**Science 1.4: Demonstrating understanding of science-related claims in communicated information (91923)**

**Assessment Criteria**

| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
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| *Demonstrate understanding of science-related claims in communicated information* involves:  • describing the source and intended purpose of the communicated information  • describing science-related claims in communicated information  • describing science language or conventions used in the communicated information. | *Explain science-related claims in communicated information* involves:  • explaining how science language or conventions are used to support science related claims in the communicated information. | *Examine science-related claims in communicated information* involves:  • evaluating the use of science language or conventions used to support science related claims in the communicated information. |

**Evidence**

| Impacts of Blue Light on Humans | | |
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| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| * Intended Purpose:   ONE: Block Blue Light want you to think that blue light stops you thinking so you will buy their products  TWO: The Harvard medical school were informing people about some of the studies that had been done on blue light  THREE: The scientists were telling other scientists about the findings of their research  *Two claims needed*   * Science related claims:   ONE: Blue light produces a high amount of energy. *Or* Blue light suppresses melatonin production *or* any other relevant science idea  TWO: Light throws our circadian rhythm out of whack *or* there is a lot of blue light in electronics and energy lighting *or* any other relevant science idea  THREE: Blue light is a wavelength that disrupts our circadian rhythms *or* blue light positively affects cognitive performance *or* any other relevant science idea  *Two from the same claims as above needed*   * Science language and conventions:   ONE: Using words like particles, high energy, visible light for describing the light, and terms like melatonin. *Or any other relevant language or conventions*  TWO: terms like circadian rhythm and biological clock, also descriptions like wavelength, energy-efficient. *Or any other relevant language or conventions*  THREE: Terms like wavelength and sleep latency, and descriptions like sleep duration. *Or any other relevant language or conventions*  *Two from the same claims as above needed* | ONE: Explaining what blue light is using science words like particle, wavelength, energy and visible light makes it sound like they know how light works. The also talk about a hormone and use the science name (melatonin) which makes it sound like they know what melatonin is and how it works.  *or any other relevant explanation*  TWO: they use many science terms in a sentence like the one where they use electronics, energy-efficient, exposure, wavelengths all in one sentence makes it sound like they are confident in what they are talking about  *or any other relevant explanation*  THREE: In the results section they list the results of their study using quantities and then go on to use the science language like ‘half found sleep latency (delay) increased’ Also phrases like ‘blue light exposure can positively affect cognitive performance …’. They are confidently using the terminology in the correct way so sound like what they are saying is accurate  *or any other relevant explanation* | The blue light company are using science language to draw a correlation between the amount of blue light we are exposed to every day in our work, on our screens and even just lights inside buildings. They are highlighting a causation effect between blue light and screen time affecting your sleep, which is in agreement with the other claim, but they are also making a correlation with eye damage, which is not present in the other claims. They give no referencing or quotations to say where they get their information from. They are just trying to get people to buy their products through fear.  The other claim is made by scientists on an educational website (from the reference at the bottom of the resource): from a peer reviewed journal. Scientists only publish their work once it is peer reviewed so we can be pretty sure that their experiments were legitimate and to the best of our science knowledge at this time, so the claims will be as accurate as they can be.  *or any other relevant discussion that includes the any of the following:*   * *representation of data and graphs* * *conflicts of interest* * *claims about correlation and causation* * *quotations* * *sample sizes* * *use of controls, blind testing, or peer review.* |

| Icy Water | | |
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| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| • describing the source and intended purpose of the communicated information  ONE: This is from a company that sells equipment to people that makes them go out in cold water, so it is dangerous if they fall off and get cold. They have a responsibility to the public to make sure they understand what could happen so people don’t die.  TWO: This is from a person who makes money from people who follow his ideas. He is selling something that he can do without thought as to what it could mean for other people.  THREE: This is from an organisation who are trying to make people aware of the dangers of water and especially cold water so they do not drown.They are trying to make people safe.  FOUR: This is from a company that is trying to sell their product and are making a big deal out of how ice baths can do some good for people, but they are not really warning about the dangers  *Two claims needed*  • describing science-related claims in communicated information  ONE: “ hypothermia is the main danger from cold water” is false and that the shock response is what is more dangerous because it reduces your ability to hold your breath if you go under water.  TWO: Wim can voluntarily control his autonomic nervous system which was previously thought to be uncontrollable by scientists.  THREE: That body weight can influence the survival time of people in cold water, the more body weight you haven the longer you can survive  FOUR: That going from cold to hot water will “flush the muscles’ metabolic waste products” helping your body to release endorphins  *Two from the same claims as above needed*  • describing science language or conventions used in the communicated information.  ONE: Using terms like Hypothermia and automatic physiological reaction make it sound like they understand about the medical science behind this so it convinces people they know what they are talking about.  TWO: This talks about scientific research and using a randomised trial, showing that they are scientists and know about scientific method.  THREE: They use a timeline of responses to show how the cold affects the body, describing the symptoms and including a graph to illustrate the correlation between body weight. Both of these are science conventions  FOUR: They use the words for hormones and endorphins to try to sound like they are scientific and know what they are talking about.  *Or any other relevant language or conventions*  *Two from the same claims as above needed* | ONE: They use science language to help explain the responses of the body to cold water, rather than relying on the science language to make them sound good. For example, they talk about what happens to your body when you have the shock response “instant involuntary body reactions … such as sudden increase in heart and blood pressure”. They are using simple science terms that people can understand, so that people can understand the science idea, but trust the author because they are using the names but explaining what they mean.  TWO: He talks about being able to “voluntarily influence his autonomic nervous system” but doesn’t explain what this means, as if you are stupid if you don’t understand what it means. But it is science terms so not everyone does. This shows that he is trying to make people feel like he is cleverer than them so he must know what he is talking about.  THREE:In this article the science words are mixed in with ordinary language, making it easier to read and understand. For example, they talk about “dizziness, loss of orientation and inhalation of water”. These are all science terms that are used in everyday language so easier to understand. What they do use is the conventions of giving a timeline of effects on the body and using a graph to show correlation. These conventions make the information more understandable and readable.  FOUR: In this advertisement they use the terms blood vessel constrict and get smaller, but these are the same thing so they are showing they do not know what they are talking about. They throw around words like hormone and endorphin, and metabolic waste products, but do not actually explain or back up what they say with any evidence other than to use the words.  *or any other relevant explanation* | Claim TWO has Win Hof trying to validate what he is saying using scientific research and the names of prominent universities. He suggests that a study was published in a scientific journal which supported what he can do and tells us that this gives credibility to his methods and he was so special the scientists were interested in what he could do. Then he goes on to talk about some research, giving the name of the article and the authors, and even the university they work for. But he goes on to say they are enthusiasts of his techniques showing some bias to their study. Also they used people who were also enthusiasts of his techniques to do the study on, so it was no wonder that they got results that supported his methods. The bias shown in this information supposedly supporting his methods do not add credibility to his technique, even though scientific research was used to back up his claims.  *or any other relevant discussion that includes the any of the following:*   * *representation of data and graphs* * *conflicts of interest* * *claims about correlation and causation* * *quotations* * *sample sizes* * *use of controls, blind testing, or peer review.* |

| **RESOURCE THREE: Sun Protection** | | |
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| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| • describing the source and intended purpose of the communicated information  ONE: This is from a sunscreen company that is selling sunscreens and they are trying to prove that their brand is better than any others.  TWO: This is a blog post from a community health site, so it is the opinion of the writer. We do not know if they have any real knowledge on the subject of sunscreens other than experience. They are just trying to make sure that people are aware of their opinion on the importance of sunscreen so that more people will use it.  THREE: This is from a company that makes sunscreens so they are trying to make you think that theirs is better because they can ‘prove’ it so you will buy it.  FOUR: This information is from the cancer society who is trying to prevent people from getting cancer. They are trying to make people aware of the dangers of being out in the sun without sunscreen.  *Two claims needed*  • describing science-related claims in communicated information  ONE: That their special ingredient will ‘shield against all form of radiation’ and that it will also be better for your skin.  TWO: The small ozone layer over New Zealand and our genetics of white skin make it easier for us to burn so we need to use the correct SPF rated sunscreen.  THREE: That different ingredients in sunscreens block different wavelength of radiation, and that chemical sunscreens need the right mixture of ingredients to be effective.  FOUR: That the different types of radiation from the sun will affect the skin in different ways, and that the smaller ozone layer over NZ means we need to use good sunscreens  *Two from the same claims as above needed*  • describing science language or conventions used in the communicated information.  ONE: Science language includes abbreviations for UVA, UVB, Visible and IR radiation, and using the latin name for the plant they get the extract from.  TWO: Using the abbreviations UVA and UVB describe the wavelengths of the light, and using words like ‘our genetics’ which is a science term and ‘ozone’ to explain some of the ideas. They even give the name for the type of cancer (squamous cell)  THREE: Giving the actual wavelengths in nm to show they are talking about wavelengths. Also using the chemical names to look like they know what they are.  FOUR: They talk about three types of UV radiation (A, B & C) which the others do not. They also give a scientific diagem to show the layers of the skin and how UV affects them.  *Or any other relevant language or conventions*  *Two from the same claims as above needed* | ONE: They use the latin name of the plant they get the extract from, and never its common name. They also talk about Harvard University which is well known when talking about the plant. This gives the impression that scientists have studied the plant and agree with what they are saying it will do for the skin. They name the disorders that will likely be protected against with the plant extract, and then go on to talk about sun protection given by their oral sunblock. They only mention the sun’s radiation once in the advert.  TWO: This person used the terms to make their point. For example they talk about the different types of UV radiation (A&B) (and Infrared and visible) but don't always write UV with capital letters, showing they are careless in their use of science language. They talk about the hole in the ozone layer letting more UVB through which causes certain types of cancer (which they name with their science names), supporting the idea that we burn more easily from the sun in New Zealand than other areas of the world.  THREE: By giving a table with all the different ingredients and which UV wavelength they block, they are showing that they have done their research so are able to choose the ingredients which will give a broad range of protection from the sun's UV radiation. They have further supported this by showing which range of nm that wavelengths are in, further supporting the idea that they know about the wavelengths so their sunscreen will be the best protection.  FOUR: The cancer society talks about the three types of radiation including UVC and goes on to show the differences in their effects using a diagram of the skin layers. The use of the science diagram showing the different layers of the skin and relating these to the different types of radiation support the ideas that all types of radiation are dangerous and that we need to be aware of them when we go out in the sun to prevent skin cancer.  *or any other relevant explanation* | ONE: they only mention the types of radiation from the sun once and do not go into any detail of them, other than to say that the skin needs protection. They try to make their main ingredient, the plant extract, sound special and innovative by describing how it was found and studied. The fact that it was found by a person who has Dr in front of their name makes you believe they were a scientist. They back this up by giving the University they were working for, which is famous, and the latin name for the plant. They go on later to mention the ‘extensive research’ which implies that what they are doing with the extract has been scientifically tested and peer reviewed, however they do not give any links to the research and so not even mention the name. So it is hard to tell if the science conventions used in research methods were followed. Other than that, any other science language is used in other parts of the information that are not related to the plant name. For example, they talk about hyperpigmentation and protecting the skin cell DNA. They do not explain how this skin cell DNA is protected or even what hyperpigmentation is, and how this can be prevented. They do not even relate it to any science diagrams. Other than that there is little science language used in the advertisement to support what they are saying.  *or any other relevant discussion that includes the any of the following:*   * *representation of data and graphs* * *conflicts of interest* * *claims about correlation and causation* * *quotations* * *sample sizes* * *use of controls, blind testing, or peer review.* |

**SUFFICIENCY STATEMENT**

| **NØ** | **N1** | **N2** | **A3** | **A4** | **M5** | **M6** | **E7** | **E8** |
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| No response; no  relevant evidence | The response shows  limited understanding  of the science claim. | The response shows  some attempt to  understand the science  Claim, or only one claim was chosen. | The response shows understanding and describes the science in two claims, although some descriptions may be partial or weak | The response securely  shows understanding  and describes the  Science in both claims. | The response explains  the science both claims,  although some parts  of explanation may  be partial or weak. | The response securely  explains the science in both  claims. | The response  examines the science in both  claims, although some  parts of discussion  may be partial or  weak. | The response securely  examines the science in both claims. |