



A-level COMPUTER SCIENCE (7517/1E)

Paper 1

Preliminary Material

To be given to candidates on or after (Date TBC), subject to the instructions given in the *Teachers' Notes (Paper 1/TN)*

Instructions

- A Skeleton Program is provided separately and must be read in conjunction with this Preliminary Material.
 - Candidates are advised to familiarise themselves with the Preliminary Material and Skeleton Program before the exam.
 - Another copy of this Preliminary Material will be made available to you in the exam. You will also be given access to the Skeleton Program and Data File electronically at the start of the exam. You must **not** take any copy of the Preliminary Material, Skeleton Program or any other material into the exam room.
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The Preliminary Material for this specimen paper uses object-oriented programming. This will **not** necessarily be the case for each exam series. Each year a different Skeleton Program will be released which will make use of one or more of the following topics from the syllabus for Paper 1:

- object-oriented programming
- advanced data structures
- recursion
- complex algorithms.

The Preliminary Material and Skeleton Program will be made available to centres from (Date TBC) of the academic year in which they will be used in Paper 1, to ensure that centres have enough time to deliver the topics featured in practical lessons.

Instructions for candidates

The question paper is divided into four sections and a recommendation is given to candidates as to how long to spend on each section.

Below are the recommended timings for the exam.

SECTION A

You are advised to spend no more than **55 minutes** on this section.

Questions will examine the specification content **not** specific to the Preliminary Material.

SECTION B

You are advised to spend no more than **20 minutes** on this section.

You will be asked to create a new program **not** related to the Preliminary Material or Skeleton Program.

SECTION C

You are advised to spend no more than **15 minutes** on this section.

Questions will refer to the Preliminary Material and the Skeleton Program, but will not require programming.

SECTION D

You are advised to spend no more than **60 minutes** on this section.

Questions will use the Skeleton Program and the Preliminary Material.

Electronic Answer Document

Answers for **all** questions, for all sections, must be entered into the word processed document made available to you at the start of the exam and referred to in the question paper rubrics as the Electronic Answer Document.

Preparation for the exam

For your programming language you should ensure that you are familiar with this Preliminary Material and the Skeleton Program.

Based on the description in Staius' journal you are sure that this must be the right place. The blue-green moss covering the rocks and the dense tree foliage combine to conceal the cave entrance; you almost walked straight past it and it was only through luck that you saw it. There isn't any time to waste – ever since the journal was discovered, everyone has been looking for this place. The thick cobwebs across the entrance prove that you must be the first one here. You know that, if you are right, you could be the one that finds, in the cavern below the mountain, the single draft of Styxian potion contained in Staius' flask. The journal says that there is a fearsome beast lying in wait, but the risk is worth it. Staius wrote that consuming the potion would grant the drinker invulnerability. Nothing could hurt you, cut you, graze, scratch or bruise you. Your thoughts start to drift and you imagine what you could do with such power.

"Snap out of it," you tell yourself. Someone else could find this place and you can't take that risk; the flask contains only enough potion for one. Quickly you shoulder your pack, then you light your torch, brush aside some cobwebs and step into the cave.

Inside, the ground is rough and you stumble several times. As you go deeper into the mountain, the cave darkens and soon the only light is coming from your torch. After you have been walking for a few minutes the cave widens and then ends abruptly. You take out your copy of the journal. You read the description of the cave again. It says that, at the end of the cave, there is a large fissure near the western part of the wall and that the cavern, where the flask is hidden, is at the bottom of the fissure. You move over to the west side of the cave. Sure enough, the fissure is there. You take off your pack and then move carefully nearer the edge. The light from the torch does not reach far enough down to reveal the bottom, but you can see that the fissure walls are too steep to get down unaided so you will need your climbing equipment. You place your torch carefully on the floor nearby and take your rope, pitons and carabiners out of your pack.

Your foot slips on some loose stones and you fall backwards into the fissure. You tumble down the hole in a shower of dust and pebbles, falling into the cavern below. You land painfully on the rocky floor.

It is dark; your torch is back in the cave and it weakly illuminates your immediate surroundings but you cannot see any farther into the cavern. You become aware of a sonorous noise around you and it takes you a few minutes to work out what it is. The monster is asleep somewhere in the cavern and is snoring loudly. The sound reverberates around you so you can't work out in which direction the monster lies.

You can see the bottom aperture of the fissure several metres above your head and try to scramble up the wall to reach it, but the rock face is too sheer and you can't get sufficient purchase. From what you can remember of the journal, you must be at the north-west corner of the cavern.

You make your mind up. You can't get out of the cavern the way that you came in and the monster could wake soon. You decide to explore the cavern. Maybe you will find another way out. Maybe you will find the Styxian potion. You have no choice but to play the game of...

MONSTER!

MONSTER!

The **Skeleton Program** in this Preliminary Material is a program for the one-player game MONSTER!.

When playing MONSTER! the player starts in the north-west corner of a dark cavern. The cavern is represented by a 7 x 5 rectangular grid of cells. The player's current position is indicated by an *. The player is presented with a list of five options: they can either return to the main menu (where they can save the current game if they want to) or they can move one cell in one of four possible directions. If they enter 'N' they will move one cell to the north, 'S' will move them one cell to the south, 'E' will move them one cell to the east and 'W' will move them one cell to the west. The initial position of a new game is shown in **Figure 1**.

Figure 1

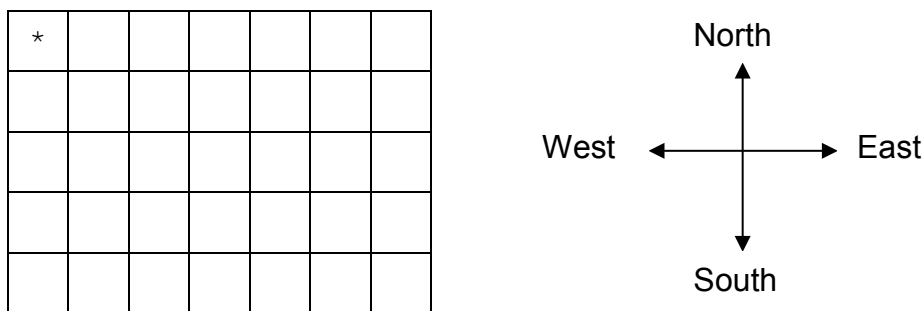
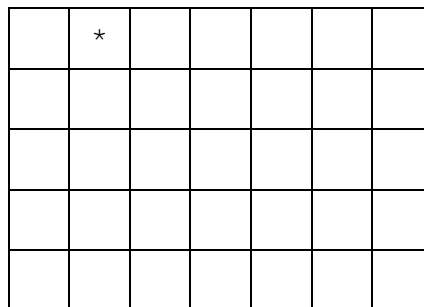


Figure 2 shows a new state, resulting from the user selecting 'E' in the starting position.

Figure 2



The aim of MONSTER! is to find the hidden treasure (a flask containing a Styxian potion) that is in one of the cells of the cavern. Unfortunately, the cavern is dark and the only way that a player can find the flask is to move around until they are in the same cell as the flask. When a new game is started, the flask will be in a random position in the cavern (though it won't be in the same cell as the player starts in). If the player moves into the cell that contains the flask, then they win the game.

The cavern is also the lair of a fearsome monster that guards the flask. At the start of a new game the monster is asleep. As the cavern is dark the player cannot see where the monster is. If the player moves into the cell that contains the monster then the monster will wake up and eat the player and the player will have lost the game.

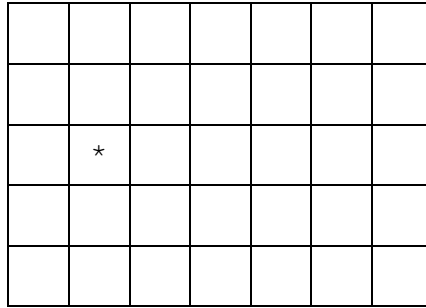
The monster has set two traps in its cavern. The player cannot see where these traps are. If the player moves into a cell that contains a trap then the monster will wake up. When the monster is awake, it will move around the cavern until it either eats the player or the player finds the flask. The monster is twice as fast as the player and makes two moves for each player move. Each move is one cell in one of the four possible directions. When it is awake the monster's skin glows so the player can see the position of the monster. The monster can see in the dark and so knows where the player is. The current position of the moving monster is indicated by an 'M' in the cavern displayed to the player.

If the monster moves into the same cell as the flask, it kicks the flask out of the way and the flask will be moved to the cell the monster came from. When the monster is awake, it does not matter if the player (or the monster) moves into a cell containing one of the traps.

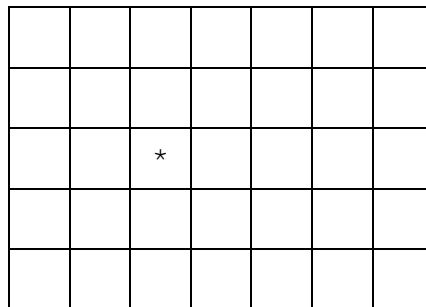
Figure 3 shows part of a possible game as displayed to the player. The player moves one cell to the east, which triggers a trap that wakes the monster. The player is then shown the position of the monster in the cavern. The monster then makes its first move and the new state of the cavern is shown. It then makes its second move and the updated state of the cavern is shown. It is then the player's turn to move.

Turn over for Figure 3

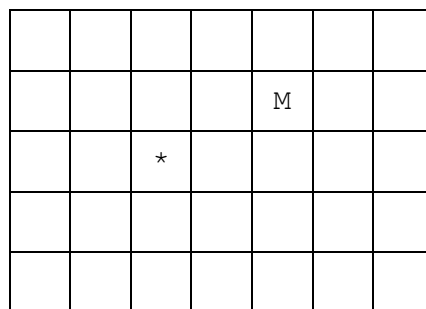
Figure 3



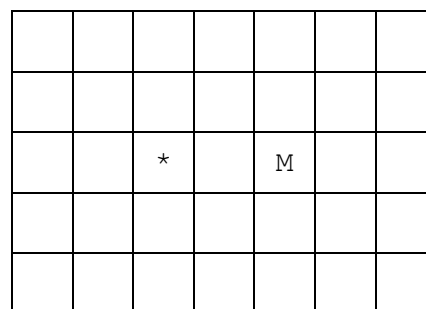
The position of the player is shown.



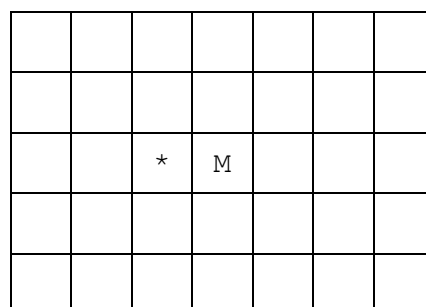
The player moves to the east.



This sets off a trap and wakes up the monster.



The monster makes a move.



The monster makes another move. Now it is the player's turn again.

In the Skeleton Program there is a menu containing **three** options: 'Start new game', 'Play training game' and 'Quit'. If the user chooses 'Play training game' the user will start playing MONSTER! from the game state shown in **Figure 4**.

Figure 4

| | | | | | | |
|--|--|--|---|---|--|---|
| | | | | M | | |
| | | | F | | | |
| | | | | * | | T |
| | | | | T | | |
| | | | | | | |

'F' denotes the position of the flask; 'T' denotes the position of a trap. The flask, traps and monster are not displayed to the player when the training game starts.

END OF PRELIMINARY MATERIAL