



12.2 Writing functional programs

Name: _____

Class: _____

Date: _____

Time: **13 minutes**

Marks: **10 marks**

Comments:

Q1.

In a functional programming language, four functions named `fw`, `fx`, `fy` and `fz` and a list named `sales` are defined as shown in the figure below.

```
fw [a,b] = a * b
fx c = map fw c
fy d = fold (+) 0 d
fz e = fy (fx e)

sales = [[10,2], [2,25], [4,8]]
```

The `sales` list represents all of the sales made in a shop in 1 day. It is composed of sublists.

The values in each sublist indicate the price of a product and the quantity of the product that was sold. For example, `[10,2]` indicates that 10 units of a product priced at £2 were sold.

- (a) Shade **one** lozenge to indicate how many of the four functions (`fw`, `fx`, `fy`, `fz`) in the figure above use a higher-order function.

1	☐	2	☐	3	☐	4	☐
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(1)

- (b) Calculate the results of making the function calls listed in the table below, using the functions and lists in the figure above as appropriate.

Function call	Result
<code>fw [4,3]</code>	
<code>fx sales</code>	
<code>fz sales</code>	

(3)

- (c) In the context of the shop, explain what the result of the function call `fz sales` represents.

(1)

(Total 5 marks)

Q2.

In a functional programming language a function named `square` and three lists `a`, `b` and `c` are defined as follows.

```
square x = x * x

a = [1, 3, 5]
b = [1, 5, 10, 15]
```

c = [9, 7, 2]

- (a) What is the list or value that is the result of applying the functions `head(tail(tail b))`?
_____ (1)
- (b) Calculate the results of making the function calls listed in **Table 1** with the lists a, b and c above.

Table 1

Function Call	Result
<code>map square a</code>	
<code>filter (<10) b</code>	
<code>fold (+) 0 c</code>	

- (c) `map` is an example of a higher-order function.
Explain what a higher-order function is.

_____ (1)
- (Total 5 marks)

EXAM PAPERS PRACTICE