YEAR 11 ATAR COMPUTER SCIENCE

REVISION BOOKLET

2021

Semester II

Name: _____

System Analysis and Development

Computer System Overview Exercises

1. What is hardware?

2. What is software?

3. List the four main sub-systems of a computer system.

4. What does the CPU do?

5. List four input devices.

6. Which input device would be most useful for a blind person to use to communicate with the computer?

7. Which input device can be used to create a digital photo for computer use?

8. What does POS stand for?

9. Describe a barcode

10. What is a computer terminal? Give an example of a place that would be using a computer terminal.

11. List three output devices.

12. What does memory hold?

13. List four secondary storage devices.

14. What is the difference between primary memory and secondary storage?

15. List one advantage and one disadvantage of using Solid State Drive?

    Advantage:

    Disadvantage:

16. What is peripheral equipment?

17. What is Plug and Play?

18. What is the difference between a notebook computer and a PDA?

Storage Capacity

1. Complete the table below and list 2 examples of files or devices that use these measurements.

Term	Definition	Examples
Bit	*Smallest unit used by computers*	*1 or 0*
Byte		
Kilobyte (kB)		
Megabyte (MB)		
Gigabyte (GB)		
Terabyte (TB)		

2. Sam has a 2 GB thumb drive. He has already used 730 MB of data and needs to copy a file 825 MB from Joyce. Will the file fit onto Sam's thumb drive? Justify your answer.

3. Alice has 160 small images, each of which is 600 KB. How much space do they take up overall in MB?

Systems Analysis and Development

1. The John Forrest Secondary College Library Loan System is an example of an information system. Consider borrowing a resource (book, DVD).

   For each component, give examples to show that the John Forrest Secondary College Library is an information system.

Input	
Processing	
Output	
Feedback	

2. Define the each of the following terms:

   System development _____

   _____

   _____

   Prototype _____

   _____

   _____

   SDLC _____

   _____

   _____

Project Management

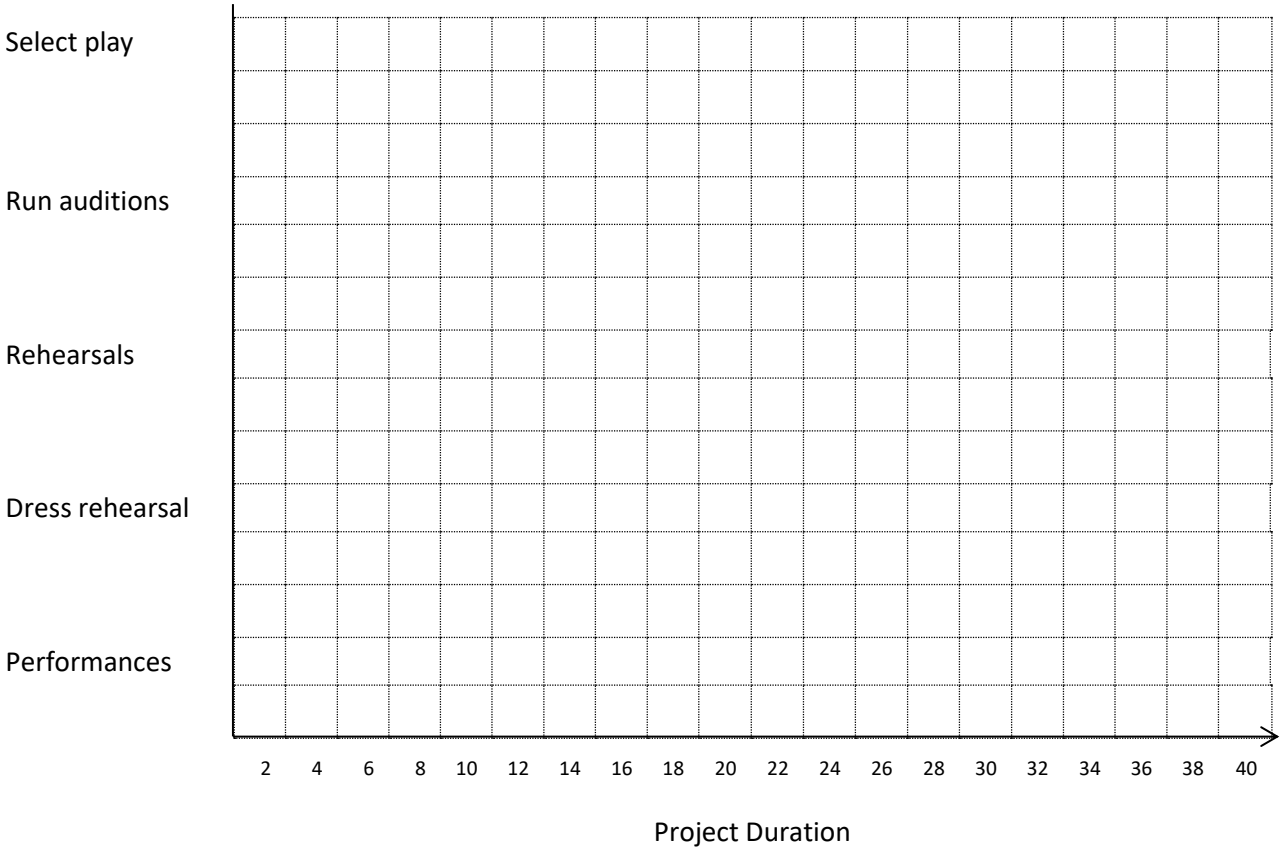
1. What is project management and why is it needed?

2. What are the four main "steps" of project management?

3.

Activity	Estimated Duration (length)
Select play to perform	2 days
Run auditions and select cast	6 days
Rehearsals	20 days
Dress rehearsals	2 days
Performances	8 days

a. Use the estimated data provided above to complete the Gantt chart below. Each square represents 2 days. Hint: Can "performances" be done at the same time as "run auditions"?



b. How long is the project expected to take? _____.

c. The actual duration for each task is provided below:

Activity	Actual Duration (length)
Select play to perform	1 day
Run auditions and select cast	3 day
Rehearsals	20 days
Dress rehearsals	2 days
Performances	8 days

i. Add the actual duration to the Gantt chart on page 2.

ii. How long did the project take? _____

4. What is a Gantt chart?

Prototyping Exercises

1. What is prototyping?

2. List two advantages and two disadvantages of using prototyping.

Advantage	Disadvantage

System Development Life Cycle Exercises

1. List the 6 stages of the Systems Development Life Cycle (SDLC).

2. Why is a feasibility study carried out before a project commences?

3. For each of the following methods of gathering information, list an advantage and a disadvantage for using the method.

Method	Advantage	Disadvantage
Questionnaire		
Observation		
Interview		
Document analysis		

4. For each of the following situations, recommend a change over strategy to implement the new system.

Situation	Strategy
Giggles' Bentley branch uses the new bookings system. When all problems are fixed then the other Giggles stores will use it.	
The current system has lots of errors and doesn't work properly.	
Changing from an inkjet printer to a colour laser printer.	
ABC Printing will start with the electronic payroll component, after two months it will add the accounts component, then two months later will add the online booking component.	

5. Trish wants to use the SDLC to produce a Student Marksbook software package that tracks her Computer Science Year 11 students' results. For each of the following activities, indicate what stage the activity would in the SDLC.

Activity	SDLC Stage name
Create the marksbook in Excel	
Sketch up the layout of the desired marksbook	
Check whether the College already has a system for recording student results.	
Identify formulae that will be needed to calculate each student's test average and cumulative total.	
Investigate what software would be appropriate to use to create the marksbook.	
Add functionality such as online help.	
Explain to the other computing teachers how to use the marksbook.	
Determine what information has to be supplied to the *School Curriculum and Standards Authority*	
Add "dummy" student data into the marksbook to ensure that the calculations are working correctly.	
Conduct a survey of students and parents.	
Check that the marksbook is easier and more efficient to use than writing the marks on a piece of paper.	

Data Flow Diagrams

The Payroll System (class example)

At the end of each week, each employee submits their time cards with their *start time and finish time*. The payroll clerk uses the time cards to determine the *Hours Worked* by an employee and enters this data into the **Time Card File**.

The clerk then checks the **Employee Card File** to determine the *Pay Rate* for the employee, calculates the *Gross Pay* and records the amount in the **Pay Book**.

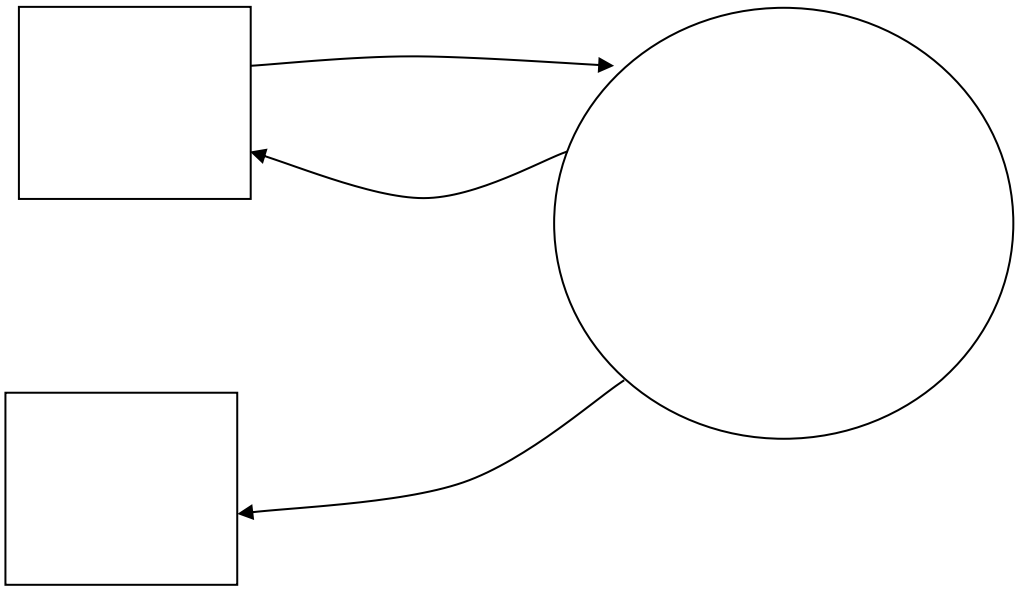
The clerk calculates the *Tax Amount* by referring to the **Employee Card File** to obtain the employee's *Tax Category* and the **Tax Rate Book** to obtain the *Tax Rate* for the employee. The Tax Amount is recorded in the **Pay Book**.

Next the clerk calculates the *Net Pay* by getting the gross pay from the **Pay Boo**k and deducting *tax amount*. The *Net pay* is then recorded in the **Pay Book**.

After the pay calculations have been completed for all employees, the *Gross Pay, Tax* Amount and *Net Pay* amounts for each employee are copied onto the employee's *Pay slip*. The correct amount of pay is then deposited into the employee's bank account and the pay slip is given to the employee.

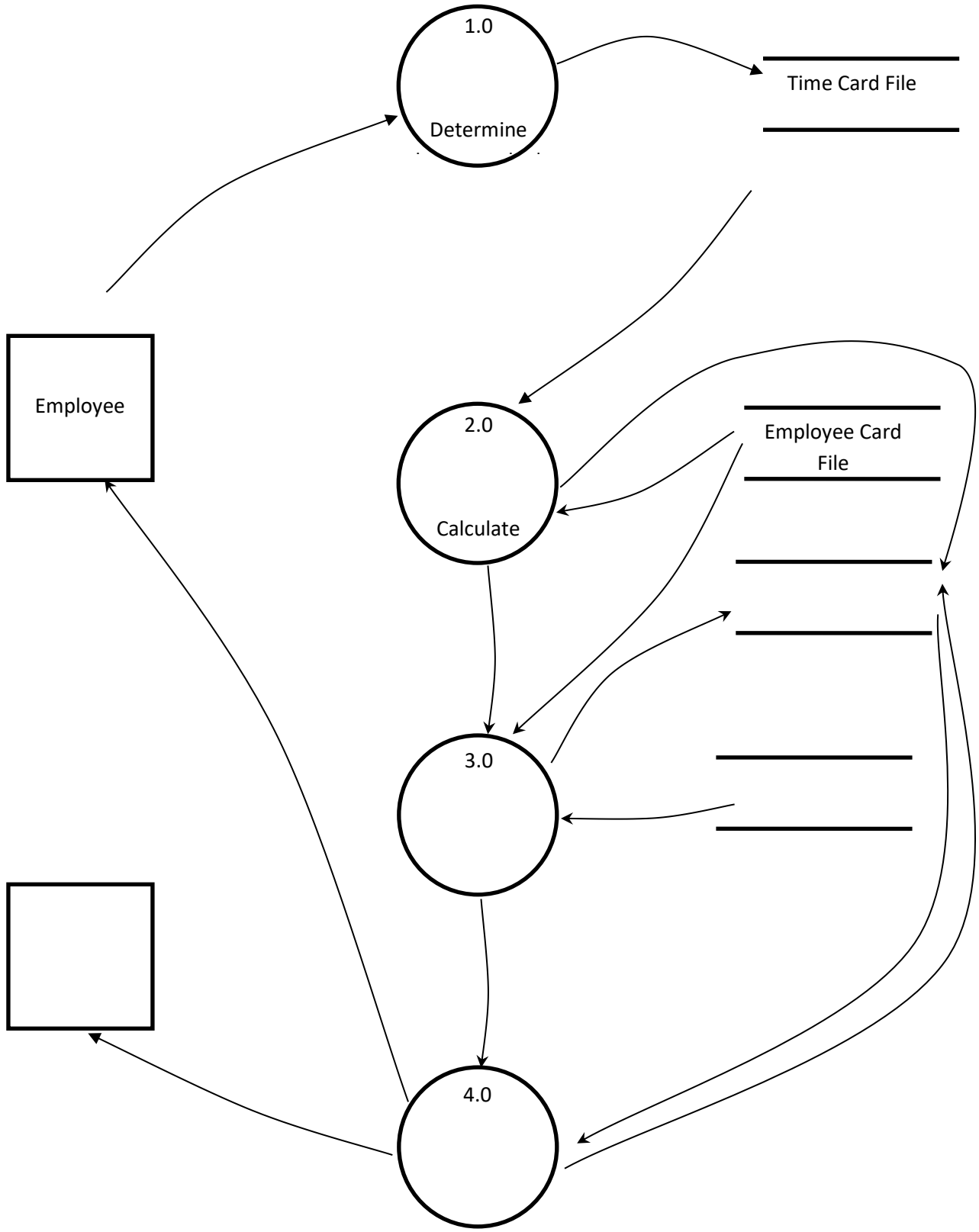
a. Fill in the missing labels of the Payroll System context diagram.

Context Diagram



b. Fill in the missing labels of the Payroll System's Level 0 DFD.

Level 0 Data Flow Diagram



Practice Question 1

A mail-order business deals with the sale of computer consumables to the general public. The analyst gathers and records the necessary information about the existing system and notes the flow of data within the store related to the sale of goods, monitoring of stock levels and the ordering of stock of the Computer Store business.

Observation shows that when a *customer order form* is received, the owner processes the order form and adjusts the *item quantity* for the ordered items on the **stock list**. The *processed customer order form* is place in the **pending invoices file.**

The owner prepares the invoice for the ordered items by referring to the *processed customer order form* from the **pending invoices file**. Then items and *invoice* are sent to the customer. A *copy of the invoice* and are then placed in the **pending invoices file**.

Once a week, the owner uses the stock list to look at the *item quantities* to determine which items need to be ordered. These are recorded on the *stock order form* which is sent to the supplier.

a. Use the description above to draw the Stock Order and Monitoring System context diagram.

Context Diagram

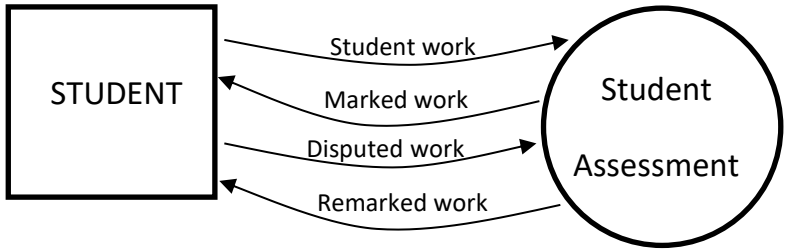
b. Use the description and context diagram to draw the Stock Order and Monitoring System's Level 0 DFD.

Level 0 Data Flow Diagram

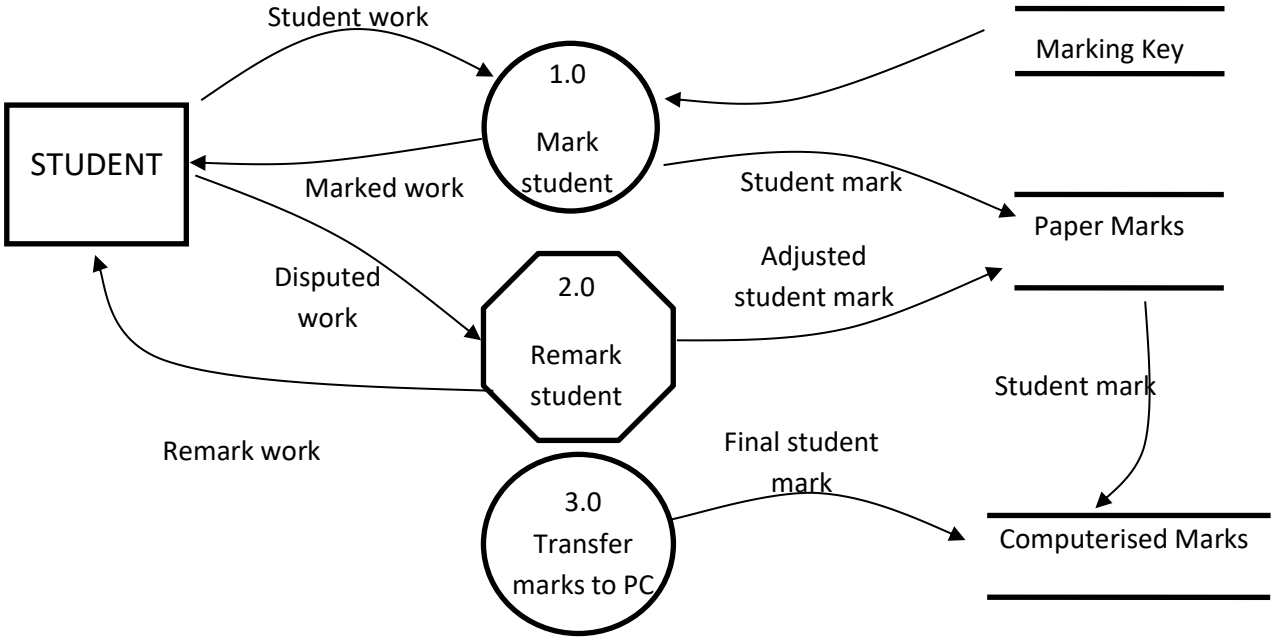
Data Flow Diagrams Checklist

1. List 5 things that are wrong with the following data flow diagram. Label the diagram with the letters A, B, C, D and E to indicate the location of the errors.

Context Diagram for the Student Assessment System



Level 0 Data Flow Diagram for the Student Assessment System



A

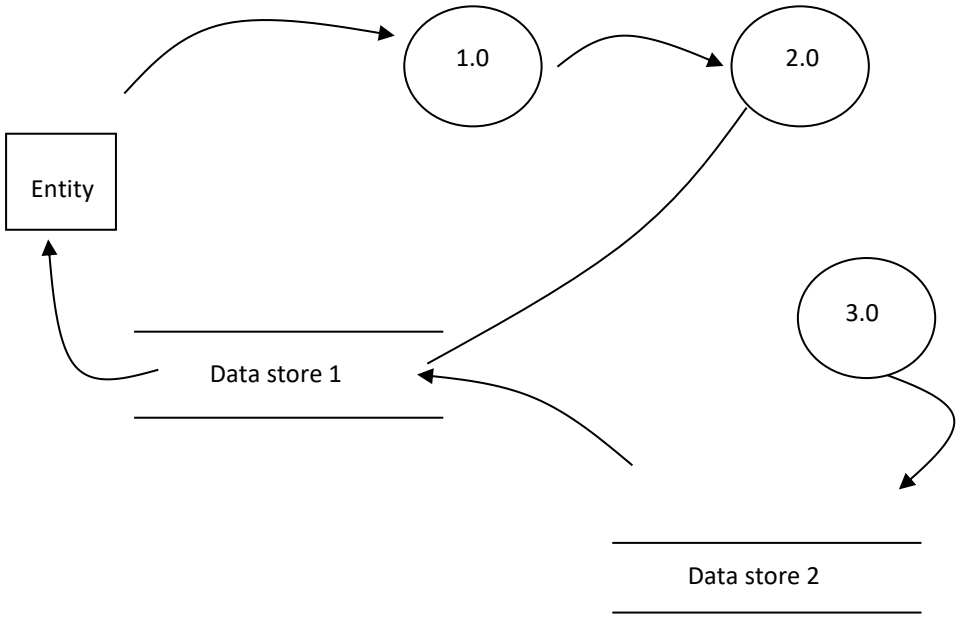
B

C

D

E

2. Ignoring the fact that the text is missing, list 4 things that are wrong with the following <u>data flow</u> diagram. Label the diagram with the letters A, B, C and D to indicate the location of the errors.



A

B

C

D

The Central Processing Unit and Memory

System Unit

1. Describe the motherboard/mainboard.

_____

_____

The CPU

2. Describe the task that the CPU performs.

_____

_____

3. Microprocessors contain tiny transistors, describe these transistors.

_____

_____

4. Explain why the processor needs primary storage (also known as memory or RAM) while the computer is executing a program.

_____

_____

5. The CPU consists of the Control Unit, the ALU and registers.
    a. Draw a labelled sketch of the CPU components.

    b. Describe each of these.

    Control Unit_____

    _____

    ALU _____

    _____

    Registers _____

    _____

6. List four arithmetic operations that the ALU can perform.

7. List three logical conditions that the ALU can test.

8. What does the program counter do?

9. List the 4 steps that the central processing unit uses to perform each instruction.

Primary memory

10. What is primary memory?

11. What does RAM stand for?

12. RAM is volatile. What does this mean?

13. What does ROM stand for?

14. Describe what ROM is.

15. What is cache?

Bus, Expansion Slots and Ports

16. Describe the bus lines.

_____

_____

17. The system bus transfers data between which two components on the mainboard?

_____

_____

18. List the 3 parts of buses and explain what it does.

_____

_____

_____

19. What is the advantage of a computer with a larger bus size (width)?

_____

_____

20. What is the unit measurement for bus speed?

_____

Standard Operating Environment

21. What is the role of standard operating environment?

_____

_____

Booting the System Worksheet

22. What is booting?

_____

_____

23. How is a warm boot different to a cold boot?

_____

_____

24. In the table below, complete the information about the chips:

	BIOS	**CMOS**
What does it stand for?		
What does it store?		

25. Number the steps of the boot process so that they are in the correct order.

The operating system loads configuration information, may request user information (e.g. username and password), start several background processes and display the desktop on the screen.	
The results of the POST are compared with data in a CMOS chip	
The power supply sends a signal to the components in the system unit.	
The BIOS performs the POST which checks components such as the mouse, keyboard, and adapter cards.	
The processor finds the ROM chip that contains the BIOS.	
The system files and the kernel (core) of the operating system are loaded into RAM from secondary storage.	
The BIOS may look for system files on a USB flash drive or CD or hard disk.	

Troubleshooting and Preventative Maintenance Exercise Worksheet

1. What is troubleshooting?

2. Describe the three strategies of troubleshooting.

   i.

   ii.

   iii.

3. What is preventative maintenance?

4. Give two advantages of preventative maintenance on a computer system.

5. List 3 type of tasks that would be performed during preventative maintenance?

6. You return to your computer from a short lunch break to find the screen is blank. What steps would you take to troubleshoot the problem?

Managing Data

Managing Data: Data Protection Methods Worksheet

1. What is data protection?

2. What is data encryption?

3. Describe how the private and public keys work in encryption.

4. Define the purpose of a digital signature.

5. What is authentication?

6. Describe biometrics authentication.

7. List any four types of biometrics authentication.

   a) _____

   b) _____

   c) _____

   d) _____

8. List two advantages and disadvantages of using biometrics authentication technology.

9. Discuss how passwords work.

Spreadsheets

Common Statistical Functions

Find the AVERAGE of a set of numbers

1. Click where the answer is to go
2. Click on the picklist (triangle) to the right of the autosum button (∑ ▼)
3. Select **Average**
4. Make sure the highlighted numbers are the ones required
5. Press ENTER

Find the MAXIMUM of a set of numbers

1. Click where the answer is to go
2. Click on the picklist (triangle) to the right of the autosum button (∑ ▼)
3. Select **Max**
4. Make sure the highlighted numbers are the ones required
5. Press ENTER

Find the MINIMUM of a set of numbers

1. Click where the answer is to go
2. Click on the picklist (triangle) to the right of the autosum button (∑ ▼)
3. Select **Min**
4. Make sure the highlighted numbers are the ones required
5. Press **ENTER**

Find the COUNT of a set of numbers

1. Click where the answer is to go
2. Click on the picklist (triangle) to the right of the autosum button (∑ ▼)
3. Select **Count Numbers**
4. Make sure the highlighted numbers are the ones required
5. Press **ENTER**

Absolute Cell Referencing

When entering a formula a cell reference is used to refer to any cells needed in the formula.

A relative cell reference is a cell address that changes as the formula is extended using the fill handle i.e. the cell reference is relative to its location.

	A	B	C	D
1	Trish's Lunch Bar			
2				
3	Item	Unit Price	Quantity	Total Cost
4	Beef roll	2.3	5	=B4*C4
5	Pastie	1.6	3	
6	Pie	1.65	4	
7	Chips	1.5	2	

When the formula is filled using the fill handle each cell changes according to its location.

	A	B	C	D
1	Trish's Lunch B			
2				
3	Item	Unit Price	Quantity	Total Cost
4	Beef roll	2.3	5	=B4*C4
5	Pastie	1.6	3	=B5*C5
6	Pie	1.65	4	=B6*C6
7	Chips	1.5	2	=B7*C7
8	Sanwich	1.95	5	=B8*C8
9	Burger	3.5	6	=B9*C9
10	Salad	2.5	1	=B10*C10

An absolute cell reference is a cell address that doesn't change as the formula is extended using the fill handle i.e. the cell reference is remains in its original location.

	A	B	C
1		**WEEKLY WAGES**	
2		**Rate/Hour**	**$25.50**
3			
4	**NAME**	**HOURS**	**WAGES**
5			
6	Smith	20.0	=$C$2 *B6
7	Jones	30.0	
8	Taylor	40.0	
9	Evans	37.5	
10	Johnson	35.0	

To create an absolute cell reference:

1. Press the equal sign
2. Click in the cell that is to remain the same
3. Press the F4 function key

A mixed cell reference has a combination of relative and absolute cell referencing i.e. some cells in the formula change and some don't as the formula is extended using the fill handle.

	A	B	C
1			
2		**Rate/Hour**	**25.5**
3			
4	**NAME**	**HOURS**	**WAGES**
5			
6	Smith	20	=$C$2*B6
7	Jones	30	=$C$2*B7
8	Taylor	40	=$C$2*B8
9	Evans	37.5	=$C$2*B9
10	Johnson	35	=$C$2*B10
11	Brown	15	=$C$2*B11
12	Cain	40	=$C$2*B12

Exercise 1

Use the following spreadsheet to answer questions the questions below.

	A	B	C	D	E	F	G	H
1		Client	Item	QTY	Unit Price	Cost	Discount	Price
2	1	Target	102	26				
3	2	Coles	101	25				
4	3	Myers	102	15				
5	4							
6								
7						**Prices and Discounts**		
8						Item	Unit Price	Discount %
9						100	30.25	5
10						101	40.50	7
11						102	125..25	8

1. Describe the formatting of the heading Prices and Discounts

   _____

   _____

2. What is the general term used to describe cells: F8:H11?

   _____

3. Cells F8:H11 have been named Prices. Why is it useful to name these cells?

   _____

   _____

4. Write the correct formula for cells:

   (a) E2 _____

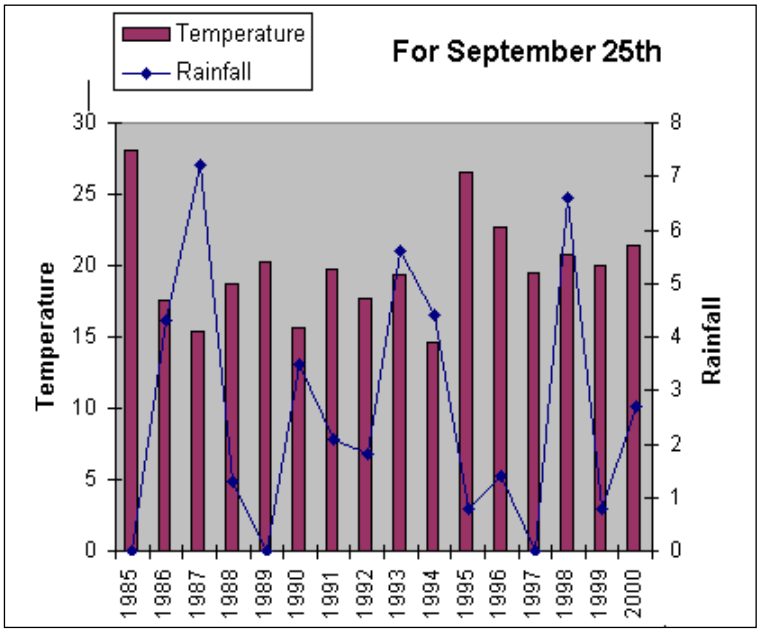
   (b) F2 _____

   (c) G4 _____

   (d) H4 _____

Exercise 2

Study the chart below and answer the questions based on the 16 years weather details for September 25th.



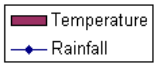
1. Between 1985 and 2000, which year had the most rainfall?

2. Between 1985 and 2000, which year had the hottest temperature?

3. Write down something significant that happened in 1985, 1989 and 1997.

4. Explain what this chart is graphically representing.

5. On the chart above, what is the name given to this part of the chart?



	A	B	C	D	E	F
1	**Movie Booking Sheet**				**Prices**	
2					**Child**	$15.00
3					**Adult**	$24.50
4						
5	**Name**	**Age**	**Child/Adult**	**Price**		
6	Lee	12				
7	Chun	25				
8	Sammy	19				
9	Yo	17				
10	Chen	15				

6. Write the if statement formula you would use in cell

Criteria for child and adult are: Child < 18 Adult >= 18

C6

D6

Databases

• Opening a database

A **database** is an organised collection of related data.

• Tables, Fields, Primary Keys and Records

A **table** is the structure that stores the data.

A **field** is a category under which a piece of information is stored.

A **primary key** is a unique identifier for each record in the table.

A **record** is the data about 1 particular item.

• Sorting – placing records in order (ascending or descending)

• Filtering – locating a subset of data

• Queries

A **query** extracts a **subset** of the data. The **rules for the query are saved** not the subset of data.

• Forms

A **form** provides a more **user-friendly interface** to data in the database. Forms can be used to view and enter data or to provide easy access to other forms or reports in the database.

• Reports

A report provides a **formatted summary and analysis of data**. A report is usually designed for printing.

Database Terminology Worksheet

Database	
Table	
Field	
Primary Key	
Record	
Sort	
Filter/Search	
Query	
Report	
Form	
Data type	
Datasheet View	
Design View	
Field Properties	

Exercise 1

Using the tables below to answer the following questions.

tblDepartment

DepartmentID	DeptName	DeptPhone	Location
100	Accounts	9457 2346	Bentley
200	Human Resources	9385 1234	Subiaco
400	Sales	9457 1982	Bentley

tblEmployees

StaffID	DeptID	Surname	First Name	Date Of Birth	Private Health Cover	Salary	Number Dependents	Mobile Phone	WorkHistory
BT2002	400	Turner	Brad	5/07/1983	No	$17,500	0	0413 728 123	Trainee
FB1997	400	Brown	Fabian	12/07/1967	Yes	$46,000	5	0408 128 023	Senior sales rep - awarded salesman of the year in 2000 and 2001.
HG1996	400	Green	Harman	9/11/1975	No	$24,500	1	0407 391 023	Part-time only as cares for disabled child.
HK1999	200	Kennedy	Henk	9/03/1955	Yes	$47,500	4		B Psych UWA, 10 years experience with Education Dept.
JL1999	200	Lim	Janet	7/08/1972	Yes	$32,000	0	0412 876 123	Studying part-time at Murdoch Uni for BA
JV1988	100	Vucens	Jim	4/07/1968	Yes	$35,000	1		B Sc UWA, travelled overseas, likes hockey and movies
MB2001	100	Bartlett	Mary	12/06/1981	No	$27,500	0	0401 872 123	TEE and has started business course at Curtin Uni - needs Friday pm off for studies.

b. Explain what will happen if you try and add the following data to the tblEmployees. Make sure you use the above tables to help you with your explanation.

StaffID	DeptID	Surname	First Name	Date Of Birth	Private Health Cover	Salary	Number Dependents	Mobile Phone	WorkHistory
YM2000	300	Monk	Yvonne	4/10/1982	Yes	$38,000	0	0413 234 123	Published several important research articles in medical journals.

_____

_____

_____

_____

_____

c. List the data types for each of the fields in tblEmployees.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

d. List the primary key for tblDepartments. _____

e. List the primary key for tblEmployees. _____

f. List the table that has the foreign key and name the foreign key field.

Table name: _____

Foreign key field name: _____

g. Draw the link or relationship between the tables. Be sure to show which is the one side and which is the many side.

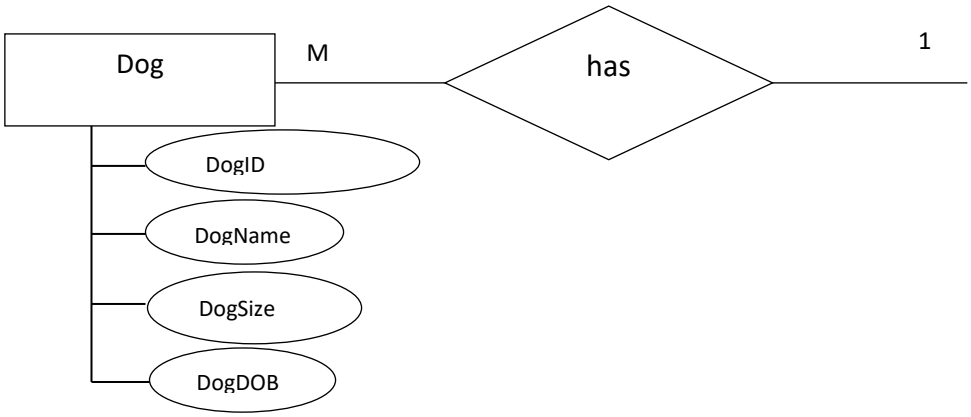
Entity Relationship Diagram

Exercise 1:

Create an ER diagram to show details about an individual dog, with links information about the dog breed (2 entities)

Add the following to the below diagram:

1. Add missing entity
2. Add primary key
3. Make up attributes for the entity
4. Write in the foreign key

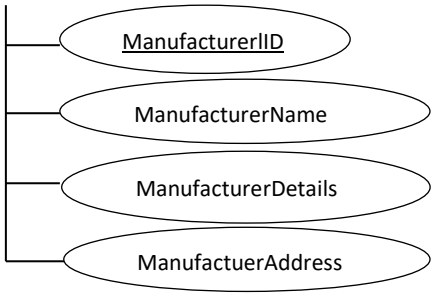


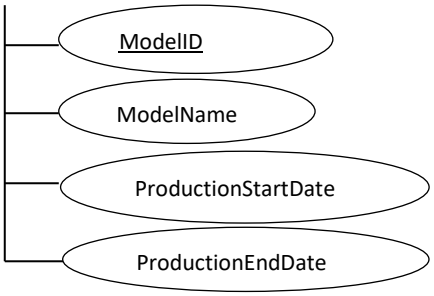
Exercise 2:

Create an ER diagram to show details of car manufactures and models (2 entities)

Complete the rest of the diagram. You will need to add:

1. Missing entity boxes
2. The relationship
3. Cardinality (1:M)
4. Insert foreign key





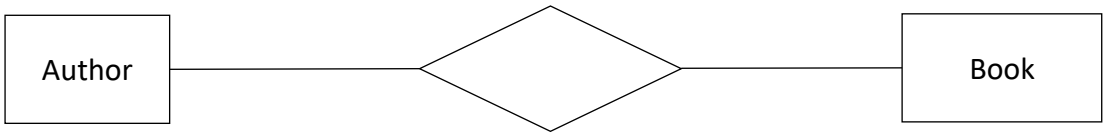
Exercise 3:

Database to show details of authors and their books (3 entities). Create an ER diagram to show the following:

- one author can write many books
- one book can be written by many authors.
- hence the cardinality is M:N

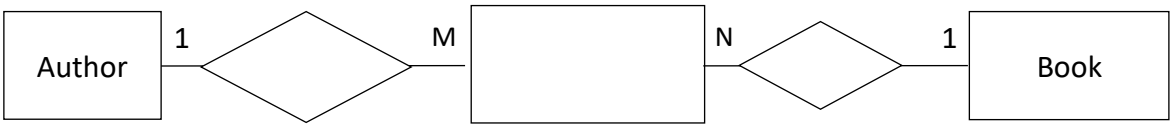
Complete the ER diagram by adding

- the relationship
- the cardinality M:N
- attributes to both entities
- underline the primary keys



You will need to resolve the M:N relationship:

1. Give an appropriate name to the third entity
2. Add type of relationship
3. Add attributes to all entities
4. Add foreign key – there are 2 foreign keys
5. Underline all the primary keys including the composite primary key.



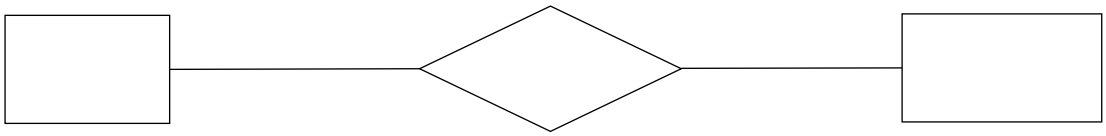
Exercise 4:

Database to show details of sports events and the participants (3 entities). Create an ER diagram to show the following:

- one sport event can have many participants
- one participant can participate in many events.
- hence the cardinality is M:N

Complete the ER diagram by adding

- the entities and the relationship
- the cardinality M:N
- attributes to both entities
- underline the primary keys



You will need to resolve the M:N relationship:

1. Give an appropriate name to the third entity
2. Add type of relationship and the cardinality
3. Add attributes to all entities
4. Add foreign key – there are 2 foreign keys
5. Underline all the primary keys including the composite primary key.

Database Documentation Worksheet

1. Why do we need to document database?

_____

_____

_____

_____

2. What is user documentation?

_____

_____

_____

3. What is technical documentation? Give an example.

_____

_____

4. What is naming conventions and why it is important?

_____

_____

5. Describe two design tools that represent the structure of databases?

_____

_____

_____

_____

_____

_____

6. Describe one design tools that representing input form to capture data?

_____

_____

Legal and Ethical Responsibilities Exercises

Exercise 1

1. What are the legal responsibilities involved in managing data?

_____

_____

_____

_____

2. Give 2 appropriate examples of ethical responsibilities in data management?

_____

_____

_____

_____

3. What is the purpose of having acceptable work practices in placed in an organisation?

_____

_____

4. List down the stages involved in resolving conflicts that arises due to legal, ethical or social issues.

_____

_____

_____

_____

_____

_____

_____

Developing Software

Software Questions

1. Define software.

2. What is **application** software?

3. List 3 examples of application software that you have used this semester.

4. What does user-friendly mean?

5. What is open source software?

6. What is freeware?

7. What is copyrighted software?

8. What is software piracy?

9. What does having a site license let an organisation do?

10. What is an **operating system**?

11. List the 3 main functions of an operating system.

12. Write a definition for each of these applications:

Word processor

Spreadsheet

Database

Desktop publisher

Browser

Email

13. What is a utility program?

14. What is a file compression program?

15. What is a defragmenter?

16. What is antivirus software?

17. What is malware and how can you protect your computer from it?

Number System Exercises

1. Convert the following **binary** numbers into the **decimal** equivalent. **Show all working**.

   10101_2

   1100110_2

   0101010_2

   11111111_2

2. Convert the following **hexadecimal** numbers into the **decimal** equivalent. **Show all working**.

   13_{16}

$9F2_{16}$

$10B2_{16}$

30_{16}

3. Convert the following **binary** numbers into the **hexadecimal** equivalent. Show all working.

11010101_2

11110110_2

1101010_2

10011_2

4. Convert the following **decimal** numbers into the **binary** equivalent. Show all working.

17

26

5. In computer networking, a Media Access Control (MAC) address is a unique identifier assigned to a network interface card (NIC) by the manufacturer for identification. If the MAC address for an iPhone is 00:1C:B3:09:85:15, express the MAC address in binary and decimal numbers.

6. Convert following binary numbers to decimal numbers, then use the ASCII table in your course booklet to help decode this message!

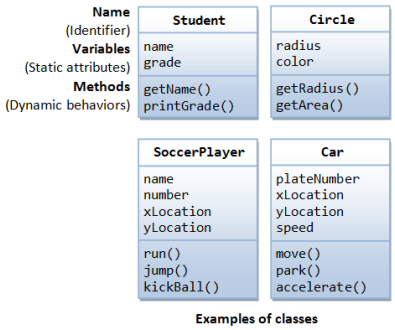
   1010111 1100101 1101100 1101100 0100000 1100100 1101111 1101110 1100101 0100001

Programming

Languages Terminology Worksheet

1. What is a program?

2. For each of the following samples of programming code indicate the specific language type and definition.

Sample	Language	Definition
ADD #B7, 17		
Input (Num1) Input (Num2) Diff = Num1 - Num2 Output (Diff)		
011010101000111		
 Examples of classes		
Select Names From Workforce		

3. What is an algorithm?

4. What is pseudo-code?

5. What is a flow chart?

6. Name 4 high-level programming languages.

7. What is the difference between a low-level programming language and a high-level programming language?

8. What do compilers, interpreters and assemblers do?

9. What is a variable?

10. What is a constant?

11. Name the three basic control structures that can be used in programming.

_____

_____

12. Which control structure would be used in a program that accepts the height and width of a rectangle and then calculates the area of that rectangle?

_____

13. Which control structure would be used in a program that accepts the goals scored by 11 soccer players and then calculates the total goals scored?

_____

14. Read the following algorithm and complete the questions below.

```
Module CalcTotalSumoWeight

    TotalWeight = 0

    For Num = 1 To 4

      Weight = inputbox(“Enter the weight of wrestler “ & Num)

      TotalWeight = TotalWeight + Weight

    Next Num

    Msgbox ("The total weight of " &  Num &  " sumo wrestlers is " &  TotalWeight &  " kg")

End Module
```

Use the VB Code above to list **one example of each** of the following:

Input statement _____

Output statement _____

Assignment statement _____

Variable name _____

Algorithms in Pseudocode and Flow Charts - Sequence

1. **Task**: Calculate the retail price of an item based on its wholesale price and a 15% percentage mark-up.
   Hint: RetailPrice = Wholesale * 1.15
   or RetailPrice = Wholesale + (Wholesale * 0.15)

   Algorithm in Pseudocode

   _____

   _____

   _____

   _____

   _____

   Check algorithm: If Wholesale = $300 then RetailPrice = _____

   Algorithm in flow chart

2. **Task**: Calculate the final cost of an item based on its retail price and the 10% GST.

   Algorithm in Pseudocode

   _____

   _____

   _____

   _____

   _____

   Check algorithm: If RetailPrice = $500 then FinalCost = _____

3. **Task**: Convert a distance in miles into kilometres.
   Hint: Kilometres = Miles * 1.6

   Algorithm in Pseudocode

   _____

   _____

   _____

   _____

   _____

   Check algorithm: If Miles= 20 then Kilometres = _____

   Algorithm in flow chart

4. **Task**: Convert a weight in pounds into kilograms.
   Hint: Kilograms = Pounds * 0.45

   Algorithm in Pseudocode

   _____

   _____

   _____

   _____

   _____

   Check algorithm: If Pounds= 300 then Kilograms = _____

5. Convert a temperature in Fahrenheit into Celsius.
   Hint: Celsius = (Fahrenheit – 32) * 5 / 9

Algorithm in Pseudocode

_____

_____

_____

_____

_____

Check algorithm: If Fahrenheit = 100 then Celsius = _____

Integer Division Using Mod and Div

Write an algorithm to:

1. Convert a total number of weeks to years and weeks.

   Module ConvertToYrsAndWks

   End Module

Test data 1:				
Test data 2:				
Test data 3:				

2. Convert a total number of days to weeks and days.

   Module ConvertToWksAndDays

   End Module

Test data 1:				
Test data 2:				
Test data 3:				

3. Convert a total number of hours to days and hours.
   Module ConvertToDaysAndHrs

   End Module

Test data 1:				
Test data 2:				
Test data 3:				

Selection – making a decision based on a Boolean statement

Exercises

For each of the following algorithms

- write the algorithm in the required style on this sheet
- desk check each algorithm
- create the Visual Basic source code for the algorithm
- use the test data from your desk check to check that the programming is working as planned.

1. **Weekly Commission:** Write an algorithm using **pseudo-code** to calculate a weekly commission based on the sales amount. A commission rate of 10% is paid for sales under 1000 and a commission rate of 15% is paid for sales of 1000 or more.

Test data used:

	SalesAmount	SalesAmount<1000?	Rate	Commission	Output
Test data 1:					
Test data 2:					
Test data 3:					

2. **Sporting:** Write the algorithm as **pseudo-code** that asks for the user's name and whether they prefer **playing** football or **watching** football. If they prefer to watch, tell them that they may need more exercise, otherwise tell them that playing sport will keep them healthy.

Test data used:

	Name	Preference	Preference = "watch"?	Output
Test data 1:				
Test data 2:				
Test data 3:				

3. **Age:** Write the algorithm in **pseudo-code** that asks the user what year they were born. If they are 17 years or younger, display a message that they can have a student discount price, otherwise display a message that says, sorry you are too old for a discount. (Hint: use a constant for ThisYear)

Test data used: ThisYear = 2017

	BirthYear	Age	Age <= 17?	Output
Test data 1:				
Test data 2:				
Test data 3:				

4. **Smaller Number:** Write the algorithm as a **flow chart** that asks the user to enter 2 numbers. Use an "if statement" to determine which is the smaller number and output that number together with the words "is the smaller number".

Test data used:

	FirstNum	SecondNum	FirstNum<SecondNum?	Output
Test data 1:				
Test data 2:				
Test data 3:				

Selection Algorithm Practice

1. Write an algorithm that will accept the current temperature. If the temperature is over 45 degrees it will display a message "It is too hot, you may go home" otherwise it will display a message "The temperature is OK, keep on working."

Test data used:

2. Write an algorithm that accepts a number between -10 and 10, then displays whether the number is positive or negative. For example, is -3 is entered then the message "-3 is a negative number".

Test data used:

3. Write an algorithm that accepts an age of a person then displays the ticket type and price of entry to the zoo. The entry rates are as follows:

Age	Ticket Type	Price
<4 years	Toddler	$0
4 – 15 years	Child	$15
16 – 65 years	Adult	$29
>65 years	Concession	$22

Test data used:

4. Write an algorithm that will accept a student's test score then display a grade and a message from the teacher.

Score	Grade	Message
0 .. 35	E	Make sure you attend all lessons and ask questions when you don't understand concepts.
36 .. 49	D	Improvements can be made by getting assistance in the Learning Centre.
50 .. 64	C	Good work. Remember to review your work every day.
65 .. 79	B	A very good effort. Keep consolidating your work.
80 .. 100	A	Excellent work! Continue with your current study plan.

Test data used:

5. In a game of golf the expected number of hits on a hole is called par. The number of hits taken in relation to par is given a name. Write an algorithm that will:
    - accept the player's score for that hole (eg 7) and the par value of the hole (eg 4)
    - calculate the difference (score – par)
    - display the official golfing term for the score.

Difference	Golfing term
-3	Albatross
-2	Eagle
-1	Birdie
0	Par
1	Bogey
2	Double bogey
3	Triple bogey

Test data used:

6. Sketch the form layout so that you can implement the questions 1 to 6 in VB Express. Include all controls needed and make sure you include the names for each control.

Repetition – Fixed

Exercises

1. Write the algorithm in pseudo-code to calculate the total cost of 5 different items.

Desk check

2. Write the algorithm in pseudo-code to calculate the total weight of 4 different sumo wrestlers.

Desk check

3. Write the algorithm in pseudo-code to calculate the total number of runs for 11 cricketers.

4. Write the algorithm in pseudo-code to calculate the average height of 6 basketball players.

Desk check

5. Write the algorithm in pseudo-code to ask the user for the number of fish caught then calculate the average weight of the fish.

Desk check

Repetition – Variable

Exercises

1. Write an algorithm using pseudocode to make sure that a height entered is between 80 and 250 cm. Display the height when it is valid. **Use variable test first**.

- Desk check using your own test data.

2. Write an algorithm to make sure that the password entered is U4Me. When the password is valid, display the message "Password entered is valid". **Use variable test last**.

- Desk check using the values provided

3. Limit the number of attempts at entering the password to 4. If they get it correct display the message "**OK you may enter**" if they did not get it correct in 4 attempts display the message "**Sorry entry forbidden**".
   HINT: You will need to have
   - 2 conditions in your algorithm
   - use 2 way selection and a repetition control structures
   - keep track of NumAttempts.

- Desk check using your own test data

4. A plane has a maximum capacity of 200 passengers. Write an algorithm using pseudocode that
    - asks a person how many tickets they want
    - checks that there are enough tickets left and if there are enough tickets left then deducts the number of tickets from the total.
    - If there is not enough tickets left, displays an appropriate message
    - This continues until all tickets are sold. Once all tickets are sold, the program will display a message that the plane is full.

    - Desk check using your own test data

5. A clown has 50 balloons to give away. Write an algorithm using pseudocode that
    - asks a person how many balloons they want
    - checks that there are enough balloons left and if there are enough balloons left then deducts the number from the total.
    - If there is not enough balloons left, displays an appropriate message
    - This continues until all balloons are given out. Once all balloons are distributed, the program will display a message that all the balloons are gone!

    - Desk check using your own test data

Networks and Communications

Network Diagrams

Exercises

1.

a. Draw a network diagram that connects 4 computers (work stations), a switch, WAP, 2 servers and a wireless laptop.

b. What transmission media did you need to include?

c. What type of network is this?

d. Add a printer so that all of the work stations and the laptop can print to the one printer. Why did you connect the printer where you did?

2. Caitlin uses Bluetooth to connect her iPod to her car stereo system so that she can listen to her music playlist through the stereo.

   a. What type of network is this?

   _____

   b. Draw the network diagram.

3. A home user would like to connect to following devices together: smart TV, network aware printer, computer, smart phone, tablet and notebook. He would also like to be able to connect to the Internet.

   a. What extra devices would he need to buy?

   _____

   _____

   b. What type of network is this?

   _____

   c. Draw a sketch of your proposed network.

4. A library is planning to set up a combined wired and wireless network so that people can access to the internet via their own devices. The network will have 2 computers in the librarian's office, 2 computers on the loans table (each with a barcode scanner attached), 2 printers (1 in the office and 1 near the loans table), database server, media storage server, a switch, a router with firewall and 3 wireless access points distributed throughout the library.

   a. Draw a network diagram showing the network topology.

   b. Describe one **advantage** of using **wireless** connectivity in the library?

   _____

   _____

   c. Describe one **disadvantage** of using **wireless** connectivity in the library?

   _____

   _____

   d. Describe one **advantage** of using a **wired** connectivity in the library?

   _____

   _____

   e. Describe one **disadvantage** of using **wired** connectivity in the library?

   _____

   _____

5. A business requires a network to be established that links the computers and other network devices which are located across 3 separate buildings on the same site.
The file server, database server, web server and router will be located in small server room in the administration building. The servers will be connected to switch A.

   The 2 workstations and network aware photocopier in the administration building will also be connected to switch A via UTP cable.

   The 3 workstations and laser printer in the engineering building will be connected to switch B via UTP cable.

   The 2 workstations, a laser printer and a wireless access point in the manufacturing building will be connected to switch C via STP cable.

   Switch B and switch C will connect to switch A via fibre optic cable. All workstations and notebooks will have Internet access.

   a. Sketch the proposed network diagram, clearly labelling all components.

   b. Why would STP cable be used in the manufacturing building?

   _____

   _____

   c. Why fibre optic cable would be used to link the 3 switches.

   _____

   _____

Networking Questions

1. Define (explain) the following terms:

   a. Network

   b. Protocol

   c. LAN

   d. WAN

   e. NIC

   f. Server computer

g. Client computer

h. Wireless access point

2. Modem is short for modulation and demodulation. Explain the function of a modem and include the terms modulation, demodulation, analogue signal and digital signal. Use a diagram to support your answer

3. Malware is short for malicious software. Name and briefly explain two types of malware.

4. Explain what is known as 'noise' in a network transmission.

5. Name the two common wired cables used in networking. Sketch a picture of each and explain the main features of each cable.

Cable 1:

Cable 2:

6. Explain the difference between the two types of twisted pairs – unshielded twisted pair (UTP) and shielded twisted pair (STP).

7. List the three basic components of a data communications system.

8. Draw a diagram to represent the components of a data communications system.

9. Name and explain the purpose of two different communication protocols.

Protocol 1:

Protocol 2:

10. Computer networks can use wireless communications instead of cables. For each of the following:
    a. indicate whether it is suitable for short distance or long distance.
    b. research the communication range of transmission.

	Short or Long distance	**Range of transmission**
Satellite		
Bluetooth		
Microwave		
Infrared		

11. What does a router do?

12. Sketch a labelled diagram of the topology (physical layout) of a star network.

13. Using the following description of the network, draw the network diagram in the space below. You may need to add devices to the network.

Nodes 1, 2 and 3 are connected to the network with unshielded twisted pair cabling.

The Printer is network aware.

Nodes 4 and 5 are wireless laptops which gain access to the wired network through the wireless access point.

All computers can access to the Internet and the server that stores the business's database.

Firewall is used to protect the network

END OF BOOKLET