

SECTION 1

D Section 1

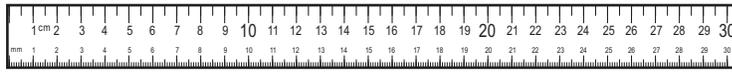
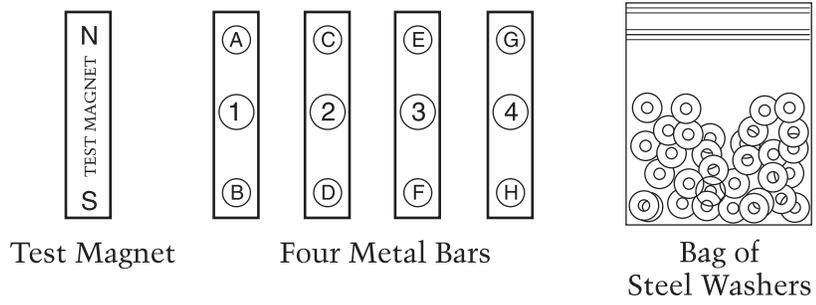
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MAGNETIC FIELDS

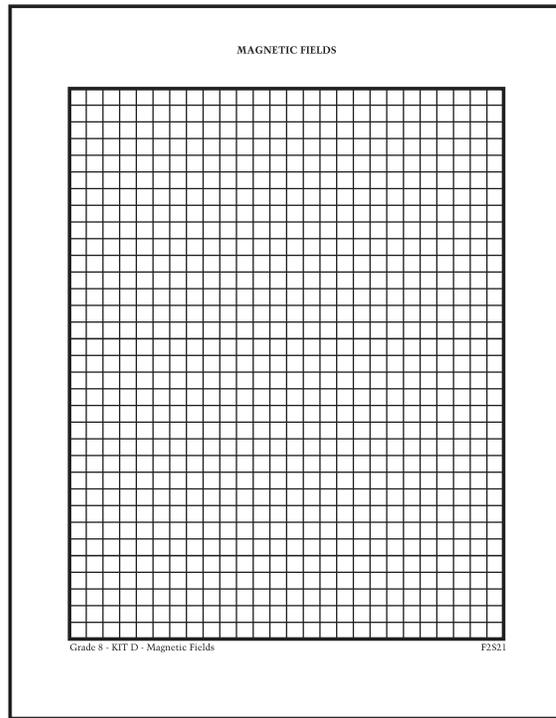
For this task, you received a kit that contains materials you will use to perform your investigation during the next 40 minutes. Please open your kit now, take all of the things out of the bag, and put them on your desk.

Use the diagram on the next page to check that all of the materials in the diagram are included in your kit. If any materials are missing, raise your hand and the administrator will provide you with the materials you need.

Diagram 1



Centimeter Ruler

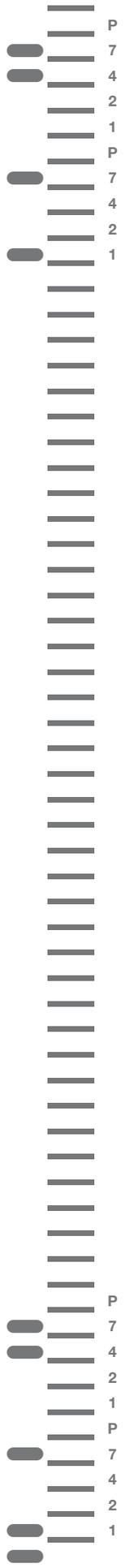


White Piece of Paper with Grid



DO NOT USE THE MATERIALS OR READ ANY FURTHER UNTIL THE ADMINISTRATOR TELLS YOU TO DO SO.





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In this task you will design and conduct an investigation to identify four mystery metal bars using two different methods. You will also make measurements of the magnetic properties of these metal bars.

This task contains the following three parts:

- Part 1: Identifying Metal Bars Using Only the Bars
- Part 2: Identifying Metal Bars Using the Test Magnet
- Part 3: Comparing the Strengths of the Magnets

You will be scored on how well you

- design your procedures to identify metal bars,
- design your procedures to compare the strengths of different magnets,
- record your observations, and
- provide explanations based on your investigation.

Follow the directions on each page and write your answers to the questions in the spaces provided in your booklet.

PART 1

In Part 1, you will identify the four metals bars (1, 2, 3, and 4).

- One is a strong magnet.
- One is a weak magnet.
- One is a copper bar.
- One is a steel (iron) bar.

1. You will conduct experiments to identify each numbered metal bar.

You will use only the four numbered bars. You will record your results in Table 1 on page 7.

Place the numbered metal bars (1, 2, 3, and 4) in front of you on the sheet of grid paper you were given.

Identify all four numbered metal bars using only the four numbered metal bars and nothing else from the kit.

In the middle column of Table 1, describe your procedures and observations (what you did and what you saw) that helped you identify each bar. Make sure you describe how you used each of the four numbered metal bars to make your identifications. In the last column, record the identity of each numbered metal bar.

Remember: For Part 1 you will only need the four numbered metal bars. You will use the test magnet later in Part 2.



TABLE 1: IDENTIFYING METAL BARS

Bar Number	Procedures and Observations (What You Did and What You Saw)	Identity of Metal Bar (Strong Magnet, Weak Magnet, Copper Bar, or Steel Bar)
1	Procedure: Observations:	
2	Procedure: Observations:	
3	Procedure: Observations:	
4	Procedure: Observations:	

PART 2

In Part 1, you found the identities of the four numbered metal bars using only the numbered metal bars. In Part 2, you will use a different method to identify the four metals bars (1, 2, 3, and 4) using only the test magnet.

- 2. Now use the test magnet to identify the four numbered metal bars. In the middle column of Table 2 on page 9, describe your procedures and observations (what you did and what you saw) that helped you identify each bar. In the last column, record the identity of each numbered metal bar based on your results using the test magnet.

Your results might not be the same using the two different methods in Part 1 and Part 2. If your identifications of the metal bars changed from what you recorded in Table 1, keep your original answers in both Table 1 and Table 2. You will use these results later in Question 3.



TABLE 2: IDENTIFYING METAL BARS WITH THE TEST MAGNET

Bar Number	Procedures and Observations (What You Did and What You Saw with the Test Magnet)	Identity of Metal Bar (Strong Magnet, Weak Magnet, Copper Bar, or Steel Bar)
1	Procedure: Observations:	
2	Procedure: Observations:	
3	Procedure: Observations:	
4	Procedure: Observations:	

D Section 1

Explain how you identified each of the four metal bars using the test magnet. Refer to your observations in Table 2 on page 9 to support your explanation.



3. Look at your results from the two different methods in Table 1 on page 7 and Table 2 on page 9.

In the second column of Table 3, for each bar write either “different” if you recorded a different identity or “same” if you recorded the same identity from this comparison of your results in Tables 1 and 2.

Then, in the last column of Table 3, fill in your final decision for the identity of each metal bar using the results from both methods. Base your decision on your observations in Tables 1 and 2.

TABLE 3: COMPARING THE IDENTITIES OF THE METAL BARS

Bar Number	Comparison of Identities in Tables 1 and 2 (Different or Same)	Identity of Metal Bar Based on Observations in Tables 1 and 2 (Strong Magnet, Weak Magnet, Copper Bar, or Steel Bar)
1		
2		
3		
4		

Remember: Keep your original identifications in Table 1 and Table 2. They will help you make comparisons in Table 3 and answer the question on the next page.

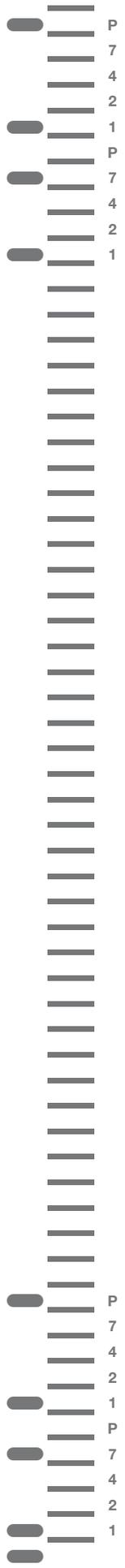
PART 3

In Part 3, you will design and conduct two different tests to compare the magnetic strength of the strong magnet and the weak magnet that you identified in Part 2. You will record your results in Table 4 on page 14.

- In the top row of Table 4 (columns 2 and 3), write down the numbers on the bars you identified as the strong magnet and the weak magnet in the spaces provided. Use the final identifications in Table 3 on page 11.
4. Think about how you can use the materials in your kit to test these magnets and demonstrate that the strong magnet is stronger than the weak magnet. You may use any of the materials in your kit.
- Now conduct two different tests to compare the magnetic strength of the strong magnet and the weak magnet.
 - In Table 4, describe the materials and procedures you used. Record all measurements you made, including numbers and units in columns 2 and 3 under Results/Data.
 - Do not forget to write in the number of the metal bar that you think is the strong magnet and number of the magnetic bar you think is the weak magnet.

TABLE 4: COMPARING THE STRONG AND WEAK MAGNETS

	Strong Magnet <u>(number)</u>	Weak Magnet <u>(number)</u>
	Results/Data	Results/Data
Test 1: Materials: Procedure:		
Test 2: Materials: Procedure:		



5. Which metal bar is the strong magnet?

- Ⓐ Bar 1
- Ⓑ Bar 2
- Ⓒ Bar 3
- Ⓓ Bar 4

Which metal bar is the weak magnet?

- Ⓐ Bar 1
- Ⓑ Bar 2
- Ⓒ Bar 3
- Ⓓ Bar 4

Explain how your data and observations showed that the strong magnet is stronger than the weak magnet.

Cleaning Up

When you have finished this task, put the steel washers in the small plastic bag and the metal bars and test magnet back in their box. Then put everything back into the large plastic bag.

