

**Final Test**

Name:.....

**1. Reading****How the damage to the LHC was repaired**

First, before any repair work could begin, the magnets had to be heated up from their low temperatures at absolute zero to room temperature. The warm-up process took about a month.

The next step was to isolate the magnets from one other. This was done by opening up the interconnections between each faulty magnet and its neighbours.

Next, each damaged magnet was lifted up to the surface. The magnets are 15 metres long and weigh 20–30 tonnes. They had to be raised approximately 100 metres up a shaft to ground level, while being kept perfectly parallel to the floor.

The damaged magnets were then inspected at a nearby above-ground site. Following this check-up, essential repairs were carried out on a total of 205 electrical interconnections.

At the same time, over 4 km of beam tube – the pipe which carries the beam of sub-atomic particles through the magnets – had to undergo a complete clean-out following the incident. This was done by pulling a large pad dipped in alcohol along the inside of the tube.

A restraint system was fitted to the magnets to tie them down and prevent them from being thrown off their supports in future. Hundreds of helium pressure release valves were also installed around each magnet to prevent any build-up of pressure in the future.

After repairs, the magnets were taken back to their original locations, and then lowered carefully into position between their neighbours.

Once the magnets were in place, the electrical cables between them were connected up. The connections were coated in copper, which was then heated under pressure to solder the parts together.

Finally, all the magnets were connected up and tested, and the temperature was brought down again to absolute zero.

As for the future, to prevent such accidents from happening again, the whole meltdown warning system was given a major upgrade.

Hundreds of new detectors were installed around the magnets to constantly monitor the status of the interconnections and initiate an automatic shutdown of power to the magnets in case of any problem.

**Activity:****1. Complete the summary paragraph with words from the box. There are more words than you need.**

|                                                                                         |
|-----------------------------------------------------------------------------------------|
| fixed/checked/warmed/upgraded/lowered/separated/undertaken/carried/shut down/brought up |
|-----------------------------------------------------------------------------------------|

Before repair work can start, the magnets have to be (1) \_\_\_\_\_. Then they are

(2) \_\_\_\_\_ and lifted to the surface where they are (3) \_\_\_\_\_ carefully and essential repairs

(4) \_\_\_\_\_. The beam tube must be thoroughly cleaned with a pad soaked in alcohol and then the magnets

(5) \_\_\_\_\_ to their supports so they are not thrown off in future. Once they have all been reconnected,

tested and the temperature (6) \_\_\_\_\_ again, they can be returned to their positions.

2. **Grammar:**

**Choose the correct word/phrase to fill in the gaps**

1. If you \_\_\_\_\_ this material in water, it will dissolve.  
a) interact                      b) immerse              c) absorb              d) interrupt
2. "Have you written your safety inspection report yet?" "Yes, \_\_\_\_\_ it."  
a) I now write    b) I'm still writing    c) I've already written    d) I'm plan to write
3. Please dismantle this engine, clean all the parts carefully, and then put \_\_\_\_\_ again.  
a) them              b) together              c) together them              d) them together
4. The fire \_\_\_\_\_ deliberately as a petrol can was found at the site.  
a) must have been started    b) should start    c) will have been started    d) starts
5. If the room had been locked, the thief \_\_\_\_\_ into the room so easily.  
a) had broken              b) will have broken    c) wouldn't have broken    d) has broken
6. I \_\_\_\_\_ a year when the accident happened  
a) have worked              b) would work              c) will work              d) had been working
7. While they \_\_\_\_\_ the new equipment , the accident happened.  
a) are testing    b) was testing    c) were testing    d) had been testing
8. We wouldn't have been able to comply with the contractor's request on time if we ..... ( not have) hightech and trained technicians in our workshop.  
a) hadn't had    b) didn't have    c) will have    d) not had.
9. If these tests don't produce positive results, we .....with this materials testing trials.  
a) don't continue    b) will continued    c) had continued    d) will not continue
10. This food should \_\_\_\_\_ at temperatures below 10°C. Now it's rotten.  
a) to keep              b)) have been kept              c) you keep              d) be kept