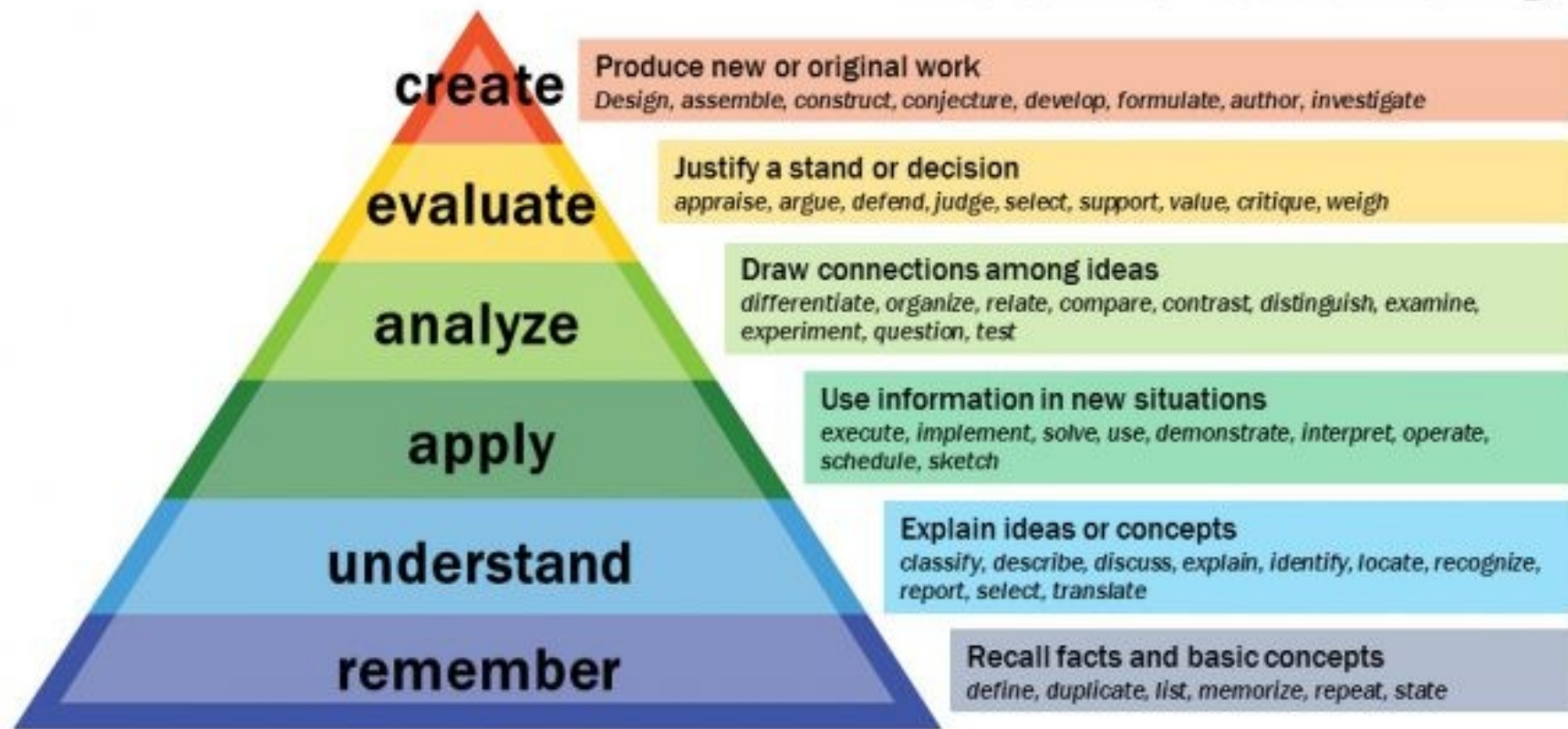# Conceptual Questions

Conceptual Questions

- One of my goals for the course this year is to see a better conceptual understanding of computing in student responses

- This might not be a style of answer you are used to giving

Bloom's Taxonomy

create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate — Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze — Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply — Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand — Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember — Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

Examples

- Within the subject of networking, what is meant by the concept of a protocol? Describe what the purpose of protocols are, and what they enable us to do within a network. How does this relate to the concept of layering?

- Congratulations, you have started a new job at a small telecommunications company. The company founder has created a new IP protocol that uses trinary (each bit can have 3 values as opposed to binary's 2 values per bit). The founder wishes to see their new trinary based IP protocol replace all currently deployed IPv4 and IPv6 protocols.
  Your job at this new company is to produce a report on how feasible it is for this to be done. What problems would you write about in such a report? As this is not a business exam you do not need to consider things such as financial cost, manpower etc. in any detail, but should instead focus on any technical or design problems.

Argument

- A good answer to these is going to be more discussion based than just being a list of facts

- You should be able to bring in and apply your knowledge to justify your answer, and potentially apply it in unfamiliar ways

- A good structure is to set out assumptions, knowledge, and a conclusion

Assumptions

- Anything not stated, but you think it is sensible to assume

- Could be physical characteristics of the system, or ways in which it is going to be used

- You don't need to state everything, just things that will affect your conclusion

- This is usually short, sometimes not needed at all

Discussion

- Identify and explain the relevant concepts
- Extrapolate how they could be applied to any new use cases
- You don't always need to be definite, can be talk in terms of probabilities
- This is the real meat of the answer

Conclusion

- Good science always has a conclusion

- This should be supported by your discussion and assumptions

- Premises → Conclusion

Lets answer an example

Congratulations, you have started a new job at a small telecommunications company. The company founder has created a new IP protocol that uses trinary (each bit can have 3 values as opposed to binary's 2 values per bit). The founder wishes to see their new trinary based IP protocol replace all currently deployed IPv4 and IPv6 protocols.

Your job at this new company is to produce a report on how feasible it is for this to be done. What problems would you write about in such a report? As this is not a business exam you do not need to consider things such as financial cost, manpower etc. in any detail, but should instead focus on any technical or design problems.

Possible Answer

- Lets assume the creator has also got a device capable of running trinary. This now means he needs to deploy these devices everywhere as current binary systems will not be able to support it

- Alternatively they could have created an emulator, but this would add massive overhead as everything would need to converted from the binary machine code to whatever system the trinary is written in

- Either way no existing router would support this as they have IP soldered into them at a hardware level, so cannot be patched

- It is also not clear what is wrong with IPv4 and IPv6, as they are sufficient for meeting the modern and expected needs of the internet. Current problems such as fairness or filling the address space would do not require a complete rework of the entire system

- The strength of IP is that everyone uses it, and so everyone can address each other and communicate. If some systems start using a completely different trinary system then you fracture the whole thing into two separate systems. There's no way to address a trinary system in IP unless trinary just uses the same address space, somewhat defeating the whole point of a new and separate system

- This is unfeasible as it would in all likelihood be slower to run, difficult to deploy and would fracture the internet for no apparent gain

Lets try some questions

- Is computer science really a science?

Lets try some questions

- Is computer science really a science?

- If everything runs in machine code anyway, why do we program in higher level languages like C?

Lets try some questions

- Is computer science really a science?

- If everything runs in machine code anyway, why do we program in higher level languages like C?

- If higher level languages like C are so good, why don't we invent a CPU that runs uses that as its instruction set instead?