



2010 VCE VET Laboratory Skills GA 2: Written examination

GENERAL COMMENTS

Most students read the questions carefully and their answers demonstrated that they had a clear understanding of the topic. Teachers should instruct students to answer only the electives they have studied throughout the year.

Questions involving calculations presented problems for some students. It is essential that students are able to determine the molarities and concentration of chemical solutions, perform dilutions and balance chemical equations. Students must familiarise themselves with relevant VET Laboratory Skills terms.

SPECIFIC INFORMATION

The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D	Comments
1	5	0	95	0	
2	0	11	32	58	A number of students chose option D, which was incorrect as balances do not have a probe.
3	11	11	5	74	Generally, students answered this question well, showing they understood the meaning of non-conformance.
4	5	0	11	79	Students found this question very difficult. The correct answer was option B, to test the samples as a batch in the afternoon so that reagents only need to be made up once, saving both time and reagents and meeting the client requirement for same-day service.
5	0	5	5	89	Students answered this question well.
6	32	26	16	26	Students found this question difficult and lacked understanding of the use of a biohazard cabinet. The UV light disinfects the cabinet when not in use but can damage the operator's eyes due to reflected UV light so it needs to be off during use. The fan provides a curtain of air, which prevents bacteria from escaping the cabinet and must be on during use.
7	89	5	5	0	Students answered this question well.
8	5	11	5	79	Students answered this question well.
9	0	0	5	95	Students answered this question well.
10	63	0	26	11	Bleach is the best disinfectant for viruses and prevents the spread of HIV and AIDS from contaminated blood.
11	53	0	0	47	A number of students chose option D incorrectly. If the equipment is not tagged as defective, another person may use the instrument without consulting the log. Also, if it is not reported it may be some time before someone reads the log and gets the problem fixed.
12	95	0	0	5	Students answered this question well.
13	0	95	5	0	Students answered this question well.
14	0	32	11	58	The majority of students answered this question incorrectly. A plastic stopper is the best, as alkalis do not react with plastic. Glass stoppers must never be used as alkalis react with the glass and are difficult or impossible to remove. Rubber and cork react with alkalis to varying degrees.
15	21	16	63	0	A large number of students chose option C incorrectly. The fume cabinet contains the flammable vapours, reducing the risk and spread of fires.
16	5	0	74	21	Generally, students answered this question well.
17	11	89	0	0	Students answered this question well.



Question	% A	% B	% C	% D	Comments
18	63	5	16	16	Generally, students answered this question well.
19	32	32	11	26	As in previous years, calculations, molarities and concentrations caused many students difficulty. Underpinning knowledge for the unit PMLTEST303B – Prepare working solutions, requires students to perform the calculation required to prepare specific amounts of solutions of specified concentration.
20	5	79	16	0	

Section B – Core Units – Short answer questions

For each question, an outline answer (or answers) is provided. In some cases, the answer given is not the only answer that could have been awarded marks.

Questions 1a. and 1b.

Marks	0	1	2	Average
%	21	50	29	1.1

Question 1a.

Any one of the following or equivalent:

- quality is ensuring the product meets its specifications
- a process in which defective products are removed and identified
- provides value for money
- satisfy customer needs
- fit for intended use.

Question 1b.

Any one of the following or equivalent:

- a management system is put into place or implemented
- use of a quality manual
- standard operating procedures
- documented quality control.

Question 1c.

Marks	0	1	2	Average
%	24	61	16	0.9

Any two of the following or equivalent:

- monitor quality
- evaluate accuracy of test results
- measure efficiency
- measure characteristics of materials.

A number of students were unable to answer this question; they could not demonstrate an understanding of the terms used in the unit PMLQUAL300B – Contribute to the achievement of quality objectives.

Question 2

Marks	0	1	2	3	Average
%	74	5	0	21	0.7

Any three of the following or equivalent:

- minimise waste
- switch off equipment not in use
- put lights on time switches
- recycle materials and/or waste
- use equipment correctly
- streamline processes

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- minimise overuse of chemicals
- outsource infrequently performed tests that use rare and very expensive materials.

Unit PMQUAL300B – Contribute to the achievement of quality objectives, Performance criteria 3.2, requires students to be able to conduct work in accordance with sustainable energy work practices. Many students found it difficult to list three sustainable practices that would be suitable in a laboratory environment.

Question 3

Marks	0	1	2	3	Average
%	11	29	47	13	1.7

Any three of the following or equivalent:

- new tests and processes
- apply sustainable work practices
- safety awareness
- changing customer needs
- new equipment
- continuous improvement
- flexible workforce.

Generally, students answered this question well; however, a few were not able to provide an answer. Unit PMLQUAL 300B – Contribute to the achievement of quality objectives, Performance criteria 5, requires students to be able to update knowledge and skills as required, to recognise their own skills and to take advantage of opportunities for development.

Question 4

All students answered Question 4a., but a number of students were unable to select the most important PPE for this particular situation. Generally, students answered 4b. and 4c. well.

Question 4a.

Marks	0	1	2	Average
%	21	55	24	1.1

- gown that covers front of the worker (not lab coat)
- gloves

These two items are essential, while other items may be worn in addition to them. A number of students answered 'safety gasses and laboratory coats'. Safety glasses are not essential when using a biohazard cabinet as the eyes are protected (though it is good practice to wear them as a second line of defence). Laboratory coats are not suitable, as they often do not cover the whole front of the worker. Back-opening or wrap-around gowns are essential and gloves are required as hands are within the cabinet during manipulations.

Questions 4b. and 4c.

Marks	0	1	2	3	4	Average
%	0	8	34	29	29	2.8

Question 4b.

Any three of the following or equivalent:

- work area cleared
- personal protective equipment
- work area disinfected
- equipment and materials available
- equipment organised
- air flow not compromised
- cabinet working properly
- cabinet has been tested and approved
- procedure has been read and understood
- waste-disposal container.

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Question 4c.

Any one of the following or equivalent:

- place in suitable containers for sterilisation or disinfection
- label as per requirements
- autoclave
- transport to designated area for decontamination and cleaning.

Questions 5a. and 5b.

Marks	0	1	2	3	4	5	6	7	8	Average
%	3	5	5	16	13	5	21	24	8	5

Question 5a.

Any one of the following or equivalent. The use of the word 'sterile' or 'autoclaved' was essential.

- displacement pipette and sterile tips
- sterile pipette and bulb
- sterile pipette

Question 5b.

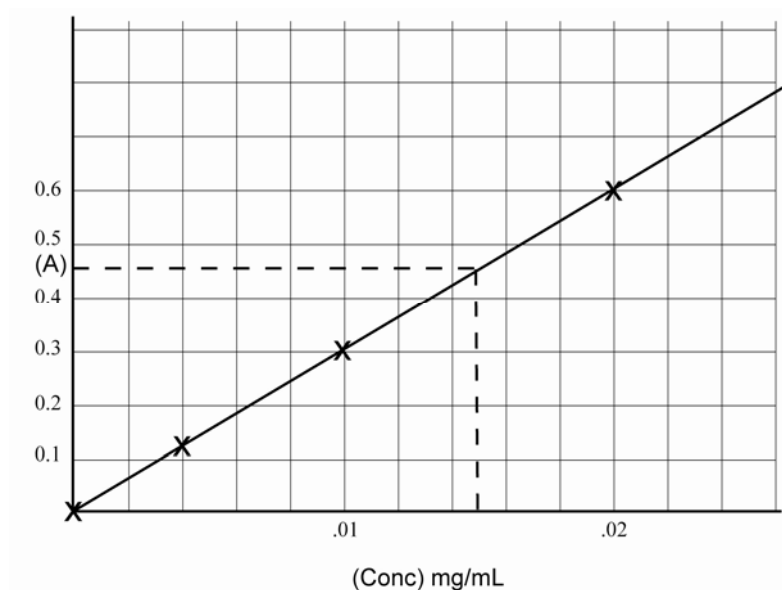
The following steps needed to be in order.

- remove bottle cap
- flame mouth of the bottle
- accurately measure 0.1 mL
- flame mouth and replace cap
- open bottle of sterile medium
- flame mouth
- dispense sample slowly to reduce aerosols
- flame mouth of the bottle and replace cap
- dispose of contaminated material correctly

Most students answered this question well.

Question 6a.

Marks	0	1	2	Average
%	16	34	50	1.4



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Question 6b.

Marks	0	1	2	Average
%	13	29	58	1.5

Approx 0.015 mg/mL

Students received one mark if they showed the correct calculation.

Question 6c.

Marks	0	1	2	3	Average
%	58	5	3	34	1.2

Conversion of 1 mL to Litres is 0.001 L

0.015 mg – 0.001 L

X 5000 L

= 75000 mg

= 75 grams

The calculations in 6c. were difficult for a number of students.

Question 6d.

Marks	0	1	Average
%	37	63	0.7

Check one of the following:

- logbook
- with supervisor
- SOP
- calibration records.

This question was answered well by most students.

Question 6e.

Marks	0	1	2	Average
%	0	13	87	1.9

PPE you should use during an analysis include:

- lab coat
- safety glasses.

This question was answered well.

Questions 6f. and 6g.

Marks	0	1	2	3	Average
%	0	13	29	58	2.5

Question 6f.

The result of an unknown sample would be recorded in a logbook.

Question 6g.

At least two of the following:

- date
- time
- value
- units
- control data
- operator.

Most students answered this question well.

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Question 7

Marks	0	1	2	3	Average
%	13	21	34	32	1.9

- Consult with the laboratory supervisor prior to attempting the preparation of standards.
- The supervisor will then understand the delay and be able to take appropriate steps.
- The supervisor may also be able to explain the cloudy suspension (for example, salts precipitate below a certain temperature so the solution may be useable after warming).

Students received one mark for their answer and two marks for their explanation. Most students answered this question well.

Elective 1 – PMLTEST308A Perform microscopic examinations

Question 1

Marks	0	1	2	3	4	Average
%	13	13	73	0	0	1.6

Microscope objective lens	Sample number
40x	4
4x	1 or 3
20x	3 or 1
Oil immersion	2

Question 2

A number of students found this question difficult, particularly parts b and c.

Question 2a.

Marks	0	1	Average
%	20	80	0.8

Neubauer counting chamber

Question 2b.

Marks	0	1	2	3	4	5	Average
%	63	3	23	7	3	0	0.9

A	stage or grid
B	bridge or support
C	cover slip
D	sample or gap
E	channel

Question 2c.

Marks	0	1	2	Average
%	57	27	17	0.6

$0.15 \times 10^5 \times 1000 = 0.15 \times 10^8$ viable cells per mL.

$\times 75 = 1.125 \times 10^{10}$

1.125×10^9

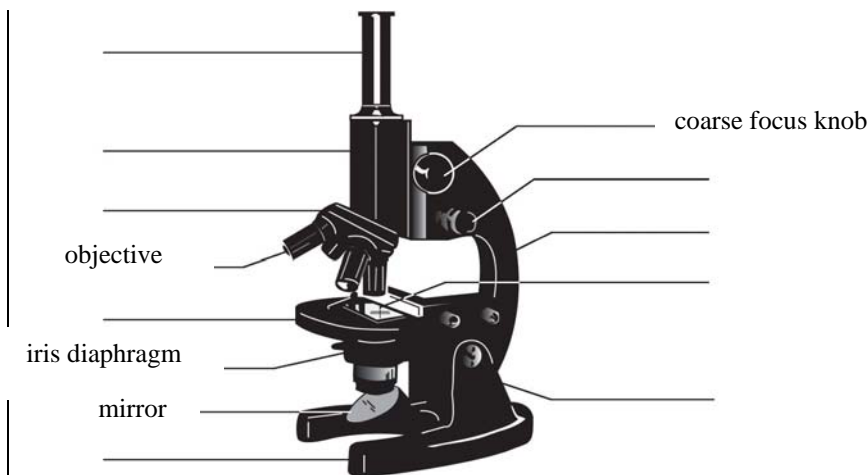
Students received one mark for their answer and one mark for showing the correct calculation.

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Question 3

Marks	0	1	2	3	4	Average
%	7	13	40	27	13	2.3



Most students were able to name the parts of the microscope as requested.

Question 4a-c.

Marks	0	1	2	3	4	Average
%	7	17	40	30	7	2.2

Question 4a.

- inverted microscope
- phase contrast

Question 4b.

- cells are either dead or dying
- cells may be contaminated
- the experimental results will not be valid (or equivalent)

Question 4c.

Light microscope with oil immersion lens

Most students answered this question well.

Elective 2 – PMLTEST409A Capture and manage scientific images

Questions 1a. and 1b.

Marks	0	1	2	3	4	Average
%	7	14	14	64	0	2.4

SLR stands for single lens reflex.

Question 1b.

Any three of the following or equivalent:

- SLR cameras provide an accurate view of the subject
- SLR cameras have a different operating mechanism
- SLR cameras have a more sophisticated lens system
- SLR cameras are usually larger
- digital
- higher resolution of the image.

Most students answered this question well.

2010 Assessment Report



Questions 2a. and 2b.

Marks	0	1	2	Average
%	29	43	29	1

Question 2a.

One of the following or equivalent:

- reduces the light exposure
- appears duller and darker
- increases contrast.

Question 2b.

One of the following or equivalent:

- produces a sharper image
- produces a darker image
- less blurred.

Most students answered this question well.

Question 3

Most students answered 3a. and 3b. well, but a number of students found 3c. difficult.

Question 3a.

Marks	0	1	2	3	Average
%	14	14	7	64	2.2

Any three of the following or equivalent:

- date
- location
- time
- weather conditions
- officer's details
- scale.

Most students answered this question well.

Question 3b.

Marks	0	1	2	3	Average
%	0	21	21	57	2.4

The explanation of how the software assists the forensic officer should have included at least three of:

- enlarging some areas
- labelling
- highlighting areas
- storing images
- sharing images
- consultation.

Question 3c.

Marks	0	1	2	3	Average
%	29	43	29	0	1

When using this software, a crime scene officer would need to be aware of:

- keeping original images
- storing images correctly
- version control
- chain of custody issues.

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Question 4a.

Marks	0	1	2	3	4	Average
%	0	29	29	36	7	2.2

To protect themselves and the crime scene, the officer should:

- isolate/cordon off area
- prevent unauthorised access
- check people's identification
- identify substance
- obtain MSDS
- manage risk
- obtain relevant PPE
- call for expert assistance.

Students received one mark for their answer and three marks for the explanation. Most students answered this question well.

Question 4b.

Marks	0	1	Average
%	0	100	1

The officer

All students answered this question correctly.

Elective 3 – PMLTEST304B Prepare culture media

Questions 1a. and 1b.

Marks	0	1	2	Average
%	0	31	69	1.7

Question 1a.

$50 \times 10 \text{ mL} = 500 \text{ mL}$

$(500/1000) \times 40 \text{ gm} = 20 \text{ gm}$

Question 1b.

100°C

Question 1c.

Marks	0	1	2	3	Average
%	13	50	25	13	1.4

Order	Procedural steps
1	weigh and dissolve all ingredients
2	dispense in 10 mL volumes
3	sterilise bottles in a wire basket
4	place bottles on a sloping rack
5	allow to set completely before moving

Question 1d.

Marks	0	1	Average
%	13	88	0.9

25 mL

2010 Assessment Report



Question 1e.

Marks	0	1	2	Average
%	0	19	81	1.8

Any two of:

- date prepared
- agar type
- coding e.g. batch number, colour coding and so on
- expiry date.

Question 1f.

Marks	0	1	2	Average
%	63	13	25	0.7

Sterility control. Representative samples are test incubated for 48 hours to ensure that the prepared medium is sterile.

Explanations could have included either of the following.

- If all the plates in the batch were test incubated they might start to dry out and their shelf life would be reduced.
- If no plates were test incubated and the sterilisation process was faulty, bacteria already in the media would grow causing incorrect results.

Students received one mark for their answer and one mark for their explanation. Most students answered this question well but some students found parts c and f difficult.

Questions 2a. and 2b.

Marks	0	1	2	Average
%	6	31	63	1.6

Autoclave

Question 2b.

Centre of load

Most students answered this question well.

Question 3

Marks	0	1	2	3	4	5	Average
%	81	0	6	6	6	0	0.6

Answers 1–4 or equivalent were essential for four marks to be awarded. Any of the other responses received one additional mark.

The explanation of how to prepare a batch of horse blood agar should include the following steps in the order listed.

- 1 boil (heat agar until it is completely dissolved)
- 2 allow to cool (to approximately 56 °C)
- 3 add sterile horse blood and mix well
- 4 dispense/pour into Petri dishes
- 5 allow to set completely before moving
- 6 label
- 7 store at 4° C

Many students found this question very difficult with a number of students unable to answer it. Students do not seem to be able to demonstrate an understanding of the steps required to pour agar plates or the necessity to add blood or other sterile heat-labile products after agar base has been autoclaved and cooled.

Question 4

Marks	0	1	2	3	Average
%	13	16	50	22	1.8

2010 Assessment Report



Any three of following or equivalent:

- quantity of medium
- damage or leakage
- stock rotation
- contamination
- dehydration
- expiry dates
- appearance.

Most students answered this question well. Students need to explain what Silas would do to check the prepared media stocks. He would need to check if the quantity was within acceptable stock levels – usually there is a set minimum and maximum quantity. He would also need to see that the medium available was useable, so he would need to assess the stock's appearance and check expiry dates.