# Knowledge

1. A dead or weakened form of the pathogen
2. 

| Advantages | Disadvantages |
|---|---|
| **Control highly infectious and often fatal diseases – eg smallpox** | Don't always give full immunity – boosters may be necessary |
| **Even those who aren't vaccinated are protected due to less people having the disease and passing it on. (herd immunity)** | Rarely, people can have reactions or side effects |
| **Usually very effective** | |

3. A
4. Plants
5. A treatment that looks exactly the same as the one being trialled, but with no drug in
6. Cells & tissues in the lab
7. Measles, mumps & rubella

8. An antibiotic resistant bacteria

9. A trial where neither the patients nor the doctors running the trial know who is getting the real drug and who is getting the placebo

10. Efficacy means how well the drug works

# Application

1. Antibiotics cannot be used to treat measles as the virus that causes measles is inside the body cells.
2. MRSA has arisen by mutation. A random mutation in some bacteria causes them to be resistant (NOT immune) to antibiotics. When a person takes antibiotics, the non-resistant ones are killed, leaving the resistant ones with less competition for food etc so their numbers increase
3. a) The white blood cells are making the antibodies to fit the particular pathogen

   b)The secondary response is much faster than the primary response and produces many more antibodies (about 2 orders of magnitude more)

   c) because the memory cells already know how to make the right antibodies as they've made them before

5.

| Stage in drug development | Reason |
| --- | --- |
| Tested in lab on cells and tissues | To make sure the drug is not toxic |
| Tested on mammals like rats & monkeys | To see how the drug reacts in a whole organism and to see what side effects there may be |
| Tested on healthy volunteers | To check for side effects |
| Tested on small number of patients | To see if it works, find optimum dose and monitor side effects in people that have the disease |
| Tested on large number of patients | To see if the findings are reproducible |