

Force Test Detectives

Plan fair tests to find what changes electric and magnetic forces.

S8P5.c "Plan and carry out investigations to identify the factors (e.g., distance between objects, magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each factor investigators change, circle each measurement of force or strength, and number the conditions kept constant so you can see how a fair investigation identifies one factor's effect.

Testing One Factor

- ① Electric and magnetic forces can be tested by changing one factor at a time. In an electric-force investigation, two charged objects are placed at measured distances. A student keeps the charges and object sizes the same, then measures the force at each distance with a force sensor. If the distance changes while other conditions stay constant, the results can show whether distance affects electric force. Repeating each measurement helps identify a pattern instead of a random result.
- ② An electromagnet uses electric current in a wire coil to make a magnetic field. To test wire turns, a team uses the same iron core, dry cells, wire type, and paper clips for every trial. They build coils with different numbers of turns and record the greatest number of paper clips each electromagnet can lift. More turns may make the electromagnet stronger, but the team must test the idea. A fair comparison changes only the number of turns.
- ③ Other electromagnet investigations can focus on the power source or the core. A team could vary the number of identical dry cells while keeping the coil and iron core unchanged. In a different test, it could use iron cores of different sizes while holding the coil and dry cells constant. The team should state what it will change, what it will measure, and what it will keep constant before collecting data. Its conclusion should match repeated observations, not just one trial.

2 ANSWER WITH EVIDENCE Use the passage

- 1 In the electric-force investigation, what factor changes? Name two conditions that stay the same.

- 2 Why would a test that changes both the number of wire turns and the number of dry cells not be a fair comparison?

- 3 What measurement does the team record when testing the number of wire turns in an electromagnet?

- 4 When testing the size of an iron core, what two parts of the setup should be held constant?

3 YOUR TURN Your own words

Plan an investigation to test how the number of identical dry cells affects an electromagnet's strength. In three or four sentences, name the factor you will change, what you will measure, at least two conditions you will keep constant, and how you will repeat trials.

PART 1 • READ AND MARK

Underline each factor investigators change, circle each measurement of force or strength, and number the conditions kept constant so you can see how a fair investigation identifies one factor's effect. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	In the electric-force investigation, what factor changes? Name two conditions that stay the same.	The distance between the charged objects changes. The charges and object sizes stay the same.
2	Why would a test that changes both the number of wire turns and the number of dry cells not be a fair comparison?	It changes more than one factor, so the team could not tell which factor caused a change in electromagnet strength.
3	What measurement does the team record when testing the number of wire turns in an electromagnet?	The greatest number of paper clips each electromagnet can lift.
4	When testing the size of an iron core, what two parts of the setup should be held constant?	The wire coil and the dry cells should stay constant.

PART 3 • YOUR TURN (SAMPLE ANSWER)

I will test whether the number of identical dry cells changes an electromagnet's strength. I will use one, two, and three dry cells and measure the greatest number of identical paper clips the electromagnet lifts. I will keep the wire coil and iron core the same and repeat each test three times.

Accept equivalent measures of electromagnet strength, such as mass lifted, if the student keeps the measurement method consistent. The plan must change only the number of dry cells and identify at least two controlled conditions and repeated trials.