 Practical assessment

Stage 4 Working Scientifically

Outcomes

Values and attitudes

SC4-1VA appreciates the importance of science in their lives and the role of scientific inquiry in increasing understanding of the world around them.

Working scientifically

SC4-5WS collaboratively and individually produces a plan to investigate questions and problems

* WS5.2 Students plan first-hand investigations by:

c. identifying in fair tests, variables to be controlled (held constant), measured and changed

d. describing safety and ethical guidelines to be addressed

* WS5.3Students choose equipment or resources for an investigation by:

a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies

SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually

* WS6 Students conduct investigations by:

b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment

c. selecting equipment to collect data with accuracy appropriate to the task (ACSIS126, ACSIS141)

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.1 Students process data and information by:

c. extracting information from diagrams, flowcharts, tables, databases, other texts, multimedia resources and graphs including histograms and column, sector and line graphs

* WS7.2 Students analyse data and information by:

d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources (ACSIS130, ACSIS145)

e. proposing inferences based on presented information and observations

SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations

* WS9 Students communicate by:

d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases

Knowledge and understanding

Knowledge and understanding outcomes can be chosen to coincide with the stimulus material given. The questions in the practical assessment are examples of what can be asked.

Learning across the curriculum

Cross-curriculum priorities

Aboriginal and Torres Strait Islander histories and cultures

Asia and Australia's engagement with Asia

Sustainability

General capabilities

Critical and creative thinking

Ethical understanding

Information and communication technology capability

Intercultural understanding

Literacy

Numeracy

Personal and social capability

Other areas of learning

Civics and citizenship

Difference and diversity

Work and enterprise

Teacher notes

This is an in class skills based task that has an appearance of a practical test, Students work in various stations to display an understanding of the basic science skills. The task may be appropriate to assess working scientifically skill in term 1 in year 7. With some classes it may even be appropriate to retest after teaching has taken place to ensure they can work safely in a lab. It could be linked to the distribution of science licenses or Bunsen burner licenses.

Teachers will be required to set up stations for students to engage with. A list of equipment and stimulus material is provided for teachers to include.

The time allowed for the task has been allocated at 60 minutes. Teachers are able to reduce or add time depending on the skills covered in school and the individual needs of their students.

The practical assessment questions have been linked to working scientifically outcomes. The information can be amended by teachers to include more questions and to reformat.

Student instructions

1. The following practical assessment task will assess some working scientifically outcomes
2. Your work is set up in 15 stations.
3. You will be allowed 4 minutes at each station.
4. Move from station to station at the bell.
5. You will need to work silently.
6. You will need to have all necessary equipment e.g. ruler, pencil, pen etc. No borrowing is allowed.

Practical assessment

Use the stimulus provided at each station to answer the questions in the space provided. Show working and units where appropriate.

Station 1 (1 mark)

Identify the equipment that is best suited to transfer 2mL of water.

Outcomes

SC4-5WS collaboratively and individually produces a plan to investigate questions and problems

* WS5.3Students choose equipment or resources for an investigation by:

a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies *Information and communication technology capability icon*

Station 2 (2 marks)

Use the given equipment to find the volume of the given object.

Outcomes

SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually

* WS6 Students conduct investigations by:

c. selecting equipment to collect data with accuracy appropriate to the task (ACSIS126, ACSIS141) Information and communication technology capability icon

Station 3 (2 marks)

Draw a scientific diagram of the equipment set up on the table.

Outcomes

SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations.

* WS9 Students communicate by:

d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases *Literacy icon* *Information and communication technology capability icon* *Ethical understanding icon*

Station 4 (1 mark)

Student M carries this equipment to their bench. How should they safely carry it across?

Outcomes

SC4-5WS collaboratively and individually produces a plan to investigate questions and problems

* WS5.2 Students plan first-hand investigations by:

d. describing safety and ethical guidelines to be addressed *Ethical understanding icon* *Personal and social capability icon*

Station 5 (1 mark)

Read the information provided and then answer the question below.

What can you conclude from the results?

Outcomes

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.2 Students analyse data and information by:

e. proposing inferences based on presented information and observations *Critical and creative thinking icon*

Station 6 (2 marks)

Use the equipment provided to find the temperature of the object.

Outcomes

SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually

* WS6 Students conduct investigations by:

b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment

c. selecting equipment to collect data with accuracy appropriate to the task (ACSIS126, ACSIS141) *Information and communication technology capability icon*

Station 7 (2 marks)

Record the information provided in a graph or diagram.

Outcomes

SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations

* WS9 Students communicate by:

d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases *Literacy icon* *Information and communication technology capability icon* *Ethical understanding icon*

Station 8 (2 marks)

Use the triple beam balance to measure the mass of the flask and the mass of water.

Outcomes

SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually

* WS6 Students conduct investigations by:

b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment

c. selecting equipment to collect data with accuracy appropriate to the task (ACSIS126, ACSIS141) Information and communication technology capability icon

Station 9 (2 marks)

Use the reference sample and write down the two things the scientists observed.

Outcomes

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.2 Students analyse data and information by:

d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources (ACSIS130, ACSIS145)

Station 10 (2 marks)

Use the ruler to measure the width of material Z. Calculate the actual width of material Z. Show your working.

Outcomes

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.1 Students process data and information by:

c. extracting information from diagrams, flowcharts, tables, databases, other texts, multimedia resources and graphs including histograms and column, sector and line graphs *Numeracy icon* *Literacy icon*

Station 11 (2 marks)

Observe the air hole in the Bunsen burner. Predict and explain the flame type and colour to complete the following table.

| Air hole | Flame colour | Flame type |
| --- | --- | --- |
|  |  |  |
|  |  |  |

Outcomes

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.2 Students analyse data and information by:

d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources (ACSIS130, ACSIS145)

Station 12 (1 mark)

Mr Y fell and hurt his arm. He was rushed to the hospital. The doctor examining Mr Y suspects his arm is broken. What observation technique would the doctor use to confirm his suspicion?

Outcomes

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.2 Students analyse data and information by:

e. proposing inferences based on presented information and observations

Station 13 (2 marks)

Look around the science laboratory and identify two pieces of equipment that are used to keep you safe.

Outcomes

*SC4-5WS collaboratively and individually produces a plan to investigate questions and problems*

* WS5.2 Students plan first-hand investigations by:

d. describing safety and ethical guidelines to be addressed *Ethical understanding icon* *Personal and social capability icon*

Station 14 (2 marks)

Look at the graph and identify the melting and boiling points of substance X.

Outcomes

SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions

* WS7.1 Students process data and information by:

c. extracting information from diagrams, flowcharts, tables, databases, other texts, multimedia resources and graphs including histograms and column, sector and line graphs *Numeracy icon* *Literacy icon*

Station 15 (6 marks)

Identify the following as controlled variable, independent or dependent variables.

| Condition | Type of variable |
| --- | --- |
| Type of seeds |  |
| Amount of water |  |
| Size of beaker |  |
| Size of dish |  |
| Amount of cotton wool |  |
| Height of the seedling |  |

Outcomes

SC4-5WS collaboratively and individually produces a plan to investigate questions and problems

* WS5.2 Students plan first-hand investigations by:

c. identifying in fair tests, variables to be controlled (held constant), measured and changed

Stimulus material

Station 1

* Test tube
* Measuring cylinder
* Graduated pipette

Station 2

* Beaker of water (known volume)
* Measuring cylinders (50/100mL)
* Pendulum
* Bob/rubber cork with string attached

Station 3

Filtration setup using the following equipment as a minimum

* Beaker or conical flask for substrate
* Filter funnel
* Filter paper

The setup can either rest the filter funnel on the conical flask or use an O-ring and retort stand.

Station 4

Microscope set up with a paramecium or any suitable specimen.

Station 5

Trading officers were called to a meat factory. They believe that sausages marked as ‘pork sausages’ may contain other type of animal meat. They use electrophoresis (test the DNA of the meat in a lab) to detect DNA in pork sausages.

Electrophoresis is a technique which separates DNA based on their size. Analysis can be performed by comparing the similarities of different strips. The results of DNA analysis are shown below.

DNA in pork sausages

**An electrophoresis strip of DNA in pork sausages showing 6 DNA bands**

DNA in pork

**An electrophoresis strip of DNA in pork showing 3 DNA bands**

DNA in beef

**An electrophoresis strip of DNA in beed showing 3 DNA bands**

DNA in horse meat

**An electrophoresis strip of DNA in horse meat showing 3 DNA bands**

Station 6

* Beaker of ice
* Thermometer

Station 7

Stimulus

Nearly the Earth’s entire atmosphere is made up of only five gases: nitrogen, oxygen, water vapour, argon, and carbon dioxide. Several other compounds also are present. Air is a mixture of various gases. The main gases present in air are nitrogen (78.1% by volume) and oxygen (20.9% by volume). These two gases together form 99% of the air. Besides these two, air contains small amounts of carbon dioxide (0.03 to 0.04%), water vapour (variable), noble gases (0.94%), and dust particles. The noble gases present in the air are helium, neon, argon, krypton and xenon. Since the percentage of these gases is very small so, they are also called "rare gases".

Equipment

* Compass
* Ruler
* Graph paper

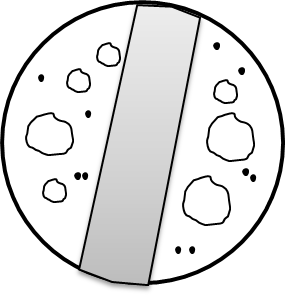
Station 8

* Triple beam balance
* Conical flask with water of known volume

Station 9

Stimulus

This is what a scientist saw through a microscope. Use the reference sample and write down the two things scientists observe.

 A table of reference samples which depict an image for each sample.
Fibres are bold black strands.
Dust mites are images of mites.
Hair is a grey band.
Skin scales are depicted as circular blobs.
Dust mite droppings are small black dots.

Station 10

Stimulus

The image shows a view of a microscope slide with a grey band in the middle, a number of circular blobs and a number of black dots.
An arrow is pointed to the grey band and is denoted by the letter Z.
The image is captioned with 'Scale 100x'

Station 11

* Bunsen burner
* Sign: Do not touch the Bunsen burner

Station 12

* Text

Station 13

Visible safely equipment in room, can include the following:

* Fire extinguisher
* Safety glasses
* Fire blanket
* Gas switch off
* Electricity switch off
* Lab coats

Station 14

The image is of a line graph with the title Substance X. The y-axis is labelled temperature and ranges from -300 to 300 degrees celsius. The x-axis is labelled Time (minutes) starts at the 0 degrees celsius point and ranges from 0 minutes to 25 minutes.
The line starts at 200 degrees and increased to 100 for 5 minutes, it is stable for 5 minutes. The line increases to about 50 degrees for the next 5 inutes and is stable again for 5 minutes. THe line increases again to 300 degrees for 5 minutes. 

Station 15

* 3 beakers with equal amounts of water
* 3 petri dishes
  + Same amount of cotton wool
  + Same number of seeds

Marking guideline/rubric

| Station No | Marking guideline | Marks |
| --- | --- | --- |
| Station 1 | Identifies correct equipment | 1 |
| Station 2 | Measures the volume of water  Calculates the volume of the object with units | 2 |
| Station 3 | Drawing in pencil and 2D  Uses a ruler and uses the spaces provided appropriately | 2 |
| Station 4 | Identifies microscope must be held using the arm and the base | 1 |
| Station 5 | Processes data to conclude sausage is contaminated with beef | 1 |
| Station 6 | Measures the temperature of ice with in the range of 0 to 5 degrees | 1 |
| Station 7 | Students may record information as an appropriate table or graph  Correct headings and axis labels | 2 |
| Station 8 | Measure mass of water  Measure mass of flask | 2 |
| Station 9 | Two correct observations | 2 |
| Station 10 | Uses magnification to calculate the size accurately | 2 |
| Station 11 | Table correctly filled including open air hole, blue flame and working/heating flame | 1 |
| Station 12 | Identifies an X-ray as an observation technique | 1 |
| Station 13 | Identifies two pieces of safety equipment | 1 |
| Station 14 | Identifies melting and boiling point | 2 |
| Station 15 | One mark per correct variable identified | 6 |