



Cogito



Discover what it means to know !

Acknowledgements

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- Review:** Dr. Jyoti Sharma, Associate Professor, Cluster Innovation Centre, Delhi University

Cogito

(कोगितो)

We have heard the word "Know" several times in our lives, but what does it truly mean to know something? We have a natural instinct to understand what we and others "know" or "don't know". For example, we may know that it is true that earth is round and that it revolves around the sun.

But how do we know if this is the truth? What is the difference between knowing that something is true from just thinking that it is true. We often encounter claims made by people for which we may or may not have evidence for; how do we differentiate between what is true and what is not in these cases.

Cogito is our journey where I and Ankit end up writing this book on our conversations when we were exploring how do we know the truth of something.

- Ankit and Ankita

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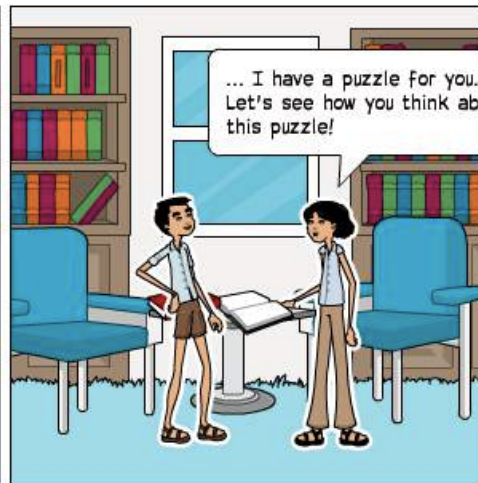
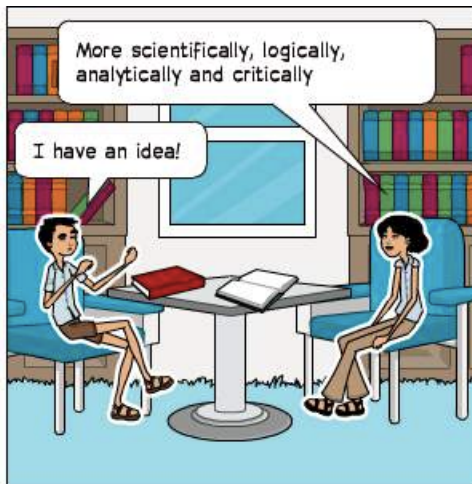
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Cogito

Cogito Ergo Sum!

Cogito Ergo Sum!





If all of the statements are true,
where is the gold?

Chest 1



The gold is
not in 2

Chest 2



The gold is
in 1 or 3

Chest 3



The gold is
not in here

hmmm....



Is the gold in
chest no 1 ??



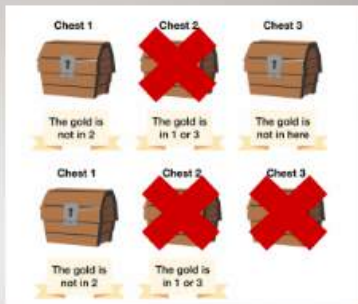
Yes! But how did you
come to this answer?



See! If statement 1
is true, then gold can
not be in chest 2.

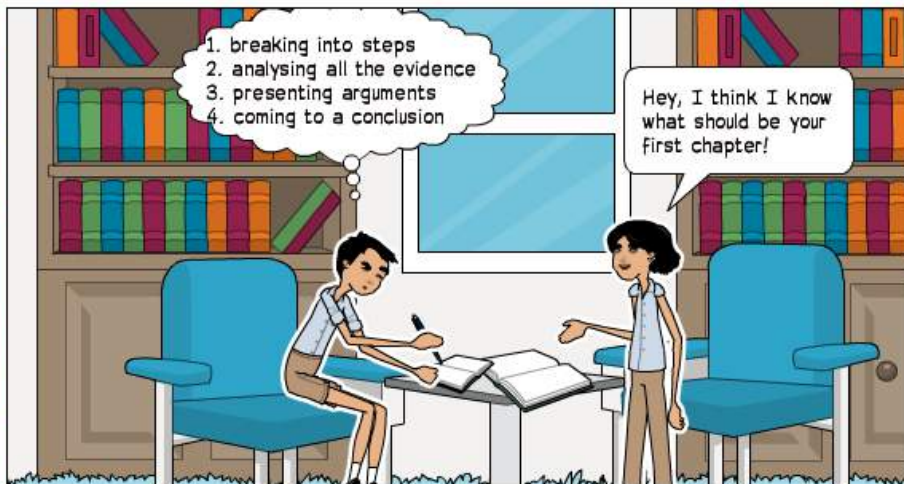
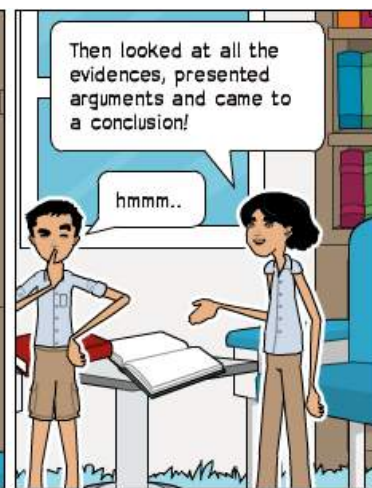


Similarly, if the
statement 2 is right,
the gold can not be in
chest 3!

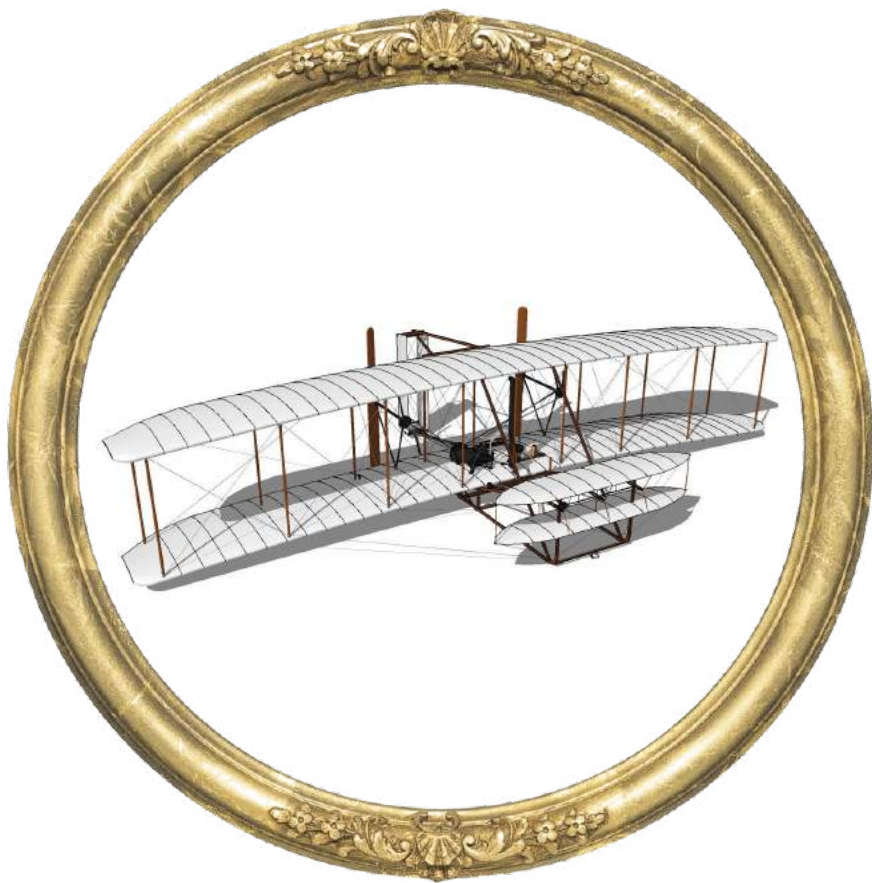


Hence, the gold
must be in
chest 1!





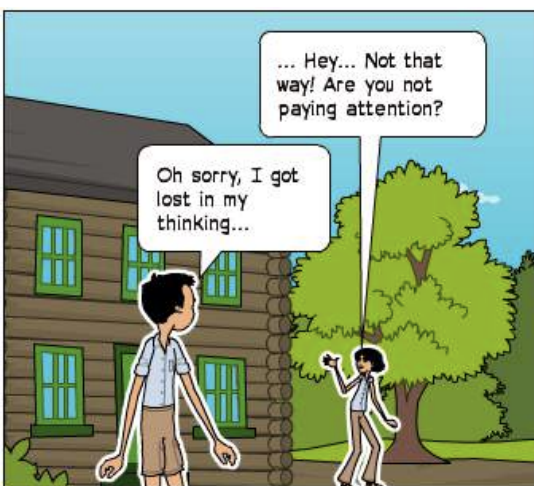
The walk





Do you want to go for a walk? I think better when I walk and think...

Sure thing! So I was saying...



... Hey... Not that way! Are you not paying attention?

Oh sorry, I got lost in my thinking...



You were saying something about our first chapter - Fake news...

Yes... You know there was this news paper article I read once...



... which claims that Wright brothers were not the first one to fly the plane

What?



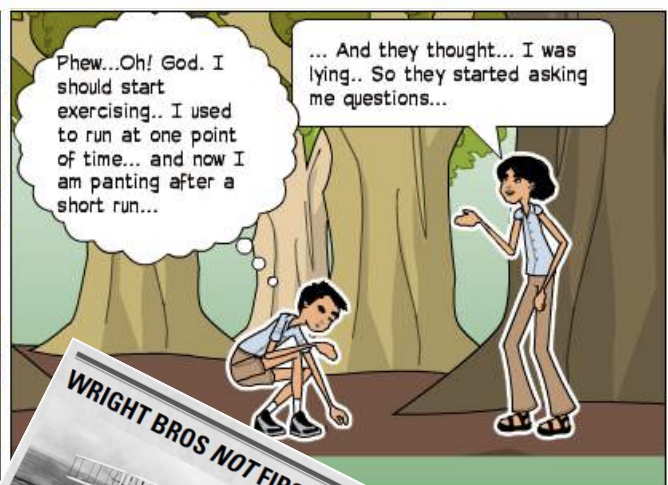
And what is - "Claim"

I know it is a little shocking....



... And I did not question if it is true or not and told some of my friends

Hey! Wait!



Phew...Oh! God. I should start exercising.. I used to run at one point of time... and now I am panting after a short run...

... And they thought... I was lying.. So they started asking me questions...



WRIGHT BROS *NOT* FIRST TO FLY



Wilbur and Orville Wright make history at Kitty Hawk, USA, December 1903. Or did they?

Many aviation experts and historians now believe that German-born Gustave Whitehead – seen here with his aeroplane 'No. 21' – beat the Wright brothers into the sky by as much as two or even three years.

In a 1935 article in the magazine *Popular Aviation*, and a book published two years later, author and historian Stella Randolph tells of a steam-powered flight made by Whitehead in 1899,

in Pittsburg, and of signed affidavits from 20 witnesses. One was Louis Daravich, stating that he was present and accompanied Whitehead on his flight. Randolph tells of two more flights, in 1901 in a plane that Whitehead named 'No. 21', and another in the following year in 'No. 22'.

A headline from the *New York Herald*, dated August 19, 1901 read: 'Gustave Whitehead travels half a mile in flying

machine . . .', and quoted a witness who affirmed: 'The machine worked perfectly, and the operator had no problem handling it.'

Whitehead was a poor German Immigrant to the United States, whose voice was easy to drown out in the debates that followed. The Wrights, by comparison, had influential friends and supporters. The prestigious Smithsonian Institute for Science, in return for ownership of the *Flyer*, agreed not to publish or exhibit anything referring to flights before 1903. The question we should be asking is: Why?

The jury is not so much out. The jury has gone home, and the case is closed. History suggests it is time to reopen it.

Jacey Dare



Gustave Whitehead, pictured with his aeroplane 'No. 21', and his daughter and assistants

You asked what a claim is?

You see, newspaper articles, WhatsApp messages and news are all created by Authors.

The case that Author is building is called – **Claim**

For example, in the article about Wright brothers ... Author claims that – "Wright Brothers were not the first humans to fly an aeroplane, someone else was!"

Exactly! Now to analyse if the article, text message or any other material is a claim....

...You first need to find what the author is saying!

And then look for evidence, supporting arguments and data if there are any!

For example, in this article...

WRIGHT BROS *NOT* FIRST TO F



Wilbur and Orville Wright make history at Kitty Hawk, USA, December 1903. Or did they?

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For example,...

First argument: there are people who believe that Whitehead flew planes successfully before 1903

German-born Gustave Whitehead – seen here with his aeroplane 'No. 21' – beat the Wright brothers into the sky by as much as two or even three years.

In a 1935 article in the magazine *Popular Aviation*, and a book published two years later, author and historian Stella Randolph tells of a steam-powered flight made by Whitehead in 1899,

Second argument: It is also true that Stella Randolph wrote books and articles in which she refers to numerous witnesses giving signed statements that they saw Whitehead flying

Many aviation experts and historians now believe that German-born Gustave Whitehead – seen here with his aeroplane 'No. 21' – beat the Wright brothers into the sky by as much as two or even three years.

In a 1935 article in the magazine *Popular Aviation*, and a book published two years later, author and historian Stella Randolph tells of a steam-powered flight made by Whitehead in 1899,



Third argument: There is another magazine article which mentions a steam powered flight by him

in Pittsburg, and of signed affidavits from 20 witnesses. One was Louis Daravich, stating that he was present and accompanied Whitehead on his flight. Randolph tells of two more flights, in 1901 in a plane that Whitehead named 'No. 21', and another in the following year in 'No. 22'.

Fourth argument: There really was a story in the New York Herald in 1901, reporting a half-mile flight by Whitehead, and quoting a witness as saying that the plane 'worked perfectly'



three years. In a 1935 article in the magazine *Popular Aviation*, and a book published two years later, author and historian Stella Randolph tells of a steam-powered flight made by Whitehead in 1899, a plane that Whitehead named 'No. 21', and another in the following year in 'No. 22'. A headline from the *New York Herald*, dated August 19, 1901, read: 'Gustave Whitehead travels half a mile in flying



Gustave Whitehead, pictured with his aeroplane 'No. 21', and his daughter

Fifth argument: The photograph of Whitehead with his 'No. 21' is understood to be genuine; and no one disputes that Whitehead built this aircraft

If all these claims are so believable, is the headline believable too?

Ummm... Yes?!



No!



You see, first argument itself doesn't tell us that Whitehead was the first person to fly an aeroplane



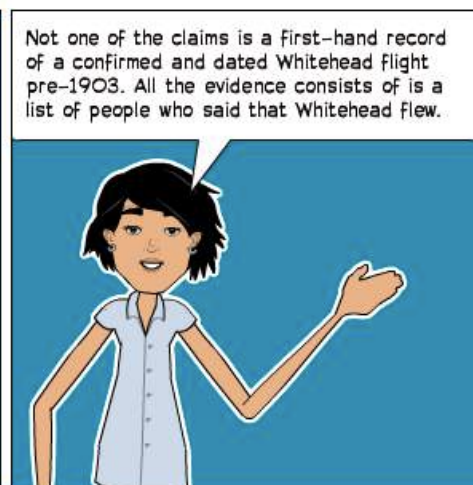
Neither does second argument nor third or fourth or fifth! **No single argument supports the claim**



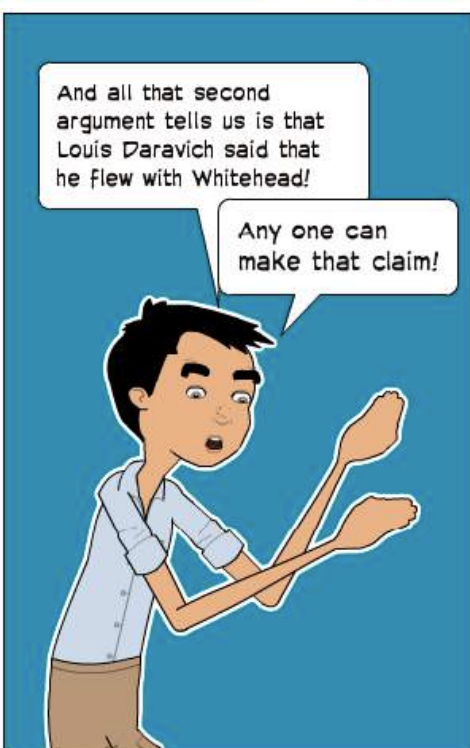
But together they all seems to carry some weight!



However, that is an *illusion*! Even together the evidence is not sufficient



Not one of the claims is a first-hand record of a confirmed and dated Whitehead flight pre-1903. All the evidence consists of is a list of people who said that Whitehead flew.



And all that second argument tells us is that Louis Daravich said that he flew with Whitehead!

Any one can make that claim!



Exactly! So what is the conclusion here?



That this article is likely to be a fake news!

And how did you think about that?



I read the claim... analysed the arguments... looked at all the evidences and formed a conclusion



Yes. You just learned how to think critically... at least a little bit of it!



You see! once you start thinking critically, you just cannot think any other way!!

I am sure!...



... This is thinking like a lawyer!... My lord!...



... all the evidences suggest that my client is not guilty!

Hahahaha..



Hahahaha..

Hahahaha..



But I want to think like a lawyer!

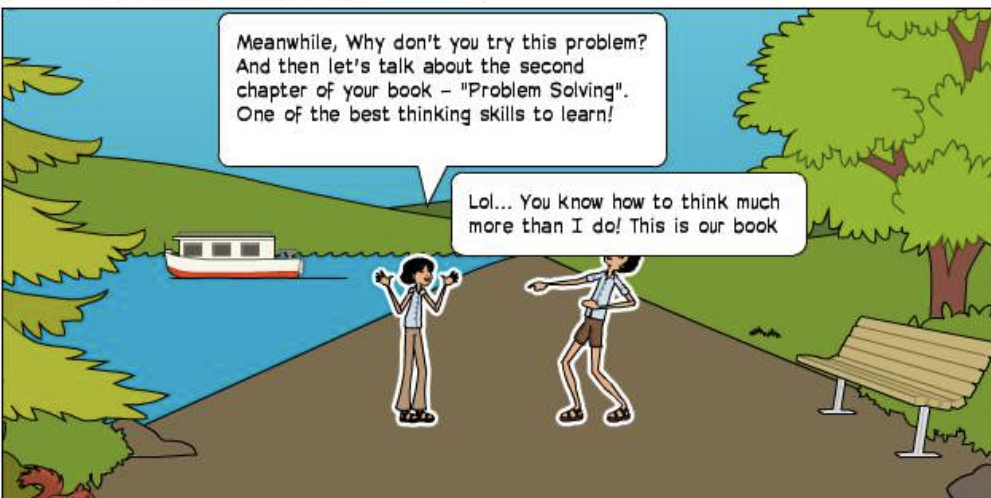
How can I do that?

Yes Ankit ! I will put some interesting questions throughout the book to make you think like a lawyer!



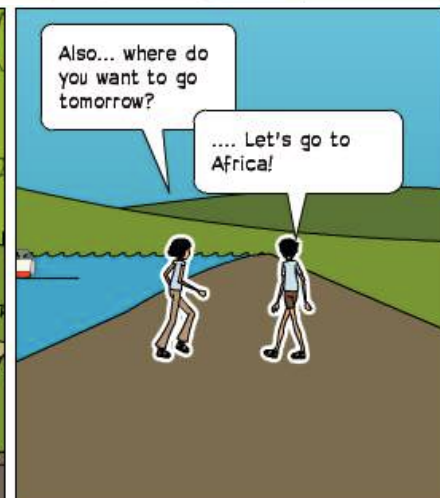
Meanwhile, Why don't you try this problem? And then let's talk about the second chapter of your book - "Problem Solving". One of the best thinking skills to learn!

Lol... You know how to think much more than I do! This is our book



Also... where do you want to go tomorrow?

.... Let's go to Africa!



Let's go anywhere





All the three sentences below are claims. How are they different?

1. Angola shares a border with Namibia
2. The dinosaurs were cold-blooded
3. Top bankers earn too much money



What do you think!
What are these
sentences?

Well they are
statements.



Yes! But do they
express something?

mmm... I
think yes!



The first sentence says –
"Angola shares a border with
Namibia"



Which means that whoever wrote these
sentences wants to say that *Angola
and Namibia are side by side and
...*



there is a border common
to both the countries



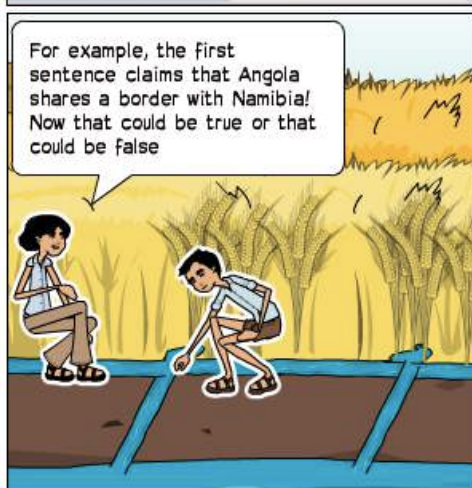
Exactly! So each of the three things
that you read, are called Sentences



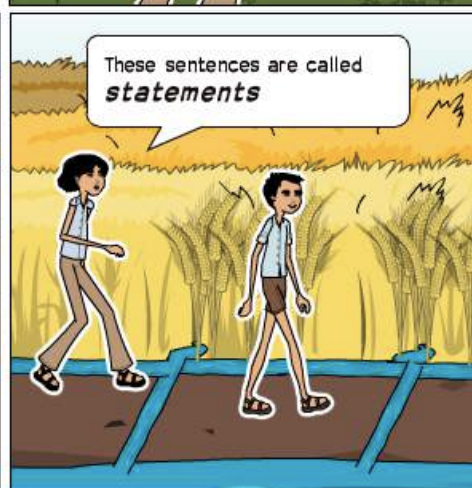
And each of these
sentences "Claim" something



For example, the first
sentence claims that Angola
shares a border with Namibia!
Now that could be true or that
could be false



These sentences are called
statements



But how do you know if a statement is true or not?



If you just look at this map you can see that Angola shares a border with Namibia



Which means that first statement is - *True*



And such statements are called facts

Like earth is round!



Yes! Hence, you can say that: Angola shares a border with Namibia... is a fact



Now look at the other sentence!

Do you mean statement?



Good catch! I mean *Statements*



Now look at other statements and think what do they claim?



Well.. this statement that: "*Angola shares a border with Namibia*" claims that both the countries are immediate neighbours



Correct... What about: The dinosaurs were cold-blooded!



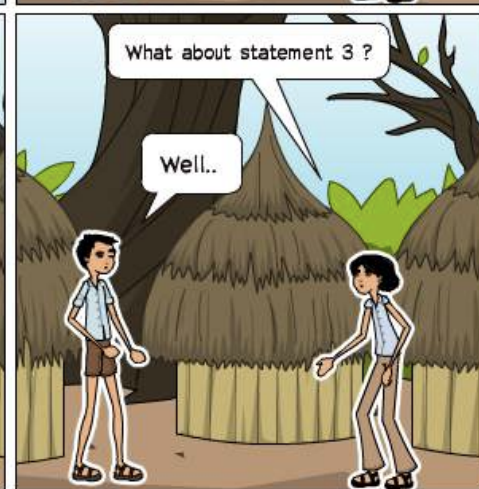
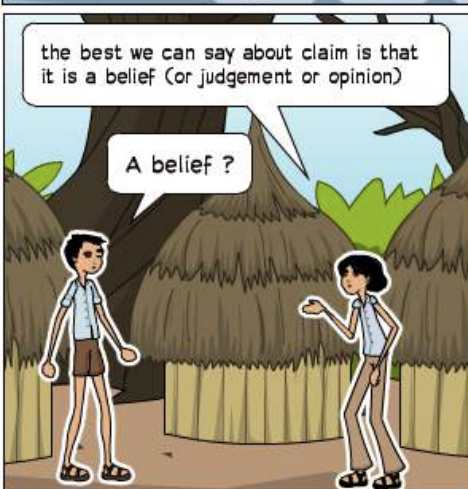
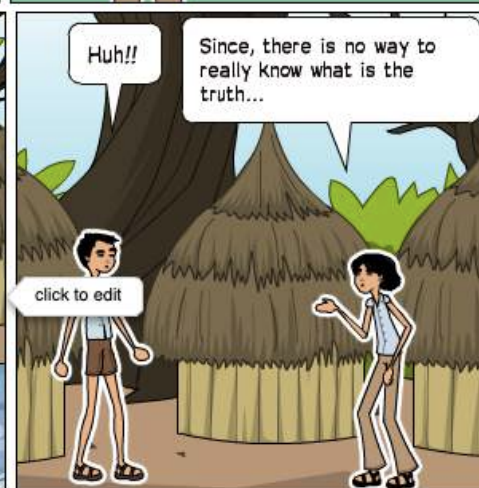
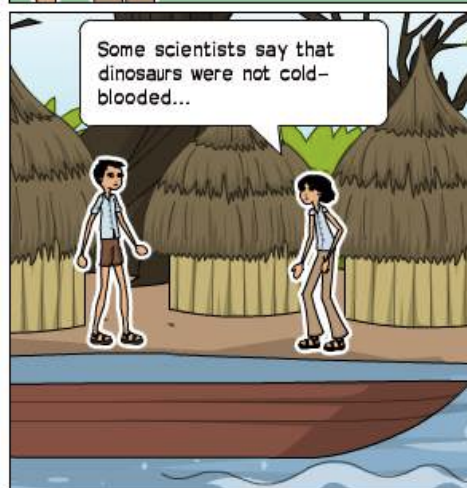
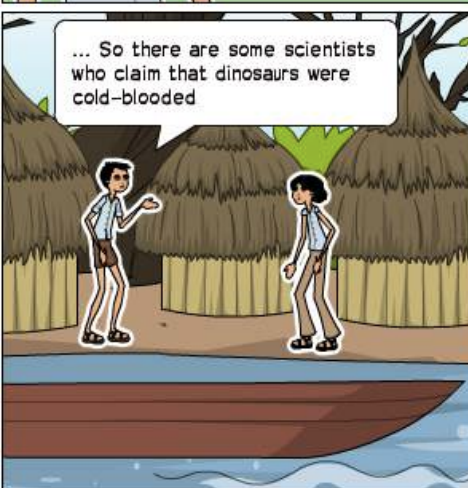
I think it claims that dinosaurs couldn't control their body temperature?

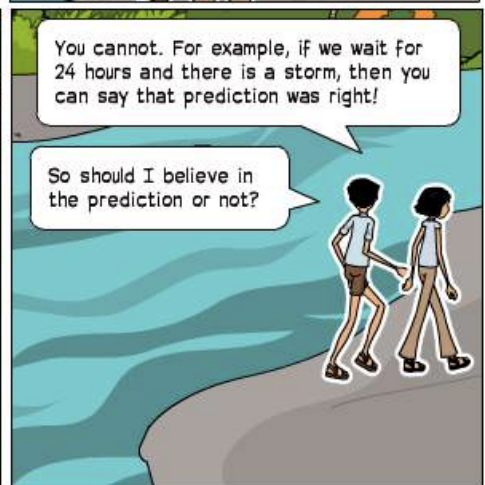
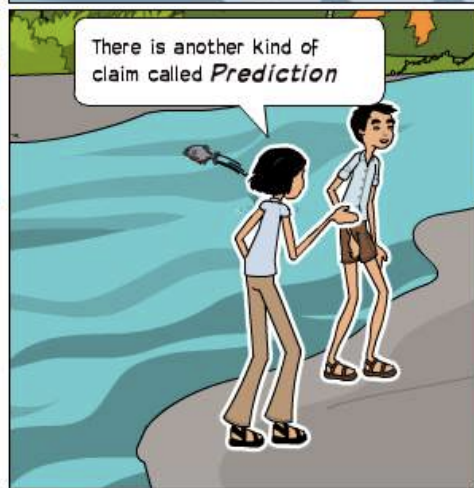
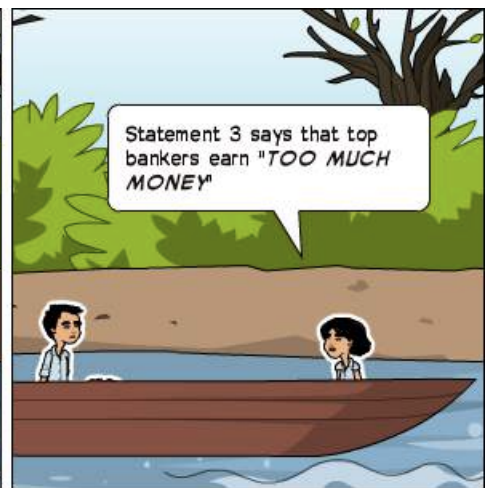


I don't know! I guess I will read some books?

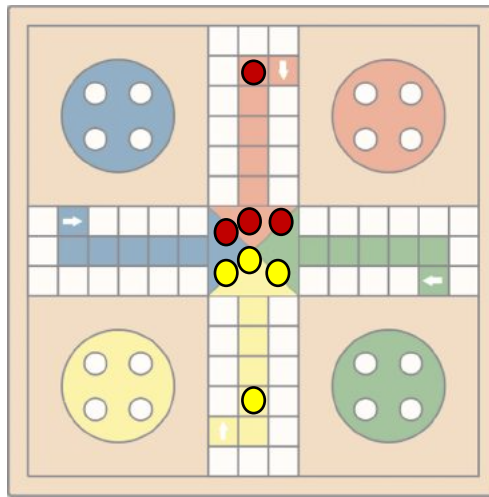
Yes! But how do we check if this is true or not?







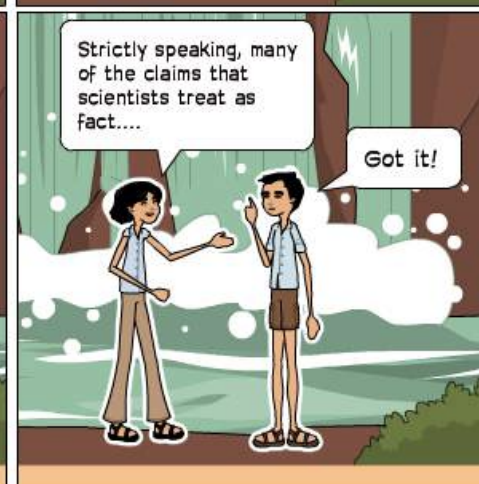
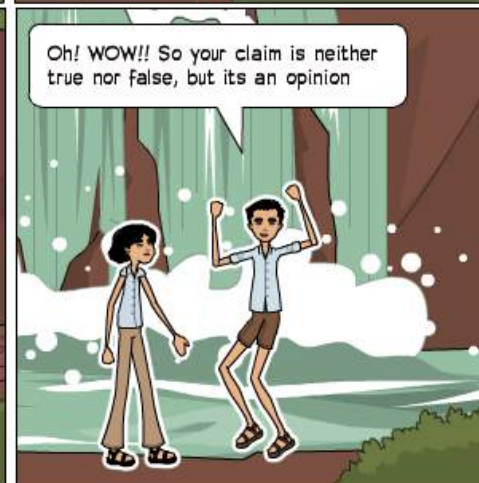
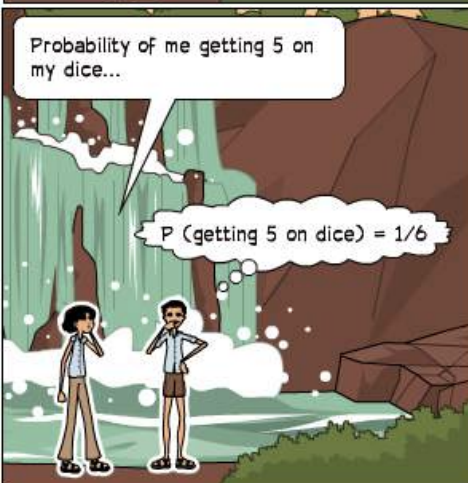
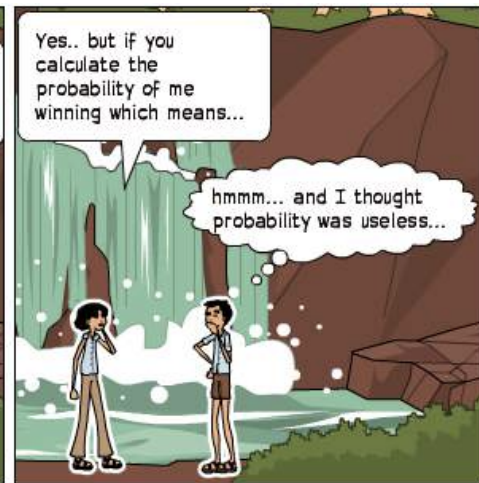
Who do you think will win the game?

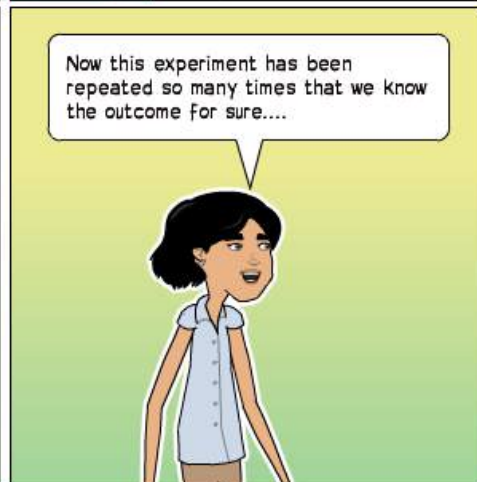
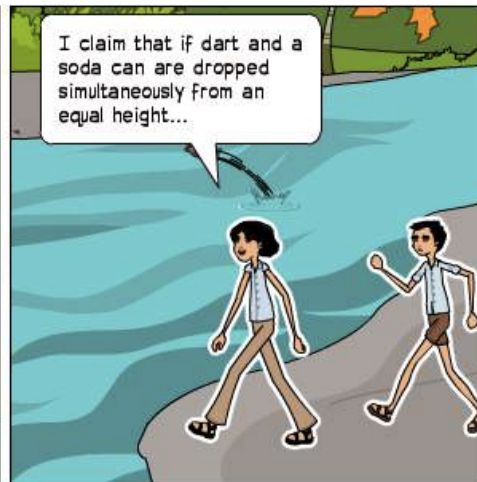
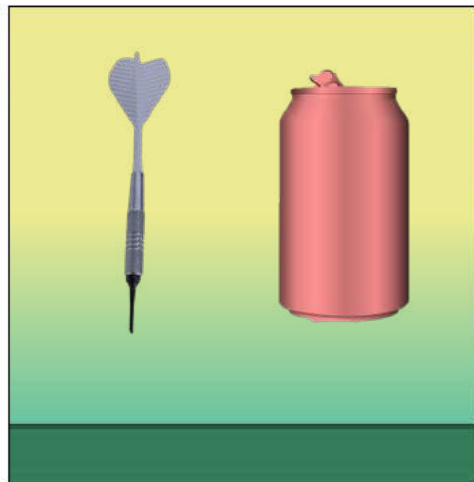
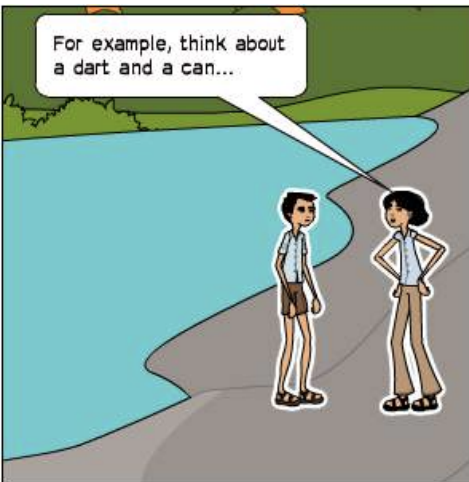
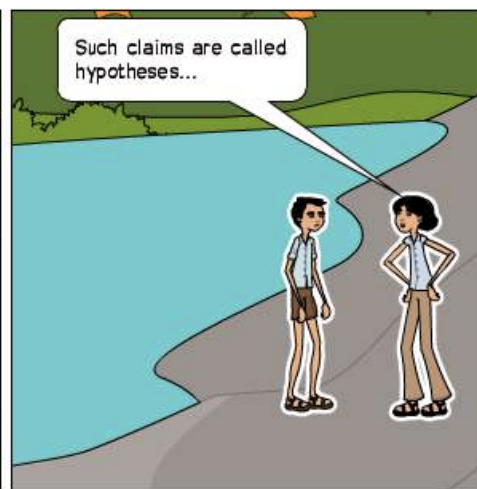


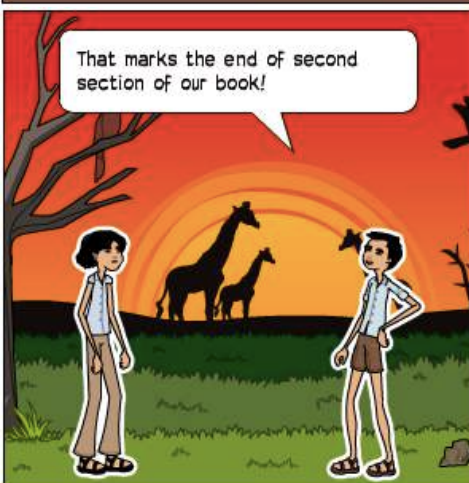
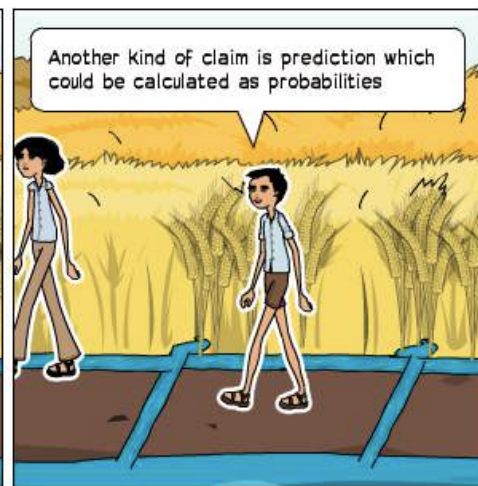
Ankit



Ankita

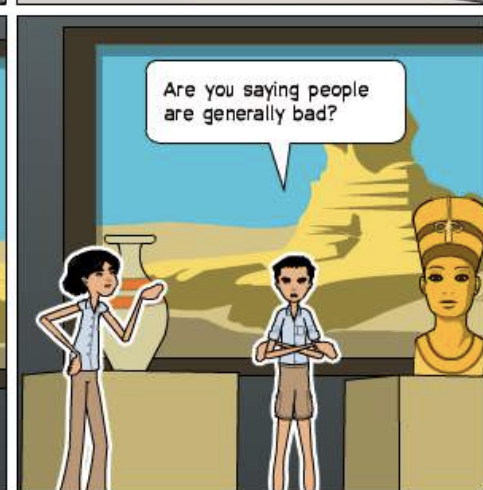
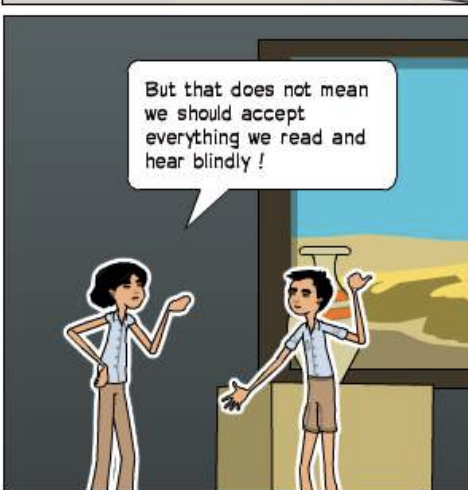
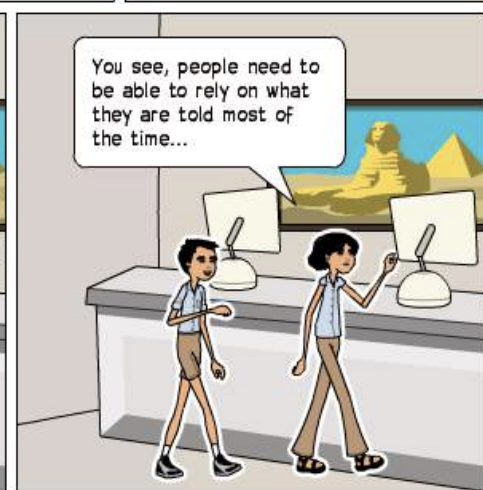
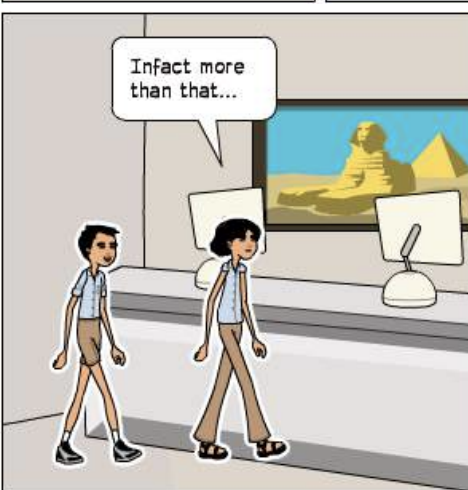
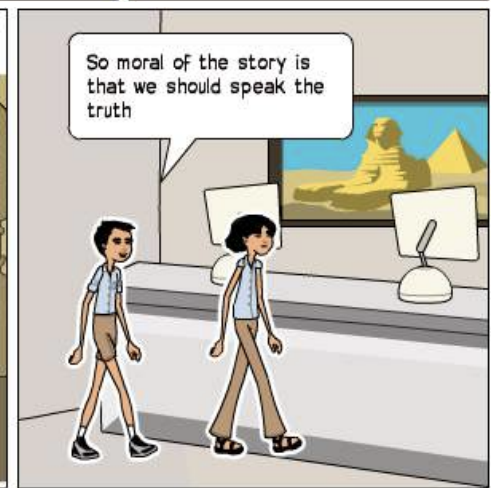
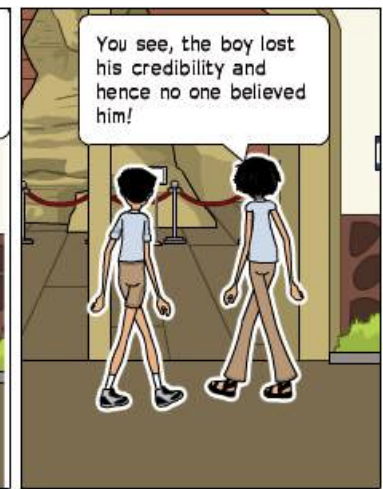


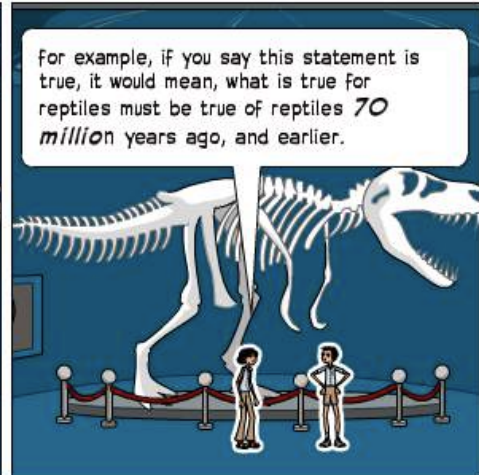
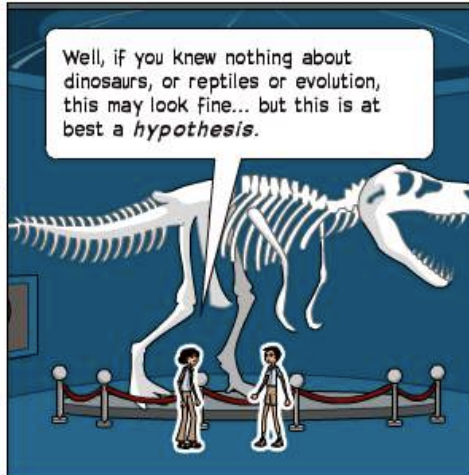
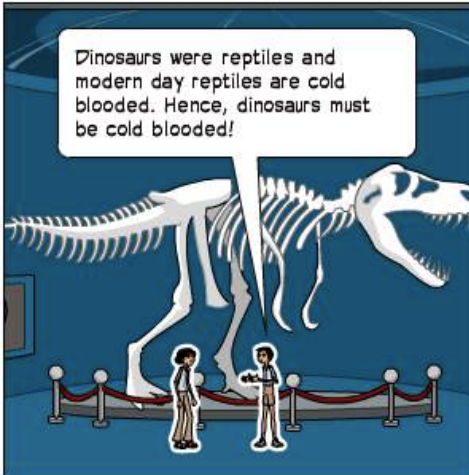
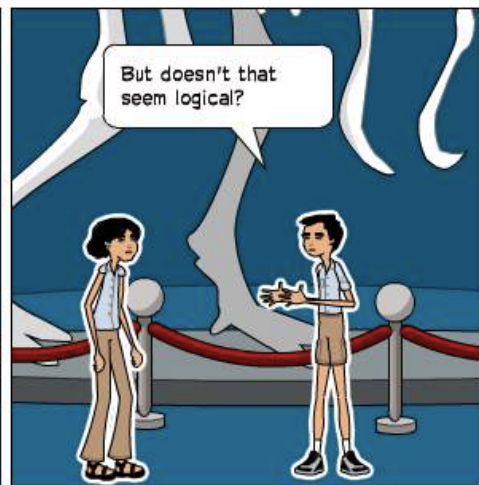
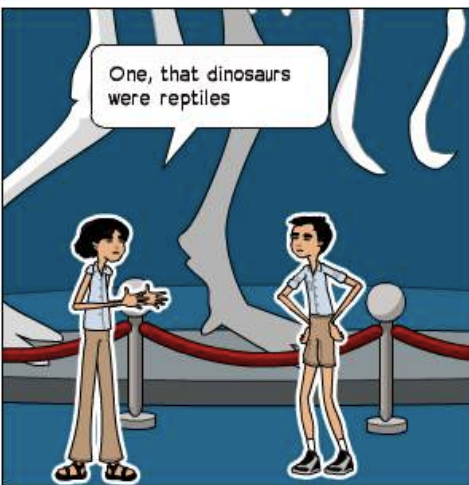
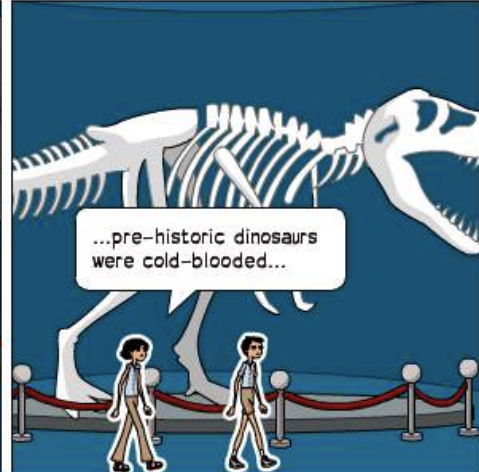
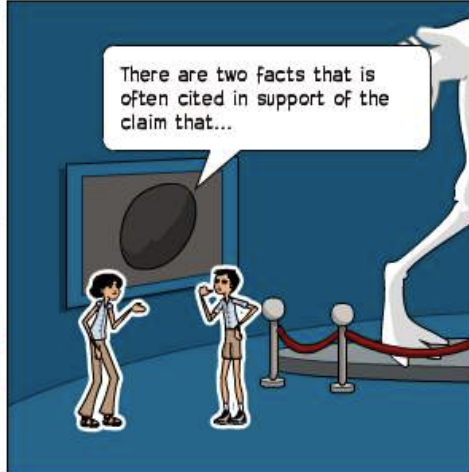
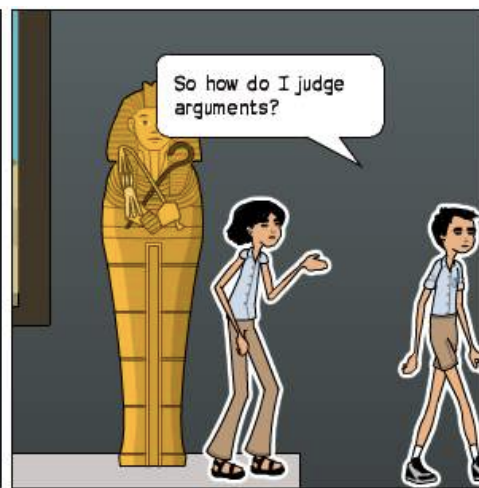


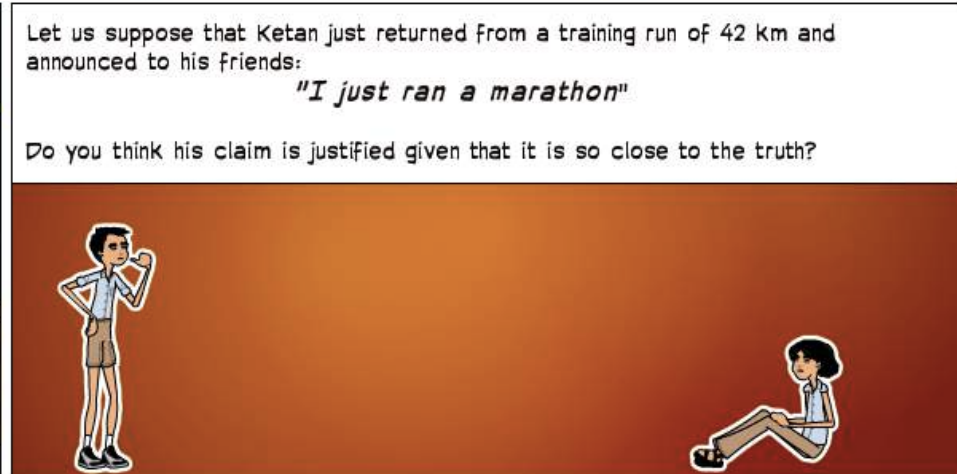
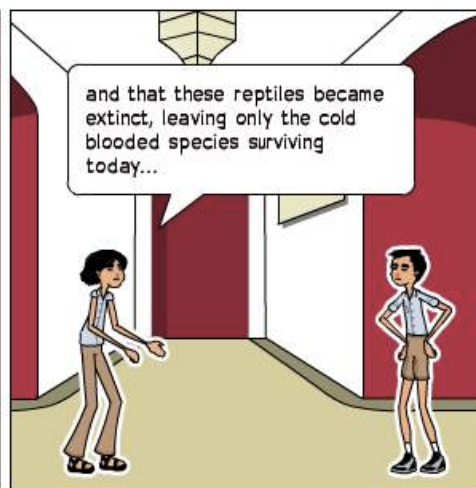
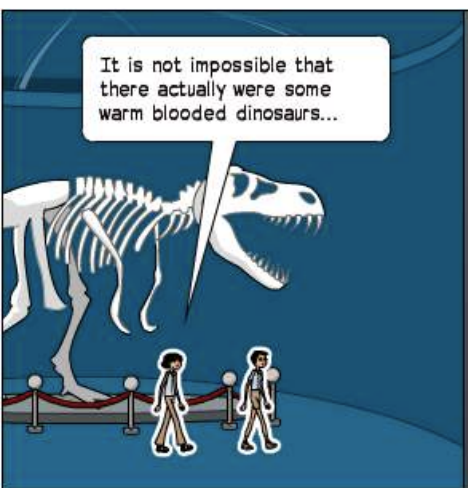


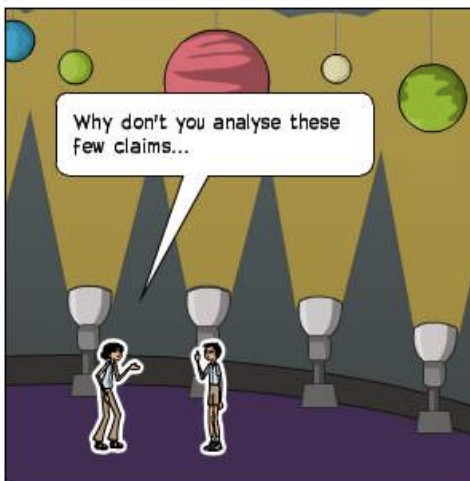
Hold your judgement





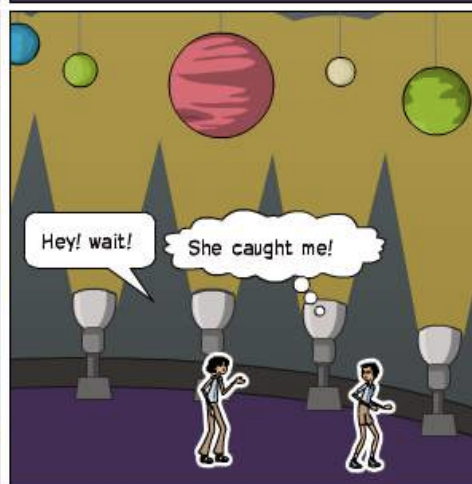
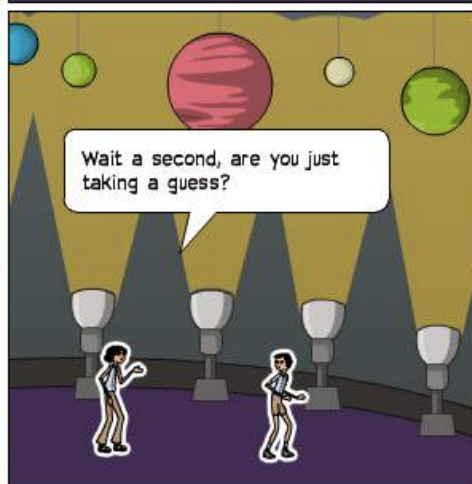
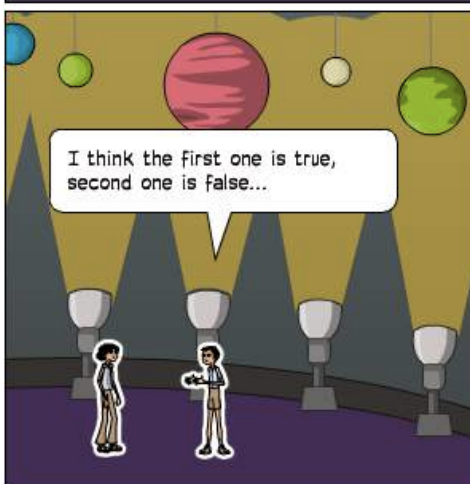
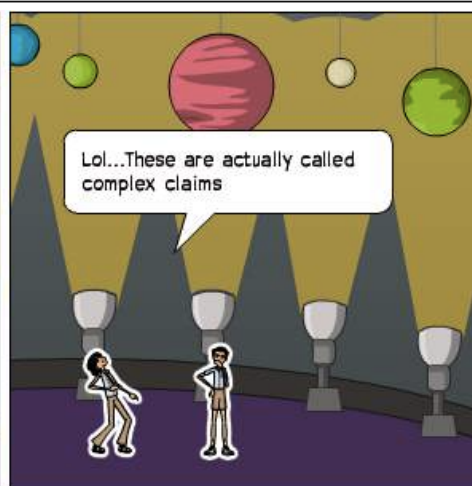
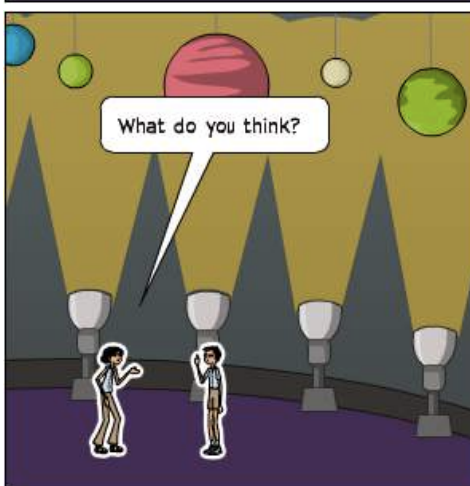


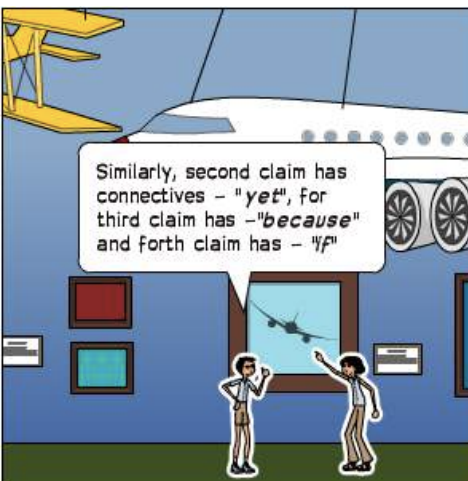
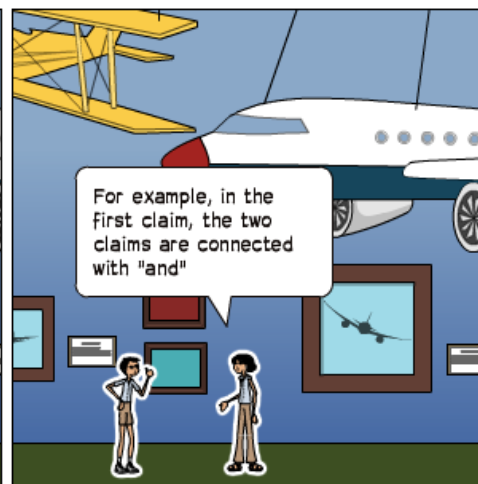
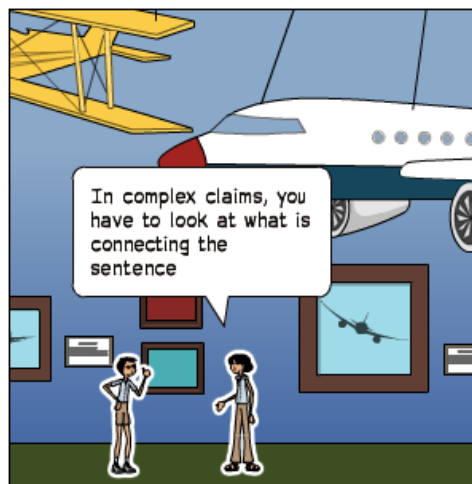
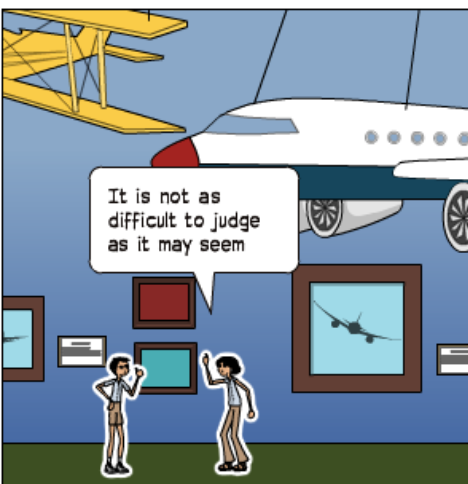




What do you think about these claims?

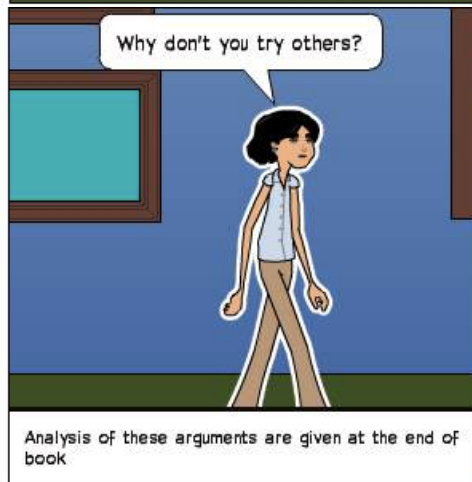
1. Ketan just ran a marathon and completed the distance in under four hours.
2. The dinosaurs were reptiles, yet they were warm-blooded.
3. Sea levels are rising around the world because global warming is melting the polar ice caps.
4. Many parts of the world will soon be submerged if nothing is done to reverse climate change.



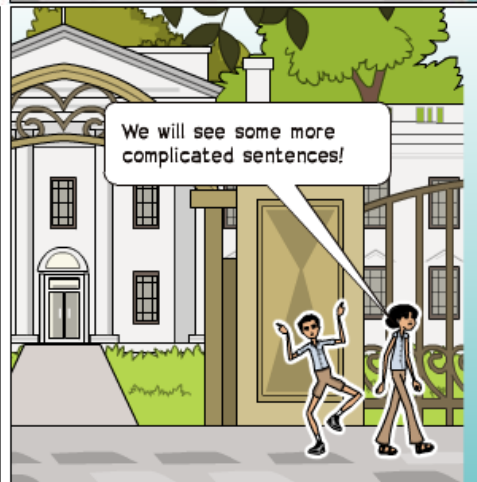
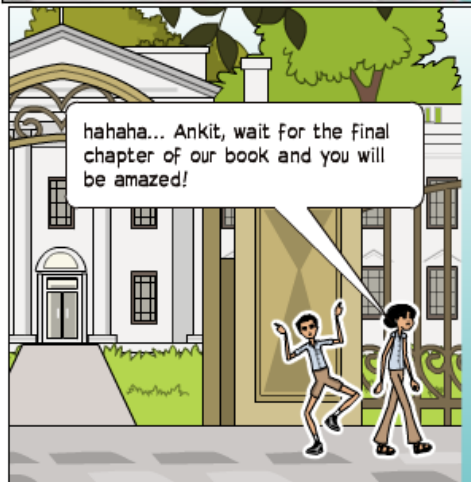
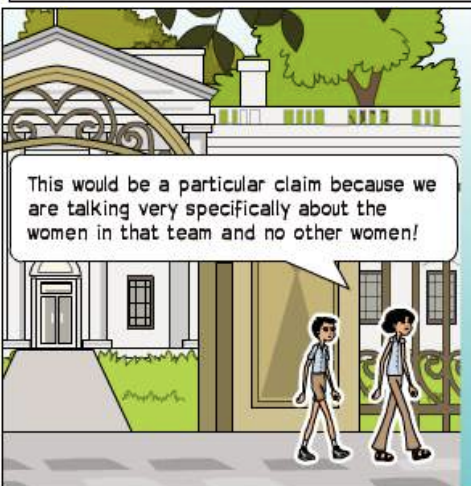
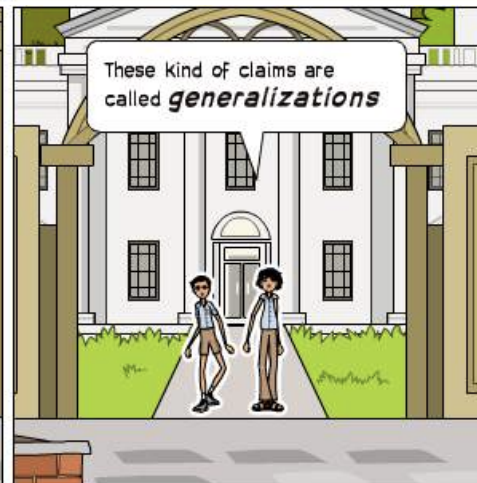
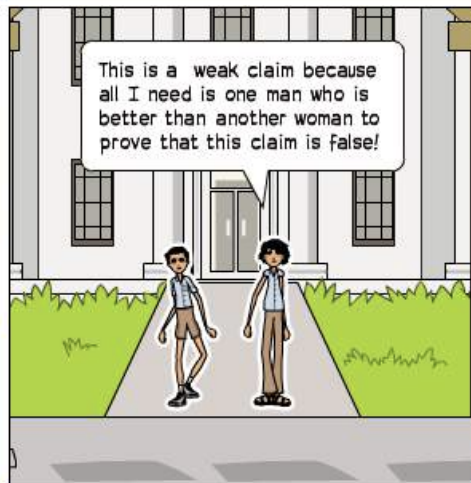
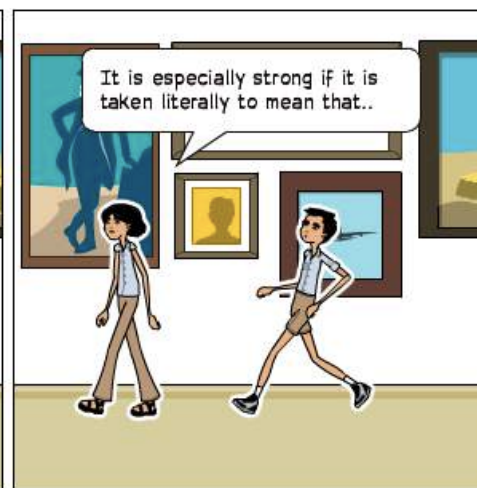
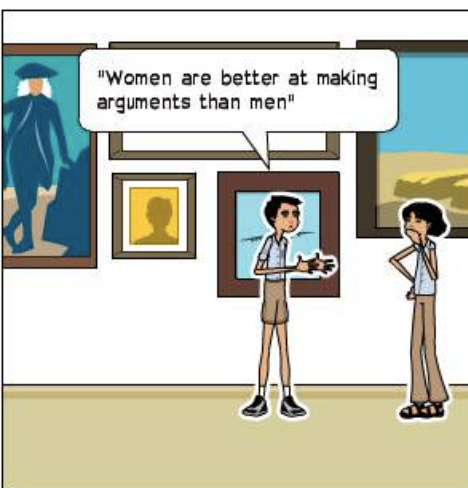


What do you think about these claims?

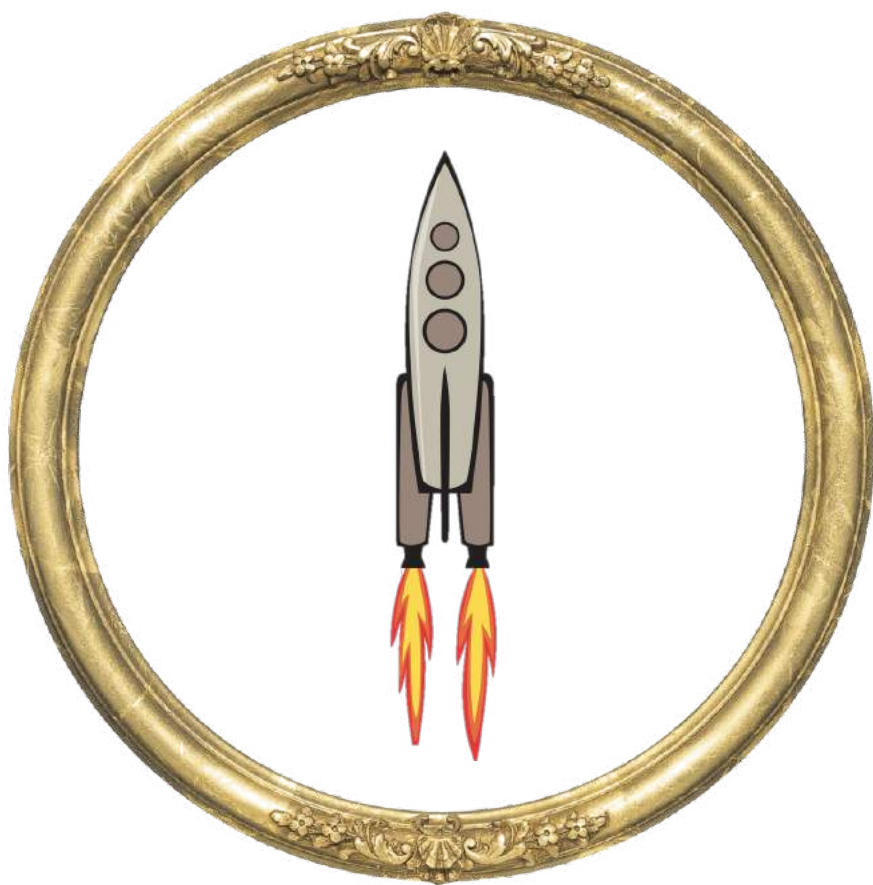
1. Ketan just ran a marathon **and** completed the distance in under four hours.
2. The dinosaurs were reptiles, **yet** they were warm-blooded.
3. Sea levels are rising around the world **because** global warming is melting the polar ice caps.
4. Many parts of the world will soon be submerged **if** nothing is done to reverse climate change.

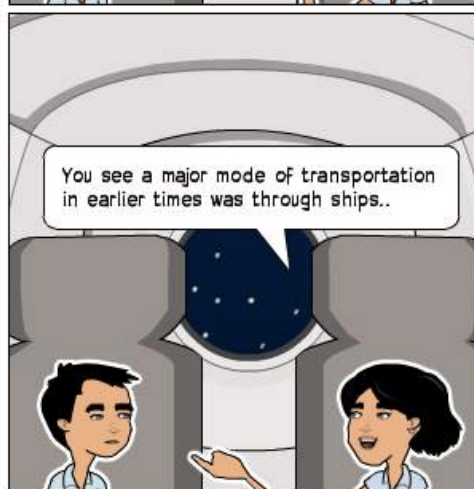


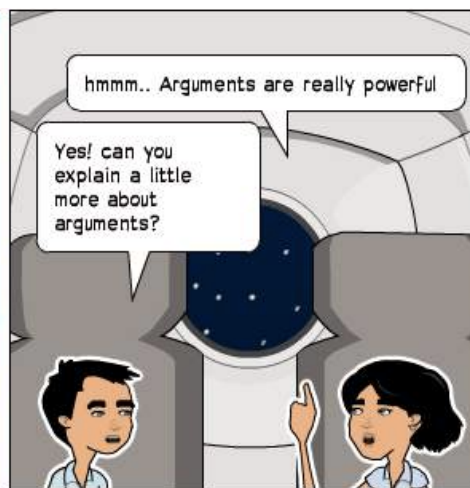
Analysis of these arguments are given at the end of book



Out of the world

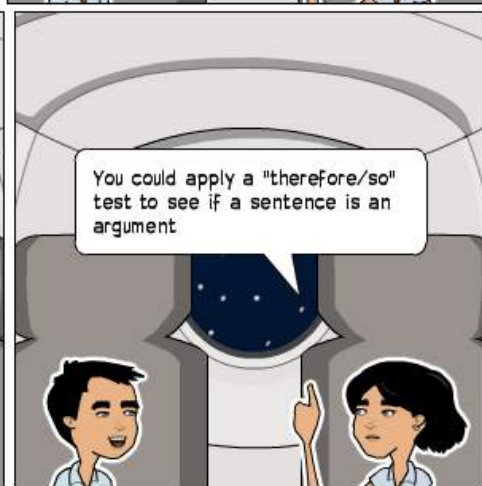
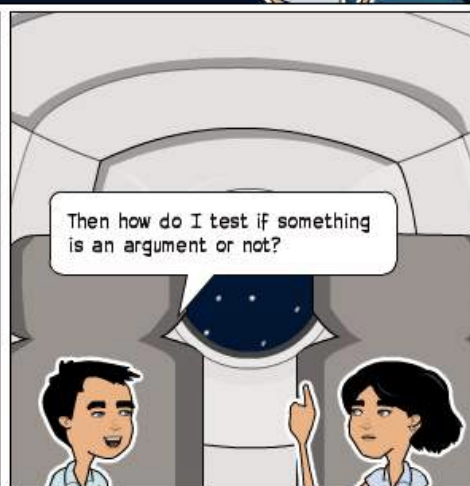


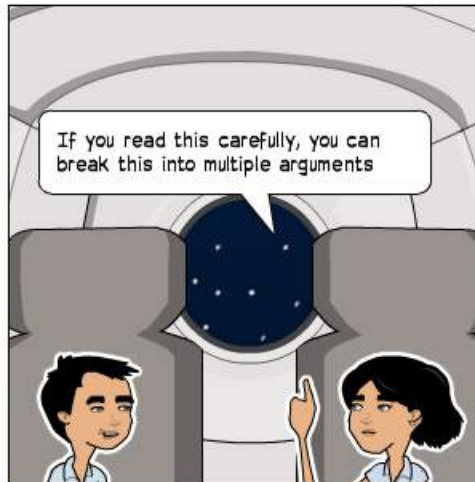
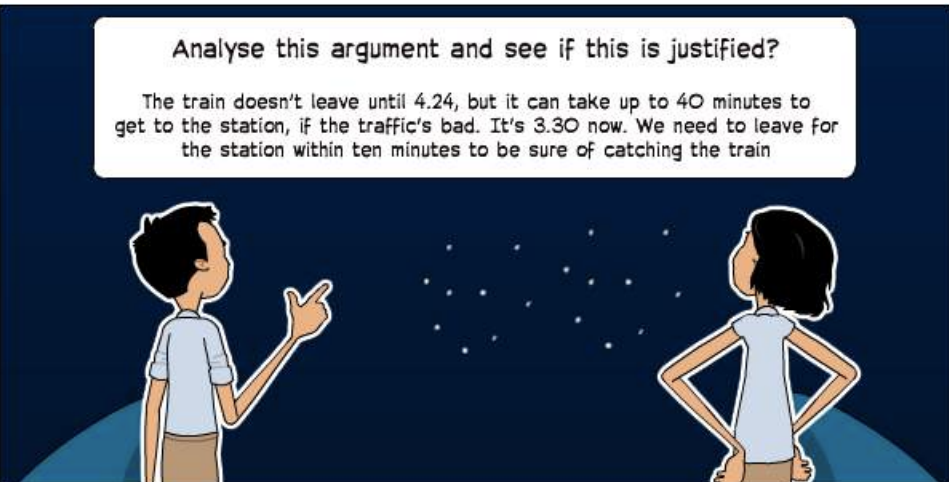
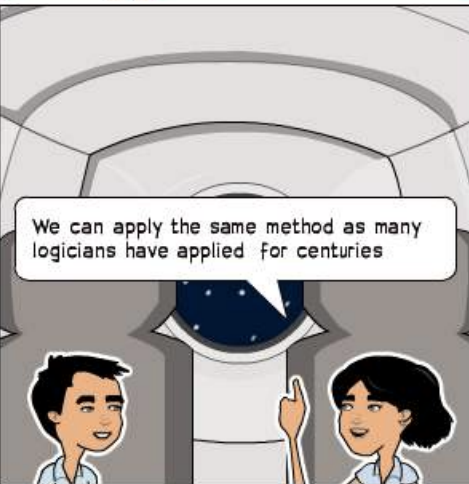
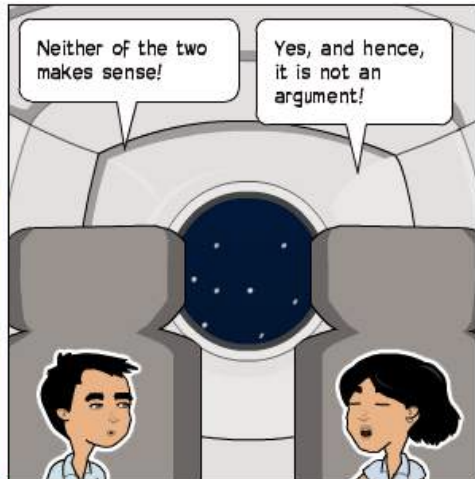
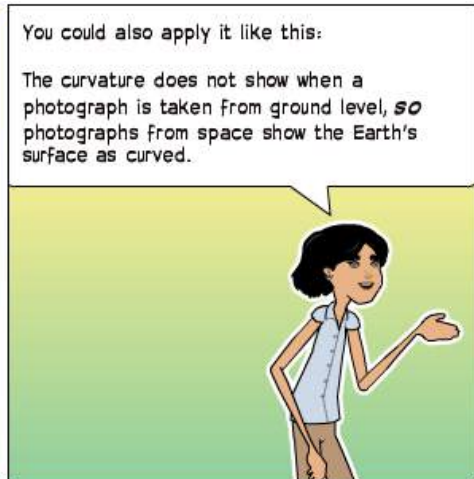
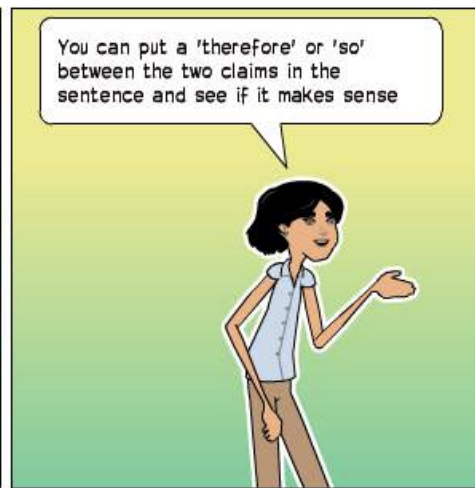




Do you think the statement below is an argument?

Photographs from space show the Earth's surface as curved. The curvature does not show when a photograph is taken from ground level.







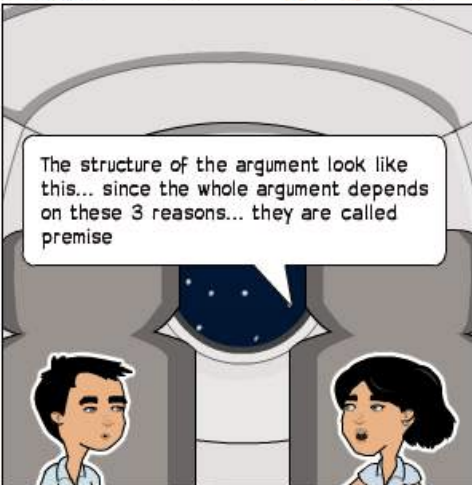
Here there are two reasons mentioned



the time of the train's departure
and the possibility of a 40-min
journey to the station



If they both are true then
clearly they justify the conclusion



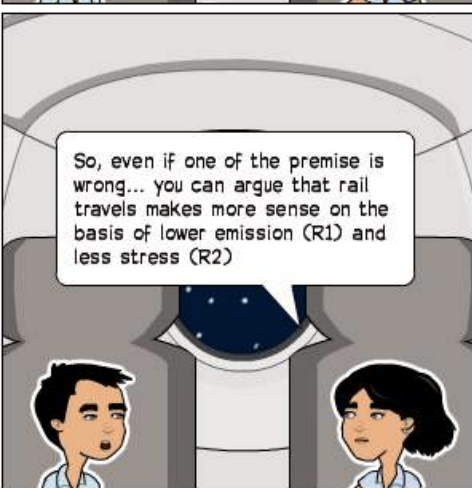
The structure of the argument look like
this... since the whole argument depends
on these 3 reasons... they are called
premise



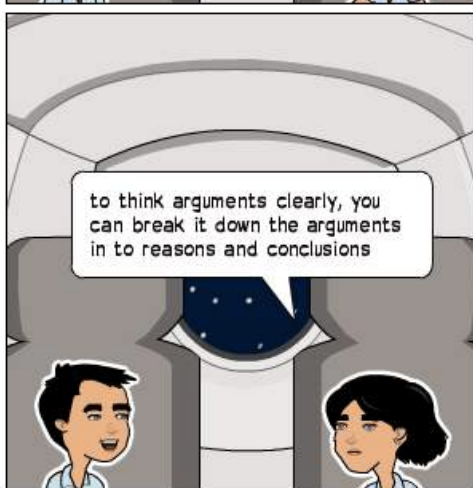
In the case of R3, for instance, the
inference that rail travel makes
more sense is made on the grounds
that trains take passengers right
into a city center unlike planes..



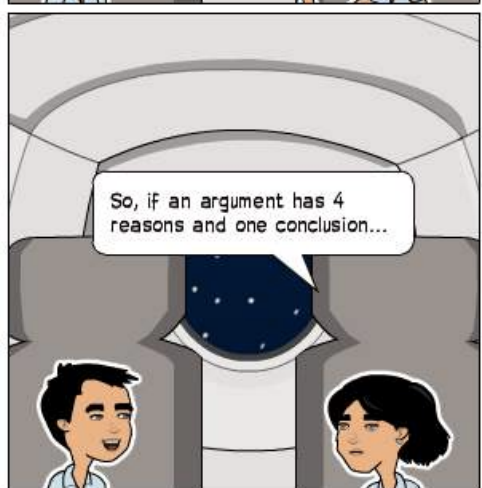
nor other two premise on this...



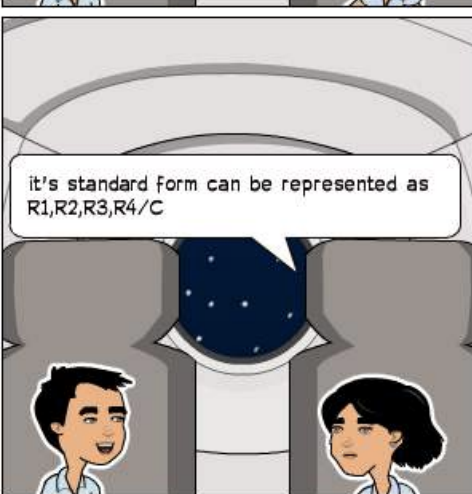
So, even if one of the premise is
wrong... you can argue that rail
travels makes more sense on the
basis of lower emission (R1) and
less stress (R2)



to think arguments clearly, you
can break it down the arguments
in to reasons and conclusions



So, if an argument has 4
reasons and one conclusion...



it's standard form can be represented as
R1,R2,R3,R4/C



Oh wow! I can think very clearly
now and I must question
everything that I see in this
structure



Yes! Although, don't start
from being sceptical



If we use 'R' for reason and 'C' conclusion we can say that all arguments have the form:

$$R_1, R_2, R_3 \dots, R_n / C$$

The reason and conclusion in a standard argument are all *claims*. In theory there is no limit to the number of reasons that can be given for a conclusion.

Take for example

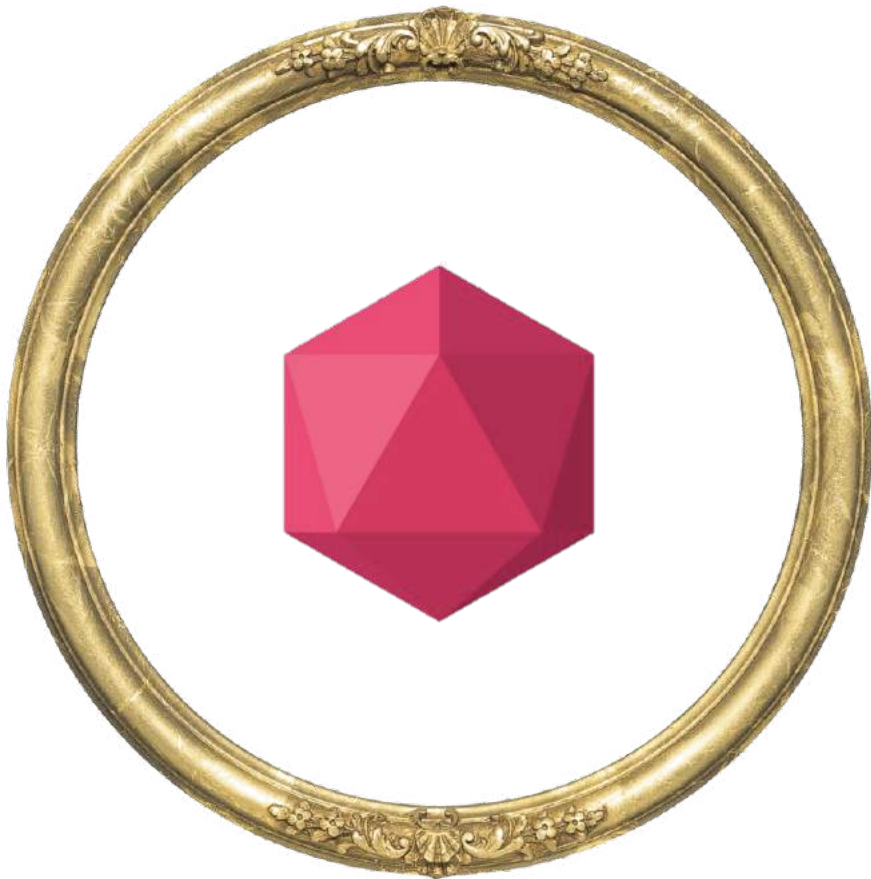
The train doesn't leave until 4.24,
but it can take up to 40 minutes to
get to the station, if the traffic's bad.
It's 3.30 now. We need to leave for
the station within ten minutes to be
sure of catching the train.

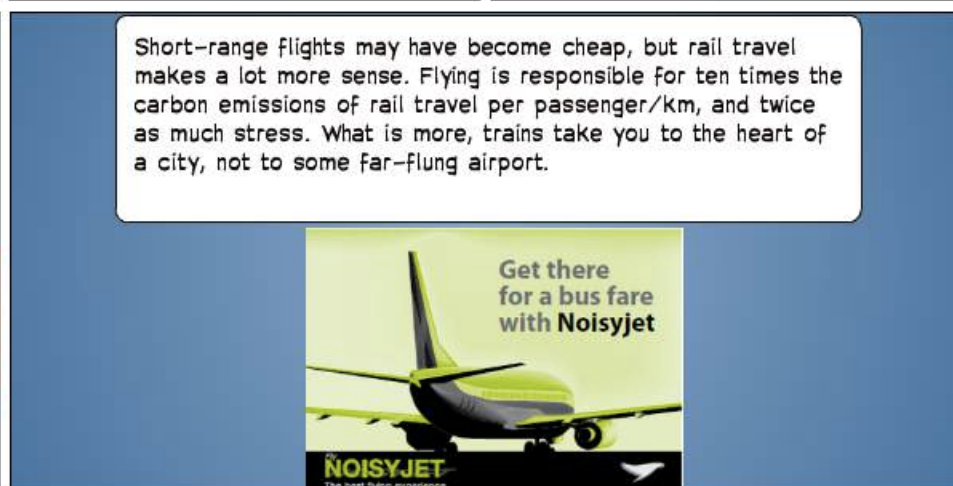
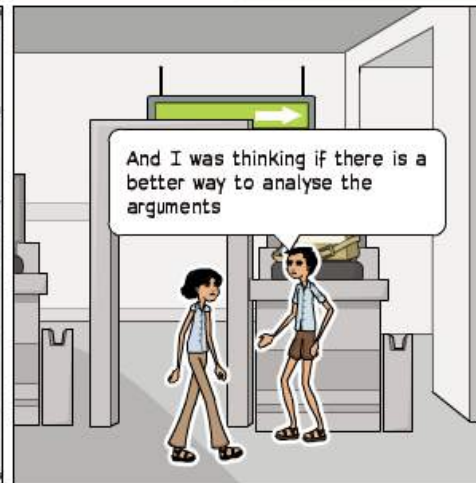
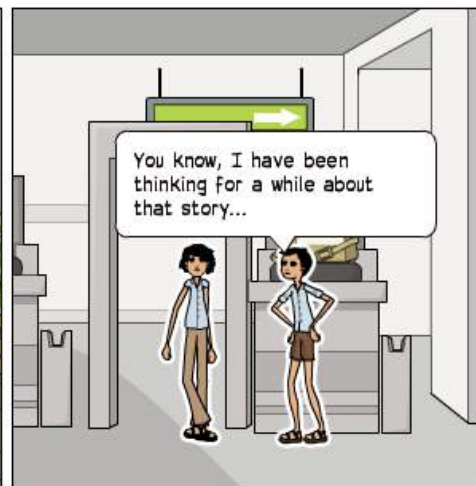
It would look like this in its standard form

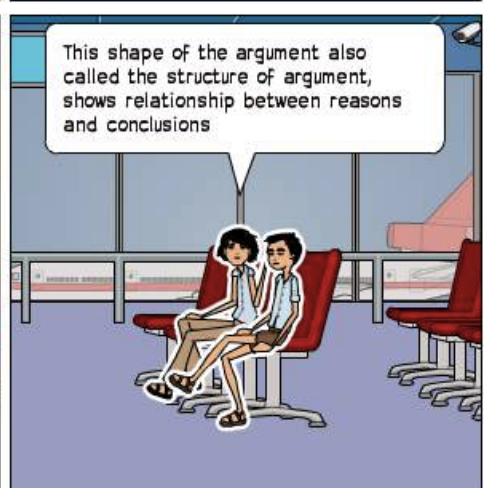
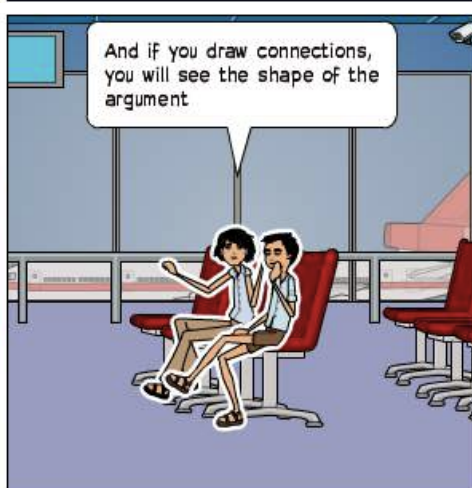
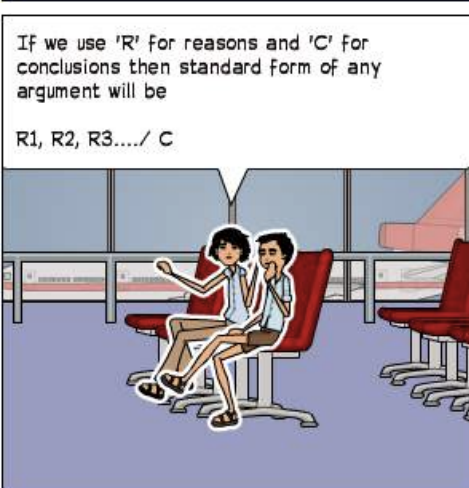
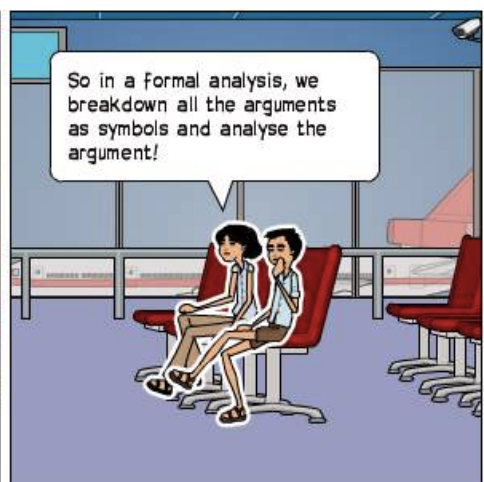
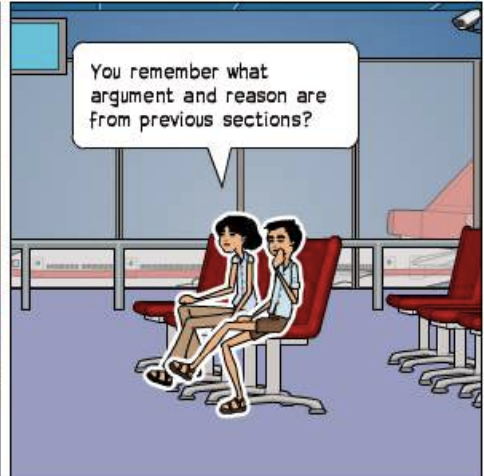
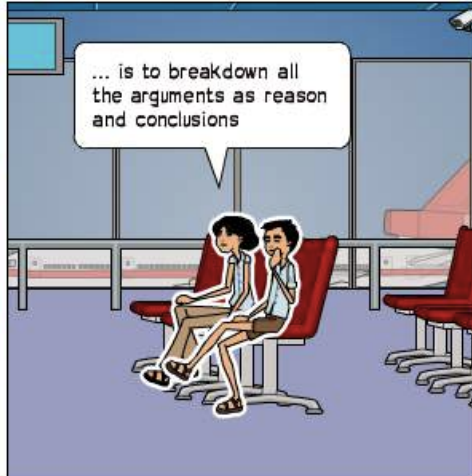
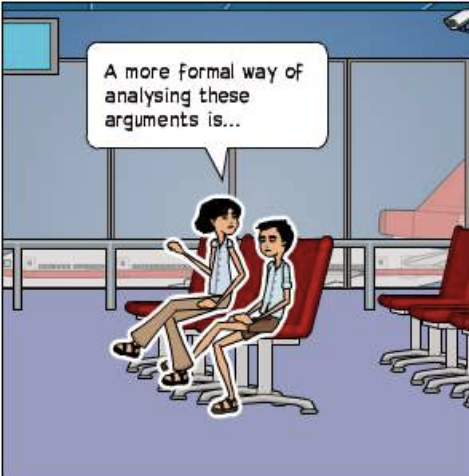
- R1 The train leaves at 4.24.
- R2 It can take 40 minutes to get to the station.
- R3 It's 3.30 now.

C We need to set off within ten minutes to be sure of catching the train

Shapes and structure



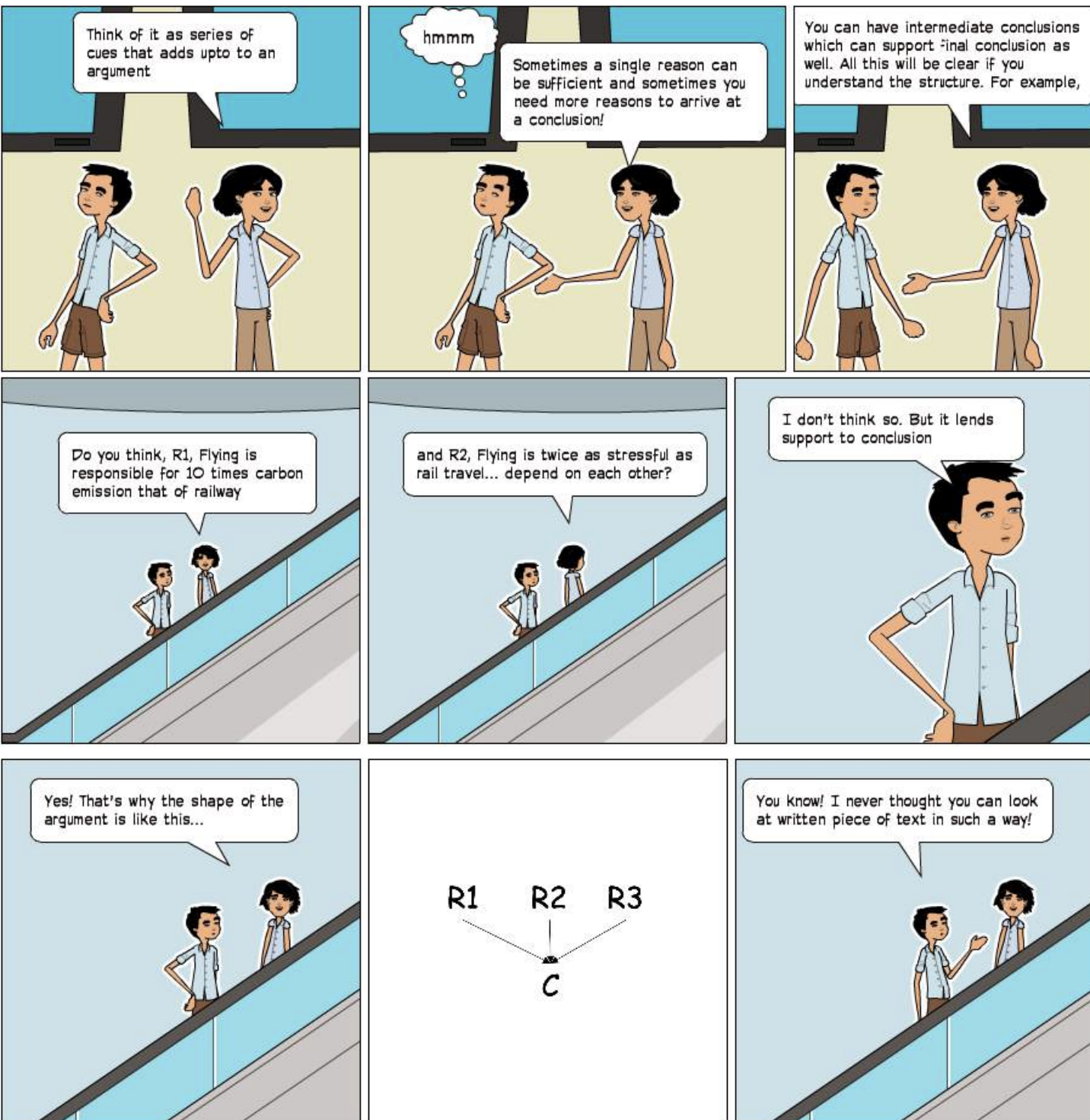
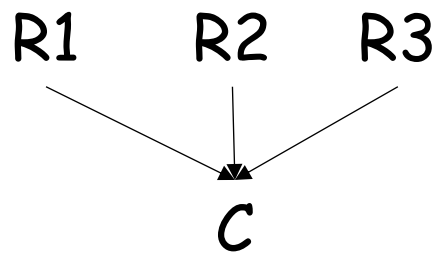




- R1 Flying is responsible for ten times the carbon emissions of rail travel.
- R2 Flying is twice as stressful (as rail travel).
- R3 Trains take you to the heart of a city, not to some far-flung airport.

C Rail travel makes a lot more sense than short-range flights.

If you want to represent the structure of the argument diagrammatically it would look like this:





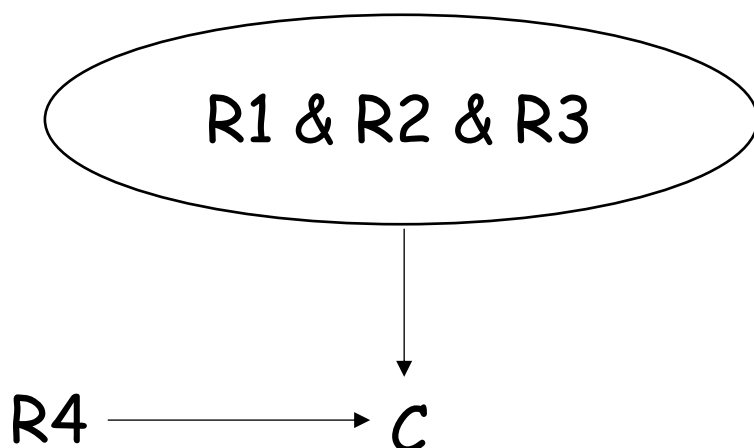
Look at this argument and analyze it

Rajinder cannot be trusted to keep a secret. He was the only person apart from me who knew about Jai and Jheel getting engaged. I haven't said a word to anyone, yet now the news is all round the college. And he spread another story about Jheel that I told him in confidence.

R1
R2
R3
R4

C

Try to draw the structure of the argument and see if you find the structure to be like this



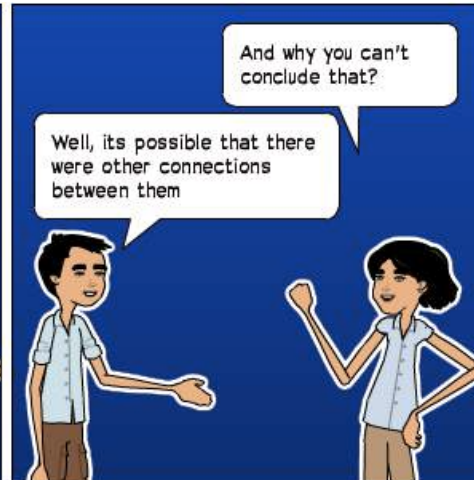


Consider the following report in a local newspaper:

Doctors investigating an outbreak of suspected virus discovered that four of the people who had reported sick had eaten at the fish restaurant the day before; and all had eaten fish. Any establishment that is found to be responsible for food-related sickness will be closed by the authorities and not permitted to reopen until it has been given a certificate of fitness from hygiene inspectors. Today the fish restaurant is closed.

Can any of the following claims safely or reliably be inferred from the passage above?

- A) The source of the outbreak of food poisoning was the fish restaurant.
- B) Fish was the cause of the outbreak.
- C) The has been closed down by the inspectors.



Similarly, we don't know if fish was the reason for sickness



We are not told if all four who fell sick did not eat anything other than fish



They could have very well eaten something else, a side dish, sauce, contaminated water, etc...



There could be many reasons other than fish that may have caused this... probably lack of hygiene in the kitchen



Nor is it safe to infer that inspector closed the restaurant



The statement in the newspaper that restaurants found responsible for food-related sickness have to close is actually irrelevant



It does not mean that because a restaurant closes it is responsible for the sickness



Many restaurants close on one or more days of the week.



Today may be the chef's day off. Many explanations for the closure are possible besides the seemingly obvious one, that it was closed because of food poisoning.



That makes perfect sense!



We are finally here!

heheheh



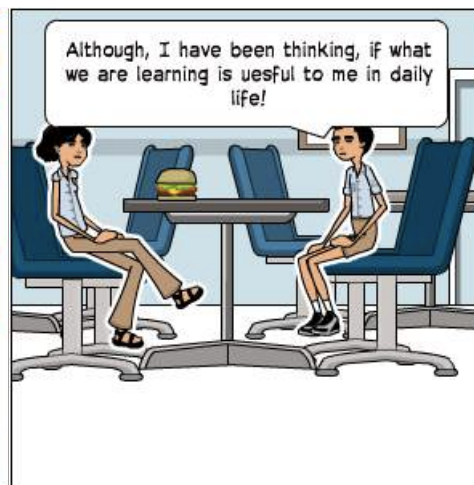
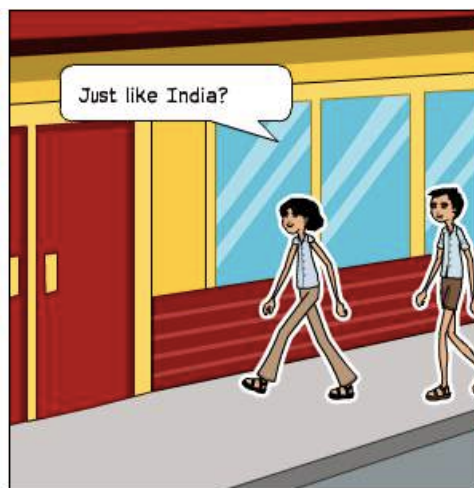
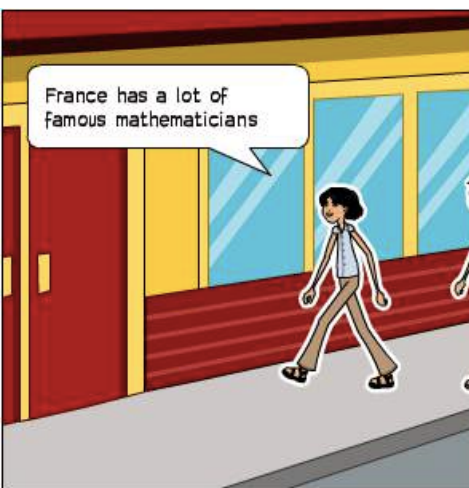
You know why we are in France?

I actually don't

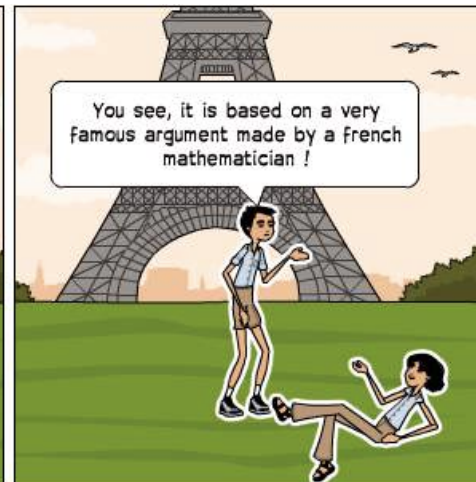
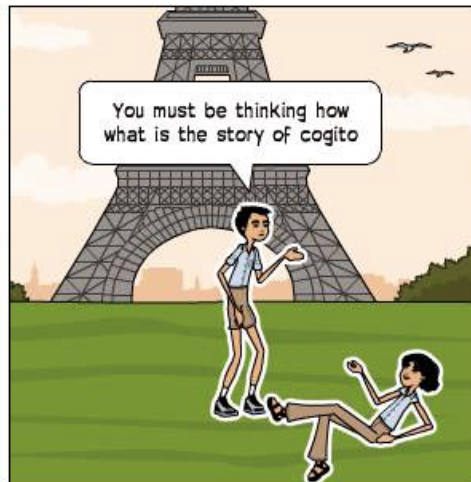
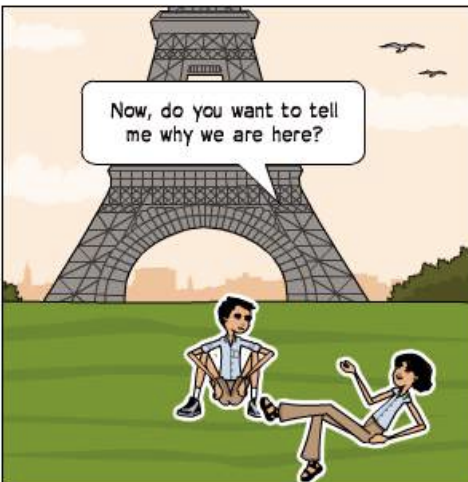
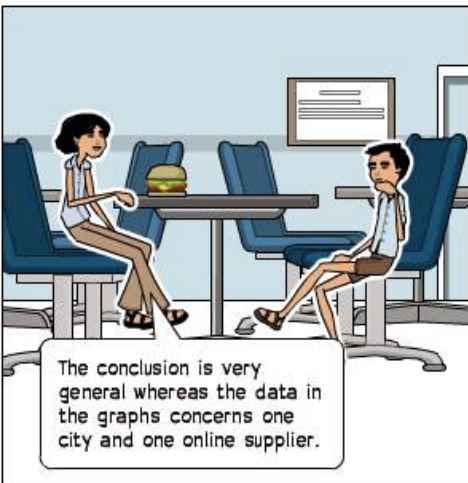
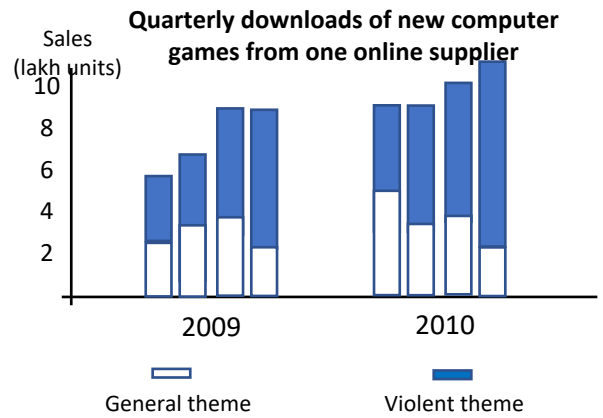
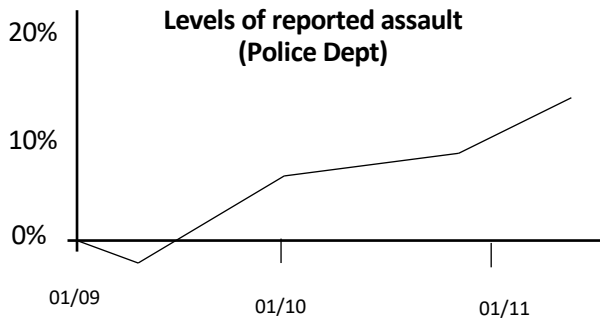


The beginning



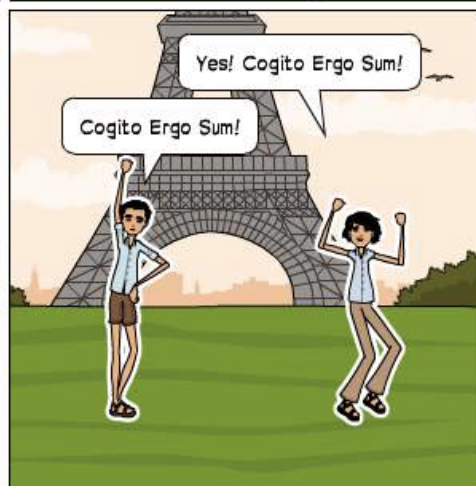
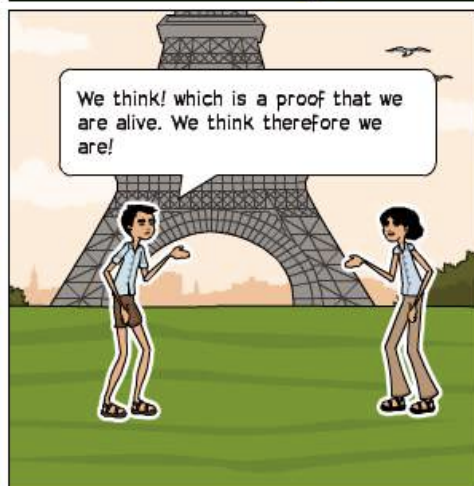
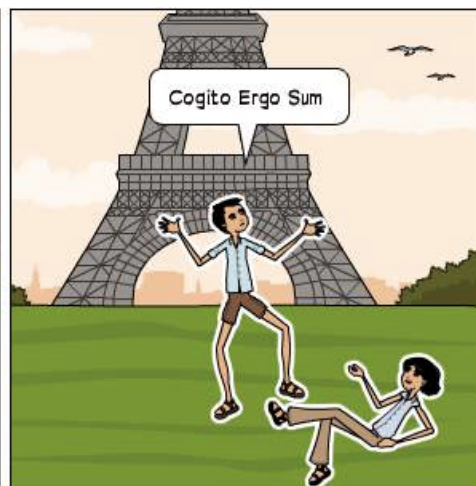


Would the data in the two graphs below support the conclusion that computer games contribute to violence?





René Descartes
(1596 – 1650)



Analysis of arguments

Following is the analysis of arguments given in section "hold your judgement"

Argument 2: The dinosaurs were reptiles, yet they were warm-blooded.

Analysis : The connective is 'yet' and the two connected claims both have to be true for the argument to be true. Firstly that dinosaurs were reptiles, and secondly that they had warm blood. But the use of the connective 'yet' also suggests that there is something surprising or unusual in this: that the second claim is true despite the first being true. The implication is that reptiles are usually, or normally, cold-blooded; and if this is not the case then the use of 'yet' is not really justified, even if both the claims are true in themselves.

Argument 3: Sea levels are rising around the world because global warming is melting the polar ice caps.

Analysis: This argument has two claims connected by 'because'. The author not only asserts that the sea levels are rising and that global warming is causing melting of the polar ice, but also that the sea level is rising because of polar ice cap melting. If all these three conditions are true i.e. two claims and that the first claim is causing the second claim then the argument is sound.

Analysis of arguments

Argument 4: Many parts of the world will soon be submerged if nothing is done to reverse climate change.

Analysis: The connective in this argument is 'if'. First of all it is not claiming either that parts of the world will soon be under water, or that nothing will be done about climate change. Since, the connective is 'if', it indicates that one argument is true, then the other argument also must be true. For instance, if nothing is done, about climate change, then parts of the world will be underwater. If nothing is done and the prediction turns out a false alarm, then the argument as a whole is untrue.

Acknowledgement

We acknowledge the work done by Mr. John Butterworth and Mr. Geoff Thwaites on critical thinking through their book - Thinking Skills (Critical Thinking and Problem Solving)
This book has been a big source of inspiration for
Cogito

Additional resources

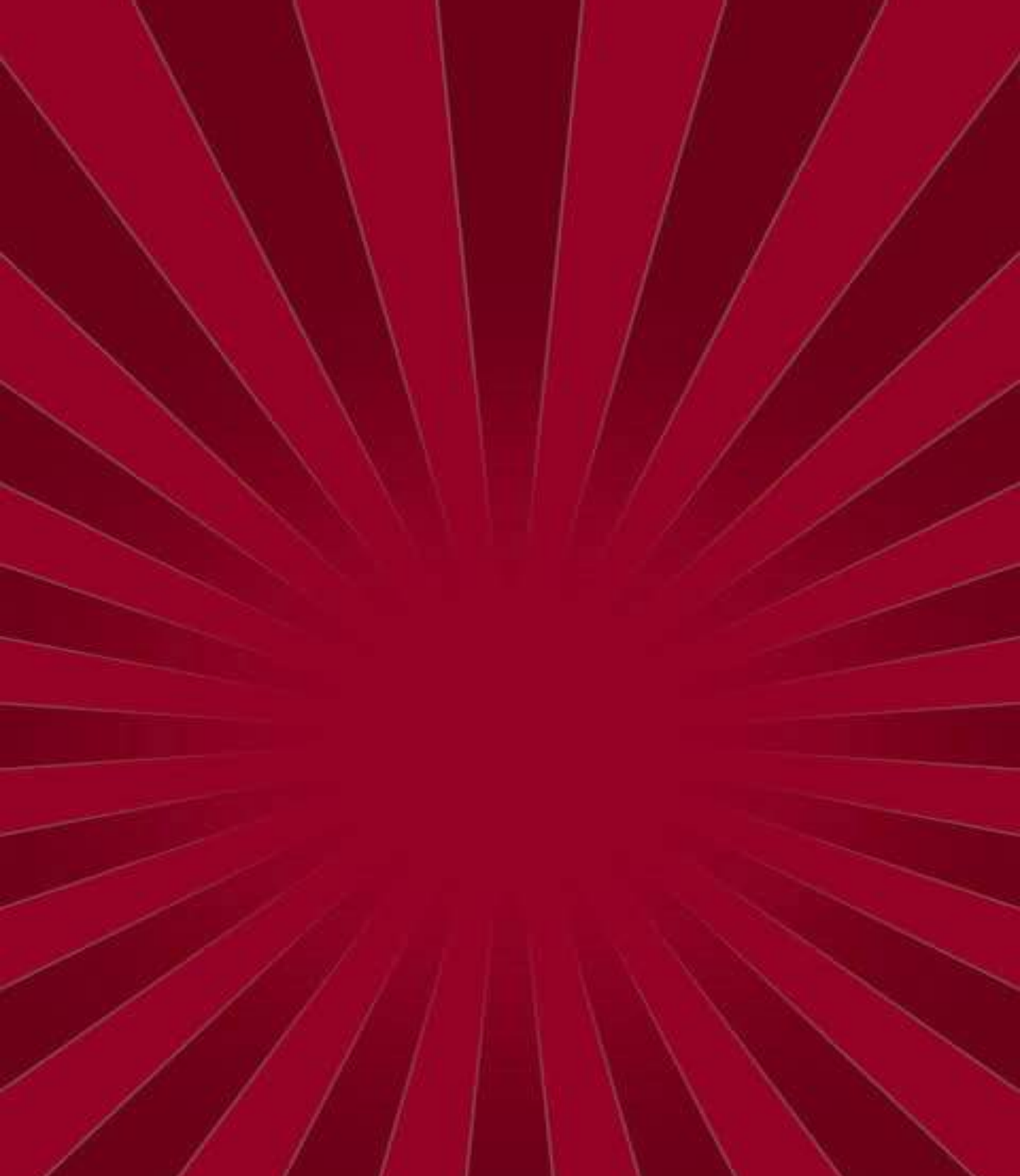
Readings

1. Introduction to Logic and Critical Thinking, Matthew J. Van Cleave
2. The basic concepts of Logic, University of Massachusetts

Videos

1. [TED-Ed - Riddles](#)
2. [5 tips to improve critical thinking](#)

We thank all the contributors for making the above resources available on the internet.



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