1. Eve enjoys playing board games. Her favourite board game is called “Pot Luck”. This has a numbered grid of 10 squares by 10 squares. Each square has a number between 1 and 100.

Players place their game counters on square 1. A 30-minute timer is set which counts downwards. Each player rolls two 6-sided dice and then moves their game counter that number of squares. Some squares tell the player to pick up a card. These have instructions on, such as 'Move forward 10 spaces'. If the player lands on one of these squares they move according to the instruction on the card. The first player to land on square 100, is announced as the winner. If no winner is announced before the timer runs out, then it is a draw.

Eve would like to create a computerised version of this game.

i. She has been told that she should make use of abstraction when creating the game.

Describe what is meant by the term 'abstraction'.

[2]

ii. Give **three** examples of how Eve could use abstraction when creating her game.

1

2

3

[3]

iii. Give **two** reasons why Eve should use abstraction when designing the game.

1

2

[2]

2. A group of students are designing a racing car game. The game will allow players to enter their name and then a choice of vehicle. They will then race against other vehicles that will be controlled by the program. Players will use the arrow keys to control their vehicle.

The students use abstraction during the design process.

i. State what is meant by abstraction **and** describe how it can be used to design the racing car game.

Definition

Use

---

[3]

ii. Explain why it is beneficial to use abstraction when designing a computer program such as a game.

---

[3]

3(a). The following strings are stored in an array.

“rainbow”	“moon”	“sun”	“stars”	“clouds”	“tornado”

Explain how a linear search would search the array for the index that stores “clouds”.

---**[3]**

(b). State why a binary search cannot be used in this example.

---**[1]**

4. A text-based computer game allows a user to dig for treasure on an island. The island is designed as a grid with 10 rows and 20 columns to store the treasure. Each square is given an x and y coordinate. Some of the squares in the grid store the name of a treasure object. Each treasure object has a value, e.g. 100 and a level, e.g. "Bronze."

The computer game makes use of abstraction.

i. Describe what is meant by the term abstraction and give an example of how abstraction can be used in the treasure game.

Description: _____

_____

_____

_____

Example: _____

_____ **[3]**

ii. Give **three** benefits of using abstraction when writing a program.

1 _____

_____

2 _____

_____

3 _____

_____ **[3]**

5. Taylor is designing a program for a client who would like to simulate earthquakes on major cities around the world in 3D. The client would like to be able to view any stage of an earthquake such as:

1. the build-up of the earthquake
2. the earthquake taking place
3. the aftershocks of the earthquake.

The client would also like to be able to play the simulation at different speeds. For example, a slow, normal or fast speed.

Give **three** examples of where abstraction can be used in the design of this program.

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____ **[3]**

6. A card game uses a set of 52 standard playing cards. There are four suits; hearts, diamonds, clubs and spades. Each suit has a card with a number from; 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13.

The card game randomly gives 2 players 7 cards each. The unallocated cards become known as the deck.

The players then take it in turns to turn over a card. A valid move is a card of the same suit or the same number as the last card played.

The winner is the first player to play all of their cards.

One component of the game is checking if a move is valid.

Identify **three** other components of the game.

1 _____

_____

2 _____

_____

3 _____

_____

[3]

7. A programmer is developing an aeroplane simulator. The user will sit in a cockpit and the simulated environment will be displayed on screens around them.

The programmer uses computational methods to design a solution for the program.

i. Complete the table by writing a definition for each computational method.

Computational Method	**Definition**
Abstraction	
Decomposition	

[2]

ii. Give **three** potential differences between the abstracted aeroplane simulator and reality.

1 ---

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2 ---

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3 ---

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[3]

iii. Identify **two** reasons why abstraction is used when designing a solution to the problem.

1 ---

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2 ---

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[2]

8. Kira is creating a computer game where the user can play against the computer.

In each turn, each character can make one move from a selection of possible moves.

Kira uses a tree data structure shown in **Fig. 1** to identify the range of possible moves the computer can make from starting position A. Each connection is a move, with each node representing the result of the move.

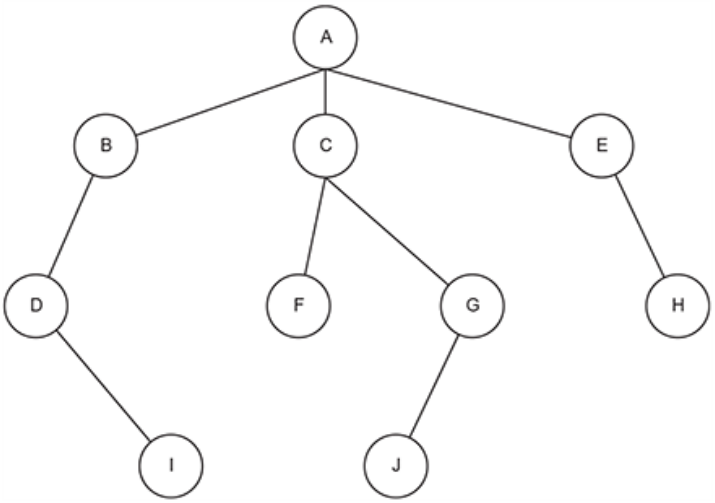

Fig. 1

State what is meant by the term ‘abstraction’ and describe how Kira has used abstraction in her design of the tree.

[3]

9. Sally is a classroom teacher. She would like a program to be able to organise where students will sit in her classroom.

A plan of her classroom is shown **in Fig. 1**.

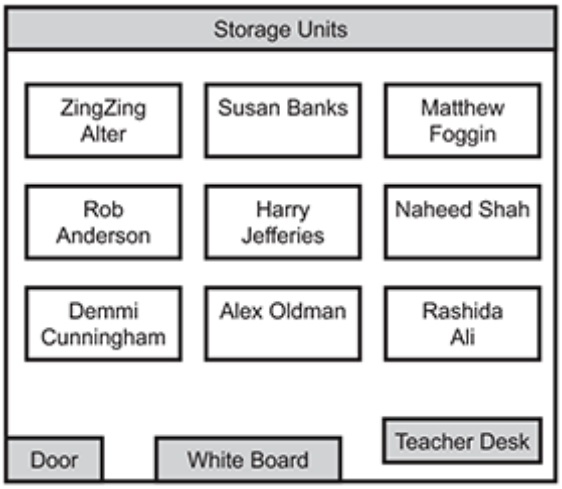

Fig. 1

i. State **three** ways that Sally has made use of abstraction in Fig. 1.

1 _____

_____

2 _____

_____

3 _____

_____

[3]

ii. Explain **two** benefits to Sally of using abstraction before creating the programming code.

1 _____

_____

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2 _____

_____

_____

[4]

END OF QUESTION PAPER