Lesson Plan

<table>
<thead>
<tr>
<th>Length</th>
<th>60 mins</th>
<th>Specification Link</th>
<th>212/c</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning objective</td>
<td></td>
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<tr>
<td>Time (min)</td>
<td>Activity</td>
<td>Further Notes</td>
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| 10 | Some of the content of this video is also covered in another video (20. Cache memory) where the CPU cache is studied.  
• Ask the students where they store most of their school equipment such as text and exercise books, pens, pencils, rulers etc and PE kit.  
• Ask them to imagine the time it would take if they had to go home between lessons to get the correct equipment for the next lesson each time.  
• Ask them how they solve this problem  
• Explain that their school bag is a cache – a temporary storage for things they need to access quickly. It saves a lot of time as they can access them from the cache rather than from their main storage area.  
• Explain that computers also use caches to temporarily store data that they frequently need in order to save time and speed up operations. | At home, bedroom, desk etc  
Use their school bag to bring in what they need for each day. |
| 15 | Watch the Video, pausing to discuss the content. | |
| 5 | Discuss the videos to assess learning. Ask questions such as:  
• Name two types of memory used in a computer?  
• What is a cache?  
• Why do web pages usually load much faster the second time they are accessed?  
• How is the memory used for the CPU cache different from the main RAM? | RAM and ROM  
A short term storage area.  
The browser saves the page in its cache – a folder on the hard disk drive and it is loaded from there the next time it is requested.  
It is much faster but more expensive. |
| | Pupils to complete Worksheet 1 either on paper or on computer. They may need access to the Internet to research some of the questions.  
Ask individual students for their answers and discuss with the class so that all students will have the correct answers. | Answers provided.  
Ask students with the correct responses to explain to the class how they arrived at their answers. |
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<th>Time (min)</th>
<th>Activity</th>
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<tbody>
<tr>
<td>10</td>
<td>The students use the <strong>Interactive Activity 1</strong>.</td>
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<tr>
<td></td>
<td><strong>Extension Challenge/Homework</strong></td>
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<td></td>
<td>Students to complete and submit Worksheet 2 for homework.</td>
<td></td>
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<tr>
<td>5</td>
<td><strong>Plenary – Quick revision</strong></td>
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<td>In order to assess learning, revisit the questions asked after the video.</td>
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What is a cache and why is it used?
A cache is a short-term storage area.
A cache is used to speed up certain computer operations by temporarily placing data, or a copy of it, in a location where it can be accessed more rapidly than normal. For example, data from a disk may be cached temporarily in memory so that it can be read and written more quickly than if it had to come directly from the disk itself.

Explain what is meant by a disk cache.
A disk cache is a mechanism for improving the time it takes to read from or write to a hard disk drive.
It is usually included as part of the hard disk but can also be a portion of random access memory (RAM).
The disk cache holds data that has recently been read and, in some cases, adjacent data areas that are likely to be accessed next.
Write caching is also provided with some disk caches.

Explain what is meant by a memory cache.
A part of RAM memory that is set aside as a specialised cache or buffer that is continually updated.
It is used to store data eg large graphic files that are frequently read from the hard disk drive.
WORKSHEET 1 ANSWERS

4. What is microprocessor or CPU cache?
A CPU cache is a cache used by the central processing unit of a computer to reduce the average time to access memory.

The cache is a smaller, faster memory which stores copies of the data from frequently used main memory locations.

Cache memory is made of Static RAM (SRAM) while the RAM is Dynamic RAM (DRAM). Static RAM does not need to be constantly refreshed; as long as power is applied to the chip, SRAM will hold the data.

Level 1 (L1) cache is closer to the CPU and is usually smaller in size.
L1 cache is usually built into the CPU while L2 cache usually resides on a separate chip next to the CPU.
Some CPUs have both L1 and L2 cache built-in and designate the separate cache chip as Level 3 (L3) cache.

5. What is a web cache?
It is a folder full of web pages in the user’s computer that is maintained by the Web browser for a period of time. If the local, cached page has not been updated on the Web, it is retrieved immediately by the browser, saving download time.

In a network a cache server keeps copies of the most-recently requested Web pages in memory or on disk in order to speed up retrieval. If the next page requested has already been stored in the cache, it is retrieved locally rather than from the Internet.
It is advisable to periodically clear the cache as it forces the browser to retrieve the newest copy available from the website, a process which should happen automatically but sometimes does not.
(a) Explain what is meant by a computer cache and what it is used for. (2)

A cache is a short-term storage area. A cache is used to speed up certain computer operations by temporarily placing data, or a copy of it, in a location where it can be accessed more rapidly than normal.

(b) Describe the function of a web cache and a problem that may arise in its use. (3)

It is a folder full of recently accessed web pages in the user’s computer. When a previously loaded web page is requested, it is loaded from the cache far more quickly than from the Internet. A problem may arise if the web page is updated online but the cache does not realise or update its copy.

(c) Explain how the memory used in a CPU cache is different from that used in the main RAM of the computer. (2)

It is static RAM rather than dynamic RAM. It has a lower latency. It does not need to be refreshed.