, quadratics, ReasMod01, ReasMod02, ReasMod03, ReasMod04, ReasMod05, ReasMod06, ReasMod09, ReasMod13, ReasMod19, substitution, USolve01, USolve02, USolve03, USolve04, USolve05, USolve06, USolve07, USolve08, USolve09, USolve10, USolve11, USolve12, USolve13



(approximately 1 minute reading and a 20 minute activity)

Photo by [CardMapr.nl](#) on [Unsplash](#)

Cryptography uses factoring and polynomials to build and break systems. If you watched the movie *The Imitation Game*, it is all about cryptography and how they were trying to decode transmissions sent during the World Wars. The original message is called *plaintext* and the coded version is called the *ciphertext*. The process of changing plaintext into ciphertext is called *coding*

or *encryption*. The process of changing ciphertext back into plaintext is called *decoding* or *decryption*. To figure out the decryption method, you use the art of *cryptanalysis*. Check out slide 27 to 31 of [this introduction to cryptography online slideshow](#) to get a basic understanding of ciphers.

(Definitions from this [New York University math course extract including cryptography \[online pdf\]](#).)

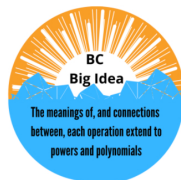
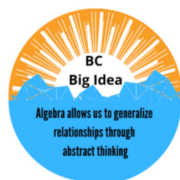
If you want to explore public keys and RSA encryption further, read this [lesson from a University of Berkeley math course including cryptography \[online pdf\]](#).

02.04.01 Can I code and decode? (Answers to slide 31)

02.04.02 How does cryptography keep my information safe?

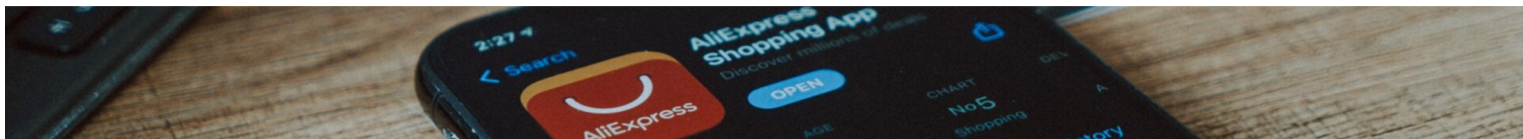
02.04.03 How can I keep my information safe?

For teachers:



IB MYP Elements

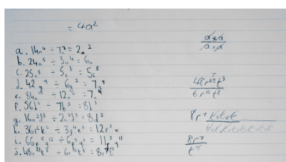




NUMERICAL REASONING



ABSTRACT REASONING



THINKING WITH MODELS



Abstract Reasoning

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(approximately 1 minute reading and a 20 minute activity)

Photo by [CardMapr.nl](#) on [Unsplash](#)

Cryptography uses factoring and polynomials to build and break systems. If you watched the movie *The Imitation Game*, it is all about cryptography and how they were trying to decode transmissions sent during the World Wars. The original message is called *plaintext* and the coded version is called the *ciphertext*. The process of changing plaintext into ciphertext is called *coding* or *encryption*. The process of changing ciphertext back into plaintext is called *decoding* or *decryption*. To figure out the decryption method, you use the art of *cryptanalysis*. Check out slide 27 to 31 of [this introduction to cryptography online slideshow](#) to get a basic understanding of ciphers.

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02.04.01 Can I code and decode? (Answers to slide 31)

To code letter 'e', it is $p=5$, substitute it into $c=3p+1$ then $c=16$, which is letter 'p'.

To code letter 't', it is $p=20$, so $c=3p+1$ would be 61. There is no 61 letter, so subtract 26 twice (to get the number under 26), which gets you to 9 which is letter 'i'.

To decode letter 'v', $c=22$, so $22=3p+1$, $21=3p$, $p=7$ which is 'g'.

To decode letter 'r', $c=18$, so $18=3p+1$, $17=3p$, but 17 does not divide evenly by 3. Add 26 to 17 which is 43, still not divisible evenly by 3. Add another 26 which is 69. Divide by 3 is 23, which is letter 'w' = p.

If you want to play more with ciphers and find out the formal way of dealing with keeping the numbers limited to 26, [explore this set of 3 worksheets including Keys and Teacher notes \[online pdf\]](#).

02.04.02 How does cryptography keep my information safe?



(approximately 12 minutes reading)

Photo by [AronPW](#) on [Unsplash](#)

Learning how to factor and understanding cryptography may be very important in the future digital world to help keep your information safe. You may want to explore cryptocurrency, a form of digital currency which uses an online ledger with strong cryptography to secure online transactions. Read these three articles

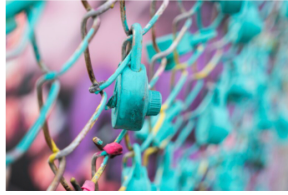


on factoring and the algorithms created to ensure security online:

- [Fermat's Factoring Trick and Cryptography \[web page\]](#)
- [Prime Factorization by Privacy Canada \[web page\]](#)
- [About Polynomials and Encryption \[web page\]](#)

You may also want to explore [how to convert numbers into binary format \[website article\]](#).

02.04.03 How can I keep my information safe?



(approximately 1 minute reading, 2 40 minute investigations, and approximately 3 hours of practice with worksheets)

Photo by [Paulius Dragunas](#) on [Unsplash](#)

1. Remember to not share your information or passwords with anyone, online or offline. Use different passwords for different platforms. Use a password for your phone. Do not use something easy like your

birthdate or name. For this resource, do not log in or sign in to any of the platforms – it is not necessary.

For a platform which asks for just your name to keep track of your submissions, such as Kahoot!, give a fake name.

2. Understand how to factor polynomials. Not only might it be useful in the future because of cyber security, but it will be useful in the immediate future when graphing (coming up in a later module).

Investigation into factoring polynomials in the form ax^2+bx+c where a, b and c are numbers and:

- $a=1$. Use this [Factoring Quadratics \$a=1\$ Investigation Google Doc](#) or download the [Factoring Quadratics \$a=1\$ Investigation pdf](#). Check against this [Factoring Quadratics \$a=1\$ Investigation KEY Google Doc](#) or download the [Factoring Quadratics \$a=1\$ Investigation KEY pdf](#).
- $a \neq 1$. Use this [Factoring Quadratics \$a \neq 1\$ Investigation Google Doc](#) or download the [Factoring Quadratics \$a \neq 1\$ Investigation pdf](#). Check against this [Factoring Quadratics \$a \neq 1\$ Investigation KEY Google Doc](#) or download the [Factoring Quadratics \$a \neq 1\$ Investigation KEY pdf](#).

If you need further instruction, watch one of these sets of videos:

- [Khan Academy \(2 online videos totalling 16 minutes\)](#)
- [Math Johnson \(3.3 Part 1, 3.3 Part 2, 3.5, 3.6 and 3.8 but skip 3.7 for about 60 minutes of good review online video in this playlist\)](#)

Step by step practice is important if you have not factored polynomials before. Steps to factor polynomials:

- Simplify first (similar to factoring numbers) so there are no like terms that have not been combined.
- Find any greatest common factor that can be taken out of all the terms. The GCF may be a fraction or a decimal.
- You may want to try algebra tile factoring.
- This [Khan Academy \[website\] checklist of factoring quadratics \(trinomials\)](#) is helpful. Test yourself with the last 7 examples after doing some practice with worksheets from Math-Aids.com.

Worksheets to practice factoring polynomials (ignore and 'x' out of any popups). Be sure to check the box to include an answer page.

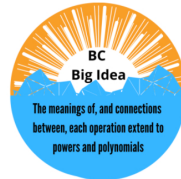
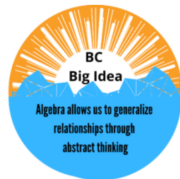
- [Factoring Quadratics \[website\]](#) – variations can include binomials, trinomials, or a mixture of both, questions that are factorable or non-factorable, and whether the first term of the quadratic is 1 or larger than one.
- [Factoring Special Quadratics \[website\]](#) – variations can include binomials, trinomials, or a mixture of both, questions that are factorable or non-factorable, and whether the first term of the quadratic is 1 or larger than one BUT include the special cases of difference of squares, and perfect squares. ([Lesson 3.8](#) above)
- [Factoring by grouping \[website\]](#) – includes polynomials that have 4 terms and are factored by taking a GCF out of 2 terms. ([Factoring by grouping method is explained in this video](#))

Test yourself by using one of these Kahoot! sets.

- [15 question Kahoot! \[web page\]](#)
- [30 question Kahoot! \[web page\]](#)



For teachers:



IB MYP Elements



[< 02.05 How is interest calculated?](#)

[02.03 How do I solve more complex problems mathematically? >](#)

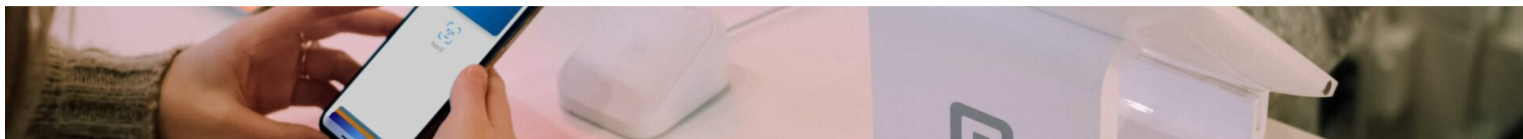
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RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

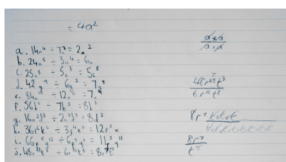
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Abstract Reasoning

02.05 How is interest calculated?

brackets, CommunicatingFacet2, CommunicatingFacet3, CommunicatingProfile, ComRep01, ComRep03, ComRep06, ConRflct01, ConRflct02, ConRflct03, ConRflct04, ConRflct05, ConRflct06, conversions, CriticalThinkingFacet1, CriticalThinkingFacet2, CriticalThinkingProfile, CulturalIdentityFacet1, CulturalIdentityFacet2, CulturalIdentityFacet3, CulturalIdentityProfile, decimals, equations, exponents, finance, formulae, operations, percentages, PersonalAwarenessFacet2, PersonalAwarenessFacet3, PersonalAwarenessProfile, polynomials, ReasMod02, ReasMod03, ReasMod06, ReasMod09, ReasMod13, ReasMod14, ReasMod17, ReasMod19, sequences, substitution, USolve02, USolve03, USolve06, USolve07, USolve08, USolve09, USolve10, USolve11, USolve12, USolve13



(approximately 8 minutes reading, a 10 minute activity and a 20 minute slideshow/activity)

Photo by [Christiann Koepke](#) on [Unsplash](#)

Read [this online article on how credit card interest is calculated](#) and, while following through the calculations provided, work through the approximate calculation using an APR of 20.24% and the 25 days of charges on the

following two images. Then check your math against [this online article on credit card interest calculations](#).

Balances on your credit card

Date	Transaction	Balance
3/1	\$2,500 purchase	\$2,500
3/2	\$300 purchase	\$2,800
3/3	None	\$2,800
3/4	None	\$2,800
3/5	\$1,050 purchase	\$3,850
3/6	None	\$3,850
3/7	\$1,000 purchase	\$4,850
3/8	None	\$4,850
3/9	None	\$4,850
3/10	\$50	\$4,900
3/11	None	\$4,900
3/12	\$100	\$5,000

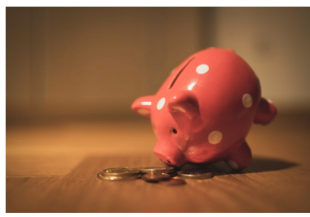


3/13	None	\$5,000
3/14	None	\$5,000
3/15	None	\$5,000
3/16	None	\$5,000
3/17	\$500 purchase	\$5,500
3/18	None	\$5,500
3/19	None	\$5,500
3/20	\$350 purchase	\$5,850
3/21	\$100 purchase	\$5,950
3/22	None	\$5,950
3/23	\$50	\$6,000
3/24	None	\$6,000
3/25	None	\$6,000

The real calculation, as you have read, is more involved. If you were charging to your credit card the same amount daily your increased balance would be an arithmetic sequence and easy to calculate. The interest calculated on the daily basis would be a geometric sequence.

[Read through this online presentation on other real-life applications of arithmetic and geometric sequences.](#) Do the math examples as you go.

02.05.01 What investing plan is best?



(approximately 2 minutes reading, an hour reading and doing examples, and 20 minutes on the task)

Photo by [Andre Taissin](#) on [Unsplash](#)

Investing plans calculate interest on specific days. When planning how to invest your savings, you will want to compare plans based on not only the interest they provide, but whether they have a fixed interest rate for a specific time frame with a penalty for early withdrawal (like a bond) or whether the interest is variable with no penalty for withdrawals (like a savings account). To compare investing plans, you will need to know approximately how much you will save, how often you will deposit into the account, and what the interest rate is. This calculation is easy if you understand arithmetic sequences. To learn more about how to recognize arithmetic sequences and how to calculate for a particular number in an arithmetic sequence, read one of the following websites:

- [Arithmetic sequences on the Math is Fun website](#) (summing an arithmetic sequence or series isn't required, but is easy and interesting though it **looks** complicated. Do the 'Your Turn' at the bottom.)
- [Arithmetic sequences on the Math Planet website \(includes a video\)](#)
- [Arithmetic sequences, including recursive sequences on OpenText BC website.](#)

If you look at an arithmetic sequence equation, it looks like a linear function, which you would have studied in previous math classes. The main difference between the two is an arithmetic sequence is discrete (has set values) whereas a linear function is continuous. Remember that height, weight and age are all considered continuous values, but number of people are discrete values (because you can't have a portion of a person). If you want a more complete answer, you may choose to read [this website comparing arithmetic sequences and linear functions.](#)

An arithmetic sequence has the general rule:

$t_n = a + (n-1)d$ where t_n is the n^{th} term, a is the first term, or t_1 , and d is the common difference (the difference between each of the terms in the arithmetic sequence).

As a simple starting question, consider a \$750 investment which, after a year in a savings account, was worth \$783.75, after two years was worth \$817.50, after three years \$851.25 and after 4 years \$885. What would be:

- the annual interest rate?
- the general term for the balance at the end of the n th year?
- the balance at the end of the 15th year?

Check your answers against the [example of page 5-7 of this online textbook excerpt](#).

If you want, compare current interest rates on savings accounts, chequing accounts, and savings bonds and discuss with your parents which you should be using for your savings.

02.05.02 Is it better to lease or buy a car?



Photo by [Alan Flack](#) on [Unsplash](#)

(approximately 3 minutes reading, 60 minutes learning and practicing, and 20 minutes on the task)

Loans require understanding of geometric series. To learn more about how to recognize geometric sequences and how to calculate for a particular number in a geometric sequence, read one of the following websites:

- [Geometric sequences on the Math is Fun website](#)
- [Geometric sequences on the Math Planet website \(includes a video\)](#)
- [Geometric sequences, including recursive sequences on OpenText BC website](#).

For a clear comparison between geometric sequences and exponential growth (which we covered in 02.03), [read through this online book and do the questions at the end](#). (approximately 10 minutes reading and 30 minutes of exercises)

Consider the difference between leasing and buying a car priced at \$26,000. Compare a 3-year loan and a 3-year lease for this car. After 3 years, the car will be worth 50% of original value, or \$13,000 — regardless of whether we lease or buy. Use a finance rate for both the loan and lease of 5.0% APR. Assume no down payment for either. How much will your monthly payment be for a loan? Remember when finding your formula, your monthly payment is decreasing your total amount, though you are also increasing the amount because of the interest.

Hint for 02.05.02 (the formula)

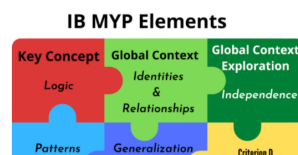
Use the formula: $a / (((1 + r)^n) - 1) / (r(1 + r)^n)$, where a is the total amount at the beginning, r is the rate of interest per month, and n is the number of months you are paying off the loan including interest.

Read [this online article to assess your math against](#). Don't worry if you are off by a few cents as that is because of rounding. Considering whether you are planning to keep the car after 3 years and how much you expect to use it, is it better for you to lease or loan? You may want to read some of the other articles listed at the bottom of the article.

If you enjoy n th term rules (arithmetic and geometric sequences) as a form of puzzling, [this website has visual patterns which can be puzzled into a mathematical equation](#) to calculate the 43rd term (answers are provided for each, but not the mathematical equation).

[2048 was a popular app \[website\]](#) involving the doubling pattern.

For Teachers:



relationships through
abstract thinking

Related
Concept

Related
Concept

Math in Real Life Situations

[← 01.01 What do I need to review?](#)

[02.04 How is online data and credit card information kept safe? →](#)

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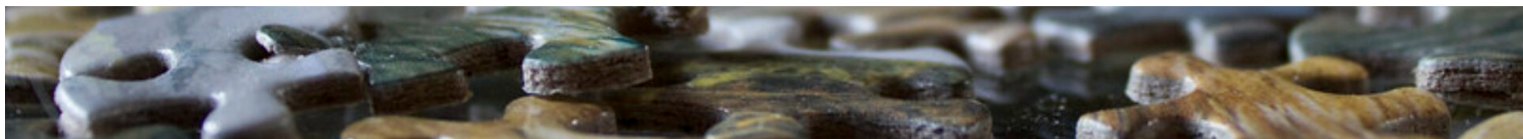
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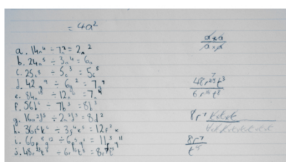
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Topic Tags

Each post is tagged with a topic required for the BC Ministry of Education's Foundations of Mathematics and Pre-Calculus 10 (FMP10) as well as those required International Baccalaureate (IB) Middle Years Programme (MYP) Year 5 Standard level (Y5St) and some of the requirements of the IB MYP Extended level (Y5Ext) courses. Important prerequisites (Pre) are also included.

Numerical Reasoning/Number Topics

Tag	Pre	FMP10	Y5St	Y5Ext	Description
conversions , fractions , decimals , percentages	✓				Forms of numbers (fractions, decimals, percentages) and transforming between them
factors	✓				Factors of numbers
integers	✓				Integers
operations	✓				Number operations
prime	✓				prime numbers and prime factors
GCF	✓				Greatest common factor
LCM	✓				lowest common multiple
decimals	✓				recurring decimals
number lines	✓				number lines
ratios	✓				ratios
exponents	✓				basics of exponents and powers
squares	✓				squares and square roots
inequalities		✓	✓	✓	representing and solving inequalities
irrational		✓	✓	✓	irrational numbers
surds		✓	✓	✓	surds, roots, and radicals, including simplifying
scientific notation	✓				scientific notation
exponents	✓				laws of exponents, including integer exponents (integral exponents)
exponents		✓	✓	✓	laws of exponents, including negative exponents (integral exponents)



fractions, exponents	✓	✓			laws of exponents, including fractional exponents
logs	✓	✓			basic logs
sequences	✓	✓			number sequences (prediction, description)
systems notation	✓	✓			number systems notation
finance	✓				financial literacy: gross and net pay

Tag **Pre** **FMP10** **Y5St** **Y5Ext** **Description**

Abstract Reasoning Topics

polynomials	✓				operating with algebraic expressions (including polynomials)
equations	✓				forming equations
equations	✓				transposing and solving simple equations
substitution	✓				substitution into expressions
brackets	✓				expanding brackets
factoring	✓				factorizing algebraic expressions (including polynomials)
formulae	✓				using formulae
flowcharts	✓				flowcharts and simple algorithms
factoring, quadratics	✓	✓	✓	✓	factorizing quadratic expressions
quadratics	✓	✓	✓	✓	solving quadratic equations
	✓	✓	✓		changing the subject of an equation
sequences				✓	arithmetic sequences
sequences				✓	geometric sequences

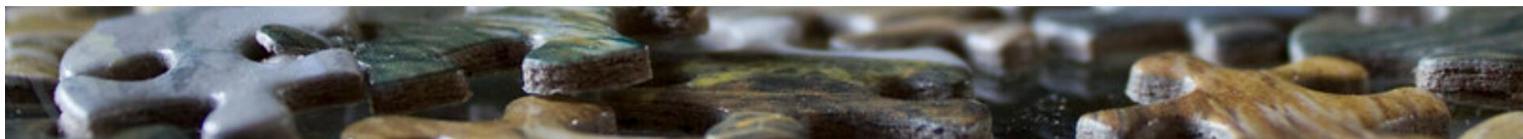
Tag **Pre** **FMP10** **Y5St** **Y5Ext** **Description**

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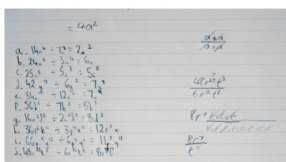
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Core Competency Tags

Each post is tagged with a shortened form of at least one of the [Core Competency Profiles and Facets](#), according to the BC Ministry of Education requirements. Profile 6 is the only level of profile used as this resource is expected to be used by students capable of achieving this level of personal competency and responsibility.

Tag	Core Competency	Profile or Facet	Description
CommunicatingProfile	Communication – Communicating	Profile	I communicate with intentional impact, in well-constructed forms that are effective in terms of my audience and in relation to my purpose.
CommunicatingFacet1	Communication – Communicating	Facet	Connecting and engaging with others – Students engage in informal and structured conversations in which they listen, contribute, develop understanding and relationships, and learn to consider diverse perspectives. This facet of communication is closely linked to the building and sustaining of relationships at home, at school, in the community, and through social media.
CommunicatingFacet2	Communication – Communicating	Facet	Focusing on intent and purpose – Students communicate with intention and purpose. They understand that communication can influence, entertain, teach, inspire, and help us make sense of the world and our experiences. They recognize the role the audience plays in constructing meaning, and they make strategic choices to help convey their messages and create their intended impact. They draw from a range of forms, media, and techniques, monitoring and adjusting their approaches and assessing their effects.
CommunicatingFacet3	Communication – Communicating	Facet	Acquiring and presenting information – Students communicate by receiving and presenting information. They inquire into topics of interest and topics related to their studies. They acquire information from a variety of sources, including people, print materials, and media; this may involve listening, viewing, or reading, and requires understanding of how to interpret information. They present information for many purposes and audiences, and their presentations often feature media and technology.
CreativeThinkingProfile	Thinking – Creative Thinking	Profile	I can develop a body of creative work over time in an area of interest or passion.
CreativeThinkingFacet1	Thinking – Creative Thinking	Facet	Creating and innovating – Students get creative ideas that are novel and have value. An idea may be new to the student or their peers, and it may be



...novel for their age group or the larger community. It may be new to a particular context or absolutely new. The idea or product may have value in a variety of ways and contexts – it may be fun, provide a sense of accomplishment, solve a problem, be a form of self-expression, provoke reflection, or provide a new perspective that influences the way people think or act. It can have a positive impact on the individual, classmates, the community, or the world.



CreativeThinkingFacet2	Thinking – Creative Thinking	Facet	Generating and incubating – Students may generate creative ideas through free play, engagement with other’s ideas, or consideration of a problem or constraint, and/or because of their interests and passions. New ideas and inspirations can spontaneously arise from the unconscious mind, but students can also develop strategies to facilitate the generation of ideas – learning a lot about something, engaging in a period of reflection, providing time for incubation, and doing relaxing or automatic activities to quiet their conscious mind. The capacity for creative thinking expands as individuals increase their range of ideas and concepts to recombine them into new ideas. The ideas available as raw material for creative thinking depend on previous experiences and learning, as well as students’ cultural legacies.
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CreativeThinkingFacet3	Thinking – Creative Thinking	Facet	Evaluating and developing – Students reflect on their creative ideas in order to decide which ones to develop. They consider whether their idea would ultimately support the well-being of self, community, and the land. They do this with a sense of place and taking into consideration unintended consequences for other living things and our planet. If they decide to develop an idea, they work individually and/or collaboratively to refine it and work to realize it. This may require accessing the knowledge of those who have gone before, building the necessary skills, sustaining perseverance, using failure productively over time, and reflecting on process and results. It may also require the generation of additional creative ideas to come up with solutions to problems along the way.
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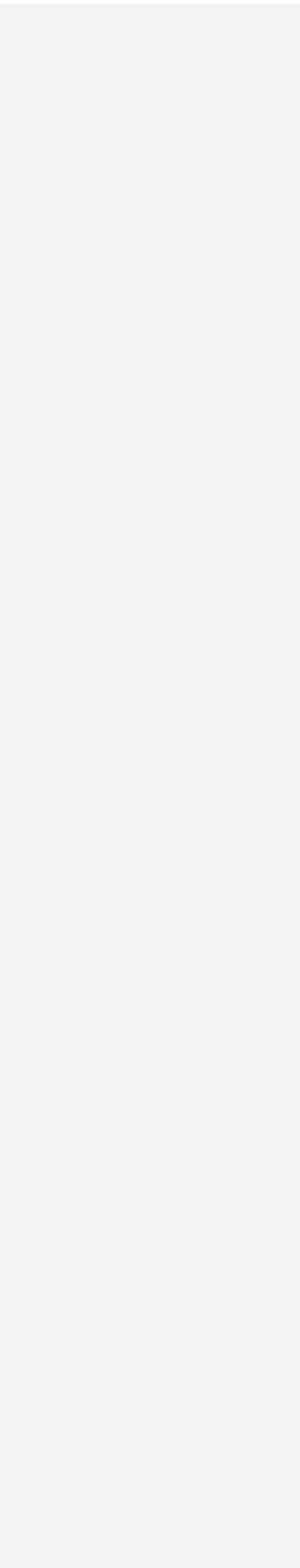







CriticalThinkingProfile	Thinking – Critical and Reflective Thinking	Profile	I can examine evidence from various perspectives to analyze and make well-supported judgments about and interpretations of complex issues.
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CriticalThinkingFacet1	Thinking – Critical and Reflective Thinking	Facet	Analyzing and critiquing – Students learn to analyze and make judgments about a work, a position, a process, a performance, or another product or act. They reflect to consider purpose and perspectives, pinpoint evidence, use explicit or implicit criteria, make defensible judgments or assessments, and draw conclusions. Students have opportunities for analysis and critique through engagement in formal tasks, informal tasks, and ongoing activities.
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CriticalThinkingFacet2	Thinking – Critical and Reflective Thinking	Facet	Questioning and investigating – Students learn to engage in inquiry when they identify and investigate questions, challenges, key issues, or problematic situations in their studies, lives, and communities
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			and in the media. They develop and refine questions; create and carry out plans; gather, interpret, and synthesize information and evidence; and reflect to draw reasoned conclusions. Critical thinking activities may focus on one part of the process, such as questioning, and reach a simple conclusion, while others may involve more complex inquiry requiring extensive thought and reflection.	
CriticalThinkingFacet3	Thinking – Critical and Reflective Thinking	Facet	Designing and developing – Students think critically to develop ideas. Their ideas may lead to the designing of products or methods or the development of performances and representations in response to problems, events, issues, and needs. They work with clear purpose and consider the potential uses or audiences of their work. They explore possibilities, develop and reflect on processes, monitor progress, and adjust procedures in light of criteria and feedback.	
CriticalThinkingFacet4	Thinking – Critical and Reflective Thinking	Facet	Reflecting and assessing – Students apply critical, metacognitive, and reflective thinking in given situations, and relate this thinking to other experiences, using this process to identify ways to improve or adapt their approach to learning. They reflect on and assess their experiences, thinking, learning processes, work, and progress in relation to their purposes. Students give, receive, and act on feedback and set goals individually and collaboratively. They determine the extent to which they have met their goals and can set new ones.	
PersonalAwarenessProfile	Personal and Social – Personal Awareness and Responsibility	Profile	I can identify my strengths and limits, find internal motivation, and act on opportunities for self-growth.	
PersonalAwarenessFacet1	Personal and Social – Personal Awareness and Responsibility	Facet	Self-advocating – Students who are personally aware and responsible have a sense of self-worth and a growing confidence in a variety of situations. They value themselves, their ideas, and their accomplishments. They are able to express their needs and seek help when needed, find purpose and motivation, act on decisions, and advocate for themselves.	
PersonalAwarenessFacet2	Personal and Social – Personal Awareness and Responsibility	Facet	Self-regulating – Students who are personally aware and responsible take ownership of their choices and actions. They set goals, monitor progress, and understand their emotions, using that understanding to regulate actions and reactions. They are aware that learning involves patience and time. They can persevere in difficult situations, and to understand how their actions affect themselves and others.	
PersonalAwarenessFacet3	Personal and Social – Personal Awareness and Responsibility	Facet	Well-being – Students who are personally aware and responsible recognize the factors that affect their holistic wellness and take increasing responsibility for caring for themselves. They keep themselves healthy and stay active, manage stress, and express a sense of personal well-being. They make choices that contribute to their safety in their communities, including their online communities	

and use of social media. They recognize their personal responsibility for their happiness and have strategies that help them find peace in challenging situations.

[CulturalIdentityProfile](#)

Personal and Social – Positive Personal and Cultural Identity

Profile

I can identify how my life experiences have contributed to who I am; I recognize the continuous and evolving nature of my identity.

[CulturalIdentityFacet1](#)

Personal and Social – Positive Personal and Cultural Identity

Facet

Understanding relationships and cultural contexts – Students understand that their relationships and cultural contexts help to shape who they are. This includes culture in its broadest sense, including how one identifies in terms of ethnicity, nationality, language(s), abilities, sexual orientation, gender identity, age, geographic region, and religious or spiritual beliefs. Students explore who they are in terms of their relationship to others and their relationship to the world (people and place) around them.



[CulturalIdentityFacet2](#)

Personal and Social – Positive Personal and Cultural Identity

Facet

Recognizing personal values and choices – Students define who they are by what they value. They understand how what they value has been influenced by their life experiences. They identify how their values help to shape their choices, in all contexts of their lives.

[CulturalIdentityFacet3](#)

Personal and Social – Positive Personal and Cultural Identity

Facet

Identifying personal strengths and abilities – Students acknowledge their strengths and abilities, and they intentionally consider these as assets, helping them in all aspects of their lives. Students understand that they are unique and are a part of larger, and often multiple, communities. They explain how they are using their strengths and abilities in their families, their relationships, and their communities.



[SocialAwarenessProfile](#)

Personal and Social – Social Awareness and Responsibility

Profile

I can initiate positive, sustainable change for others and the environment.

[SocialAwarenessFacet1](#)

Personal and Social – Social Awareness and Responsibility

Facet

Building relationships – Students build and maintain diverse, positive peer and intergenerational relationships. They are aware and respectful of others' needs and feelings and share their own in appropriate ways. They adjust their words and actions to care for their relationships.



[SocialAwarenessFacet2](#)

Personal and Social – Social Awareness and Responsibility

Facet

Contributing to community and caring for the environment – Students develop awareness of and take responsibility for their social, physical, and natural environments by working independently and collaboratively for the benefit of others, communities, and the environment. They are aware of the impact of their decisions, actions, and footprint. They advocate for and act to bring about positive change.

[SocialAwarenessFacet3](#)

Personal and Social – Social Awareness and Responsibility

Facet

Resolving problems – Students identify and develop an appreciation for different perspectives on issues. They show empathy, disagree respectfully, and create space for others to use their voices. They generate, use, and evaluate strategies to



They generate, use, and evaluate strategies to resolve problems.

[SocialAwarenessFacet4](#)

Personal and Social – Social Awareness and Responsibility

Facet

Valuing diversity – Students value diversity, defend human rights, advocate for issues, and interact ethically with others. They are inclusive in their language and behaviour and recognize that everyone has something to contribute. Their approach to inclusive relationships exemplifies commitment to developing positive communities.

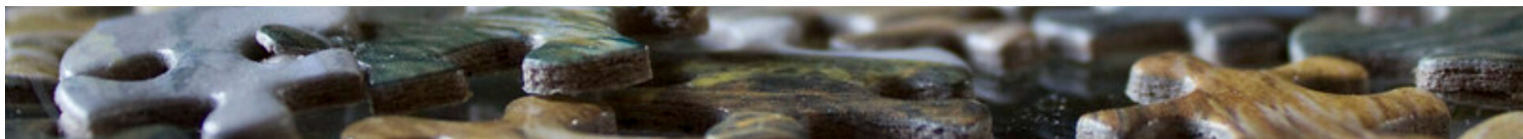
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RESOURCES FOR BC MATH 10

BC's Foundations of Mathematics and Pre-Calculus 10

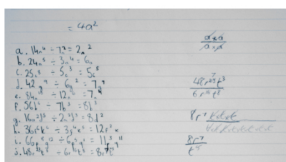
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Curricular Competency Tags

Each post is tagged with a shortened form of at least one of the [Curricular Competencies](#), according to the BC Ministry of Education requirements for Foundations of Mathematics and Pre-Calculus 10.

Reasoning and Modelling Tags

Tags	Curricular Competency
ReasMod01	Develop thinking strategies to solve puzzles and play games – using reason to determine winning strategies
ReasMod02	Develop thinking strategies to solve puzzles and play games – generalizing and extending
ReasMod03	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – examine the structure of and connections between mathematical ideas
ReasMod04	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – inductive reasoning
ReasMod05	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – deductive reasoning
ReasMod06	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – predictions, generalizations, conclusions drawn from experiences (e.g., with puzzles, games, and coding)
ReasMod07	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – graphing technology
ReasMod08	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – dynamic geometry
ReasMod09	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – calculators
ReasMod10	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – virtual manipulatives
ReasMod11	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – concept-based apps
ReasMod12	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – manipulatives such as algebra tiles and other concrete materials
ReasMod13	Explore, analyze, and apply mathematical ideas using reason, technology, and other tools – various purposes including exploring and demonstrating mathematical relationships, organizing and displaying data, generating and testing inductive conjectures & mathematical modelling
ReasMod14	Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number – be able to defend the reasonableness of an estimated value or a solution to a problem or equation
ReasMod15	Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number –



using known facts and benchmarks, partitioning, applying whole number strategies to rational numbers and algebraic expressions

[ReasMod16](#) Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number – choosing from different ways to think of a number or operation

[ReasMod17](#) Model with mathematics in situational context – use mathematical concepts and tools to solve problems and make decisions

[ReasMod18](#) Model with mathematics in situational context – take a complex, essentially non-mathematical scenario and figure out what mathematical concepts and tools are needed to make sense of it

[ReasMod19](#) Model with mathematics in situational context – including real-life scenarios and open-ended challenges that connect mathematics with everyday life

[ReasMod20](#) Think creatively and with curiosity and wonder when exploring problems – by being open to trying different strategies

[ReasMod21](#) Think creatively and with curiosity and wonder when exploring problems – refers to creative and innovative mathematical thinking rather than to representing math in a creative ways, such as through art or music

[ReasMod22](#) Think creatively and with curiosity and wonder when exploring problems – asking questions to further understanding or to open other avenues of investigation

Understanding and Solving Tags

Tags	Curricular Competency
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USolve01	Develop, demonstrate, and apply mathematical understanding through play, story, inquiry, and problem solving – includes structured, guided, and open inquiry
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USolve02	Develop, demonstrate, and apply mathematical understanding through play, story, inquiry, and problem solving – noticing and wondering
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USolve03	Develop, demonstrate, and apply mathematical understanding through play, story, inquiry, and problem solving – determining what is needed to make sense of and solve problems
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USolve04	Visualize to explore and illustrate mathematical concepts and relationships – create and use mental images to support understanding
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USolve05	Visualize to explore and illustrate mathematical concepts and relationships – visualization can be supported by using dynamic materials (e.g., graphical relationships and simulations), concrete materials, drawings and diagrams
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USolve06	Apply flexible and strategic approaches to solve problems – deciding which mathematical tools to use to solve a problem
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USolve07	Apply flexible and strategic approaches to solve problems – choosing an appropriate strategy to solve a problem (e.g., guess and check, model, solve a simpler problem, use a chart, use diagrams, role-play)
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USolve08	Apply flexible and strategic approaches to solve problems – interpret a situation to identify a problem
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USolve09	Apply flexible and strategic approaches to solve problems – apply mathematics to solve the problem
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USolve10	Apply flexible and strategic approaches to solve problems – analyze and evaluate the solution in terms of the initial context
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USolve11	Apply flexible and strategic approaches to solve problems – repeat this cycle until a solution makes sense
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[USolve12](#) Solve problems with persistence and a positive disposition – not giving up when facing a challenge



[USolve13](#) Solve problems with persistence and a positive disposition – problem solving with vigour and determination

[USolve14](#) Engage in problem-solving experiences connected with place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures – through daily activities, local and traditional practices, popular media and news events, cross-curricular integration

[USolve15](#) Engage in problem-solving experiences connected with place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures – by posing and solving problems or asking questions about place, stories, and cultural practices

Communicating and Representing Tags



Tags	Curricular Competency
ComRep01	Explain and justify mathematical ideas and decisions in many ways – use mathematical arguments to convince
ComRep02	Explain and justify mathematical ideas and decisions in many ways – includes anticipating consequences
ComRep03	Explain and justify mathematical ideas and decisions in many ways – have students explore which of two scenarios they would choose and then defend their choice
ComRep04	Explain and justify mathematical ideas and decisions in many ways – including oral, written, visual, use of technology
ComRep05	Explain and justify mathematical ideas and decisions in many ways – communicating effectively according to what is being communicated and to whom
ComRep06	Represent mathematical ideas in concrete, pictorial, and symbolic forms – using models, tables, graphs, words, numbers, symbols
ComRep07	Represent mathematical ideas in concrete, pictorial, and symbolic forms – connecting meanings among various representations
ComRep08	Represent mathematical ideas in concrete, pictorial, and symbolic forms – using concrete materials and dynamic interactive technology
ComRep09	Use mathematical vocabulary and language to contribute to discussions in the classroom – partner talks, small-group discussions, teacher-student conferences
ComRep10	Take risks when offering ideas in classroom discourse – is valuable for deepening understanding of concepts
ComRep11	Take risks when offering ideas in classroom discourse – can help clarify students' thinking, even if they are not sure about an idea or have misconceptions



Connecting and Reflecting Tags



cross-curricular integration)

[ConRflect03](#) Use mistakes as opportunities to advance learning – range from calculation errors to misconceptions

[ConRflect04](#) Use mistakes as opportunities to advance learning – by analyzing errors to discover misunderstandings

[ConRflect05](#) Use mistakes as opportunities to advance learning – making adjustments in further attempts

[ConRflect06](#) Use mistakes as opportunities to advance learning – identifying not only mistakes but also parts of a solution that are correct

[ConRflect07](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – by collaborating with Elders and knowledge keepers among local First Peoples

[ConRflect08](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – by exploring the First Peoples Principles of Learning (e.g., Learning is holistic, reflexive, reflective, experiential, and relational [focused on connectedness, on reciprocal relationships, and a sense of place]; Learning involves patience and time)

[ConRflect09](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – by making explicit connections with learning mathematics

[ConRflect10](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – by exploring cultural practices and knowledge of local First Peoples and identifying mathematical connections

[ConRflect11](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – local knowledge and cultural practices that are appropriate to share and that are non-appropriated

[ConRflect12](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – Bishop's cultural practices: counting, measuring, locating, designing, playing, explaining
(http://www.csus.edu/indiv/o/oreyd/ACP.htm_files/abishop.htm)

[ConRflect13](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – Aboriginal Education Resources (www.aboriginaleducation.ca)

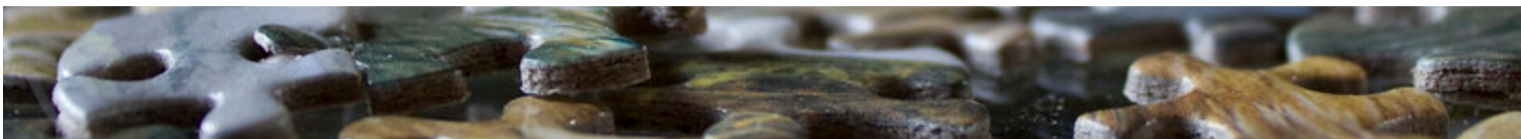
[ConRflect14](#) Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts – Teaching Mathematics in a First Nations Context, FNESC (<http://www.fnesc.ca/resources/math-first-peoples/>)

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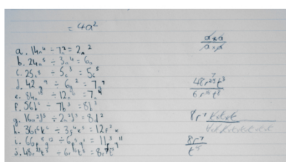
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