

## Lesson15: Are mobile phones bad for your health?

### Teachers' Notes

#### Starter

Use the task cards to complete the following:

1. Sort the seven wave cards into the correct order.
2. Place the highest and lowest wavelength or frequency cards in the correct positions above the wave cards.
3. Match the uses and possible dangers to the correct wave card.

Use the cards to answer the following questions:

1. Which type of wave has the highest frequency?
2. Which type of wave has the longest wavelength?
3. How does frequency affect the amount of harm the wave could possibly cause?

#### Answers to starter task

Order of waves and uses / dangers

**Long wavelength / Low Frequency**

Type of Wave	Used to/for	Dangers
<b>Radio Waves</b>	<ul style="list-style-type: none"> <li>• Transmit signals for Radio and Television</li> </ul>	
<b>Microwaves</b>	<ul style="list-style-type: none"> <li>• Telecommunications (e.g. Mobile phones)</li> <li>• Cooking</li> </ul>	<ul style="list-style-type: none"> <li>• Can cause burns at high amplitudes (high powers)</li> </ul>
<b>Infra Red</b>	<ul style="list-style-type: none"> <li>• Cooking</li> <li>• Transmit signals (e.g. T.V. Remote controls)</li> </ul>	<ul style="list-style-type: none"> <li>• Can cause burns at high amplitudes</li> </ul>
<b>Visible light</b>	<ul style="list-style-type: none"> <li>• Detected by human eyes</li> <li>• Communication</li> </ul>	<ul style="list-style-type: none"> <li>• Can cause blindness at high amplitudes</li> </ul>
<b>Ultra Violet</b>	<ul style="list-style-type: none"> <li>• Sun beds</li> </ul>	<ul style="list-style-type: none"> <li>• Can cause skin cancer</li> <li>• Can damage your eyes</li> </ul>
<b>X – Ray</b>	<ul style="list-style-type: none"> <li>• Detect fractures in bones</li> </ul>	<ul style="list-style-type: none"> <li>• Repeated and prolonged exposure can increase risk of cancer</li> </ul>
<b>Gamma</b>	<ul style="list-style-type: none"> <li>• Sterilise medical equipment</li> <li>• Treat cancer.</li> </ul>	<ul style="list-style-type: none"> <li>• Repeated and prolonged exposure can increase risk of cancer.</li> </ul>

**Short wavelength / High Frequency**

### Main Task 1

You have been given two fictional newspaper stories and a press release from a fictional mobile phone company.

Read through the articles and press release and answer the following questions.

(Throughout the task, try to understand the need for scientific evidence and its use in supporting a statement).

Questions:

1. In each article identify and highlight statements that are made but could not be based on scientific evidence.
2. In each article identify and highlight statements that are made and could be based on scientific evidence.
3. Could the mobile mast be the only cause for Mr Jones' ill health? Can you think of any other causes?
4. Why do you think Professor Atkins research team used such a large sample of people for their research?
5. Why is evidence important when making a claim?

**Suggested Answers for Main Task 1:** (students may suggest other answers that could be correct if supported with a solid idea or evidence)

1. "Ever since they put that mast next to our house six months ago he has never been right" said Frieda, 53. "He started suffering with his migraines about three months after the mast went up and now he sometimes struggles to get out of bed they are so bad."  
(from article 1)  
  
Mrs Jones said,  
"I still think the mast behind our house caused my Fred to get his headaches."  
(from article 2)
2. "We have found no increase in the level of health problems in people who live in close proximity to a Mobile Telecommunications Mast", said Professor Atkins, "Our research suggests that these people are no more likely to develop health problems than those who live away from the masts".  
(article 2)
3. Other causes could be the promotion or an unrelated illness. The students need to realise that there could be any reason for his illness other than the mobile mast, and that more tests need to be done to eliminate other possibilities.
4. Larger samples lead to more reliable evidence. Large samples should reduce the impact of anomalous results in the data the scientists collected.
5. The students should start to realise that any claim could be made, but only those supported with evidence can be proved.

### **Main Task 2**

You are part of a local government planning committee who are responsible for the positioning of a new mobile phone mast in Sometown.

The three sites are labelled on the map you have been provided with.

**Site A:** Is on top of a local secondary school with pupils between the ages of 11 – 16 years. The parents of the pupils are unsure about positioning the mast on the school and would need solid scientific evidence to support this site.

**Site B:** Is near a residential area. The mast would be approximately 300 – 500 metres from the school. The parents of the pupils would prefer the mast to be sited here. The local residents are not happy that the mast might be positioned here and have called for a public meeting where all sides of the arguments would be heard.

**Site C:** Is near the local commercial and industrial area. This is the most popular site for the position of the mast amongst the residents of Sometown as it is away from their homes. The range of the mast would just cover the school and the residential area of the town so the emissions from the mast would be very low in these areas.

### **Part 1**

You must now choose a site for the mast. You have 10 minutes to decide where you would position the mast in the town based on the information above. Report your choice to the class with a brief reason.

### **Part 2**

After this time you will be given more information and will then have a further 5 minutes to decide if you will change the site of the mast or stay with your original decision. You must have reasons for your decision.

### **Part 3**

At the end of the task you must be prepared to present your decision to the public meeting with the evidence you will use to support your choice.

**Suggested Answers for Main Task 2:** (students may offer other answers that can be accepted as long as they are supported with evidence)

#### **Part 1:**

Site C would appear to be the best site as the emissions from the mast would be very low at the school and the signal in the commercial district would be high, which would be good for businesses.

#### **Part 2:**

After information cards 1 and 2 the preferred position of the mast should not change from the previous answer. It appears from these cards that site C would have the lowest effect on public health.

After information cards 3 and 4 the preferred position should be site A. This should cause the least damage to the health of the students and the local residents.

#### **Part 3:**

Site C - Evidence: cards 3 and 4 support this choice.