



Algebraic and Transcendental Functions

Exponential Growth and Decay: Multicultural Project

Partial Project

In this partial project, we will Understand the concept of exponential growth and decay. Analyze the behavior, translations and main characteristics of the graphs of exponential functions.

Prepa tec Campus Garza Sada:

Felipe de Jesús García López-A01197573

René Omar Camporredondo Villarreal-A01197621

Prepa Tec Campus Cumbres:

Hector Villarreal Rodriguez-A0157227

Pepe David-A011

Part II

Interesting facts and consequences of the incident of Chernobyl:

In short, the Chernobyl accident in 1986 was the result of a flawed reactor design that was operated with inadequately trained personnel.



In result the resulting steam explosion and fires released at least 5% of the radioactive reactor core into the atmosphere and downwind some 5200 PBq.

In fact, two Chernobyl plant workers died on the night of the accident, and a further 28 people died within a few weeks because of acute radiation poisoning.

An interesting fact is that UNSCEAR says that apart

from increased thyroid cancers, "there is no evidence of a major public health impact attributable to radiation exposure 20 years after the accident."

Resettlement of areas from which people were relocated is ongoing. In 2011 Chernobyl was officially declared a tourist attraction.

Real Life Situations:

Every day Medicine dosage:

A patient is given a 300-mg dose of medicine the degrades by 25 percent every hour. What is the remaining drug concentration after a day?

Remember that the decay/growth rate must be in decimal form.

A drug degrading infers decay. In this case B will be a decay factor. The decay factor is $b = (1 - r)$.

In this situation x is the number of hours, since the drug degrades at 25% per hour. There are 24 hours in a day.

$$y = ab^x$$

$$y = 300(0.75)^{24}$$

$$0 = 0.30 \text{ mg}$$

Down Value of Objects:

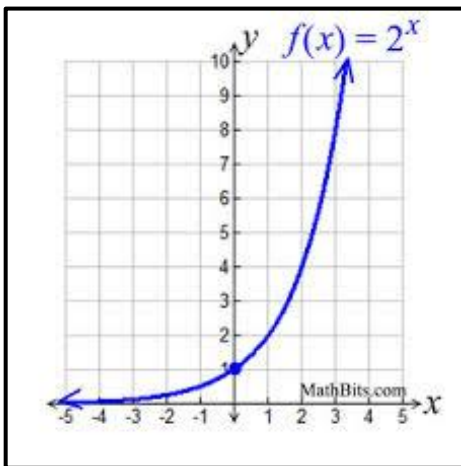
Something that happens every single day is the down value of objects. Let's say that you have a boom box store. A boom box is a very old object used to play songs but currently it isn't used as much as before so it has lost a lot of value. Anyways your store is currently earning \$50,000 a year. Nobody wants to buy boom boxes anymore. So what do you do? You sell 30% less boom boxes every year.

This would be modeled by $y=50000(1-0.30)^x$

$y=50000(1-0.30)^x$, in which y represents your income and x represents the amount of years from now.

Team Conclusion

This project has really helped us with this new topic in our math class being exponential growth and decay. In summary of all our project we learned what exponential growth is, exponential growth is basically the change that occurs when an original amount is increased by a consistent rate over a period of time. To calculate it



correctly we use this function $y = a(1 + b)^x$ which once you get the hang of it, it is easy to use. To explain this a little better and what every variable means y stands for the final amount remaining over a period of time, a is the original amount, and finally x is the time. The growth factor is $(1 + b)$, in fact the variable, b , is percent change in decimal form. $F(x) = 2^x$ is the simplest of exponential functions in a graph. Another topic we used in this project was exponential decay. Exponential decay occurs when an

original amount is reduced by a consistent rate over a period of time, and the purpose of

this concept is to use the exponential decay function to make predictions about market trends and expectations for impending losses. To calculate exponential decay, we use the same function but instead of adding we subtract: $y = a(1-b)^x$.

Some implications of using nuclear energy could be that the radioactive waste produced can pose serious health effects on the lives of people as well as the environment. The Chernobyl accident that occurred on 26 April 1986 at the Chernobyl Nuclear Power Plant in Ukraine was the worst nuclear accident in the history. Its harmful effects on humans and ecology can still be seen today. Then there was another accident that happened in Fukushima in Japan. Although the casualties were not that high, but it caused serious environmental concerns. It also has a really high cost, and it can have a really big impact on the environment close to nuclear energy work places. But apart from the cons we do consider it it's a clean source of energy with the simple reasons that as of today, nuclear energy is considered as one of the friendliest source of energy as it produces fewer greenhouse gas emissions during the production of electricity as compared to traditional sources like coal power plants. Nuclear fission is the process that is used in nuclear reactors to produce high amount of energy using element called uranium. It is the energy that is stored in the nucleus of an atom. While being environmentally friendly is the big plus of nuclear energy, disposal of radioactive waste and protecting people and environment from its radiations is a big con of nuclear energy. We are aware of the nuclear energy plant Mexico has, Laguna Verde Nuclear Power Plant is located on the coast of the Gulf of Mexico, in Alto Lucero, Veracruz, Mexico. A fun fact is that it is the only nuclear power plant in Mexico and produces about 4.5% of the country's electrical energy. We believe it is safe if it is monitored by the correct personal. Also, it must have certified workers working on the plant not any guy that just wants to work, if they follow all the correct procedures we don't see why it is not safe. This could have potential risks to the lives of many Mexican people living nearby the nuclear plant, but we should see the positive side to be a number one nation we must compete with the most powerful nations out there. We can't stay behind in technology we must take risks to move forward and evolve as a Nation.

A question asked in the project is if we think the Chernobyl nuclear disaster could have been prevented. In our opinion of course it could have been prevented, we now know that properly designed process controls could have prevented the meltdown at Chernobyl. That could have prevented it and having the right and trained personal in charge the incident happened at night and this is where the poorly trained personal were supposed to act but since they had zero experience they didn't know what to do which later caused the huge incident.

In that time, there was basically nothing to do, once the radiation reached the air it was impossible to stop it due to the winds taking it a moving the radiation. The most affected territories were Ukraine and Belarus. But yes, we believe the radiation reached Mexico, the explosion at Chernobyl brought up radioactive substances to the altitude of 1.5 kilometer in the air. In this elevation, wind from the southeast took the radioactive cloud to as far as Scandinavia. The cloud flew over Scandinavia and then turned back to Ukraine again. During the day of the accident, the direction of the wind changed to westward. The second contaminated cloud thus flew via Poland to Czechoslovakia and further to Austria. There, it bounced back from the Alps and flew back to Poland. As far as we know today, there is no place in the world where the radioactive clouds from Chernobyl were not present. Contaminated clouds flew all around the world.

Four environmental consequences caused but the Chernobyl disaster are that in that time the Chernobyl accident took place during the growing season. It took only two weeks for the conifers to suffer significant damage from exposure. Initially many trees suffered severe damage to reproductive tissue. About 40% of the contaminated area was used for agriculture, meaning many farms and ways of obtaining food was gone they couldn't do that no more in that place. The water supply as well as the ground water was seriously contaminated which affected millions of lives living nearby. Most of the soil near and in Chernobyl is not a good place to farm or create settlements as to this day, it is said that after all this year's much of Chernobyl is still very dangerous and full of radiation.

Consequences of the use of nuclear weapons or nuclear disasters are in the short term the survivors will be affected within a matter of days by radioactive fall-out. The extent of the fall-out will vary according to whether the nuclear bomb detonates in the air or upon impact on the ground. While the former will entail more blast impact, the latter will throw up much larger quantities of radioactive debris into the atmosphere. The area covered by the fall-out is determined by wind speed and direction. The heavier particles of radioactive material will fall in the immediate or close vicinity. This will later cause cancer or even worse diseases. The effects of exposure to high levels of radioactive fall-out include hair loss, bleeding from the mouth and gums, internal bleeding and hemorrhagic diarrhea, gangrenous ulcers, vomiting, fever, delirium and terminal coma. There is no effective treatment and death follows in a matter of days. Nuclear weapons cause severe damage to the climate and environment on a scale incomparable to any other weapon.

To be honest nuclear weapons are a horrible thing they can cause so much destruction on a short and long term. It cannot just ruin one generation but several after the one that was affected. A solution to this can be to just use nuclear power for the sole purpose to advance in technology but once it was used to kill, that was when everything started going wrong. So, a solution can be banning nuclear weapons or at least supervise so a country can't have enough to start a nuclear war.

This project was very interesting for each one of us, we liked it we never researched about Chernobyl before this project so it helped us have a little more knowledge about our past and what has happened using nuclear power. It was quite easy to be honest since we all worked together everything was easier.

