This assessment is based on a now-expired version of the achievement standard and may not accurately reflect the content and practice of external assessments developed for 2025 onwards.

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91923Q

NZQA | Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Science 2024

91923 Demonstrate understanding of science-related claims in communicated information

Credits: Five

ASSESSMENT TASK

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of science-related claims in communicated information.	Explain science-related claims in communicated information.	Examine science-related claims in communicated information.

Refer to information in this booklet for Science 91923.

Check that this booklet includes pages 2–10 in the correct order and that none of these pages is blank.

Do not use chatbots, generative AI, or other tools that can automatically generate content.

DO NOT TAKE THESE ASSESSMENT MATERIALS OUT OF THE ASSESSMENT ROOM.

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The assessment continues on the following page.

ASSESSMENT TASK

For this standard you will need to:

- select ONE resource from this booklet to use for your report
- use the multiple claims that are in the selected resource.

Write a report using your science knowledge, science language, and critical thinking skills on the selected claims in the resource.

In your report, discuss **TWO** claims you have identified in the resource. Include in your discussion:

- the source of each of the **TWO** claims
- the intended purpose of the communicated information for each of the **TWO** claims
- the science language OR conventions that are used to support each of the **TWO** claims.

Tick the resource you will write about in your report:

☐ Resource one: How much protein?

☐ Resource two: Ultrasonic pest control

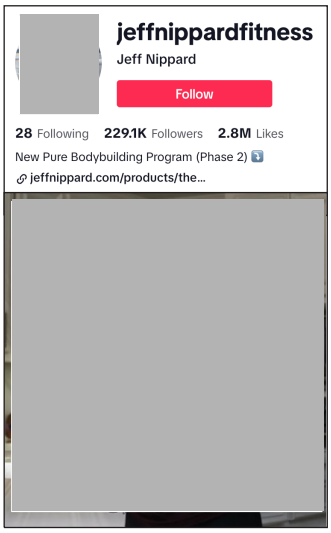
☐ Resource three: The shape of the Earth

RESOURCE ONE: How much protein?

The following summaries about protein are from different sources and make different science-related claims.

Claim one: TikTok creator Jeff Nippard

In September 2023, TikTok creator Jeff Nippard (@jeffnippardfitness) said the following in a post about gaining muscle from protein.



"Data from 49 studies found that you really only need 1.6 grams of protein per kilogram of body weight. So if you weigh 80 kilos, 128 grams of protein per day will max out your gains and going beyond that has 'no further benefit on gains'. Eating three to six high-protein meals is better than just one or two meals per day. Try to eat some protein within a 5-hour window around your workout. Protein sources shouldn't really matter, as long as you hit your daily total, and you should count protein from all food sources."

The study Jeff Nippard is talking about was published in 2018 in the *British Journal of Sports Medicine*. It is open access so anyone can view it. It is a meta-study, which means that it takes information from a lot of other studies to look for patterns. In this case, the meta-study used 49 other articles to make new conclusions.

A summary of the findings from the 2018 meta-study:

- If you're doing weightlifting or strength training, adding more protein in your diet helps you gain more muscle and become stronger.
- Extra protein is especially effective for people who are already used to resistance training, like bodybuilders or athletes.
- Once you're already eating around 1.6 g/kg (grams per kilogram) of protein for your body weight each day, adding even more protein doesn't give you extra benefits.

Source: tiktok.com/@jeffnippardfitness/video/7276085368410098949; bjsm.bmj.com/content/bjsports/52/6/376.full.pdf

Claim two: Harvard Medical School

Harvard Medical School answered the following question about eating too much protein.

So, when it comes to protein, how much is too much?

It's hard to provide a specific answer since so much is still uncertain and the experts themselves don't agree. However, for the average person (who is not an elite athlete or heavily involved in bodybuilding) it's probably best to aim for no more than 2 gm/kg; that would be about 120 grams per day for a 60 kg person. New information could change our thinking about the maximum safe amount, but until we know more about the safety, risks, and benefits of high protein diets, this seems like a reasonable recommendation.

Source: health.harvard.edu/nutrition/when-it-comes-to-protein-how-much-is-too-much

Claim three: New Zealand Nutrition Foundation

In 2022, the New Zealand Nutrition Foundation website published the following article.

Protein is made up of smaller molecules known as amino acids. Protein is found in:

- animal sources: meat, fish, chicken, eggs, milk, cheese, and yoghurt
- plant sources: soy (soybeans, tofu, soy milk, etc.), grains (quinoa, oats, barley, etc.), and nuts and pulses (dried beans, peas, lentils, etc.).

Animal and plant sources of protein

Table 1 below shows the recommended daily intake (RDI) of protein for people in New Zealand and Australia.

Table 1: Recommended daily protein intake

	Age (years)	RDI of protein (grams per day)
Infants / toddlers	1–3	14
Children	4–8	20
Boys	9–13	40
	14–18	65
Girls	9–13	35
	14–18	45
Men	19–70	64
	>70	81
Women	19–70	46
	>70	57

Athletes: Endurance athletes in heavy training require extra protein to cover a small proportion of the energy costs of their training and to assist in the repair and recovery process after exercise. Strength athletes, who are interested in gaining muscle size and mass, require more protein in the early stages of very intensive resistance exercise.

Gym-goers / active people: Similar to athletes, gym-goers and active people (e.g. recreational sports players) will require more protein to support muscle growth and help to repair and maintain muscle tissue.

Source: nutritionfoundation.org.nz/nutrition-facts/nutrients/protein

RESOURCE TWO: Ultrasonic pest control

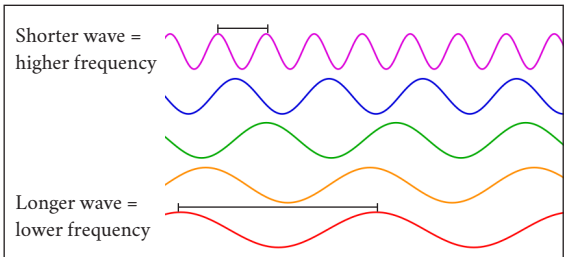
The following summaries about ultrasonic pest control are from different sources and make different science-related claims.

Claim one: Science Learning Hub

The following information is from the Science Learning Hub and is written by scientists and educational experts for students and teachers to help them understand and learn about science.

Sound is a pressure wave caused when something vibrates. Every sound has a frequency. Frequency is how high or low a sound is. Low-frequency sounds are low pitched like the thump of an explosion or the rumble of a truck going past. High-frequency sounds are high pitched like a baby crying or a kettle whistling. Really high-frequency sounds beyond human hearing are called ultrasonic.

- Frequency is measured in hertz (Hz).
- Humans can normally hear sounds between 20 Hz and 20 000 Hz (20 kHz).
- Sounds above 23 000 Hz are called ultrasonic.
- Some animals can hear ultrasonic sounds.



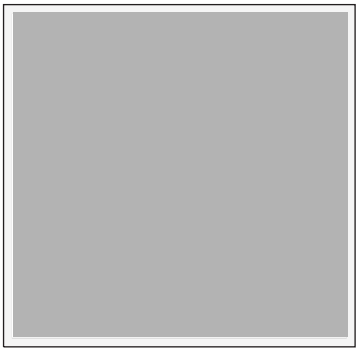
Five sound waves of different frequencies: Ultrasonic sounds can be heard by some animals but not humans (short waves, violet); high frequencies sound like a high-pitched whistle or squeal (blue); low frequencies sound like a bass drum or thunder (long waves, red)

Source: sciencelearn.org.nz/resources/573-measuring-sound; sciencelearn.org.nz/resources/999-ultrasound

Claim two: *Pestrol Home and Garden*

This business sells the Pestrol Sonic Pest Repeller device on their website. A summary of this product is shown below.

Pestrol Sonic Pest Repeller **$99.90**



The Pestrol Sonic Pest Repeller is a small electronic device designed to help repel pests from your home. The device emits a series of high-frequency sound waves that can't be heard by humans or pets.

These sound-wave pulses are meant to disrupt the nervous systems of pests, causing them to flee the area.

This makes it a safe, non-toxic alternative to traditional pest-control chemicals or traps.

High-intensity ultrasonic and pressure waves provide 360-degree coverage to repel rodents from open spaces.

- Coverage: 200 m^2
- Sonic pest repeller emits high-intensity ultrasonic and pressure waves with a frequency range of 25–65 kHz
- Designed to make rats, mice, and other pests panic and leave the area.
- You can place the device in garages, garden sheds, barns, roof spaces, dairy sheds, wool sheds, grain storage, etc.

Source: pestrol.co.nz/buy-online/pestrol-sonic-pest-repeller

Claim three: Louisiana State University

Researchers gathered data from six studies carried out between 1942 and 1994 measuring which frequencies animals can hear. Some of their data is graphed below and shows the highest frequency sounds that humans, dogs, cats, mice, and rats can hear. For instance, the graph shows that humans can't hear sounds above about 20 000 Hz.

Figure 1: Sound frequencies that can be heard by animals

Source: lsu.edu/deafness/HearingRange.html

Claim four: *Bug King*

Bug King *is an Auckland business that specialises in pest control and the removal of unwanted pests such as rats, mice, and insects. Here's a summary of what they say about ultrasonic pest repellers.*

We're often asked about ultrasonic pest repellers for getting rid of rats, mice, and insects. We don't use them because ultrasonic pest repellers don't work.

Ultrasonic pest repellers don't require traps or poison and some people think they are eco-friendly.

Studies have found that pests might initially be bothered by ultrasonic repellers, but they quickly get used to them and just stick around. Ultrasonic sound waves have a low penetrating ability so they don't travel very far and are easily blocked by furniture, walls, and corners.

In fact they are so useless that the United States' Federal Trade Commission sent letters to people selling ultrasonic repellers warning them that they needed scientific evidence to back up their claims. Also, a Newcastle University study rejected ultrasonic sound as a rodent control method because it couldn't be proved that rodents were affected by the sound waves.

Source: bugking.co.nz/do-electronic-rodent-repellers-work

RESOURCE THREE: The shape of the Earth

The following summaries about the shape of the Earth are from different sources and make different science-related claims.

Claim one: Mark Sargent's ideas about the Earth

Mark Sargent believes that the Earth is flat. He has around 100,000 YouTube followers and has been invited to talk at numerous flat-Earth events around the world. Sargent's videos have had over 10 million views and he is now a full-time YouTuber.

Mark Sargent holding a Gleason projection model of a flat Earth

In 2015, Sargent released a series of videos explaining that the stars are lights suspended in a dome, and the flat Earth is surrounded by a 50-foot ice wall that stops the oceans from draining over the edge of the Earth. Sargent says that government organisations like NASA are lying to the public and using computer-generated images to convince the public that the Earth is a sphere.

The map Sargent is holding in the photo is known as Gleason's projection. According to Mark Sargent, it shows the North Pole at the centre of the Earth and the edge of the Earth's disc is Antarctica – the 50-foot ice wall. Sargent argues that it isn't possible to visit this ice wall independently as you can only visit Antarctica if you work for the government or if you are on a guided tour.

A physical model of a flat Earth with dome

Sargent says that stars and planets are not physical places but simply lights attached to a dome covering the Earth. He says that all world governments have been lying about the shape of the planet, and that NASA faked the Apollo space programme as well as all other space exploration programmes.

Source: wikipedia.org/wiki/Mark_Sargent_(flat_Earth_proponent)

Claim two: NASA's ideas about the Earth

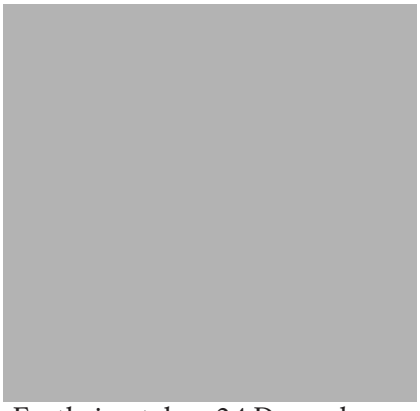
The National Aeronautics and Space Administration (NASA) is responsible for any science and technology research related to aeroplanes and space in the United States of America. The United States government funds NASA, and some private companies pay NASA for their services.

Earthrise (top right) is a famous photograph of the Earth seen from the Moon. NASA states that:

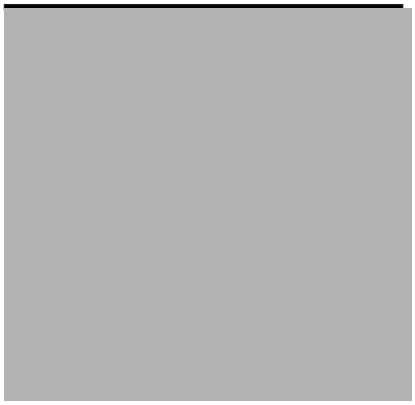
- Apollo 8 was the first mission to take humans into the orbit of the Moon in 1968
- NASA astronaut William Anders took this photo when humans first orbited the Moon in 1968
- the image shows that the Earth is a globe when viewed from the Moon.

Another famous photo from NASA is the Blue Marble (bottom right). Data was gathered from the MODIS (Moderate Resolution Imaging Spectroradiometer) instrument aboard Terra, a school-bus-sized satellite orbiting Earth over the North and South Poles since 1999. The Blue Marble image was created in 2002.

Source: wikipedia.org/wiki/Earthrise; nasa.gov/missions/terra/earth-from-space-15-amazing-things-in-15-years



Earthrise, taken 24 December 1968



Western hemisphere of the Blue Marble, created in 2002

Claim three: International Space Station

The International Space Station (ISS) is a huge artificial satellite that orbits the Earth once every 90 minutes. NASA has published a livestream that allows anyone to see a live feed from the ISS as it orbits the Earth.

NASA shares the following facts about the ISS on its website:

- An international crew of seven people lives and works on the ISS at once.
- The ISS travels at a speed of 29 000 kilometres per hour, orbiting around the Earth about every 90 minutes.
- Every 24 hours, the ISS makes 16 orbits of Earth, travelling through 16 sunrises and sunsets.
- From the ISS, astronauts have taken millions of images of the planet below and these can be viewed on NASA's website.

Screenshot from a NASA video showing the ISS orbiting Earth

Source: nasa.gov/international-space-station/space-station-facts-and-figures

Acknowledgements (images)

Images from the following sources has been adapted for use in this assessment:

Resource one:

TikTok details	Jeff Nippard. [Screenshot, accessed 20 March 2024]. tiktok.com/@jeffnippardfitness
TikTok video	Jeff Nippard. (2023, September 8). *Everything you need to know about protein for muscle growth* [Video]. tiktok.com/@jeffnippardfitness/video/7276085368410098949
Animal and plant sources	Beerman, K. (2021, January 12). [Image] *Plant protein vs. animal protein: Which has the greatest impact bone health?* American Society for Nutrition. nutrition.org/plant-protein-vs-animal-protein-which-has-the-greatest-impact-bone-health

Resource two:

Sound waves	Unknown. (2007, January 7). *Sine waves different frequencies* [Image]. wikipedia.org/wiki/File:Sine_waves_different_frequencies.svg (public domain)
Pestrol sonic pest repeller	Pestrol Home & Garden. [Image]. pestrol.co.nz/buy-online/pestrol-sonic-pest-repeller
Bug King logo	Bug King. (2022, August 13). *Logo* [Image]. bugking.co.nz/do-electronic-rodent-repellers-work

Resource three:

Mark Sargent	Daniel J. Clark. (2018). *Behind the curve* [Screenshot of video]. imdb.com/name/nm7392551/mediaviewer/rm3655951104
Flat Earth with dome	Flat Earth Merchandise. (2019, April 25). *Flat Earth map dome display model* [Image]. amazon.com/Flat-Earth-Dome-Display-Model/dp/B07RBKKFN7
Earthrise	NASA. (1968, December 24). *Earthrise* [Photograph]. upload.wikimedia.org/wikipedia/commons/a/a8/NASA-Apollo8-Dec24-Earthrise.jpg
Blue Marble	NASA. (2002, February 8). *Blue marble* [Image]. nasa.gov/wp-content/uploads/2015/02/1-bluemarble_west.jpg
ISS	NASA. *Live space station tracking map* [Screenshot]. spotthestation.nasa.gov/tracking_map.cfm