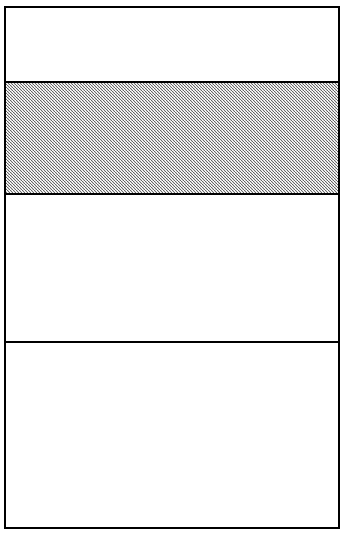
REVIEW EXERCISE 6: MAIN MEMORY MANAGEMENT

1. Given memory partitions of **100 KB, 500 KB, 200 KB**, **300 KB** and **600 KB** (in order) and the processes arrive in the order requesting for **212 KB, 417 KB, 112 KB** and **426 KB** of main memory (in order).

   With the aid of diagrams, demonstrate how each of the first-fit, best-fit and worst-fit algorithms place processes in the main memory. Calculate the **internal** and **external fragmentation** for each algorithm and state which algorithm makes the most efficient use of memory.

   (Ans: Int. Fragmentation: 359 KB, 433 KB, 359 KB, Ext. Fragmentation: 600 KB, 0, 600 KB)

2. The memory partitions of a computer system are shown below. THREE processes arrive in the order **P0**, **P1** and **P2** of size 120K, 75K and 135K respectively.



Based on the **Worst-Fit** and **Best-Fit** allocation algorithms,

a. draw and label the memory map to illustrate the allocated memory space for the processes. State which processes, if any, cannot be loaded in the memory map.

b. Calculate the total amount of internal and external fragmentation for each allocation algorithm.

(Ans: Int. Fragmentation: 85 KB, 30 KB, Ext. Fragmentation: 80 KB, 0)

3. Consider a logical address space of 4 pages of 16 bytes each, mapped onto a physical memory of 8 frames.

a. How many bits are required to represent the logical address (page number and page offset)?

b. Calculate how many bits are required to represent the physical address.

(Ans: (a) 6 bits, (b) 7 bits)

4. Consider the following segment table:

Segment	**Base**	**Length**
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the **physical addresses** for the following logical addresses? Indicate whether they are **legal** or **illegal** references.

a. 0, 430 (Ans: 649, legal)
b. 1, 10 (Ans: 2310, legal)
c. 2, 500 (Ans: 590, illegal)
d. 3, 400 (Ans: 1727, legal)
e. 4, 112 (Ans: 2064, illegal)