

# LEARNER WORKBOOK

## Irrigation

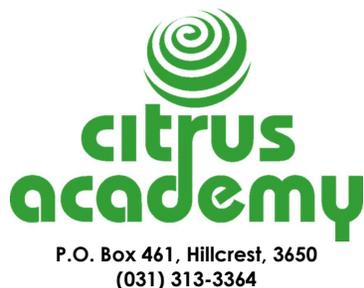


<b>Title:</b>	<b>Schedule the Operation and Maintenance of Irrigation Systems</b>				
<b>Applied Title:</b>	<b>Schedule the Operation and Maintenance of Irrigation Systems for Subtropical Fruit Production</b>				
<b>Field:</b>	Agriculture and Nature Conservation				
<b>Sub-Field:</b>	Primary Agriculture				
<b>SETA (SGB):</b>	AgriSETA				
<b>Skills Area:</b>	Irrigation				
<b>Context:</b>	Subtropical fruit Production				
<b>US No:</b>	116317	<b>Level:</b>	4	<b>Credits:</b>	3
		<b>Notional Hours:</b>	30		
<b>Author:</b>	F. Kruger (BSc Agric (Mechanised Agriculture))				
<b>Adaptation:</b>	T. Bekker				

NQF Level **4**

---

**This material is adapted from production learning material developed by and under license from:**



**Disclaimer**

By accepting this document and reading its contents you agree to be bound by the terms of this disclaimer.

The use of the contents of this document is at your own risk. The Citrus Academy does not warrant that the content of this document is suitable for your intended use or that it is free of inaccuracies or omissions. The opinions and advice expressed in this document are not necessarily those of the Citrus Academy. The Citrus Academy, its directors, officers, employees, agents and contractors shall not be liable for any loss or damage of any nature suffered by any person as a direct or indirect result of the use of, or inability to use any advice, opinion or information contained in this document, or any misrepresentation, misstatement or omission, whether negligent or otherwise, contained in this document.

You indemnify the Citrus Academy against any claim by any third party against the Citrus Academy, its directors, officers, employees, agents or contractors arising from, or in connection with, the use of, or reliance on, the contents of this document. It is your responsibility to determine suitability of the contents of this document for your intended use.

---

## Table of Contents

Directions .....	4
Step 1 .....	5
Step 2 .....	7
Step 3 .....	8
Step 4 .....	9
Step 5 .....	11
Step 6 .....	24
Step 7 .....	25
Step 8 .....	26
Step 9 .....	27
Step 10.....	34

## Directions

This material is aimed at learners wishing to complete this unit standard. The guide contains all necessary activities and instructions that will enable the assessor and learner to gather evidence of the learner's competence as required by the unit standard.

This guide is designed to be used by the learner with guidance from a facilitator and a trained assessor to develop competence in all knowledge, skills and attitudes required by this unit standard.

This guide contains step-by-step instructions for the assessment process. These steps are as follows:

<b><i>Step</i></b>	<b><i>Description</i></b>	<b><i>Timeframe</i></b>
1	Learner Assessment Contract	Before delivery of program
2	Learner Declaration of Authenticity	Before delivery of program
3	Learning Assumed to Be in Place	Before delivery of program
4	Learner Assessment Plan for Gathering of Evidence	Before delivery of program
5	Assessment Activity Workbook	During delivery of program, assessment after delivery of program
6	Report Writing	After delivery of program
7	Practical Assessment	After delivery of program
8	Re-assessment Procedures	After completion of assessment
9	Documentation	After completion of assessment
10	Administration and Completion of Portfolio of Evidence	After completion of assessment

# Step 1

## Learner Assessment Contract

The assessor and / or the facilitator holds a pre-assessment briefing with you before the learning program starts in order to guide you and assist you to make sure that you understand exactly what is expected from you in order to become competent in this learning module.

As part of the pre-assessment briefing, the learner assessment contract must be signed. The assessor will assist you and explain the agreement to you in detail.

<b>Learner Assessment Contract</b>	
<b>Learner's Name:</b>	
<b>Assessor's Name:</b>	
<b>Unit Standard:</b>	116317
<p>Your rights as a learner are:</p> <ol style="list-style-type: none"> <li><b>1. You have a right to appeal</b> against any judgment given as a result of any assessment. You must have valid reasons for doing this.</li> <li><b>2. You have the right to an interpreter</b> if you need one. However, if one of the learning assumptions for the unit standard is that you are competent within the language of assessment, you may not have an interpreter.</li> <li><b>3. You can ask that an impartial observer attend any assessment.</b> This observer may not take any part in the assessment.</li> <li><b>4. If you do not agree with the assessment, you have the right to have your assessment internally moderated.</b> If you still do not agree with the result of the assessment you can ask that the ETQA to perform an <b>external moderation</b> on the assessment. If any verification upholds the assessment findings, you will be held liable for all the costs of the verification. If any verification rules that you have been aggrieved as a result of the assessment, your assessor will be held liable for all cost of verification.</li> <li><b>5. If during the assessment you are found not yet competent, your assessor will encourage you to master the areas where you have not reached competency.</b> This will be recorded on a <b>development plan</b>. You are required to arrange with the assessor for a new assessment schedule. The assessor can only permit three such re-assessments. If a learner has not reached mastery after three additional attempts, the assessor reserves the right to remove you from the program.</li> </ol>	
<p><b><u>Qualification</u></b></p> <p>This standard leads to the award of credits for unit standard 116317. Once the assessment is complete application will be made to register and certify you for that standard with the AgriSETA. You may contact the assessor or facilitator at any time for information to assist you with further studies.</p>	
<p><b><u>Confidentiality</u></b></p> <p>Each assessment application, the outcomes, results and reviews will be treated as a confidential matter by you, the learner, the facilitator(s), assessor(s), and moderator(s). No references will be made to anyone or any organisation outside the SETA about the status of an application during the assessment process.</p>	

**Assessment Guide – Learner**

**Skills Area:** Irrigation

**Level:** 4

**Unit Standard:** 116317

**Consent**

I, the learner, hereby state that I have read the above and understood the contents thereof. I was given the opportunity to clarify any issues relating to the assessment process and my assessment plan. I have requested this assessment of my own free will and without duress.

<b>Learner's Signature</b>		<b>Date:</b>	
<b>Assessor's Signature</b>		<b>Date:</b>	

## Step 2

### Learner Declaration of Authenticity

It is important that we make sure that each learner supplies original evidence completed by himself / herself and according to the level of knowledge and skill that he / she has acquired from the learning process.

Please sign the following declaration:

I hereby declare that the following documentary evidence is my own. I certify that the process followed was ethical and did not infringe on the copyright of any individual or organisation.			
<b>Learner's Signature</b>		<b>Date:</b>	
<b>Assessor's Signature</b>		<b>Date:</b>	

## Step 3

### Learning Assumed to Be in Place

Do you have all the knowledge and skills necessary to begin this learning process?

This is a level 4 module of learning, and we have to make sure that you have already learnt all the skills, knowledge and attitudes that you will need to use in this module. It will help you to understand and learn more easily in this module, and it is important that we know whether you are ready to move on.

Please look at the list of unit standards below of modules that you should have completed before undertaking this one. Tell us whether you have completed each of the unit standards or modules, and if you did, tell us when you learnt this.

If you need help in understanding this list, please ask the facilitator or assessor.

<i><b>NQF Level</b></i>	<i><b>Unit Standard Number</b></i>	<i><b>Learning Module Name</b></i>	<i><b>No, I Have Not Completed It</b></i>	<i><b>Yes, I Have Completed It</b></i>	<i><b>If Yes, When Did You Complete It?</b></i>
NQF3		Literacy and Numeracy			
3	116266	Monitor the operation and maintenance of irrigation systems			
4	116290	Establish a plan for the monitoring, safe use and maintenance of equipment, implements, technology and infrastructure			
<b>Learner's Signature</b>			<b>Date:</b>		
<b>Assessor's Signature</b>			<b>Date:</b>		

## Step 4

### Learner Assessment Plan for Gathering of Evidence

As the assessor has explained to you, the aim of an assessment is not to catch you out, but rather to help you develop all the skills, knowledge and attitudes that you need to move forward. It is important that you know what is expected from you and that you play an active role every step of the way.

Let us plan for the assessment together. Below are the steps that you have to work through in order to show that you are competent in this module. Check them carefully and discuss each step with the assessor. Agree with the assessor on the dates on which each step has to be completed or documents handed in. Write the dates in the right-hand column as a reminder.

<b>Learner Assessment Plan</b>		
<b>Module / Unit Standard Name:</b>	Schedule the Operation and Maintenance of Irrigation Systems	
<b>Module / Unit Standard Registration Number:</b>	116317	
<i>Step Number</i>	<i>Step Description and Learner's Tasks</i>	<i>Completion / Submission Date</i>
<b>5</b>	<p><b>Assessment Activity Workbook</b></p> <ul style="list-style-type: none"> <li>• In this step, you complete certain tasks in class or as homework.</li> <li>• It is important that you complete every task and understand why it is necessary, because it will help you to gain the knowledge, skills and attitudes that you need to be found competent in this learning module.</li> <li>• If there are things that you are unsure about, please ask the facilitator or the assessor to explain it to you again.</li> <li>• You hand in the completed workbook to the facilitator or assessor who will help you to check your progress.</li> <li>• The assessor or facilitator mark it and discuss areas that need more work with you.</li> </ul>	
<b>6</b>	<p><b>Report Writing</b></p> <ul style="list-style-type: none"> <li>• There are many important things that you need to remember about irrigation in order to be found competent in this learning module, and so that you can do your job well and move on to level five.</li> <li>• You have to write a report to check if you have gained all this knowledge.</li> <li>• There is a detailed list of things that you need to know in this guide and examples of the types of questions that you could be asked.</li> <li>• Please prepare yourself well and remember to ask the facilitator or assessor to explain anything that you don't understand.</li> </ul>	
<b>7</b>	<p><b>Practical Assessment</b></p> <ul style="list-style-type: none"> <li>• You have to develop very specific character traits and attitudes and have to be able to do very specific tasks to be competent in this learning module, be good in this job, and to be able to move on to level five.</li> <li>• Going out into the field, and showing and explaining certain skills and attitudes, is the most appropriate way for you to show that you are competent in the skills and attitudes that are needed.</li> <li>• You will have an opportunity to practice these tasks and develop these attitudes during your practical learning module.</li> </ul>	

	<ul style="list-style-type: none"> <li>• There is a list of all the things that you would have to be able to show and explain in this guide.</li> <li>• Please prepare yourself well and remember to ask the facilitator or assessor to explain anything that you don't understand.</li> </ul>	
<b>8</b>	<p><b>Re-Assessment Procedure</b></p> <ul style="list-style-type: none"> <li>• What if the assessor tells you that you have not met the right standard or that you still need more evidence to prove your competence?</li> <li>• The assessor explains to you exactly what you need to do or learn to become competent.</li> <li>• You and the assessor and / or facilitator, develop an action plan together, and you may be granted a second or even a third opportunity to prove your competence.</li> <li>• Remember you have the right to appeal against the assessor's decision, if you feel it is unfair. There is a copy of the form in the back of this guide if you need it.</li> </ul>	
<b>9</b>	<p><b>Paperwork</b></p> <ul style="list-style-type: none"> <li>• If you have met the standard that is explained for each step of the process you will be found competent in this unit standard.</li> <li>• The assessor will discuss everything with you in detail and will ask you to fill in and sign forms throughout the process.</li> <li>• You will also be given an opportunity to write down any comments you might have on the assessment process.</li> <li>• Once the assessor has given you the final declaration of competence, you will be asked to give some feedback in order to help everyone to improve the learning and assessment process.</li> <li>• Please think carefully. It might really help other learners in the future.</li> </ul>	
<b>10</b>	<p><b>Administration and Completion of Portfolio of Evidence</b></p> <ul style="list-style-type: none"> <li>• All the documents, or copies of them, must be kept on file as part of your portfolio of evidence.</li> </ul>	
<p><b>Into the Future</b></p> <ul style="list-style-type: none"> <li>• The assessor will discuss what happens next and when you will get a certificate of competence.</li> <li>• It is also important to remember that you learnt this module for a specific reason. Discuss with the assessor, facilitator, mentor, and / or coach how you can move forward in your career with this level of competence.</li> <li>• Also remember that the learning process never stops. Plan together with the assessor, facilitator, coach, and / or mentor what you need to learn next.</li> </ul>		
<b>Learner's Signature</b>		<b>Date:</b>
<b>Assessor's Signature</b>		<b>Date:</b>

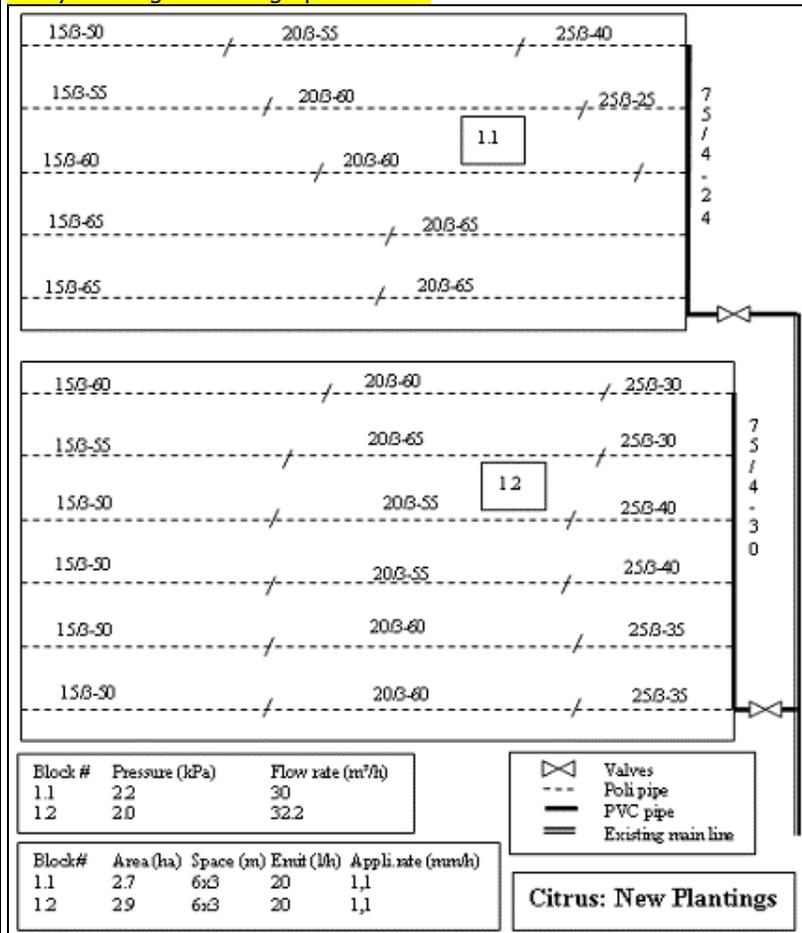
# Step 5

## Assessment Activity Workbook

- The activities that follow are designed to help you gain the skills, knowledge and attitudes that you need in order to become competent in this learning module.
- It is important that you complete all the activities and worksheets, as directed in the learner guide and at the time indicated by the facilitator.
- It is important that you ask questions and participate as much as possible in order to play an active roll in reaching competence.
- When you have completed all the activities and worksheets, hand this workbook in to the assessor who will mark it and guide you in areas where additional learning might be required.
- You should not move on to the next step in the assessment process until this step is completed, marked, and you have received feedback from the assessor.

### Activity 1 – Action Plan

Study the irrigation design plan below.









**Assessment Guide – Learner**

**Skills Area:** Irrigation

**Level:** 4

**Unit Standard:** 116317

Describe the testing of the irrigation system.

**Activity 4 – Duty Lists**

Draft duty lists for the team on the daily, weekly, monthly, seasonal and yearly maintenance of the irrigation system.

**Daily:**

**Weekly:**

**Monthly:**





**Activity 6 – Worksheet**

Name and discuss the three components of the irrigation schedule.


**Activity 7 – Report Writing**

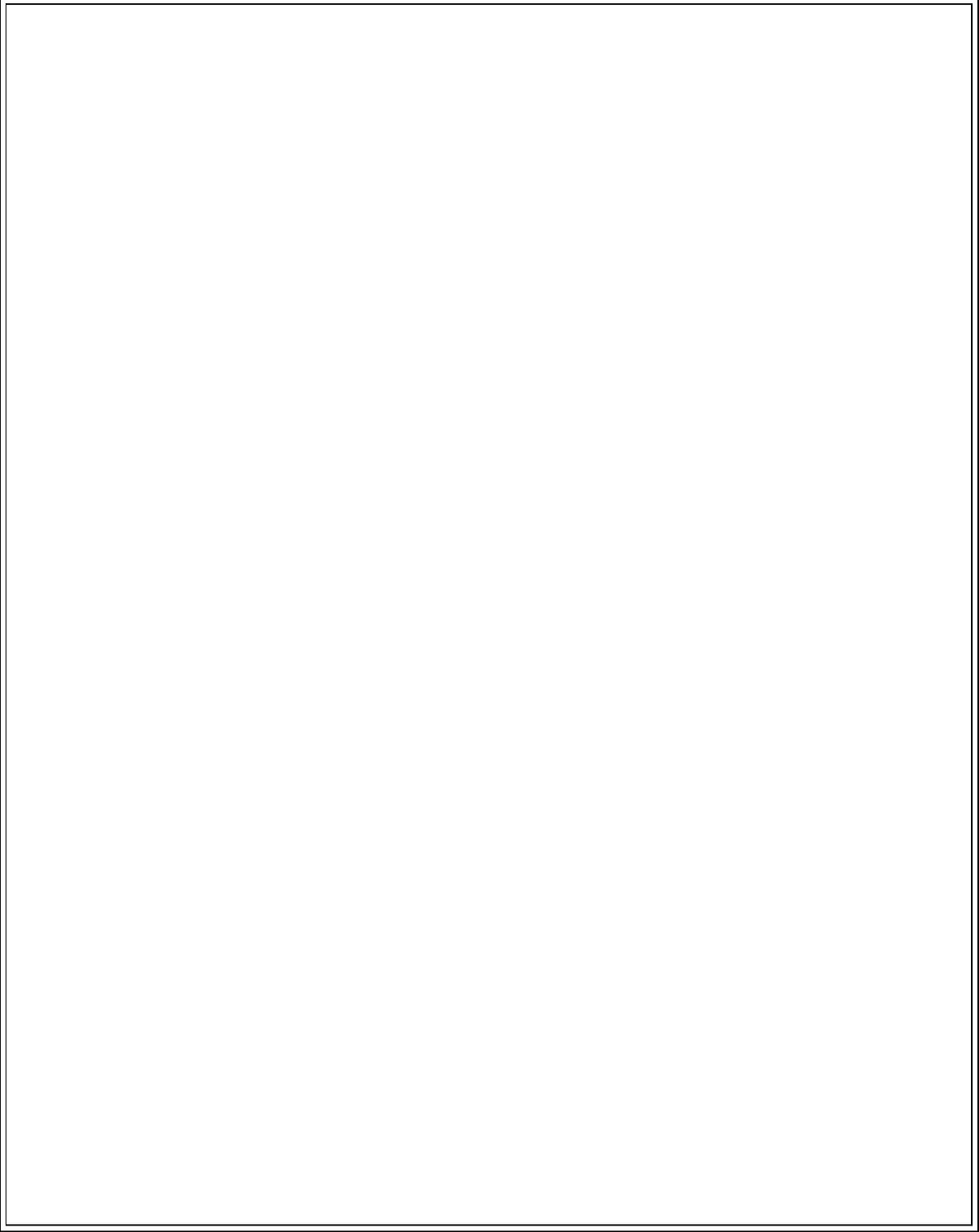
Obtain an irrigation schedule of the farm where you are performing your practical work. Draft an additional report explaining in detail how the following influenced the irrigation schedule and how it would influence adjustments to the schedule:

1. The use of tensiometers and tensiometer readings
2. The taking of soil samples and analyses of soil sample reports
3. The use of a probe
4. The considerations of the previous week's and month's scheduling programmes
5. Current flow rates and flow rate readings
6. Weather station information and data
7. 7-day weather forecasts



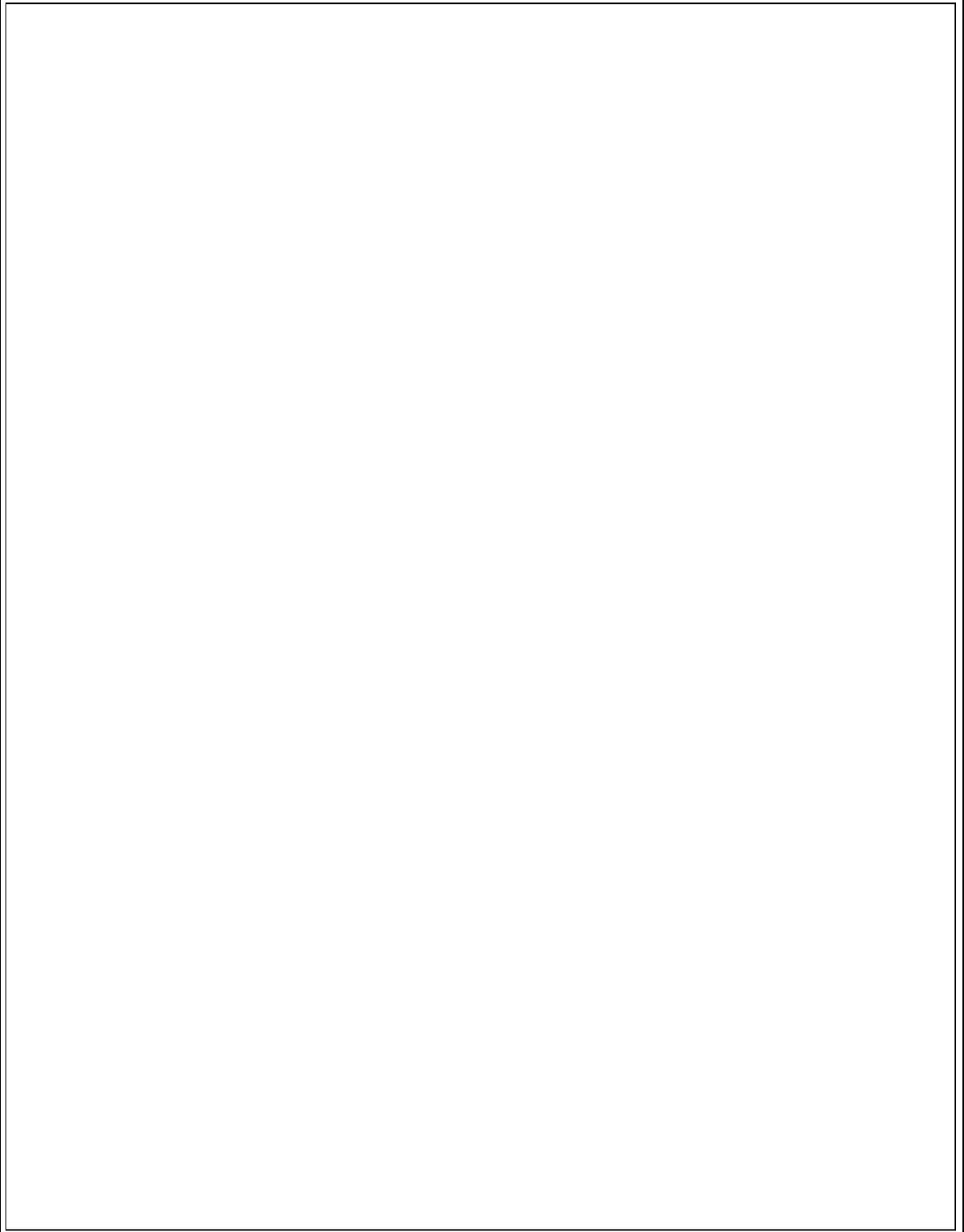

**Activity 8 – Pictogram**

Draft a pictogram and make a brief presentation to the class explaining the process of irrigation effectiveness. Be sure to include considerations for CU tests, water balance determination and depth of irrigation.



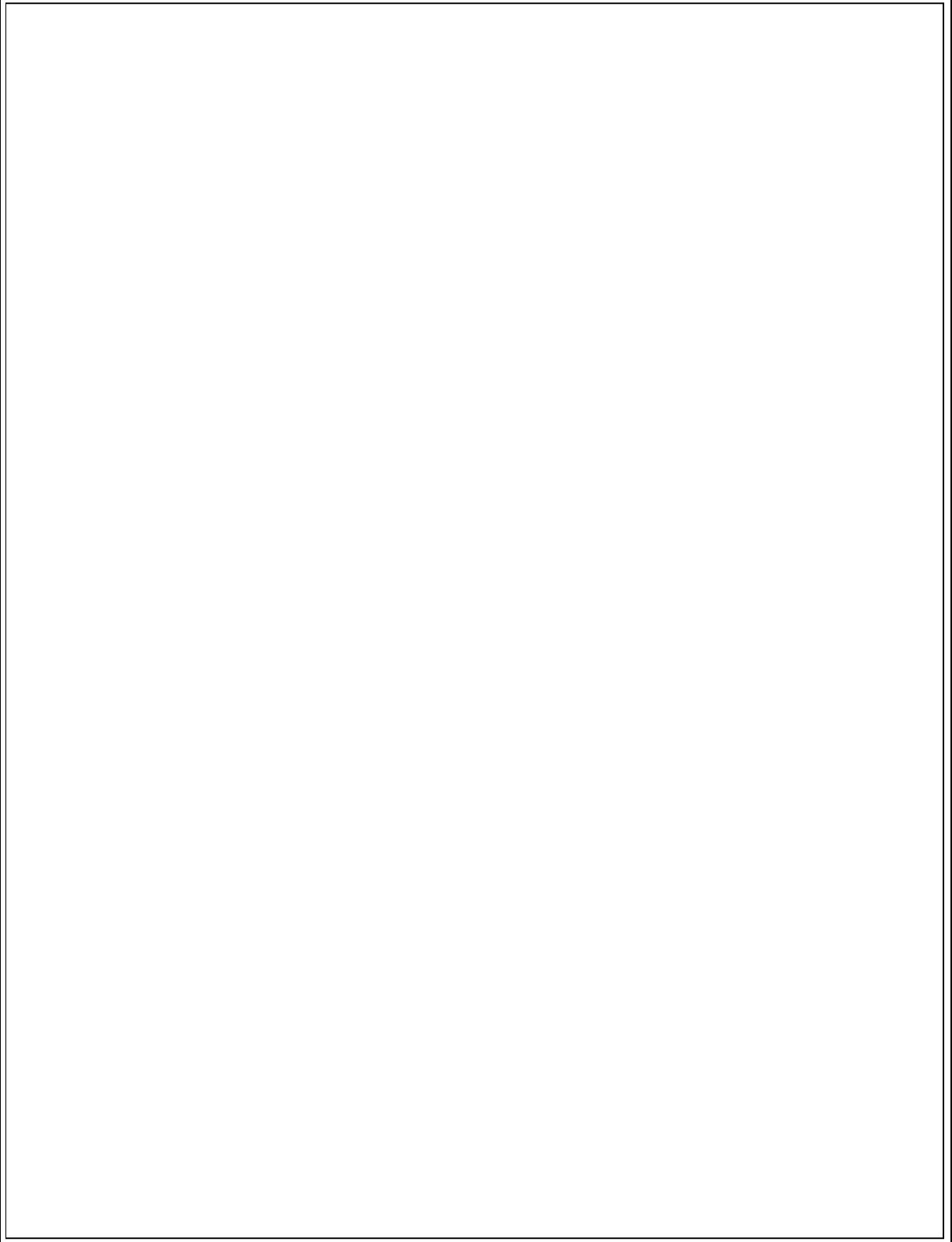
**Activity 9 – Flow Diagram**

Draw a flow diagram with attached notes, details and training schedules for the preparation of reports regarding management of the irrigation system.



**Activity 10 – Worksheet**

Use the examples of records in section 1 and adapt it to suit your specific conditions. Prepare a form that captures the yield of **subtropical fruit** per block.



<b>Assessment Feedback Form – Activity Workbook</b>			
	<b>Comments / Remarks</b>		
Feedback to learner on assessment			
Feedback from learner to assessor			
<b>Learner's Signature</b>		<b>Date:</b>	
<b>Assessor's Signature</b>		<b>Date:</b>	

## Step 6

### Report Writing

You are now ready for step six of the assessment process, during which you will be asked to write a report for the farm on which you are completing your practical duties comparing the current management of the irrigation system versus the ideal long-term efficient management of the same irrigation system. Make constructive observations and suggestions for possible improvements. Include information regarding the following:

- General recordkeeping of all irrigation practices
- Periodic scientific appraisal and improvement of irrigation practices
- Compare records pertaining to water use versus crop yield versus climatic data and make recommendations.
- Assess the format in which records are kept, being hand written, electronic, manual, computerised, etc. and make recommendations on how these can be improved.
- Discuss the first line maintenance and checking an evaluation of all instruments, i.e. calibrated to assure validity and avoid instrument drift or calibration drift

Check your plan carefully to make sure that you prepare in good time.

You have to score an overall mark of at least 85% in this task in order to be found competent.

Inform the assessor if you have any special needs or requirements **before** the agreed date for the hand in of the assessment task. You might, for example, require an interpreter to translate the questions to your mother tongue, or you might need to take this test orally. Please write your request down in your activity workbook on the front page and explain why you have made this request. Ask the assessor to sign next to your request to prove that they are aware of your special request.

The assessor or facilitator has explained this step to me.			
<b>Learner's Signature</b>		<b>Date:</b>	
<b>Assessor's Signature</b>		<b>Date:</b>	

The assessor will give you feedback on the assessment and guide you if there are areas in which you still need further development.

## Step 7

### Attitudes and Attributes Assessment

You are now ready for step seven of the assessment process, the Attitude and Attribute assessment. Check your plan carefully to make sure that you prepare in good time.

Inform the assessor if you have any special needs or requirements before the agreed date for the assessment test. You might, for example, require an interpreter to translate the questions to your mother tongue, or you might need to take this test orally. Please write your request down in your activity workbook on the front page and explain why you have made this request. Ask the assessor to sign next to your request to prove that they are aware of your special request.

Use the checklist below to help you prepare for the part of the practical assessment when you are observed on the attitudes and attributes that you need to have to be found competent for this learning module.

<i>Observations</i>	<i>I Am Sure of This and Understand It Well</i>	<i>I Am Unsure of This and Need to Ask the Facilitator or Assessor to Explain What It Means</i>
Can you identify problems and deficiencies correctly?		
Are you able to work well in a team?		
Do you work in an organised and systematic way while performing all tasks and tests?		
Are you able to collect the correct and appropriate information and / or samples as per the instructions and procedures that you were taught?		
Are you able to communicate your knowledge orally and in writing, in such a way that you show what knowledge you have gained?		
Can you base your tasks and answers on scientific knowledge that you have learnt?		
Are you able to show and perform the tasks required correctly?		
Are you able to link the knowledge, skills and attitudes that you have learnt in this module of learning to specific duties in your job or in the community where you live?		

- The assessor will complete a checklist that gives details of the points that are checked and assessed by the assessor.
- The assessor will write commentary and feedback on that checklist. They will discuss all commentary and feedback with you.
- You will be asked to give your own feedback and to sign this document.
- It will be placed together with this completed guide in a file as part of you portfolio of evidence.

## **Step 8**

### **Re-Assessment Procedure**

The assessor will discuss in detail with you what to do in case you require a re-assessment, and when the re-assessment will take place.

## Step 9

### Paperwork

Please assist the assessor by filling in these forms and signing them as instructed.

<b>Learner Information Form</b>				
<b>Unit Standard</b>	116317			
<b>Program Date(s)</b>				
<b>Assessment Date(s)</b>				
<b>Surname</b>				
<b>First Name</b>				
<b>Learner ID / SETA Registration Number</b>				
<b>Job / Role Title</b>				
<b>Home Language</b>				
<b>Gender</b>	Male		Female	
<b>Race</b>	African	Coloured	Indian/Asian	White
<b>Employment</b>	Permanent		Non-permanent	
<b>Disabled</b>	Yes		No	
<b>Date of Birth</b>				
<b>ID Number</b>				
<b>Contact Telephone Numbers</b>				
<b>Email Address</b>				
<b>Postal Address</b>				

<b>Assessor Report, and Formative and Summative Evidence Collection Summary for Unit Standard 116317 – Level 4</b>					
<i>Description</i>	<i>Evidence Gathered</i>		<i>Benchmark</i>	<i>Competent / Not yet Competent</i>	<i>Feedback and Comments</i>
	<b>Foundational and Embedded Knowledge</b>	<b>Practical Skills, Underpinning Knowledge and Reflexive Competence</b>			
<b><i>Specific Outcome 1:</i></b> <b>Install an irrigation system</b>	Attend all lectures Complete workbook as per instruction	Summative Report. Observation checklist of practical tasks integrated with knowledge and reflexive competence questionnaire	85% competence in all areas		
<b><i>Specific Outcome 2:</i></b> <b>Maintain and evaluate an irrigation system</b>	Attend all lectures Complete workbook as per instruction	Summative Report. Observation checklist of practical tasks integrated with knowledge and reflexive competence questionnaire			
<b><i>Specific Outcome 3:</i></b> <b>Efficiently operate an irrigation system</b>	Attend all lectures Complete workbook as per instruction	Summative Report. Observation checklist of practical tasks integrated with knowledge and reflexive competence questionnaire	85% competence in all areas		
<b><i>Specific Outcome 4:</i></b> <b>Collate data pertaining to the long-term efficient management of an irrigation system</b>	Attend all lectures Complete workbook as per instruction	Summative Report. Observation checklist of practical tasks integrated with knowledge and reflexive competence questionnaire	85% competence in all areas		
<b><i>Embedded Knowledge:</i></b> The learner is able to	Attend all lectures Complete workbook as per instruction	N/a	Overall minimum test score of 85%		

<b>Assessor Report, and Formative and Summative Evidence Collection Summary for Unit Standard 116317 – Level 4</b>					
<b>Description</b>	<b>Evidence Gathered</b>		<b>Benchmark</b>	<b>Competent / Not yet Competent</b>	<b>Feedback and Comments</b>
	<b>Foundational and Embedded Knowledge</b>	<b>Practical Skills, Underpinning Knowledge and Reflexive Competence</b>			
demonstrate a basic knowledge of: 1. Appropriate laws and regulation pertaining to agricultural water use, environmental safety, etc. 2. Elementary hydraulics 3. Principles of irrigation, crop water requirements, soil water holding capacity, etc. 4. Principles of irrigation system design 5. Principles of irrigation scheduling 6. Use of computer based irrigation scheduling programs 7. Principles of human and resource management					
<b>Unit Standard CCFO's:</b> 1. <b>Problem solving</b> relates to all specific outcomes. 2. <b>Teamwork</b> relates to all specific outcomes. 3. <b>Self-organisation and management</b> relates to all specific outcomes. 4. <b>Communication</b> relates	N/a	Rating Scale	Minimum rating of 3:5 in each criteria or overall average of 3:5		

<b>Assessor Report, and Formative and Summative Evidence Collection Summary for Unit Standard 116317 – Level 4</b>					
<i>Description</i>	<i>Evidence Gathered</i>		<i>Benchmark</i>	<i>Competent / Not yet Competent</i>	<i>Feedback and Comments</i>
	<b>Foundational and Embedded Knowledge</b>	<b>Practical Skills, Underpinning Knowledge and Reflexive Competence</b>			
to all specific outcomes. 5. <b>Self-development</b> relates to all specific outcomes. 6. <b>Inter-relatedness of systems</b> relates to all specific outcomes. 7. <b>Information evaluation</b> relates to all specific outcomes. 8. <b>Use science and technology</b> relates to all specific outcomes.					

<b>Learner Assessment Re-Actionnaire</b>			
<b>Questions</b>		<b>Response</b>	
How did the assessor encourage you to be involved in the assessment process?			
Did the assessor take your special needs into account? If so, how?			
Did the assessor agree on the assessment procedures with you?			
Was feedback relevant to your needs?			
Were you always aware of the outcome of the assessment?			
Did the assessor help you to explore ways of becoming competent whenever you were judged NYC?			
Did the assessor allow you to ask questions?			
Did you always agree with assessment decisions?			
Was all appropriate documentation completed and signed and did you receive copies?			
Did the assessor assist or prevent you in any way when gathering evidence so as to obscure its authenticity?			
All the evidence submitted in my name is my authentic work, which was not acquired by any unethical means.			
<b>Learner's Signature</b>		<b>Date:</b>	
<b>Assessor's Signature</b>		<b>Date:</b>	
<b>Moderator's Signature</b>		<b>Date:</b>	

<b>Assessor's Assessment Review and Improvement Document</b>	
<b>Issues</b>	<b>Comments</b>
Did the assessment go according to plan?	
Did anything unexpected happen?	
Were you pleased with the assessment decision; i.e. was it what you expected?	
How could the process have been carried out more efficiently?	
How could the process of assessing the knowledge be improved?	
How could the Performance Observation checklist be improved?	
Was the evidence you gathered sufficient to make a judgment of competence?	
Was the way you obtained feedback from the learner effective?	
Were you pleased with the way you communicated your decision to the learner? If not, how could this have been improved?	
How would you improve the assessment process?	

## Assessment Appeal Form

Any candidate has the right of appeal against any not-yet-competent decision by the assessor. If you wish to appeal, please complete the form below.

<b>Appeal Form</b>			
I hereby appeal against the outcome of my assessment.			
<b>Date:</b>			
<b>Learner's Name:</b>			
<b>Assessors Name:</b>			
<b>Organisation:</b>			
<b>Assessment Details:</b> Criteria, role, standards Used, etc.			
<b>Issue to be Reviewed:</b>			
<b>Learner's Signature</b>		<b>Date:</b>	
<b>Assessor's Signature</b>		<b>Date:</b>	

## **Step 10**

### **Administration and Completion of Portfolio of Evidence**

All the documents or copies thereof, as prescribed previously, must be kept on file as part of the learner portfolio of evidence.