Government of **Western Australia**
Curriculum Council

WACE
Western Australian Certificate of Education

Western Australian Certificate of Education Examination, 2010

Question/Answer Booklet

COMPUTER SCIENCE

Stage 3

Please place your student identification label in this box

Student Number: In figures | | | | | | | | |

In words _____

_____

Time allowed for this paper

Reading time before commencing work: ten minutes
Working time for paper: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer Booklet
Source Booklet

To be provided by the candidate

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators, MATHOMAT and/or Mathaid and/or any system flowchart template

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Short answer	25	25	70	70	40
Section Two: Extended answer	5	5	110	110	60
				Total	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in the spaces provided in this Question/Answer Booklet. A blue or black ballpoint or ink pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question. Where no specific instructions are given, you should feel free to use a range of formats to express your knowledge and understandings.

4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
   - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
   - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

See next page

Section One: Short answer **40% (70 Marks)**

This section contains **25** questions. You must answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time: 70 minutes.

Question 1 **(2 marks)**

'WWW' stands for the 'World Wide Web' but it is sometimes referred to as the 'world wide wait' as response can be degraded at peak times. Explain why this is so.

Question 2 **(2 marks)**

Describe two functions of the BIOS.

One:

Two:

Question 3 **(3 marks)**

You have applied the latest operating system updates and notice that your favourite application does not run anymore.

(a) Explain why this may have happened. (1 mark)

(b) Outline **two** things you could do to rectify the situation. (2 marks)

One: _____

_____

Two: _____

_____

Question 4 **(3 marks)**

After some time a computer's performance becomes degraded. The user notices that the hard disk's access time is particularly slow. The hard disk has over 40% of space free.

(a) What are **two** possible causes for the degradation in performance? (2 marks)

One: _____

_____

Two: _____

_____

(b) What is **one** process that could be undertaken to fix the problem? (1 mark)

_____

_____

_____

_____

Question 5 **(3 marks)**

Two 64 bit processors of the same clock speed (3.0 GHz) are available for purchase from a chip manufacturer. One is called the 'Celery' and costs $150, while the other is called the 'Zeeon' and costs $260. When the company's website is checked, the Zeeon is found to have four times the on-chip cache of the Celery.

(a) Which chip would be more suitable for a home computer that is used mainly for word processing and some internet browsing? Give **one** reason to support your answer. (2 marks)

_____

_____

_____

_____

See next page

(b) Give **one** advantage of the Zeeon's larger cache. (1 mark)

Question 6 **(3 marks)**

(a) In the context of the TCP/IP model, HTTP, FTP, POP and SMTP are all examples of what? (1 mark)

(b) Describe how any **two** of them are used. (2 marks)

One:

Two:

Question 7 **(3 marks)**

The word modem is made up from two other words.

(a) Give the **two** words that make up the word modem. (2 marks)

One: _____

Two: _____

(b) Explain what a modem does. (1 mark)

_____

_____

_____

_____

Question 8 **(2 marks)**

Explain the difference between an object-oriented programming language and a procedural language.

_____

_____

_____

_____

Question 9 **(3 marks)**

Identify **three** differences between a batch system and a real-time system.

One: _____

_____

Two: _____

_____

Three: _____

_____

Question 10 **(2 marks)**

Explain how a Gantt chart is used in project management.

Question 11 **(3 marks)**

Identify **three** personal skills required by program developers.

One:

Two:

Three:

Question 12 **(4 marks)**

(a) Explain the difference between a computer program syntax error and a run time error. (2 marks)

(b) Give an example of a syntax error. (1 mark)

(c) Give an example of a run time error. (1 mark)

Question 13 **(2 marks)**

Explain what a content management system is.

Question 14 **(1 mark)**

When would a business need an extranet rather than an intranet?

Question 15 **(2 marks)**

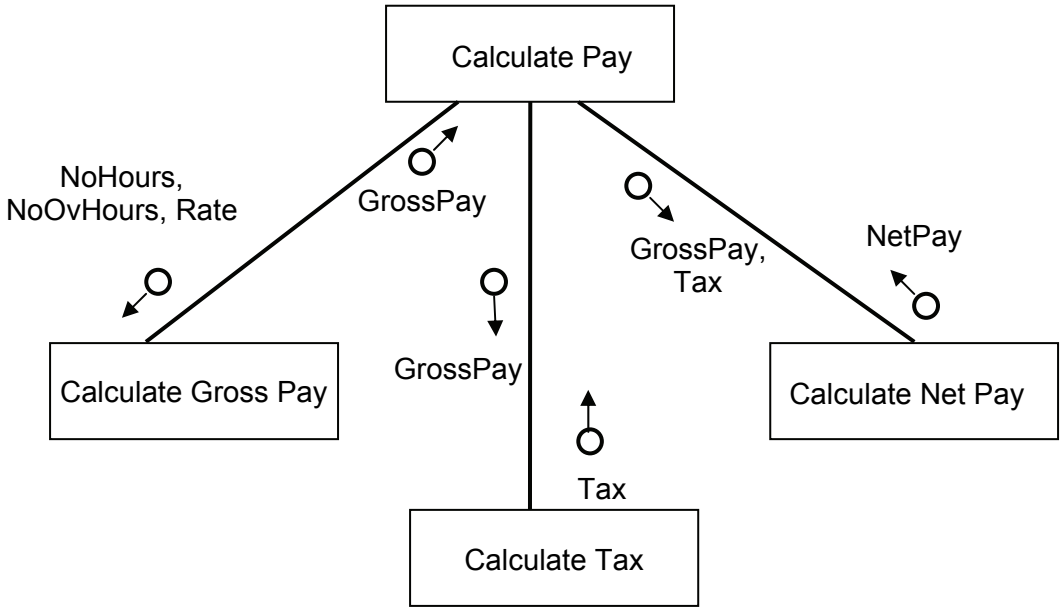
Explain **two** differences between online and distributed storage of data.

One:

Two:

Question 16 **(10 marks)**

Analyse the following structure chart.



Susan has started writing the mainline and procedures that correspond to this structure chart in pseudocode. Complete the pseudocode for the mainline and stubs for all procedures as required.

Module Main

    Call CalculateGrossPay(NoHours,

End Main

Module CalculateGrossPay(NoHours,

Questions 17 to 20 refer to the pseudocode below.

```
Constant NumMonths

Temp[1] ← 25
Temp[2] ← 20
Temp[3] ← 30
Temp[4] ← 20
Temp[5] ← 20
Temp[6] ← 22

TotalTemp ← 0
For Month ← 1 to 6 do
    TotalTemp ← TotalTemp + Temp[Month]
End For

AverageTemp ← TotalTemp / NumMonths
```

Question 17 **(1 mark)**

What data type is Temp?

Question 18 **(1 mark)**

What data type would you make AverageTemp?

Question 19 **(3 marks)**

Explain what will happen when this pseudocode runs. Do not paraphrase the pseudocode, but explain step by step what will happen. Do not give only the final result of the pseudocode.

See next page

Question 20 **(1 mark)**

What will be the value in the variable TotalTemp when the loop has been completed three times; that is, when Month equals 3 and the command in the loop has been completed?

Question 21 **(2 marks)**

A student suggested that while a system was running smoothly, there was no need for a backup. A backup was only necessary when a virus was detected. What are **two** problems with this suggestion?

One:

Two:

Questions 22 to 24 refer to the validation rule below.

Age > 16 AND Age <= 65

Question 22 **(2 marks)**

Explain what the validation rule above does.

Question 23 **(1 mark)**

List a value that will return True when using the validation rule.

Question 24 **(1 mark)**

List a value that will return False when using the validation rule.

See next page

Question 25 **(10 marks)**

The first layer in the ISO-OSI is the Physical layer and the seventh layer is the Application layer.

(a) List the other **five** layers in the ISO-OSI model. (5 marks)

One: _____

_____

Two: _____

_____

Three: _____

_____

Four: _____

_____

Five: _____

_____

(b) Describe the purpose of any **three** of the layers of the ISO-OSI model. (3 marks)

One: _____

_____

Two: _____

_____

Three: _____

_____

(c) Give **two** reasons why it is important to have models in networks. (2 marks)

One: _____

_____

_____

Two: _____

_____

_____

End of Section One

Section Two: Extended answer **60% (110 Marks)**

This section contains **five (5)** questions. You must answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
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Suggested working time: 110 minutes.

Bingdarra High School Athletics Carnival

Bingdarra High School is having its athletics carnival in three months' time. A team from the Year 12 Computer Science class is helping with the organisation and running of the carnival. In particular, the students have been asked to plan and implement a system that includes:

- a network for recording results on the day of the carnival
- a database system to record the data for the carnival
- several programs for analysing the results of the carnival
- a project plan to keep track of the project and ensure that everyone is informed.

Question 26 **(13 marks)**

The team has decided to use prototyping to develop the system.

(a) Identify **three** advantages of using prototyping to develop the system. (3 marks)

(b) Describe **two** things the team should do to ensure that the data in the database is secure. (2 marks)

See next page

(c) Describe **two** things the team must consider to ensure the privacy of any personal data stored on the database. (2 marks)

(d) The system will have some of the data placed on the web. Describe **two** methods that can be used to keep this data on the web secure. (2 marks)

The team has allocated one person (Jenny), to be responsible for checking the interface of the new system.

(e) Write a list of **four** rules that Jenny could use to check that the interface is appropriate and inclusive for a variety of people. The list should be written as a list of rules that can be applied, not a description of a well designed interface. (4 marks)

See next page

Question 27 **(13 marks)**

The team has decided to implement a wireless network for recording results from the carnival. They are planning to use laptops connected to a wireless network to submit results to the main system.

(a) What equipment will they need, apart from the laptops, to create the wireless network? List **three** items and describe the purpose of each. (6 marks)

The team decides to test the equipment a week before the carnival. All appears to go well on the testing day, except for one problem. The students at the long jump pit and the shot put area, both of which are located on the far edges of the oval, are complaining that their connections drop out.

(b) Identify **two** issues that could be causing this. (2 marks)

(c) For one issue identified in (b), outline a possible solution. (1 mark)

See next page

(d) The day of the carnival has arrived. In the first hour the web server that displays the results shows the online data in big letters as '1337 HaXOR'. The team attempts to change it, but it reverts to '1337 HaXOR'. A frantic call to the IT personnel is made. They respond by stating they did not turn on a firewall or put a password on the web server administration account. Under instructions from the IT personnel, the team turn on the firewall and it stops the problem.

Why did a firewall fix the problem in this situation? (2 marks)

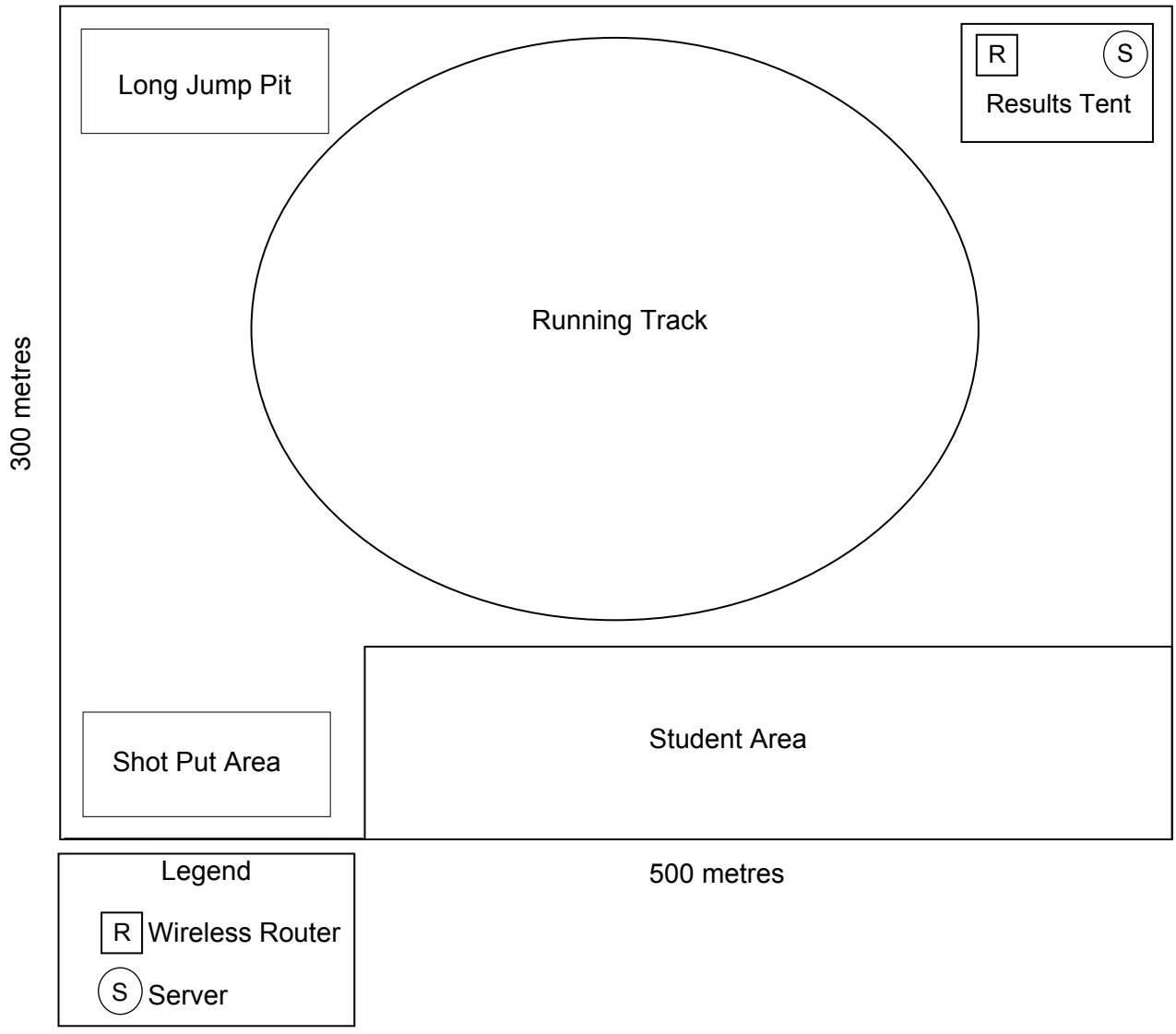
See next page

(e) In their technical review of the carnival the technical staff have indicated that there were network performance issues, particularly near the shot put area. A wireless router was connected via a short Ethernet UTP cable to the server that maintained the database for the web server. In the tent, the staff used wireless enabled laptops to enter results. The staff in the field used wireless enabled laptops and PDAs to transmit the results to the tent. There was power in the middle of the track and in each corner, for the loudspeaker system.

Wireless was used as it was not possible to lay long lengths of UTP Ethernet cable across the oval due, to safety issues.

Examine the diagram provided of the setup on the day. Alter the diagram to show how you would redesign the network to eliminate the performance issues described above.

(2 marks)



See next page

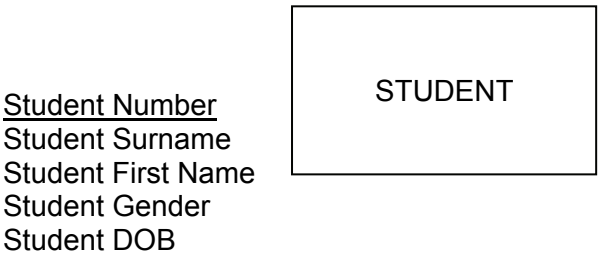
Question 28 **(33 marks)**

(a) Describe **three** advantages of making a database model in third normal form. (3 marks)

See next page

(b) Consider the completed forms in the **Source Booklet**. The team will use them to design the database model in third normal form. The model will need to record all the details on the forms and have any many-to-many relationships resolved.

One of the team has drawn the entity relationship diagram (ERD) below. It shows the STUDENT entity, with Student Number as the primary key. Complete the ERD below for a design to model all the data on the forms in third normal form. Include on your diagram the attributes, primary keys and foreign keys. (14 marks)



(c) Describe a situation in which the developer of a database system for the carnival would create each of the following: (3 marks)

(i) a query _____

_____

(ii) a form _____

_____

(iii) a report _____

_____

(d) In terms of one of the relationships in the ERD, explain the role the foreign key plays in that relationship. (2 marks)

_____

_____

_____

_____

(e) From the database design, give an example of a field that would have the following data types: (4 marks)

(i) text _____

_____

(ii) integer _____

_____

(iii) real _____

_____

(iv) date _____

_____

(f) One of the students on the team has suggested that the school should give them access to its student record system so that they can get all the student details. Explain why the school would not allow this to happen. (2 marks)

(g) The team is keen to protect the data on the database by using encryption. Explain how encryption can protect data. (3 marks)

(h) Explain why the STUDENT entity stores the date of birth of the student and not the age. (2 marks)

See next page

Question 29 **(27 marks)**

Joanne, Patrick and Lisa are members of the team responsible for writing the programs for the system. Joanne is keen to ensure that all the code they write is modularised.

(a) Give **three** reasons Joanne could use to justify using modularised code to the rest of the team. (3 marks)

The team need to write a program to calculate the top male student and the top female student. For each event, students get 3 points for first place, 2 points for second place and 1 point for third place. They have written a program that has selected the following data from the database:

Student Number
Student Surname
Student First Name
Student Gender
Student Age
Event
Place

The program has only selected records where the Place field is 1 (for 1st), 2 (for 2nd) and 3 (for 3rd). The records have been sorted by student number so that all the records for each student are displayed together.

Patrick has written the pseudocode to calculate the top male and female student. The pseudocode is in the **Source Booklet**. Use this pseudocode to answer the following parts of question 29.

(b) In the pseudocode in the **Source Booklet**, the following statements define some variables as global:

```
Global TopFemaleSurname
Global TopFemaleFirstName
Global TopFemaleScore

Global TopMaleSurname
Global TopMaleFirstName
Global TopMaleScore
```

See next page

(i) What is a global variable? (1 mark)

(ii) Explain **two** advantages of making these variables global. (2 marks)

(c) Consider the following pseudocode statements from the **Source Booklet**:

```
TopFemaleScore ← -99
TopMaleScore ← -99
```

Give **two** reasons why these variables are set to -99. (4 marks)

(d) Consider the pseudocode in the **Source Booklet** inside the box marked 'A'. Explain what the code is doing. Give a full explanation and do not simply reword the pseudocode. (7 marks)

See next page

(e) Write a Print pseudocode statement that could be used at the end of the program to print out the names and number of points for the top male and female students. (3 marks)

(f) Write the pseudocode missing from the box marked 'B' in the **Source Booklet**. This code should determine the number of points depending on the variable Place, then add the number of points to the variable CurrentScore. (7 marks)

See next page

Question 30 **(24 marks)**

The system for the carnival was split into three parts:

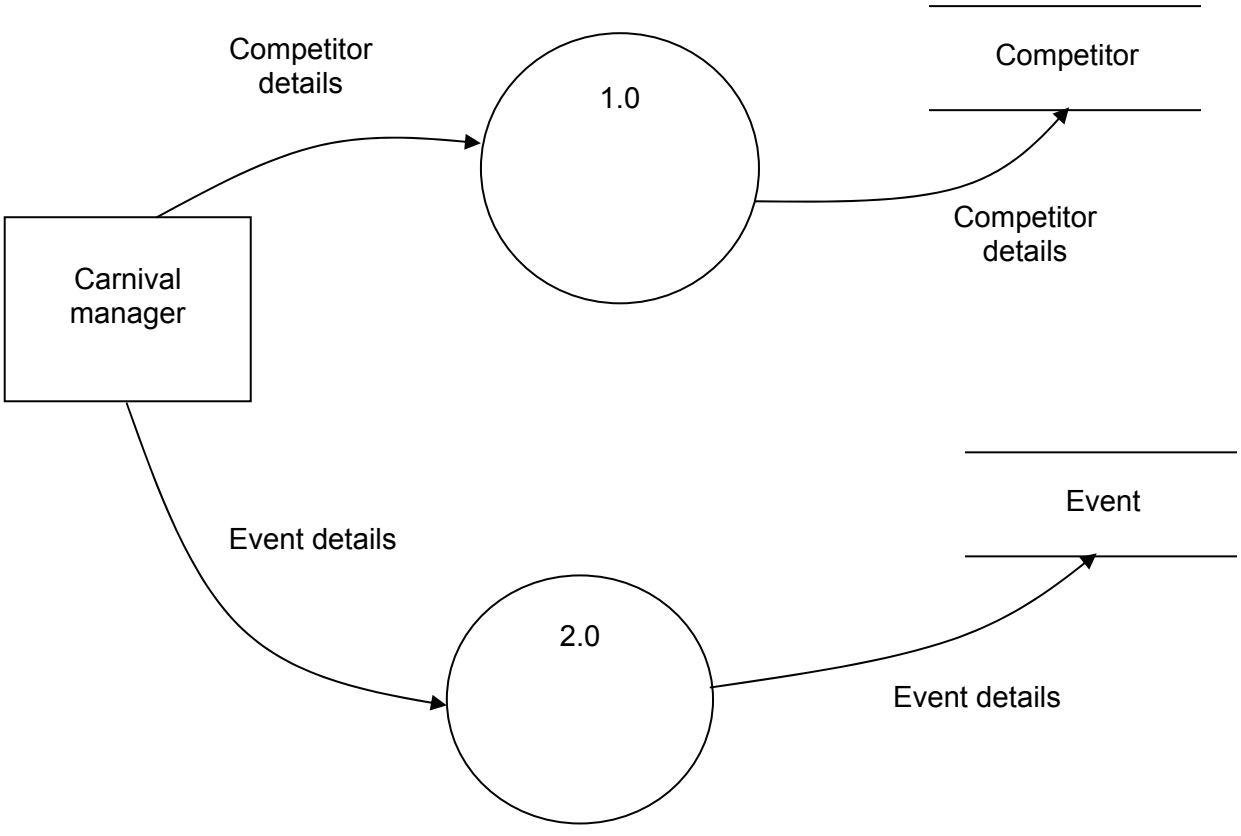
- what happens prior to the carnival
- what happens during the day of the carnival
- what happens after the day of the carnival.

A separate DFD was completed for each part of the system.

Prior to the day of the carnival, the data relating to the students and the events needs to be added into the relevant files in the system. This data comes from the carnival manager, who gets the student details from the student record system, via the school administrator.

Consider the DFD below, which shows what happened prior to the day of the athletics carnival.

(a) Complete the DFD by adding suitable names for the two processes. (2 marks)



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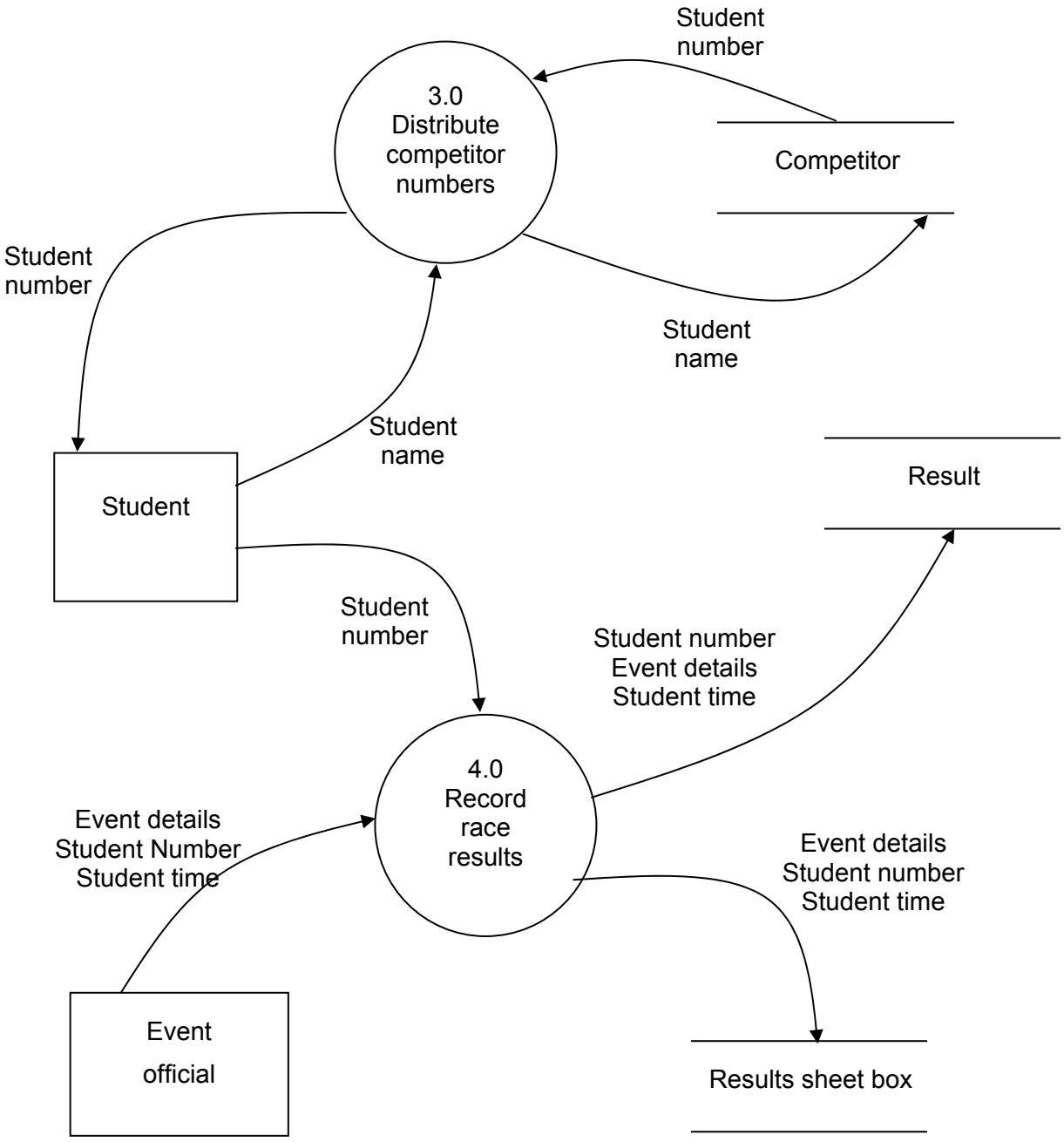
See next page

(b) Consider the DFD below that shows what will happen on the day of the athletics carnival.



See next page

Explain how the DFD on the previous page represents what happened on the day of the carnival. Your explanation should not be limited to naming processes, data flows and entities. (5 marks)

See next page

(c) The day after the carnival, the results of each event were printed and pinned up on a notice board next to the physical education department office.

Students were asked to check that their results had been entered correctly into the system and to report any errors to the carnival manager. The carnival manager checked the original datasheets and made adjustments to the Result database as required. Students were given two days to confirm that event data was correct.

Create a DFD for the system after the day of the carnival. (11 marks)

See next page

(d) Create a **context diagram** that includes everything that will happen prior to the carnival (part a), on the day of the carnival (part b) and after the carnival (part c). (6 marks)

End of questions

Question number: _____

Question number: _____

Additional working space

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