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.

Logical conditions are checked once a player has rolled the dice.

Describe **two** different logical conditions and how the result will affect the outcome of the game.

Logical Condition 1

Condition: .....

.....

Outcome: .....

.....

Logical Condition 2

Condition: .....

.....

Outcome: .....

.....

[4]

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2(a) Given the following procedure:

```
01 procedure generate(number)
02         a = 0
03         while number > 0
04              if number MOD 2 == 0 then
05                   a = a + 2
06                   print(a)
07                   number = number – 2
08              else
09                   a = a + 1
10                   print(a)
11                   number = number – 1
12              endif
13         endwhile
14 endprocedure
```

Explain why = is used on line 11 of the procedure `generate` instead of ==.

---

[2]

(b) State the values printed by the procedure `generate` when `number` = 7.

---

[1]

(c) Describe the purpose of the `MOD` operator on line `04` of the procedure `generate`.

---

[2]

3 A group of A-level students are working together to program a computer game.

In the game, the player controls a character who moves through a virtual world. The game starts with a load-up screen. The player can select which area to move to on an on-screen map, and then they control the movements of their character using a keyboard to solve puzzles on the screen.

The following pseudocode algorithm is for the sub-procedure of the game created `characterMovement`.

```
    procedure characterMovement(inputKey:byVal, characterx:byRef,
charactery:byRef)
        if inputKey == 37 then
            characterx = characterx + 1
        elseif inputKey == 38 then
            charactery = charactery + 1
        elseif inputKey == 39 then
            characterx = characterx - 1
        elseif inputKey == 40 then
            charactery = charactery - 1
        endif
    endprocedure
```

i. Identify the **three** parameters in the procedure `characterMovement`.

1 ---

2 ---

3 ---

[3]

ii. Describe the decision that is made in this procedure and how the decision affects the flow through the procedure.

---

[3]

iii. Explain why `characterx` and `charactery` are passed by`Ref` and not by`Val`.

---

[3]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Guidance
1			1 mark for condition and 1 mark for outcome to max 4 e.g. • **Condition:** Check if the square has an instruction ... • **Outcome:** ... move the player the number of places specified • **Condition:** Check if they have landed on square 100 ... • **Outcome:** ... Announce the player as the winner • **Condition:** Check if the timer is 0 ... • **Outcome:** ... Announce the game as a draw	4	Allow other suitable examples that are relevant to the scenario. The outcome must be related to the condition for a mark to be awarded. Examiner's Comments Some candidates did not present clear conditions but gave descriptions of actions to perform within the game such as 'roll dice'. The condition required an identification within the context of something that would lead to a Boolean result with consequent outcome. For example, *if* the timer runs out *then* the game will end in a draw.
			Total	**4**	
2	a		1 mark per bullet up to a maximum of 2 marks, e.g.: • = is used as the `number` variable is being assigned a value… • …== is not used as the program is not checking if the variable is equal to a value	2 (AO1.2) (2)	Accept: • = is an assignment operator • == is a comparison operator. Examiner's Comments Most candidates were correctly able to distinguish between assignment and equality.
	b		• 1,3,5,7	1 (AO3.3) (1)	Examiner's Comments Candidates who answered the previous part of the question generally went on to score full credit for a second trace of the algorithm with a different calling argument value.
	c		1 mark per bullet up to a maximum of 2 marks, e.g.: • Modulo division • Finds the remainder after a division • Used to determine if a is an odd or even number	2 (AO3.3) (2)	Examiner's Comments Candidates who successfully identified that a remainder was calculated found it harder to determine that its purpose was to see if the number was even or odd.  **Misconception** Some candidates think that a modulo division calculation resulting in 0 means that there is no remainder. Where the result of modulo division is 0 it means that the remainder is 0.
			Total	**5**	

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Question			Answer/Indicative content	Marks	Guidance
3		i	1 mark for each parameter – case sensitive • `inputKey` [1] • `characterx` [1] • `charactery` [1]	3 AO1.2 (3)	No spaces allowed in parameter names **Examiner's Comment:** Most candidates had a good understanding of what parameters were and could hence answer the question well.
		ii	1 mark per bullet • Decision is based on the value of `inputKey`… [1] • …and the values of `characterx` or `charactery` are changed [1] • Description of a condition and what it will do e.g. If the input key equals value 37 [1], then the x coordinate is increased [1]	3 AO1.2 (1) AO2.1 (2)	**Examiner's Comment:** Many candidates answered vaguely and could not describe in detail the condition that was implemented.
		iii	1 mark per bullet to max 3 • ByRef changes the value in the variable passed (`characterx` and `charactery`) [1] • ByRef passes the address/location [1] • ByVal only a copy of the data is passed [1] • ByVal the change would be lost when the procedure ended [1]	3 AO2.1	**Examiner's Comment:** ByRef and ByVal continue to be an area that candidates struggle with. Those with experience of languages that implement this tended to do better.
			Total	9	

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