

Specification & learning objectives

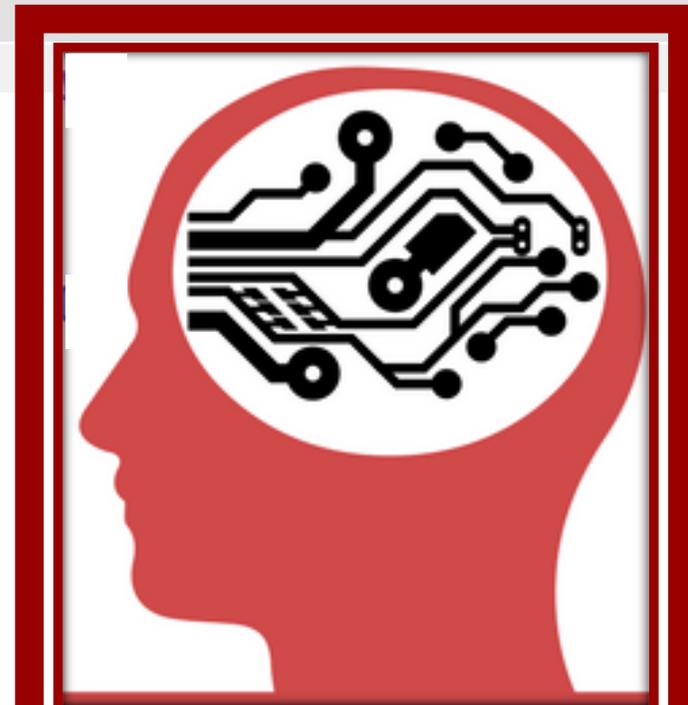
<u>A Level</u>	<u>Specification point description</u>
2.1.1a	The nature of abstraction
2.1.1b	The need for abstraction
2.1.1c	The differences between an abstraction and reality
2.1.1d	Devise an abstract model for a variety of situations

Resources

PG Online textbook page ref: 260-264

Hodder textbook page ref: 26-27

[CraignDave videos for SLR 18](#)



Key question: What is abstraction and why is it needed?

Abstraction- Abstraction is the process of separating ideas from reality.

Abstract model- A model which has been abstracted for a specific function by removing unnecessary features in an image which has been taken of reality.

- The hiding of necessary detail and only showing the relevant detail.
- It's used to model and display certain situations.
- It makes ideas easier to represent.

- Most buildings and topography removed
- Major roads clearly colour coded and labelled
- Major tourist attractions added as 3D graphics
- River Thames clearly marked
- Major parks shown

A simplified map of London which is designed to highlight the major tourist attractions and the relative locations.

Key question: How is abstraction used in every-day life?

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- *Different classification of roads coloured (M, A, B etc.)*
- *Road names labelled in boxes*
- *Major areas written in CAPITALS*
- *Minor areas written in lower case*
- *Most other features removed*
- *Grid lines added for easy reference*

This helps car drivers navigate around London.

Key question: What are some examples of abstraction in computer science?

How abstraction is used when draw building plans

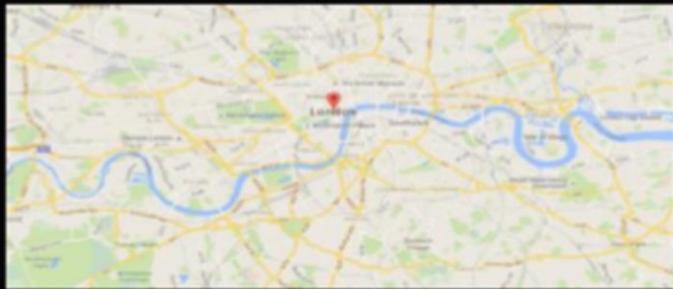
- Top down view used
- Scale added
- Most internal features removed
- Structural elements, such as main walls the feature, bold thick black lines
- Location of windows clearly shown
- All doors shown along with direction of opening
- Rooms labelled
- Stairs clearly shown with direction



Abstract models



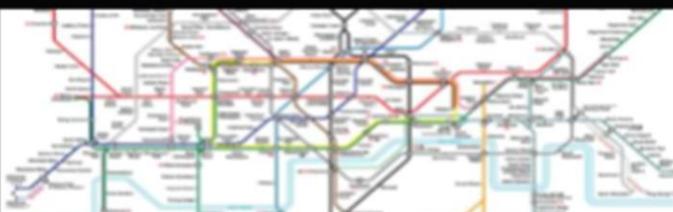
London from above. It is a true reflection of reality with nothing added and nothing removed.



It would however be completely unusable if you gave this image to someone who was unfamiliar with London and expected to take a tube journey across the city.

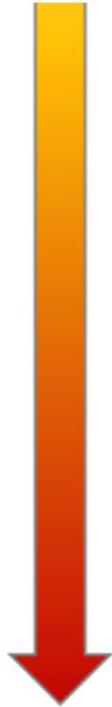


The fourth image is a very highly abstracted version of London. Distances have been distorted, landmarks and geography have been removed, leaving only the River Thames and the Tube network as the only remaining features of London.



The fourth image although very far from reality is now the most useful for navigating the underground system.

Abstract models



The last two images take abstraction even further, they just show the complete Central line and then just part of the Central line heading Eastbound from Chancery Lane. These additional maps would be should inside the trains on the Central Line, where there is no longer any need to show the additional detail or complexity of the other tube lines.

Abstraction

Move through the various images the level of abstraction increases. More detail is removed and other details highlighted. We move further and further from the actual reality of the original satellite image and move deeper into abstraction.

Typical exam questions

1. AirlineGo is a flight simulator, designed for pilots, to learn how to fly commercial aircraft. The simulator allows the pilot to fly virtually over many types of terrain including cities, landing and taking off at international airports.

The developers of the simulation software examine real cities. They then use a process of abstraction to design a virtual city and airport.

Explain why developers use abstraction. **[2]**

- Removing unneeded complexities (1)
- Saves memory / resources (1)
- E.g. remove passengers, other planes, other obstacles, landscaping to reduce memory needed (1)

The simulated city and the real city will have similarities and differences.

2. State two similarities between the simulated city and the real city, and explain why these similarities exist. **[4]**

- Road signs / road markings (1) – so the user can practise obeying these when driving (1).
- Traffic Lights (1) – so user can practise obeying traffic light signals (1).
- Zebra crossing (1) – so user can practise slowing down / stopping at zebra crossing (1).
- Cars / vehicles (1) – so user can practice driving with other cars on the road (1).
- Pedestrians (1) – so user can practice looking out for and avoiding pedestrians (1).

3. State two differences between the simulated and real city. **[4]**

- Scenery may be simplified (1).
- Smaller roads may be removed (1).
- Potholes may be removed (1).
- Buildings may be simplified (1).
- Imperfections / wear / damage in road markings and signs will be ignored (1).
- No need to worry about sounds of real town (1).

Target:

Overall grade:

Minimum expectations & learning outcomes

- Term 204-205 from your A Level Key Terminology PowerPoint should be included and formatted.
- You must include a clear example of abstraction in every-day life with an explanation of how and why abstraction has been applied to the context.
- You must include examples of how abstraction is used in computer science.
- You must include a case study of abstraction for a car racing game.
- Answer the exam questions.

Feedback

<u>Breadth</u>	<u>Depth</u>	<u>Presentation</u>	<u>Understanding</u>
<input type="checkbox"/> All	<input type="checkbox"/> Analysed	<input type="checkbox"/> Excellent	<input type="checkbox"/> Excellent
<input type="checkbox"/> Most	<input type="checkbox"/> Explained	<input type="checkbox"/> Good	<input type="checkbox"/> Good
<input type="checkbox"/> Some	<input type="checkbox"/> Described	<input type="checkbox"/> Fair	<input type="checkbox"/> Fair
<input type="checkbox"/> Few	<input type="checkbox"/> Identified	<input type="checkbox"/> Poor	<input type="checkbox"/> Poor

Comment & action required

Reflection & Revision checklist

<u>Confidence</u>	<u>Clarification</u>
☹️ 😐 😊	Candidates need to understand the term abstraction and its purpose in the design and creation of computer programs.
☹️ 😐 😊	Candidates need to understand the benefits of abstraction and apply these benefits to a specific scenario.
☹️ 😐 😊	Candidates may be given a scenario and be asked how abstraction can be applied to it, how it has been applied or how further abstraction can be applied.
☹️ 😐 😊	Candidates need to have an understanding of how reality differs to abstraction and understand the differences between reality and abstraction.
☹️ 😐 😊	Candidates may be given a scenario/example and be asked how the abstraction differs from the reality.