

Subject:

Clinical Microbiology

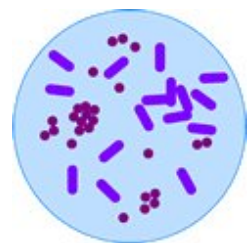
Topic:

Professional English for
Clinical Microbiology

Teaching Notes

Isabel Borja

NILE 2011





Index of teaching notes

Introduction to teaching notes pag. 3

Unit 1 – Laboratory techniques

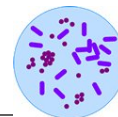
Lesson 1.1 – Gram Stain pag. 4
Lesson 1.2 – The Microscope pag. 8
Lesson 1.3 – Preparing Culture Media pag. 13
Lesson 1.4 – Bacterial Culture pag. 18
Assessment Unit 1 – Tick box template pag. 24

Unit 2 – Working with bacteria

Lesson 2.1 – Identification of Bacteria pag. 25
Lesson 2.2 – Biochemical Test pag. 30
Lesson 2.3 – Variability of Bacteria pag. 34
Lesson 2.4 – Susceptibility Tests pag. 37
Assessment Unit 2 – Tick box template pag. 42

Unit 3 – Infectious Diseases

Lesson 3.1 – Epidemiology pag. 43
Lesson 3.2 – Intervention measures pag. 48
Assessment Unit 3 – Tick box template pag. 53



Introduction to Teaching notes

This is a 30-hour project. It is aimed at students that already have a certain level of English, but there is some differentiation provided as well: the most difficult activities have **alternative worksheets** that include more language support and may be found in “Supplementary materials”.

Before the class, look at the vocabulary in the unit you will teach. Decide which words are difficult and which students should know. Check in class if students know difficult words by giving clues if they should know or explain if words are new.

There are **assessment activities** at the end of each unit. The activities are in “Supplementary materials”. They are planned as group activities to give students the opportunity to be creative and produce visuals or essays and present them to the class. There are different topics for each group and all of them are complementary, so they may contribute to the lesson content.

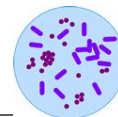
To make the feedback of activities easier, there are **power point presentations** containing the answer key for each unit in “Supplementary materials” as well.

Difficulty of activities is rated as follows:

- Low - ↓
- Medium - ↔
- High - ↑

Lessons and timing

UNIT	Lesson	Timing
UNIT 1	1.1 - Gram Stain	2:00 h
	1.2 - The Microscope	3:00 h
	1.3 - Preparing Culture Media	2:30 h
	1.4 - Bacterial Culture	2:30 h
	Assessment unit 1	2:00 h
UNIT 2	2.1 – Identification of Bacteria	3:00 h
	2.2 – Biochemical Tests	2:00 h
	2.3 – Variability of Bacteria	2:00 h
	2.4 – Susceptibility Tests	2:00 h
	Assessment unit 2	2:00 h
UNIT 3	3.1 - Epidemiology	2:00 h
	3.2 – Intervention Measures	2:00 h
	Assessment unit 3	3:00 h
Total timing		30 hours



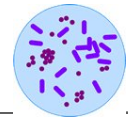
Unit 1: Laboratory Techniques

In this unit, we deal with the basic vocabulary students need to develop further topics and to use technical documents. All the content is introduced in active tasks as an opportunity to develop thinking skills and self-learning by students.

Teaching notes 1.1 – Gram Stain

Timing: 2:00 h	Room: computer room (laboratory optional)
Teaching aims: <ul style="list-style-type: none">○ Morphological classification of bacteria○ Gram stain procedure	
Assessment targets: <ul style="list-style-type: none">○ Initial assessment	
Resources: <ul style="list-style-type: none">○ Internet access○ Digital projector for feedback○ Power point presentation containing the answer key Unit 1 in “Supplementary materials”	

Activity 1 – Significance of Gram Stain	
Subject difficulty: ↓	Language difficulty: ↓
Procedure: <ul style="list-style-type: none">○ Explain activity 1○ Students work individually○ They check the answers with their partners○ Feedback in plenary	
Language support: <ul style="list-style-type: none">○ Text frame○ Word bank	
Resources: <ul style="list-style-type: none">○ Worksheet 1.1	



Answer key:

Gram stain is the main stain procedure in Microbiology. It enables us to know several things about bacteria in the smear:

- **GRAM-STAIN REACTION**
- **SHAPE**
- **ARRANGEMENTS** of bacteria

Bacteria are divided into **two** large groups depending on their Gram-stain reaction: the so-called **Gram-positive** (GP) that remains coloured after the decolouration procedure and the **Gram-negative** (GN) that do not retain the dye and take the colour of the counterstain. Those differences rely on the basis of cell wall structures.

Considering together Gram reaction and shape we may set the **four** big groups of bacteria: GP bacilli, GP cocci, GN bacilli, and GN cocci.

Activity 2 – Morphological classification of bacteria: shape

Subject difficulty: ↔

Language difficulty: ↓

Procedure:

- Explain activity 2
- Students work individually to complete the activity
- They check the answers with their partners
- Feedback in plenary

Language support:

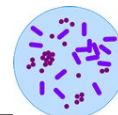
- Word bank with specific words below

Resources:

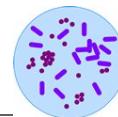
- Worksheet 1.1

Answer key:

Bacterial morphology chart		Word bank
Straight rods are called ...	Bacilli	Vibrio
Small straight rods are ...	Coccobacilli	Cocci
Curved rods are called ...	Vibrio	Fusobacteria
Sphere shaped bacteria are ...	Cocci	Bacilli
Spiral shaped bacteria are ...	Spirilla	Coccobacilli
Rods with tapered ends are ...	Fusobacteria	Spirilla



Activity 3 – Morphological classification of bacteria: arrangements																	
Subject difficulty: ⇔	Language difficulty: ⇔																
<p>Procedure:</p> <ul style="list-style-type: none"> ○ Explain activity 3 ○ Students work in pairs to complete the activity ○ They check the answers with another pair ○ Feedback in plenary 																	
<p>Options:</p> <ul style="list-style-type: none"> ○ In mixed skilled groups match one strong student with one weak 																	
<p>Language support:</p> <ul style="list-style-type: none"> ○ Word bank with specific words ○ Audio guides on the Internet: <ul style="list-style-type: none"> - Online dictionary of Medical English http://medical-dictionary.thefreedictionary.com/ - Latin names http://www.atsu.edu/faculty/chamberlain/Website/studio.htm 																	
<p>Resources:</p> <ul style="list-style-type: none"> ○ Worksheet 1.1 ○ Internet access ○ Gram Stain descriptions: http://archive.microbelibrary.org/asmonly/details.asp?id=2380 																	
<p>Answer key:</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="2">Bacterial arrangements chart</th> </tr> <tr> <th>Arrangement</th> <th>Suggestion</th> </tr> </thead> <tbody> <tr> <td>GPC singly</td> <td>Cocci</td> </tr> <tr> <td>GPC in lance-shaped pairs</td> <td><i>Streptococcus pneumoniae</i></td> </tr> <tr> <td>GNC in coffee-bean shaped pairs</td> <td><i>Neisseria gonorrhoeae</i></td> </tr> <tr> <td>GPC in chains</td> <td><i>Streptococcus pyogenes</i></td> </tr> <tr> <td>GPC in grape-like clusters</td> <td><i>Staphylococcus sp.</i></td> </tr> <tr> <td>GPB club-ended in palisade</td> <td>Diphtheroids</td> </tr> </tbody> </table>		Bacterial arrangements chart		Arrangement	Suggestion	GPC singly	Cocci	GPC in lance-shaped pairs	<i>Streptococcus pneumoniae</i>	GNC in coffee-bean shaped pairs	<i>Neisseria gonorrhoeae</i>	GPC in chains	<i>Streptococcus pyogenes</i>	GPC in grape-like clusters	<i>Staphylococcus sp.</i>	GPB club-ended in palisade	Diphtheroids
Bacterial arrangements chart																	
Arrangement	Suggestion																
GPC singly	Cocci																
GPC in lance-shaped pairs	<i>Streptococcus pneumoniae</i>																
GNC in coffee-bean shaped pairs	<i>Neisseria gonorrhoeae</i>																
GPC in chains	<i>Streptococcus pyogenes</i>																
GPC in grape-like clusters	<i>Staphylococcus sp.</i>																
GPB club-ended in palisade	Diphtheroids																



Activity 4 – Gram Stain procedure

Subject difficulty: ⇔

Language difficulty: ⇔

Procedure:

- Explain activity 4
- Students read individually
- Then students fill in the gaps in pairs
- Feedback in plenary: each pair reads a sentence
- Words of difficult pronunciation are checked

Option:

- In mixed skilled groups match one strong student with one weak

Language support:

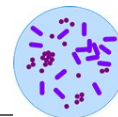
- Word bank with missing words
- Pictures
- Online dictionaries:
 - General English:
<http://www.wordreference.com>
 - Medical English dictionary with sound:
<http://medical-dictionary.thefreedictionary.com/>
- Alternatively, read and perform the actions in the laboratory

Resources:

- Worksheet 1.1
- Internet access

Answer key:

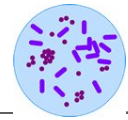
1. Place a drop of sterile saline or water on the slide. Transfer a small portion of a colony with a **wire loop** and gently mix to emulsify.
2. Let air-dry.
3. **Fix** the cells to the slide by heat by passing it (cell side up) through a flame. Do not let the glass become hot to the touch.
4. Place your slide on a slide holder.
5. Cover the entire slide completely with crystal violet and leave it for 1 minute. Pour it off and **rinse** briefly with running tap water. Drain the slide.
6. Cover the slide with iodine solution. Let it stand for 1 minute as well. Pour off and rinse with tap water. **Drain** the slide.
7. Add the **decolouriser** drop by drop until the runoff remains clear. Wash off briefly with tap water and drain the slide.
8. **Counterstain** with safranin for one minute and wash off briefly with tap water to remove excess dye.
9. Drain slide and let it air-dry in an **upright** position.



Activity 5 – Revision: sequencing Gram Stain	
Subject difficulty: ⇄	Language difficulty: ⇄
Procedure: <ul style="list-style-type: none"> ○ Explain activity 5 ○ Students work individually ○ Students check the answers with their partners ○ Feedback in plenary 	
Language support: <ul style="list-style-type: none"> ○ Look on activity 1 and activity 4 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.1 	
Answer key: First, you cover the smear with crystal violet . Next, you wash and cover it with iodine solution . Then you wash and decolourise it and finally you counterstain the smear with safranin . As a result, Gram-positive bacteria stain blue . And Gram-negative bacteria stain red .	

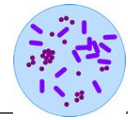
Teaching notes 1.2 – The Microscope

Timing: 3 h	Room: laboratory
Teaching aims: <ul style="list-style-type: none"> ○ Parts of the microscope ○ Standard operating procedure 	
Prior knowledge: <ul style="list-style-type: none"> ○ Sorting bacteria by Gram-reaction, morphology and grouping 	
Resources: <ul style="list-style-type: none"> ○ Microscopes ○ Digital projector for feedback ○ Power point presentation with answer key Unit 1 in “Supplementary materials” ○ Optional : Tutorial on the bright light microscope http://www.udel.edu/biology/ketcham/microscope/scope.html 	



Activity 1 – History of the Light Microscope	
Subject difficulty: ↓	Language difficulty: ↔
Procedure: <ul style="list-style-type: none"> ○ Explain activity 1 ○ Students work in pairs ○ They check the answers with another pair ○ Feedback in plenary 	
Language support: <ul style="list-style-type: none"> ○ Clues in the time line 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.2 	
Answer key: <div style="text-align: center;"> </div>	

Activity 2 – Parts of the bright-field microscope	
Subject difficulty: ↔	Language difficulty: ↔
Activity 2.a	
Procedure: <ul style="list-style-type: none"> ○ Explain activity 2.a ○ Read the sentences and manipulate the microscope to demonstrate what is said ○ Students work in pairs to complete the activity and manipulate their microscopes ○ They check the answers with another pair ○ Feedback in plenary 	
Options: <ul style="list-style-type: none"> ○ In mixed skilled groups match one strong student with one weak 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.2 ○ Microscopes 	
Language support: <ul style="list-style-type: none"> ○ Written definitions provided on the text ○ Performance of actions on the text 	



Answer key:

Activity 2.b

Procedure:

- Explain activity 2.b
- Students work in pairs to complete the activity
- They check the answers with another pair
- Feedback in plenary

Options:

- In mixed skilled groups match one strong student with one weak

Resources:

- Worksheet 1.2

Language support:

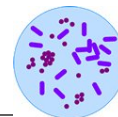
- Written definitions provided on the text

Answer key:

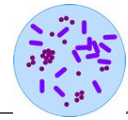
- The arm is **on the left side**
- The base is **at the bottom**
- The light source is **at the top of the base, right in the middle**

Activity 3 – Standard operating procedure to look under the microscope

Subject difficulty: ↑	Language difficulty: ↑
Procedure:	
<ul style="list-style-type: none"> ○ For each section, read the text and perform the actions at the microscope. ○ Students decide on the heading and then answer the questions. ○ Students work in pairs ○ Feedback in plenary 	



<p>Options:</p> <ul style="list-style-type: none"> ○ In mixed skilled groups match one strong student with one weak 						
<p>Language support:</p> <ul style="list-style-type: none"> ○ Word bank ○ Teacher's performance 						
<p>Resources:</p> <ul style="list-style-type: none"> ○ Worksheet 1.2 ○ Microscopes 						
<p>Activity 3.a</p>						
<p>Answer key:</p> <ul style="list-style-type: none"> ○ Heading (A): STARTING 						
<p>Activity 3.b</p>						
<p>Answer key:</p> <ul style="list-style-type: none"> ○ Heading (B): FIRST FOCUS ○ What happens if you start focusing with the high magnification objective instead of the medium-power one? – It is more difficult ○ What happens if you start focusing already looking down the microscope and rotate the coarse focus knob moving the objective to the slide? – I could break the objective lens 						
<p>Activity 3.c</p>						
<p>Answer key:</p> <ul style="list-style-type: none"> ○ Heading (C): LIGHT ADJUSTEMENT ○ Chart: <table border="1" style="margin-left: 40px;"> <tr> <td></td> <td>40X objective</td> </tr> <tr> <td>Condenser must be ...</td> <td>low / lowered</td> </tr> <tr> <td>Diaphragm lever must be ...</td> <td>open / opened</td> </tr> </table>		40X objective	Condenser must be ...	low / lowered	Diaphragm lever must be ...	open / opened
	40X objective					
Condenser must be ...	low / lowered					
Diaphragm lever must be ...	open / opened					
<p>Activity 3.d</p>						
<p>Answer key:</p> <ul style="list-style-type: none"> ○ Heading (D): SCANNING ○ What happens if you do not have a set scan pattern? - I will get lost in the smear and I may have seen the same field of view twice or I may haven't seen it 						



Activity 3.e

Answer key:

- Heading (E): **MOVE UP MAGNIFICATION**
- Chart:

	100X oil objective
Condenser must be ...	high / raised
Diaphragm lever must be ...	close /closed

- What happens if you use the coarse focus knob when changing from one objective to another? - **I will get out of focus (objectives on a nosepiece are adjusted to be PARAFOCALS)**
- What happens if you do not adjust the condenser again when changing from one objective to another? - **I will have a poor quality image, with low resolution and few details. Each objective**

Activity 4 – Revision

Subject difficulty: ↑

Language difficulty: ⇔

Procedure:

- Explain activity 4
- Student alone to complete the activity
- They check the answers with their partners
- Feedback in plenary

Options:

- In mixed skilled groups match one strong student with one weak

Language support:

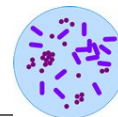
- Written definitions provided on the text

Resources:

- Worksheet 1.2

Answer key:

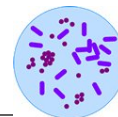
- Turning the focus knobs you obtain ... **(2) ... a good quality image**
- Adjusting the condenser you obtain ... **(1) ... enhanced contrast**
- You change lens to a higher power objective for ... **(3) ... higher resolution**
- We start under medium-power objective to ... **(4) ... do a quick scan of the smear**



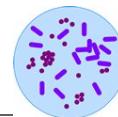
Activity 5 – Reporting results in direct specimens: case studies	
Subject difficulty: ⇔	Language difficulty: ↓
Procedure: <ul style="list-style-type: none"> ○ Explain activity 5 ○ Students work individually ○ They check the answers with their partners ○ Feedback in plenary 	
Language support: <ul style="list-style-type: none"> ○ Word bank with grading expressions 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.2 	
Answer key: <ul style="list-style-type: none"> ○ Image 1 – B: cerebrospinal fluid ○ Image 2 – C: urethral discharge ○ Image 3 – A: vaginal discharge ○ Image 4 – E: sputum ○ Image 5 – D: urine 	

Teaching notes 1.3 – Preparing culture media

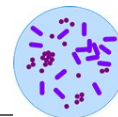
Timing: 2:30 h	Room: ordinary classroom
Teaching aims: <ul style="list-style-type: none"> ○ Procedure to prepare culture media ○ Fundamentals of autoclaving ○ Preparing plates 	
Prior knowledge: <ul style="list-style-type: none"> ○ Mathematical operations ○ International System of Units ○ Reading decimals 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.3 ○ Alternative worksheet for activity 4 in “Supplementary materials” ○ Digital projector for feedback ○ Power point presentation with answer key Unit 1 in “Supplementary materials” 	



Activity 1 – Previous knowledge					
Subject difficulty: ↓			Language difficulty: ↓		
Activity 1.a					
Procedure:					
<ul style="list-style-type: none"> ○ Explain activity 1.a ○ Students work individually to complete the activity ○ They check the answers with their partners ○ Feedback in plenary 					
Language support:					
<ul style="list-style-type: none"> ○ Mathematical operations word bank 					
Resources:					
<ul style="list-style-type: none"> ○ Worksheet 1.3 					
Answer key:					
+	Addition	$2 + 2 = 4$	Two plus two are four		
-	Subtraction	$5 - 3 = 2$	Five minus three are two		
x	Multiplication	$4 \times 2 = 8$	Four times two is eight		
÷	Division	$6 / 2 = 3$	Six divided by two is three		
Activity 1.b					
Procedure:					
<ul style="list-style-type: none"> ○ Explain activity 1.b ○ Students work individually to complete the activity ○ They check the answers with their partners ○ Feedback in plenary 					
Language support:					
<ul style="list-style-type: none"> ○ International System of Units word bank 					
Resources:					
<ul style="list-style-type: none"> ○ Worksheet 1.3 					
Answer key:					
Measures of VOLUME		Measures of MASS		Measures of LENGTH	
Units	Symbols	Units	Symbols	Units	Symbols
Litre	l	Gram	g	Metre	m
Millilitre	ml	Milligram	mg	Millimetre	mm

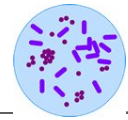


Activity 2 – Preparing culture media: preparing solution	
Subject difficulty: ⇔	Language difficulty: ⇔
Activity 2.a	
Procedure:	
<ul style="list-style-type: none"> ○ Explain activity 2.a ○ Students work individually ○ They check the answers with their partners ○ Feedback in plenary 	
Language support:	
<ul style="list-style-type: none"> ○ Diagram on changes in state 	
Resources:	
<ul style="list-style-type: none"> ○ Worksheet 1.3 	
Answer key:	
<ul style="list-style-type: none"> ○ Agar melts / <i>solidifies</i> when heating above 85°C ○ Agar <i>melts</i> / solidifies when cooling from 42°C and below ○ Agar must be molten / <i>solidified</i> to be handled 	
Activity 2.b	
Procedure:	
<ul style="list-style-type: none"> ○ Explain activity 2.b ○ Students work individually ○ They check the answers with their partners ○ Feedback in plenary 	
Language support:	
<ul style="list-style-type: none"> ○ Reading decimals ○ Text containing the words needed 	
Resources:	
<ul style="list-style-type: none"> ○ Worksheet 1.3 	
Answer key:	
<div style="border: 1px solid red; padding: 10px; width: fit-content; margin: 0 auto;"> $X \text{ g} = 200 \text{ ml} \times \frac{111 \text{ g}}{1000 \text{ ml}} = 22.2 \text{ g}$ </div>	
Activity 2.c	
Procedure:	
<ul style="list-style-type: none"> ○ Explain activity 2.c ○ Students work individually ○ They check the answers with their partners ○ Feedback in plenary 	
Language support:	
<ul style="list-style-type: none"> ○ Labelled images 	



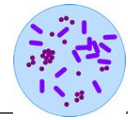
<p>Resources:</p> <ul style="list-style-type: none"> ○ Worksheet 1.3
<p>Answer key:</p> <ul style="list-style-type: none"> ○ For weighing substances, you have to use a weighing dish to put the powder on the scales, and a graduated cylinder to measure the water.
<p>Activity 2.d</p>
<p>Procedure:</p> <ul style="list-style-type: none"> ○ Explain activity 2.d ○ Students work individually ○ They check the answers with their partners ○ Feedback in plenary
<p>Language support:</p> <ul style="list-style-type: none"> ○ Text contains the words needed
<p>Resources:</p> <ul style="list-style-type: none"> ○ Worksheet 1.3
<p>Answer key:</p> <ul style="list-style-type: none"> ○ (1) The vessel must be about twice the final volume of the medium because boiling liquids expand and generate vapours. If there is no space enough, the flask may explode ○ (3) As you pour the water, use it to wash the weighing dish because as powder is hygroscopic, it will stick on the dish and we don't want to lose powder ○ (6) Heat the mix to boil for 1 minute to dissolve the agar in the water

Activity 3 – Prepare culture media: sterilizing	
Subject difficulty: ↔	Language difficulty: ↓
Activity 3.a	
<p>Procedure:</p> <ul style="list-style-type: none"> ○ Explain activity 3.a ○ Students work individually to complete the activity ○ They check the answers with their partners ○ Feedback in plenary 	
<p>Language support:</p> <ul style="list-style-type: none"> ○ Changes in state of water word bank 	
<p>Resources:</p> <ul style="list-style-type: none"> ○ Worksheet 1.3 	
<p>Answer key:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>solidify</p> <p>ice ↔ water</p> <p>melt</p> </div> <div style="text-align: center;"> <p>condense</p> <p>water ↔ vapour /steam</p> <p>evaporate</p> </div> </div>	



Activity 3.b	
Procedure:	
<ul style="list-style-type: none"> ○ Explain activity 3 ○ Students work individually to complete the activity ○ They check the answers with their partners ○ Feedback in plenary 	
Language support:	
<ul style="list-style-type: none"> ○ Text contains the words 	
Resources:	
<ul style="list-style-type: none"> ○ Worksheet 1.3 	
Answer key:	
<pre> graph LR A[Boiling water] --> B[At atmospheric pressure] A --> C[At high pressure] B --> D[100°C] C --> E[121°C or more] D --> F[Not sterilise] E --> G[Sterilise] </pre>	

Activity 4 – Prepare solid culture media: pouring into plates	
Subject difficulty: ⇔	Language difficulty: ⇔
Procedure:	
<ul style="list-style-type: none"> ○ Explain activity 4 ○ Students work in pairs to complete the activity ○ They check the answers with another pair ○ Feedback in plenary 	
Language support:	
<ul style="list-style-type: none"> ○ Connectors word bank ○ Photo ○ Written sentences 	
Resources:	
<ul style="list-style-type: none"> ○ Worksheet 1.3 ○ Alternative worksheet for activity 4 in “Supplementary materials” 	



Answer key:

FIRST OF ALL cool the flask to 50°C in a water-bath for half an hour, BECAUSE that avoids burns and keeps the medium still liquid. MEANWHILE, lay Petri dishes on the bench top. Wrap a paper towel around the flask to handle it. Hold the flask with your right hand and with your left hand open the cover of the plate just wide enough to pour the media. THEN pour about 20 ml into each plate. This is enough to set an even agar layer of 0.5 mm thick over the bottom of the plate. Leave the plates undisturbed to cool and solidify. Once the agar has set, invert the plates to store them. OTHERWISE, condensation falling from the lids into the agar surface will cause problems when inoculating the plate.

Activity 5 – Revision

Subject difficulty: ⇔

Language difficulty: ↓

Procedure:

- Explain activity 5
- Students work individually to complete the activity
- They check the answers with their partners
- Feedback in plenary

Language support:

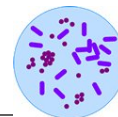
- Text frame

Resources:

- Worksheet 1.3

Answer key:

Cause	Effect
<p>Dirty materials Overdilution Overheating Error in weighing Incomplete dissolution</p>	<p>Turbidity and poor bacterial growth Soft gel Darkening and poor bacterial growth Soft gel Turbidity and soft gel</p>



Teaching notes 1.4 – Bacterial culture

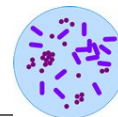
Timing: 2:30 h	Room: computer room
Teaching aims: <ul style="list-style-type: none"> ○ Selection of media ○ Streak plate method ○ Incubation atmospheres ○ McFarland turbidity standards 	
Prior knowledge: <ul style="list-style-type: none"> ○ Reading fractions ○ Reading decimals ○ Reading powers ○ Reading potentials of ten in scientific notation 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.4 ○ Power point presentation with answer key Unit 1 in “Supplementary materials” ○ Digital projector for feedback ○ Internet connection 	

Activity 1 – Previous knowledge: mathematics																											
Subject difficulty: ↓		Language difficulty: ↓																									
Procedure: <ul style="list-style-type: none"> ○ Explain activity 1 ○ Students work individually to complete the activity ○ They check the answers with their partners ○ Feedback in plenary 																											
Language support: <ul style="list-style-type: none"> ○ Word bank 																											
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.4 																											
Answer key: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Fractions</th> <th colspan="2" style="text-align: center;">Decimals</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$\frac{1}{2}$</td> <td style="text-align: center;">A half</td> <td style="text-align: center;">3.14</td> <td style="text-align: center;">Three point one four</td> </tr> <tr> <td style="text-align: center;">$\frac{1}{4}$</td> <td style="text-align: center;">A quarter</td> <td style="text-align: center;">0.5</td> <td style="text-align: center;">Nought point five</td> </tr> <tr> <td style="text-align: center;">$\frac{2}{3}$</td> <td style="text-align: center;">Two thirds</td> <td style="text-align: center;">0.07</td> <td style="text-align: center;">Nought point oh seven</td> </tr> <tr> <td style="text-align: center;">$\frac{5}{8}$</td> <td style="text-align: center;">Five eighths</td> <td style="text-align: center;">6.003</td> <td style="text-align: center;">Six point oh oh three</td> </tr> <tr> <td style="text-align: center;">1/100</td> <td style="text-align: center;">One hundredth</td> <td style="text-align: center;">0.1×10^{-3}</td> <td style="text-align: center;">Nought point one times ten to minus three</td> </tr> </tbody> </table>				Fractions		Decimals		$\frac{1}{2}$	A half	3.14	Three point one four	$\frac{1}{4}$	A quarter	0.5	Nought point five	$\frac{2}{3}$	Two thirds	0.07	Nought point oh seven	$\frac{5}{8}$	Five eighths	6.003	Six point oh oh three	1/100	One hundredth	0.1×10^{-3}	Nought point one times ten to minus three
Fractions		Decimals																									
$\frac{1}{2}$	A half	3.14	Three point one four																								
$\frac{1}{4}$	A quarter	0.5	Nought point five																								
$\frac{2}{3}$	Two thirds	0.07	Nought point oh seven																								
$\frac{5}{8}$	Five eighths	6.003	Six point oh oh three																								
1/100	One hundredth	0.1×10^{-3}	Nought point one times ten to minus three																								



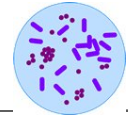
Powers		
x^y	2 ⁴	Two to the four
	5 ²	Five squared
	2 ³	Two cubed
Potentials of ten (scientific notation)		
10^x	10 ²	Ten squared
	4.7 x 10 ¹²	Four point seven times ten to the twelve
	0.5 x 10 ⁻²	Nought point five times ten to minus two

Activity 2 – Selection of media																						
Subject difficulty: ⇄	Language difficulty: ⇄																					
<p>Procedure:</p> <ul style="list-style-type: none"> ○ Explain activity 2 ○ Students read the text individually ○ Students work in pairs to search for information on the net and complete the table ○ They check the answers with another pair ○ Feedback in plenary 																						
<p>Language support:</p> <ul style="list-style-type: none"> ○ Words provided on the text ○ Online dictionaries: http://www.thefreedictionary.com/medicaldictionary and http://wordreference.com 																						
<p>Resources:</p> <ul style="list-style-type: none"> ○ Worksheet 1.4 ○ Interesting suppliers of dehydrated culture media: <ul style="list-style-type: none"> - BD - http://www.bd.com/products - Oxoid - http://www.oxoid.com/uk/blue/index.asp 																						
<p>Suggested answer key:</p> <table border="1"> <thead> <tr> <th>Media name (i.e.)</th> <th>Category</th> <th>Utility</th> </tr> </thead> <tbody> <tr> <td>Blood agar</td> <td>Enriched</td> <td>Streptococcus etc</td> </tr> <tr> <td>Chocolate agar</td> <td>Enriched</td> <td>Nesisseria, Haemophilus</td> </tr> <tr> <td>SS agar</td> <td>Selective</td> <td>Salmonella, Shigella</td> </tr> <tr> <td>TCBS</td> <td>Selective</td> <td>Vibrio cholerae</td> </tr> <tr> <td>MacConkey agar</td> <td>Differential</td> <td>Enterobacteriae</td> </tr> <tr> <td>Manitol-Chapman agar</td> <td>Differential</td> <td>Staphilococcus</td> </tr> </tbody> </table>		Media name (i.e.)	Category	Utility	Blood agar	Enriched	Streptococcus etc	Chocolate agar	Enriched	Nesisseria, Haemophilus	SS agar	Selective	Salmonella, Shigella	TCBS	Selective	Vibrio cholerae	MacConkey agar	Differential	Enterobacteriae	Manitol-Chapman agar	Differential	Staphilococcus
Media name (i.e.)	Category	Utility																				
Blood agar	Enriched	Streptococcus etc																				
Chocolate agar	Enriched	Nesisseria, Haemophilus																				
SS agar	Selective	Salmonella, Shigella																				
TCBS	Selective	Vibrio cholerae																				
MacConkey agar	Differential	Enterobacteriae																				
Manitol-Chapman agar	Differential	Staphilococcus																				



Activity 3 – Streak plate method	
Subject difficulty: ⇔	Language difficulty: ⇔
Procedure: <ul style="list-style-type: none"> ○ Explain activity 2 ○ Students read the text individually ○ Students working in pairs to complete the diagram ○ They may look difficult words in the online dictionary ○ They check the answers with another pair ○ Feedback in plenary. Use the power point to gradually reveal a picture of the streak plate method. 	
Language support: <ul style="list-style-type: none"> ○ Text ○ Diagram ○ Online medical dictionary: http://www.thefreedictionary/medicaldictionary ○ Online colloquial dictionary: http://wordreference.com 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.4 	
Answer key: <div style="text-align: center;"> </div>	

Activity 4 – Atmospheric conditions	
Subject difficulty: ⇔	Language difficulty: ⇔
Procedure: <ul style="list-style-type: none"> ○ Explain activity 3 ○ Students read the text individually ○ Students work individually to complete the activity ○ They check the answers with their partners ○ Feedback in plenary 	
Language support: <ul style="list-style-type: none"> ○ Text contains the words 	
Resources: <ul style="list-style-type: none"> ○ Worksheet 1.4 	



Answer key:

Group	Aerobic atm	CO ₂ – rich atmosphere	O ₂ – low atmosphere	Anaerobic atm
STRICT AEROBES	✓	✓		
CARBOXYPHILIC ORG		✓		
MICROAEROBIC ORG			✓	
FACULTATIVES	✓	✓		✓
STRICT ANAEROBES				✓

Activity 5 – Bacterial standards

Subject difficulty: ⇔

Language difficulty: ⇔

Activity 5.a

Procedure:

- Explain activity 4.a
- Students read the text individually
- Students working in pairs
- They check answer with another pair
- Feedback in plenary

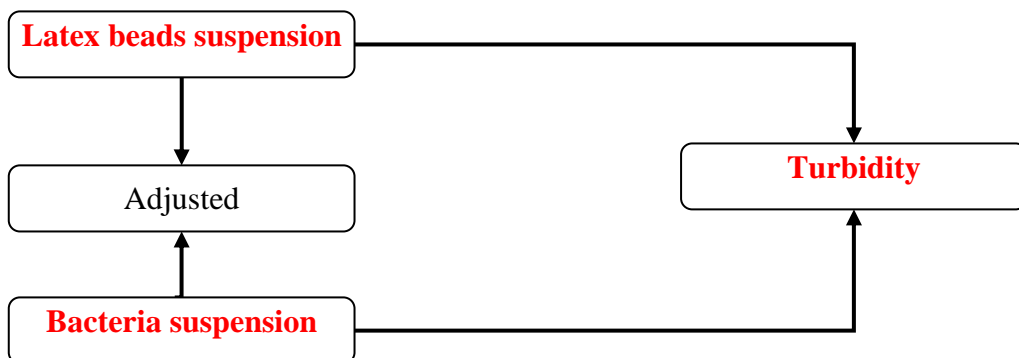
Language support:

- Language provided on the text

Resources:

- Worksheet 1.4

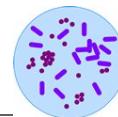
Answer key



Activity 5.b

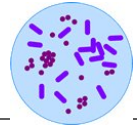
Procedure:

- Explain activity 4.b
- Students work individually
- They check the answers with another pair
- Feedback in plenary



Language support: <ul style="list-style-type: none">○ Word frame
Resources: <ul style="list-style-type: none">○ Worksheet 1.4
Answer key: <ul style="list-style-type: none">○ The McFarland 1 Standard corresponds to a suspension of three point oh times ten to eight cells per millilitre○ The McFarland 2 Standard corresponds to a suspension of six point oh times ten to eight cells per millilitre○ The McFarland 3 Standard corresponds to a suspension of nine point oh times ten to eight cells per millilitre
Activity 5.c
Procedure: <ul style="list-style-type: none">○ Explain activity 4.c○ Students work individually○ They check the answers with another pair○ Feedback in plenary
Language support: <ul style="list-style-type: none">○ Word frame
Resources: <ul style="list-style-type: none">○ Worksheet 1.4
Answer key <ol style="list-style-type: none">1. For a final volume of 1 ml, first of all we dispense 0.9 ml of solvent into a sterile tube.2. Then, we dispense 100 µl of the suspension 1McF.3. Mix and use

Assessment
Procedure: <ul style="list-style-type: none">○ At the end of the unit, students in pairs do a power point to summarize the unit through visuals○ They prepare the activity by their own and give the presentation in plenary○ Assessment criteria as shown below
Language support: <ul style="list-style-type: none">○ Text frame for the presentation
Resources: <ul style="list-style-type: none">○ Assessment 1 in "Supplementary materials"○ Tick box template for assessment



Tick box template – Assessment criteria UNIT 1

		Students																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Criteria																					
1	Does the student include 10 slides or more?																				
2	Does the student include different kind of diagrams?																				
3	Does the student present from 10 to 12 contents?																				
4	Can the student link the contents presented?																				
5	Can the student explain concepts properly?																				
6	Can the student use technical words correctly?																				
7	Does the student show self-confidence?																				
8	Can the student talk fluently?																				
9																					