

# Magnetic Mining

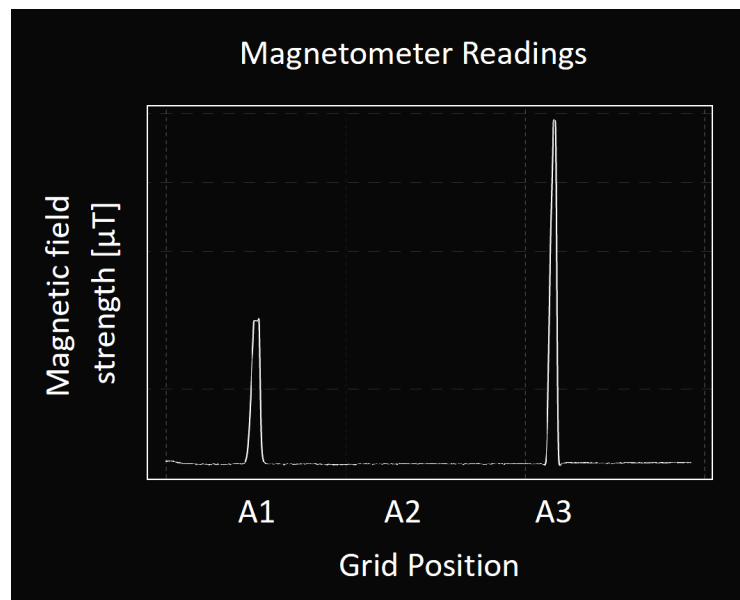
Student quiz — *Answer Key*

**Directions:** Respond to each question below, as directed.

1. In your own words, explain below why a ship would trigger a magnetic mine.

*A magnetic mine reacts to anything that causes changes in its surrounding magnetic field. A ship is made from lots of steel, which is a ferromagnetic material. This means that it behaves like a huge floating magnet and will interact with any other magnetic field close by. When it approaches the magnetic mine, the mine registers the change in its magnetic field and gets triggered to explode.*

2. You are searching for hidden mines (magnets) in another group's box using the magnetometer in your sensor app. You get following readings when moving your magnetometer along the grid paper. What does this graph tell you about where and which magnets (single or double) are hidden at what grid position? [Select all answers that apply]

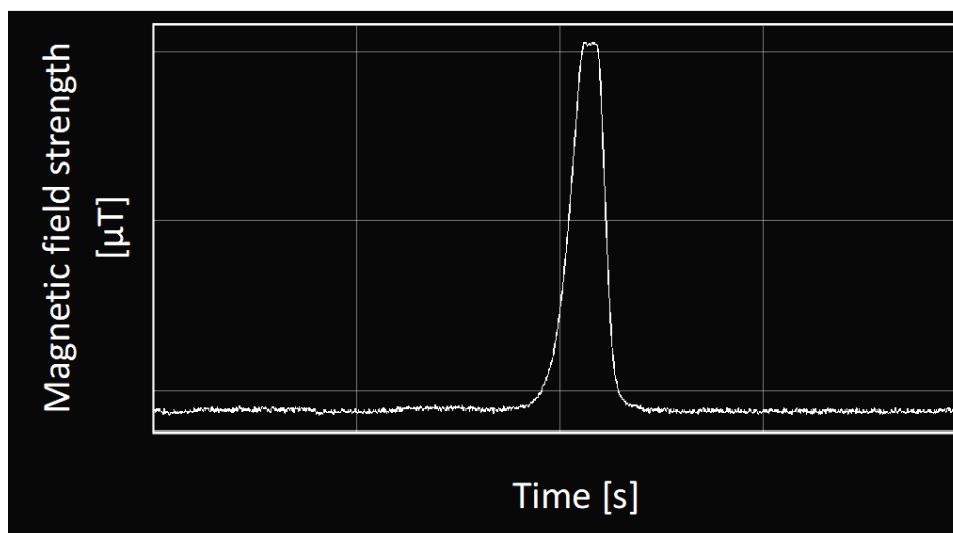


- a. There is a magnet (mine) hidden at each position: A1, A2, and A3
- b. There are only magnets (mines) hidden at position A1 and A3
- c. There is a double magnet hidden at position A3 and a single magnet at position A1
- d. The magnet at position A3 has the opposite polarity of the magnet at position A1

## Student quiz

**Directions:** Complete the graph below, as described, and write your explanation below it.

3. What graph would the magnetometer within your sensor app record when moving a magnet close to the magnetometer and then removing it again? Draft your graph in the graph template below and explain your reasoning. Please also label the graph axes.



*When moving a magnet close to the magnetometer, its readings increase as the magnetometer registers its magnetic field. When removing the magnet, the readings go back to normal background readings. This results in a graph that has a peak form (see graph above), with the maximum being the point where the magnet was closest to the magnetometer.*

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Answer Key

Student quiz

**Directions:** Choose the best answer(s) for each question below, as directed.

4. Which factors affect the readings of your magnetometer? [Select all answers that apply]
- a. The strength of a magnet, for example, measuring a single versus a double magnet
  - b. Earth's magnetic field
  - c. The distance of a magnet to the magnetometer
  - d. All of the above
5. Two magnetic fields of the same strength and with the opposite polarity... [Select all answers that apply]
- a. ...result in a magnetic field double the strength
  - b. ...cannot interact with each other
  - c. ...cancel each other out
  - d. ...none of the above