

7. A company sells computers using a database-driven website.

Maintenance is needed to ensure that the website is compatible with the latest 2023 versions of web technologies, including the server-side database used to store product and order details and the programming languages used in the development of the website.

- (a) Name the type of maintenance required.

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- (b) The project manager creates a Gantt chart to plan the development work that will be needed. The design section of the Gantt chart is shown below.

Design Tasks							
Data dictionary							
Entity-occurrence diagram							
Entity-relationship diagram							
Query design							

The project manager claims that use of this Gantt chart for planning will help to:

- improve efficiency and ensure work is completed on time
- manage resources.

By making reference to the section of the Gantt chart shown, explain why you agree or disagree with these claims.

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- (c) The following data dictionary has been produced when redesigning the relational database.

Entity: Customer					
Attribute name	Key	Type	Size	Required	Validation
custID	PK	varchar	5	yes	
firstName		varchar	15	yes	
lastName		varchar	20	yes	
address		varchar	50	yes	
email		varchar	30	yes	

Entity: Order					
Attribute name	Key	Type	Size	Required	Validation
orderID	PK	integer		yes	Auto increment
orderDate		date		yes	
custID	FK	varchar	5	yes	Existing custID from Customer table
orderSent		varchar	1	yes	Restricted choice: y, Y, n, N

Entity: Product					
Attribute name	Key	Type	Size	Required	Validation
prodID	PK	integer		yes	Auto increment
type		varchar	7	yes	Restricted choice: Desktop, Laptop, Tablet
make		varchar	10	yes	Restricted choice: Cell, Orange, Race, Sung
model		varchar	20	yes	
rating		integer		no	Range: 1 to 5
price		float		yes	>= 50.00

Entity: OrderProduct					
Attribute name	Key	Type	Size	Required	Validation
orderID	PK/FK	integer		yes	Existing orderID from Order table
prodID	PK/FK	integer		yes	Existing prodID from Product table
orderQuantity		integer		yes	>=1

Complete the following SQL statement used to create the `Order` table.

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```
CREATE TABLE Order(
    orderID int NOT NULL auto_increment,
    orderDate date NOT NULL,
    custID varchar(5) NOT NULL,
    orderSent varchar(1) NOT NULL
    _____
    _____
    _____
);
```

## 7. (continued)

- (d) The SQL statement below is executed successfully.

```
SELECT type, make, model, price
FROM Product
WHERE price < 200 OR price > 400;
```

Re-write the `WHERE` clause using Advanced Higher logical operators.

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- (e) The following query is used to display details of products that were ordered fewer than 12 times in April 2023.

```
SELECT *
FROM Product
WHERE EXISTS
    (SELECT prodID
     FROM OrderProduct, Order
     WHERE OrderProduct.prodID = Product.prodID
     AND orderDate LIKE "* /04/2023"
     GROUP BY prodID
     HAVING COUNT(*) < 12);
```

Explain how these results are generated by making reference to the use made of:

- the subquery
- the `EXISTS` operator
- the `HAVING` clause

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- (f) A query is used to display the number of each type of product that costs less than £300.

The sample output from the query shown below is based on products made by Cell, Race and Sung and shows only those with fewer than five available.

type	Number of products available
Tablet	3
Desktop	2

Complete the following SQL query used to produce the sample output shown.

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```
SELECT type, COUNT(*) AS 'Number of products available'
FROM Product
WHERE price < 300
```

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## 7. (continued)

(g) The changes made to the updated website must be tested.

The test plan includes the following test cases:

Test	Expected Result	Actual Result	Test Successful?
Select the following computer: Type = Desktop Make = Race Model = CL2	Specified computer selected using drop-down lists for type, make and model		
Add selected computer to the cart	Selected computer appears in cart		
Choose delivery date of Friday 17 June 2023 and make payment	Delivery date selected from calendar and payment made		

Two testers are chosen to complete these tests:

- Jill — a member of the development team
- Ben — an existing customer asked to test the updated website.

(i) Name the type of testing Jill is undertaking. Give one reason for your choice.

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(ii) Name the type of testing Ben is undertaking. Give one reason for your choice.

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