



**PECANWOOD
COLLEGE**

Prepared for Life

Information Technology

Grade 12

OOP Test 2020

Student Name	
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Examiner: Ms E van Aarde

Total: 45 marks

Moderators: Ms L Krause, Mr S Barber

Time: 45 minutes

Instructions:

1. This question paper consists of 9 pages (including the cover page).
2. Answer ALL questions. There are no options in this paper.
3. This is a fill-in paper. Please answer question in the space provided. If you need additional space, please use the last page.

Scenario

A database that stores data about hiking trails in South Africa exists. A system will be created to display this data and allow for changes to the data.

Section A – OOP Concepts

[27]

1. Investigate the class diagram in figure 1 and fill in the values that correspond with the number and question mark. Write your answers in the table below.

Notes concerning the method, "convertDifficulty": ← NB

- The method is not accessible from another class.
- The method uses the "difficulty" property and returns a string representation, 1 = Easy, 2 = Moderate, 3 = Difficult. This string value forms part of the toString method's return value.

Trail
Properties: - name : string - area : string 1.1? difficulty : integer
1.2?: + Constructor (n : string, a : string, d : 1.3?) + Constructor(n: string, a: string) + getArea : string + setDifficulty (d: integer) 1.4? convertDifficulty : 1.5? + toString : string

Figure 1

(5)

1.1	
1.2	
1.3	
1.4	
1.5	

2. What is the reason for making the properties in the "Trail" class private?

(1)

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3. How can the properties be accessed from another class? (1)

4. Explain what encapsulation is by referring to the diagram in figure 1. (1)

5. Why does the "Trail" class have two constructors? (2)

6. What term is used for the fact the we can have two constructor methods with the same name, yet different parameters? (1)

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7. Would it be allowed to create yet another constructor as seen below? The "a" represents area and "n" represents name. Explain your answer.

+ Constructor (a: string, n:String)

(2)

8. I want to create an object for a trail. I want the trail to be named "Mount Komati" and the area of the trail to be "Machadodorp". If the code below was to be used to create the object with one of the constructors in the class diagram in figure 1, would it be instantiated accurately? Explain your answer.

Java: `Trail mk = new Trail("Machdodorp", "Mount Komati", 3);`

Delphi: `Result := Trail.Create("Machdodorp", "Mount Komati", 3);` (2)

9. If a trail object already exists and the trail rating needs to be upgraded from 'moderate' to 'difficult', could this change be made using the given information in the class diagram? Motivate your answer. (2)

10. In the current scenario, the method "convertDifficulty" cannot be called from another class.

10.1 What is the OOP term for this kind of method? (1)

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10.2 The method, "convertDifficulty" is used in the toString method. If there is a need to retrieve the converted difficulty level from another class apart from the toString method, how can this be accomplished? (2)

11. Investigate the diagram in figure 2 and answer the questions that follow.

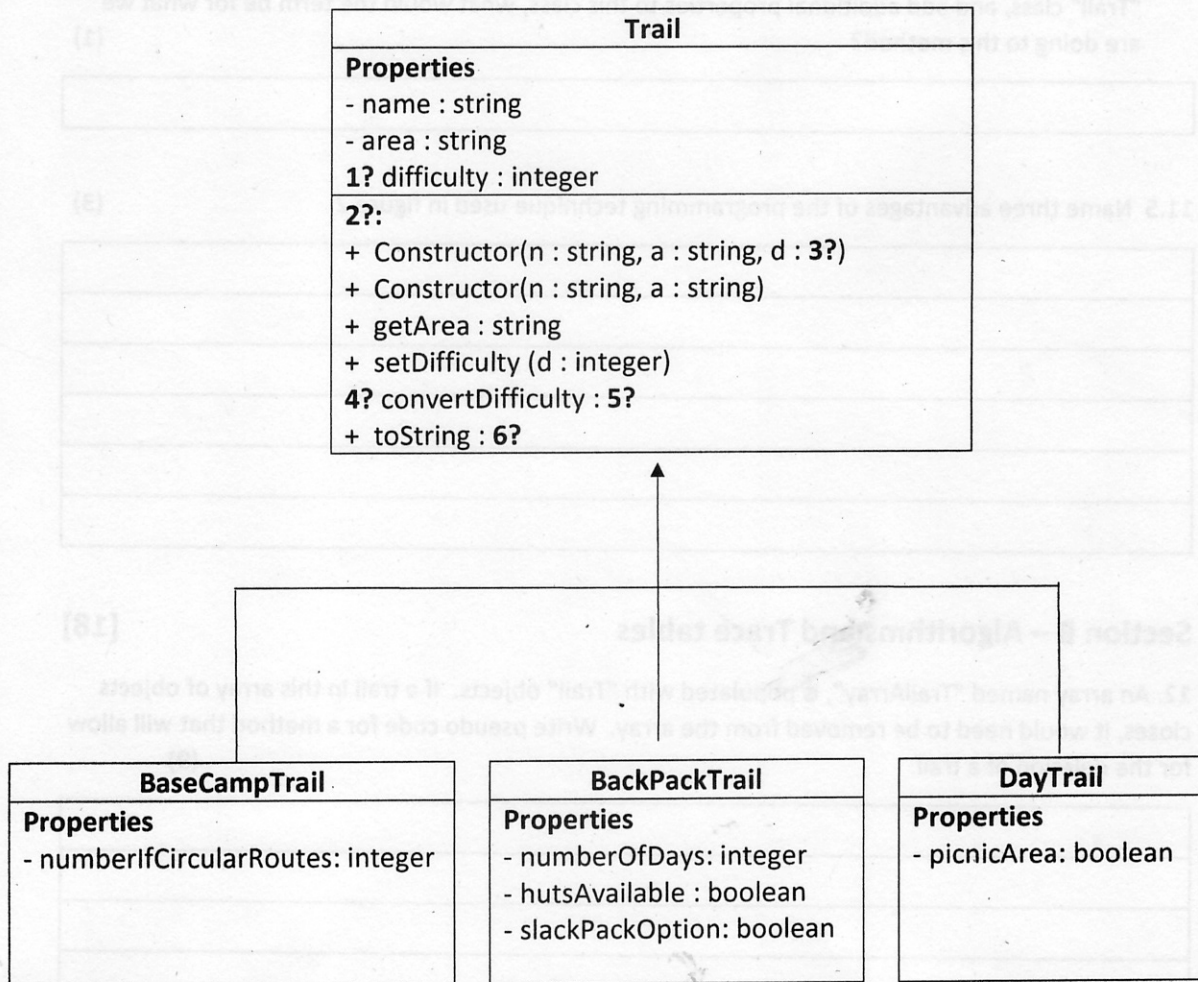


Figure 2

11.1 What is this programming technique that is represented by figure 2, called? (1)

11.2 What is the term we use for the "Trail" class in this figure 2? (1)

11.3 What is the term we use for the "BaseCampTrail" class in this figure 2? (1)

- 11.4 If we create a toString method for the "BackPackTrail" that uses the toString method of the "Trail" class, and add additional properties to this class, what would the term be for what we are doing to this method? (1)

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- 11.5 Name three advantages of the programming technique used in figure 2. (3)

Section B – Algorithms and Trace tables

[18]

12. An array named "TrailArray", is populated with "Trail" objects. If a trail in this array of objects closes, it would need to be removed from the array. Write pseudo code for a method that will allow for the deletion of a trail. (9)

13. A stand-alone program is developed to calculate a conservation fee for hiking trails. If a hiking trail is part of a nature reserve, every hiker needs to pay a conservation fee. The conservation fee is based on the distance of the trail. If the trail stretches over more than one day, the total distance applies. A fee of R2.50 per kilometre is payable. No fee is payable if the trail is on private property or other land that is not part of a nature reserve. The pseudo code in figure 3 represents a method calculating and displaying the conservation fee.

```
1 Method calculateConservationFee
2 Begin
3     DECLARE boolean natureReserveArea <- false
4     DECLARE double totalDistance <- 0
5     DECLARE double fee <- 0

6     natureReserveArea <- Get user input: Is the trail in a nature reserve?
7     If natureReserveArea is true
8         fee <- totalDistance x 2.50
9     Display "The conservation fee is: R" & value of variable, fee
10 End
```

Figure 3

(6)

1	DEF USE double totalDistance = 0;
2	DECLARE boolean natureReserves < false;
3	Begin
4	Method calculateConservationFee

(3)

[45]

ADDITIONAL SPACE (Indicate question numbers clearly).

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