Survey grid.

Name: Class: Date:

Olympic Dam lies under about 300 m of younger rock, and nothing of it shows at the surface. Geologists found it by measuring how the ground changes from place to place and drilling where the readings stood out. In this practical you do the same on a small scale: survey a measured grid for metal objects your teacher has hidden, then decide where to dig.

YOU NEED

- A metal detector, or a phone with a free magnetometer app such as phyphox
- A tape measure at least 5 m long
- Twelve pegs, or chalk, to mark the grid
- This sheet, a pencil and a clipboard

TEACHER SET-UP

Hide three or four metal objects in a 5 m by 5 m area: at least one of steel (a bolt or a food can) and one that is not magnetic (an aluminium drink can or a piece of copper pipe). Bury them no more than 10 cm deep in sand or mulch, or hide them under a sheet. Do not dig in school grounds unless underground services have been located.

Method

1. Mark out a square 5 m by 5 m. Put a peg at every metre along two opposite sides. The grid has six lines, A to F, and six stations on each line, at 0, 1, 2, 3, 4 and 5 m.
2. Take a **background reading** well away from the grid and from any metal, and write it below.
3. At every station, hold the detector or phone about 10 cm above the ground, pointing the same way each time. Wait three seconds, then record the reading in the table.
   - **Phone:** record the total magnetic field in microtesla (µT). 1 µT is 1,000 nT, the unit on screen 6 of the lesson.
   - **Metal detector:** record a score: 0 no signal, 1 weak, 2 medium, 3 strong.
4. Keep keys, other phones and anything made of steel at least a metre from the sensor while you read it.

Instrument: Background reading: Units:

LINE	0 M	1 M	2 M	3 M	4 M	5 M
A						
B						
C						
D						
E						
F						

Record each reading as you take it. If a reading looks odd, take it again and write both.

Map your results

Work out each station's **anomaly**: its reading minus the background. Choose four ranges for the key, then shade each square to match.

	0 m	1 m	2 m	3 m	4 m	5 m
A						
B						
C						
D						
E						
F						

KEY: ANOMALY, LIGHTEST TO DARKEST

- from _____ to _____
- from _____ to _____
- from _____ to _____
- from _____ to _____

Mark north on the map with an arrow.

Choose where to dig up to three places, like drill holes

DIG	LINE AND STATION	WHY THERE	WHAT YOU FOUND
1			
2			
3			

1. **Which hidden objects did your survey find, and which did it miss? Explain why, using what your instrument measures.**

2. **On screen 6, a magnetic dyke and a dense rock with no ore both gave a high in one survey. How is that like what happened in your survey?**

3. **Give two ways to make your survey more reliable, and explain how each would help.**

4. **The Olympic Dam surveys covered kilometres and looked through 300 m of rock. Give one way your survey is like them and one way it is different.**