

Project (C,D)

The Life of a Babylonian Merchant

MYP2

'A history of numbers'

There once was a merchant who said,

"It's all about using your head.

The further you stray

from the place something's made,

the harder it will be to get."

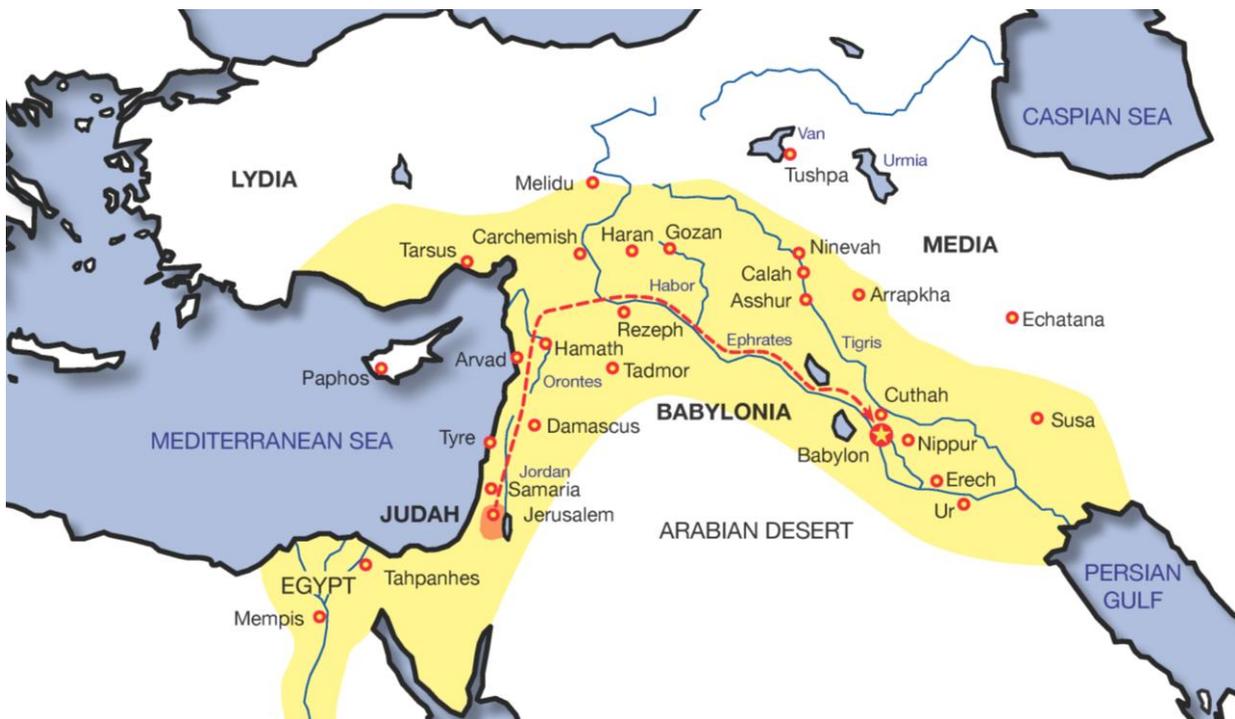
"And here is the trick about trade:

if it's hard to get where it's not made

it's easy to sell,

and I'll do very well

because I'll be handsomely paid"



It's the year 620 BC. The Assyrian Empire is beginning to crumble, and there are even people predicting the fall of its mighty capital Nineveh. Trouble-makers and fantasists, of course, your older relatives assure you. Still, these are exciting times, and for a young Babylonian it seems like anything is possible.

Part 1 – Looking at your options

You have decided you want to become a merchant. It's a great way to see the world, and it will mean you are out of the country a lot of the time, which means you'll avoid the social pressure of becoming a conscript for the war with the Assyrians which is sure to come.

Your mentor has advised you to look into the cities Ur, Thebes and Carthage. By talking to other merchants you trust, you manage to make the following list with the value of products you're considering trading in, in the different cities:

City	Goods (value in silver; mina and shekels)					Distance to Babylon
	Coil of rope	Bag of dates	Lump of ebony	Log of Cedar	Piece of Silk	
Babylon	2 m	10 sh	10 m	5 m	3 m 50 sh	
Ur	2 m	11 sh	10 m	5 m	3 m 30 sh	
Thebes	1 m 20 sh	20 sh	8 m	4 m	4 m	
Carthage	2 m 20 sh	33 sh	12 m	3 m	3 m	

To know which routes are worth considering, you need to know how far each of the cities is to Babylon. There are bound to be good enough maps at the local library.

*Copy the table and fill in the distance to Babylon for each of the cities.
Also, write the values of all the products in shekels only. 1 mina is 60 shekels.*

Part 2 – Clever trading

In the library, you find a manuscript called 'το εμπορευεσθαι τοις αρχουσιν'. It explains that clever merchants should always invest the money they have earned in a city in another product that's relatively cheap there.

The manuscript suggests that it's good to know how the value of any product changes when you take it from one city to another. That seems like good advice.

*Copy and fill in each of the following tables using exact fractions.
Briefly explain how you calculate the numbers.*

		Relative value of rope compared to				Relative value of dates compared to			
		Babylon	Ur	Thebe	Carthago	Babylon	Ur	Thebe	Carthago
City	Babylon	1	1	$\frac{3}{2}$	$\frac{6}{7}$	1			
	Ur	1	1				1		
	Thebe	$\frac{2}{3}$		1				1	
	Carthago	$\frac{7}{6}$			1				1
		Relative value of ebony compared to				Relative value of cedar compared to			
		Babylon	Ur	Thebe	Carthago	Babylon	Ur	Thebe	Carthago
City	Babylon	1				1			
	Ur		1				1		
	Thebe			1				1	
	Carthago				1				1

Part 3 – Your first profit

Your mother has been telling everyone in the neighbourhood about your ambitions. Many of the local farmers are excited; probably they're happy that you're going to have such great adventures. They propose you take their surplus of dates, 120 bags, to Ur, where they are more valuable. Once you've returned to Babylon, you hand over the full 22 mina. More profit for them, valuable experience for you. Plus, they'll lend you the necessary camels. Everyone agrees it's a great opportunity which you should be very grateful for.

Find a way to make a profit on this first journey (to Ur).

Part 4 – Onward to Carthage

Impressed by your exploits in Ur the local farmers have rallied and pooled their savings. They find they'll have enough money to last next year if they only sell three-quarters of their crops, which means you can take the remaining 800 bags to Carthage, where dates are a valuable delicatessen.

As you plan your journey, you notice that if you travel across land to the Red Sea, and cross that into Egypt, to go up the Nile to the Mediterranean – you pass Thebes. It's slightly out of the way, but not too much. Perhaps it would be worth travelling past it to trade goods there as well.

*Calculate how much you could earn on this trip,
from Babylon to Carthage and back, and past Thebes in either direction if it's worthwhile.*

Part 5 – The Far East

The trip you made in 619 BC, which seems so long ago now, was less profitable than you had hoped. Not only were the taxes in Thebes, Carthage and Babylon significant, the tolls in the many cities you passed took a chunk out of the profits too, and on top of that, the use of cargo ships had cost you dearly.

Now it's 605 BC, and over the years you have slowly built up an impressive business. You own several small cargo ships, which are docked in Memphis whenever they are not in use. Contacts in each of the cities you trade with make sure you get the best deals you can, and the recent patronage of king Nabopolassar allows you to travel through the Neo-Babylonian Empire without paying tolls and has given you a great advantage over your competitors.

One day, when you return to Babylon after overseeing a caravan to Ur, you are distressed to hear the king has passed away. His son, Nebuchadnezzar II, has become king. Astonishingly, he has summoned you to his palace.

When you arrive, Nebuchadnezzar is indisposed. Instead, some of his advisors come to speak to you. They tell you that negotiations have been started with the rulers of the Far East city of Bharuch, and that the intention is to establish a fixed exchange rate between the Babylonian mina and the Indian rupiya, such as exists between the mina and the Greek drachma. The idea appeals to you, although you feel these sorts of initiatives are beginning to make the world a very small place indeed.

You are requested to travel to Bharuch, to find out the relative values of different items, and make a suggestion for the exchange rate. Only too happy to please the new king, you travel to India and once in Bharuch make the following observations:

- 1) 1 piece of silk can be bought for 20 rupiya
- 2) 1 rope is worth slightly less than 10 bags of dates
- 3) 1 piece of silk is worth exactly 4 bags of dates
- 4) 4 pieces of silk are worth slightly more than 1 log of cedar
- 5) 2 ropes will get you exactly 1 lump of ebony plus two bags of dates

Use as many of these observations as you can to suggest an exchange rate between the mina and the rupiya that will allow trade between Babylon and Bharuch. Explain how you make sure that Bharuch can keep exporting silk and ebony, and that Babylon can keep exporting rope and cedar to Bharuch.

Part 6 – The Barbaric North-West

Your journey to Bharuch was a success and has opened up new opportunities which you have since made full use of. You feel like there is little challenge to be found in trading anymore, and so are delighted when you once again receive a summons from your now beloved king Nebuchadnezzar.

He invites you to come and stroll with him through his palace gardens. As you walk, he explains that he is having new gardens built for his wife, Amytis. He gestures excitedly as he tells you his plans, and exclaims how he wants them to be the wonder of the new world. Though his aim in building them is to remind Amytis of her homeland, the Median Empire – which you know lies to the North-East – he wants to gather flora from all over the known world to mark and celebrate that Babylon is its centre.

For this purpose, he is looking for seasoned and experienced travellers such as yourself to venture into the lands of the barbarians to the far North-West. You are asked to travel northward along the east coast of the Apennine peninsula towards the mountains known as the Alps, and to initiate trade with the barbarians who live there. When you have done this, have them help you seek out plants that might survive in normal conditions.

Again, you are glad to embrace the challenge. The journey goes well, though you should perhaps have brought some more ox-hides for warmth. Together with an Etruscan translator who speaks a dialect that is understood reasonably by most inhabitants of the region you make contact with a local tribe, whose people are apparently known as the Raetians. They are in awe of the gifts you have brought but are aggressive and greedy. You assure them that you're willing to give them more than you have brought, but they don't seem to understand what you mean.

Explain how negative numbers work to someone who is not familiar with them, so they can imagine the concept of debt.

Part 7 – Memoirs

Your mission to the Alps was a failure. None of the plants you returned to Babylon survived the voyage back, and you doubt anyone will want to have a second attempt. There is little need anyway. Nebuchadnezzar's gardens have been built, and have established the city of Babylon as the centre of the civilized world. The continent of Europe is no part of that, and you doubt it ever will be.

But, though the mission was a failure, you did enjoy it, and it helped you realize why your life has been so successful. You feel it your duty to share your story with future generations.

Explain why it was so important in your life that you could understand and manipulate numbers. Try to make them worth keeping, so that when civilisation does finally reach Europe it may inspire any youngsters there who find math hard work to keep at it.

Rubric

Criterion C Communication

Strand i Use appropriate mathematical language in both oral and written explanations

1-2	No clear critical or logical thinking in parts 6 or 7
3-4	It is clear in parts 6 and 7 that you tried to approach these with a mathematical mindset
5-6	Your explanation for part 2 helped to understand your calculations
7-8	Throughout the project, especially in parts 6 and 7, your use of language shows a mathematical approach

Strand ii Use different forms of mathematical representation to present information

5-6	You correctly convert all values in table 1 to shekels only
7-8	You correctly represent the comparisons given in part 5 as (in)equalities

Strand iii Move between different forms of mathematical representation

1-2	
3-4	You find a metaphor for negative numbers in part 6
5-6	You use variables as short-hand for the name of product in part 5
7-8	You show that you understand why each fraction in the tables in part 2 has an opposite which contains the same information

Strand iv Communicate complete and coherent mathematical lines of reasoning

1-2	It takes too much effort to understand how you solved the problems
3-4	Clear what steps you took to solve each problem
5-6	Each step you took in solving the problem is clear, or obvious from the steps you show
7-8	You don't leave out any important information when showing the solution to the problems

Strand v Organise information using a logical structure

1-2	You have made a clear attempt to structure your solutions
3-4	The basic structure of your solutions makes sense
5-6	The project is a complete piece of work, and generally well organised
7-8	The project is a complete piece of work that is easy to read through and find particular parts in

Criterion D Applying mathematics in real-life contexts

Strand i Identify relevant elements of authentic real-life situations

1-2	You start your attempts to solve problems by stating or using some measurement or amount that is given
3-4	You only use measurements or information that are of importance to the problem given
5-6	You use all the measurements and information given that is necessary to solve the problems
7-8	In addition to the above, you take into account who you're addressing in parts 6 and 7

Strand ii Select appropriate mathematical strategies when solving authentic real-life situations

1-2	
3-4	You found the calculation necessary to find the relative values in part 2
5-6	You found a way to make a profit in part 3
7-8	You used equations and/or inequalities in part 5

Strand iii Apply the selected mathematical strategies successfully to reach a solution

1-2	You calculated the relative values correctly in part 2
3-4	You found the optimum solution in part 4
5-6	Find the value in rupiya of all the goods in part 5
7-8	Find a suitable exchange rate in part 5

Strand iv Explain the degree of accuracy of a solution

1-2	
3-4	Comment on how good your solution is in part 4
5-6	Your calculations and results show you take into account that goods are bought in units
7-8	Explain the range of choices you had in part 5

Strand v Explain whether a solution makes sense in the context of the authentic real-life situation

1-2	
3-4	Comment on whether the distances you found in part 1 can be correct, using bounds due to geography
5-6	Comment in greater detail on whether the distances you found in part 1 can be correct, using the positions of the cities on a map
7-8	Explain why the exchange you found is acceptable in part 5 (economically, not mathematically)