**Cecil Andrews College**

**Yr 12 ATAR Human Biology**

**Scientific Inquiry 2**

**Transmission of Disease and Immunisation**

**ANSWERS**

**Part I (36 marks)**

|  |  |  |
| --- | --- | --- |
| **Transmission (1 each)**  **Total = 9** | **Description (2 marks)**  **Total = 18** | **Example/s (1 mark)**  **Total = 9** |
| Spread through the air by droplets | Some infections are spread when an infected person talks, coughs or sneezes small droplets containing infectious agents into the air. Due to their size, these droplets in the air travel only a short distance (around a metre) from the infected person before falling. The droplets in the air may be breathed in by those nearby. Spread can also occur by touching the nose or mouth with droplet contaminated hands. | * [common cold](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/common+cold/common+cold+-+including+symptoms+treatment+and+prevention) * [flu](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/flu) * [meningococcal disease](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/meningococcal+infection/meningococcal+infection+-+including+symptoms+treatment+and+prevention) * [rubella](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/rubella/rubella+german+measles+-+including+symptoms+treatment+and+prevention). |
| Spread through the air by aerosol | Some infections are spread when an infected person talks, breathes, coughs or sneezes tiny particles containing infectious agents into the air. These are called small particle aerosols. Due to their tiny size, small particle aerosols can travel long distances on air currents and remain suspended in the air for minutes to hours. These small particle aerosols may be breathed in by another person | * [chickenpox](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/chickenpox+and+shingles/chickenpox+and+shingles+-+including+symptoms+treatment+and+prevention) * [measles](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/measles/measles+-+including+symptoms+treatment+and+prevention) * [tuberculosis (TB)](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/tuberculosis/tuberculosis+tb+-+including+symptoms+treatment+and+prevention) |
| Spread through faeces and then the mouth (faecal-oral spread) | Some infections are spread when microscopic amounts of faeces (poo) from an infected person with symptoms or an infected person without symptoms (a carrier) are taken in by another person by mouth. The faeces may be passed:   * directly from soiled hands to the mouth   indirectly by way of objects, surfaces, food or water soiled with faeces. | * [*Campylobacter*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/campylobacter+infection/campylobacter+infection+-+including+symptoms+treatment+and+prevention) * [*Cryptosporidium* infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/cryptosporidium+infection/cryptosporidium+infection+-+including+symptoms+treatment+and+prevention) * [*Giardia* infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/giardia+infection/giardia+infection+-+including+symptoms+treatment+and+prevention) * [hand, foot and mouth disease](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hand+foot+and+mouth+disease/hand+foot+and+mouth+disease+-+including+symptoms+treatment+and+prevention) * [hepatitis A](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hepatitis/hepatitis+a+-+including+symptoms+treatment+and+prevention) * [meningitis (viral)](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/viral+meningitis/viral+meningitis+-+including+symptoms+treatment+and+prevention) * [rotavirus infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/rotavirus+infection/rotavirus+infection+-+including+symptoms+treatment+and+prevention) * [*Salmonella*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/salmonella+infection/salmonella+infection+-+including+symptoms+treatment+and+prevention) * [*Shigella*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/shigella+infection/shigella+infection+-+including+symptoms+treatment+and+prevention) * [thrush](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/thrush/thrush+-+including+symptoms+treatment+and+prevention) * [viral gastroenteritis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/viral+gastroenteritis/viral+gastroenteritis+-+including+symptoms+treatment+and+prevention) * [worms](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/worms/worms+-+including+symptoms+treatment+and+prevention) * [*Yersinia* infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/yersinia+infection/yersinia+infection+-+including+symptoms+treatment+and+prevention). |
| Spread by skin or mucous membrane contact | Some infections are spread **directly** when skin or mucous membrane (the thin moist lining of many parts of the body such as the nose, mouth, throat and genitals) comes into contact with the skin or mucous membrane of another person. Infections are spread **indirectly** when skin or mucous membrane comes in contact with contaminated objects or surfaces. | * [chickenpox](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/chickenpox+and+shingles/chickenpox+and+shingles+-+including+symptoms+treatment+and+prevention) * [cold sores (herpes simplex infection)](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/cold+sores+herpes+simplex+type+1/cold+sores+herpes+simplex+type+1+-+including+symptoms+treatment+and+prevention) * [conjunctivitis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/conjunctivitis/conjunctivitis+-+including+symptoms+treatment+and+prevention) * [hand, foot and mouth disease](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hand+foot+and+mouth+disease/hand+foot+and+mouth+disease+-+including+symptoms+treatment+and+prevention) * [head lice](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/bites+burns+cuts+and+pests/head+lice/head+lice+-+including+symptoms+treatment+and+prevention) * [molluscum contagiosum](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/molluscum+contagiosum/molluscum+contagiosum+-+including+symptoms+treatment+and+prevention) * [ringworm](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/worms) * [scabies](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/bites+burns+cuts+and+pests/scabies/scabies+-+including+symptoms+treatment+and+prevention) * [school sores (impetigo)](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/school+sores/school+sores+impetigo+-+including+symptoms+treatment+and+prevention) * [*Staphylococcus aureus*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/staphylococcus+aureus+including+methicillin-resistant+staphylococcus+aureus+mrsa/staphylococcus+aureus+including+methicillin-resistant+staphylococcus+aureus+mrsa+-+including+symptoms+treatment+and+prevention) * [warts](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/warts/warts+common+flat+and+plantar+-+including+symptoms+treatment+and+prevention). |
| Spread through blood or other body fluids | Some infections are spread when blood or other body fluids (for example for example, urine, saliva, breastmilk, semen and vaginal secretions) from an infected person comes into contact with:   * the mucous membranes (the thin moist lining of many parts of the body such as the nose, mouth, throat and genitals), such as through kissing, breast-feeding or sexual contact or   the bloodstream of an uninfected person, such as through a needle stick injury or a break in the skin. | * [hepatitis B](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hepatitis/hepatitis+b+-+including+symptoms+treatment+and+prevention) - blood, saliva, semen and vaginal fluids * [hepatitis C](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hepatitis/hepatitis+c+-+including+symptoms+treatment+and+prevention) - blood * [human immunodeficiency virus (HIV) infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/human+immunodeficiency+virus+infection+hiv+and+aids/human+immunodeficiency+virus+hiv+aids+infection) - blood, semen and vaginal fluids, breastmilk * [cytomegalovirus (CMV) infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/cytomegalovirus+cmv+infection/cytomegalovirus+cmv+infection+-+including+symptoms+treatment+and+prevention) - saliva, breastmilk, semen and vaginal fluids, urine * [glandular fever](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/glandular+fever/glandular+fever+-+including+symptoms+treatment+and+prevention) - saliva |
| Spread through sexual contact (sexually transmitted infections) | These infections are most commonly transmitted by sexual contact. Sexual contact means:   * genital to genital * oral to genital * genital to anal. | * [*Chlamydia*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/chlamydia+genital/chlamydia+genital+-+including+symptoms+treatment+and+prevention) * [genital herpes](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/genital+herpes/genital+herpes+-+including+symptoms+treatment+and+prevention) * [genital warts](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/human+papilloma+virus+hpv+genital+warts+related+cancers) * [gonorrhoea](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/gonorrhoea/gonorrhoea+-+including+symptoms+treatment+and+prevention) * [hepatitis B](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hepatitis/hepatitis+b+-+including+symptoms+treatment+and+prevention) * [human immunodeficiency virus (HIV) infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/human+immunodeficiency+virus+infection+hiv+and+aids/human+immunodeficiency+virus+hiv+aids+infection) * [non-specific urethritis (NSU)](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/non-specific+urethritis+nsu/non-specific+urethritis+nsu+-+including+symptoms+treatment+and+prevention) * [pubic lice (crabs)](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/bites+burns+cuts+and+pests/pubic+lice/pubic+lice+crabs+-+including+symptoms+treatment+and+prevention) * [syphilis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/syphilis/syphilis+-+including+symptoms+treatment+and+prevention) * [trichomoniasis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/trichomonas+infection/trichomonas+infection+-+including+symptoms+treatment+and+prevention). |
| Spread through food or water | These diseases result from ingestion of water or a wide variety of foods contaminated with disease-causing germs or their toxins. Often these infections are also spread by the faecal-oral route. | * botulism * [*Campylobacter*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/campylobacter+infection/campylobacter+infection+-+including+symptoms+treatment+and+prevention) * [cholera](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/cholera/cholera+-+including+symptoms+treatment+and+prevention) * [*Cryptosporidium* infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/cryptosporidium+infection/cryptosporidium+infection+-+including+symptoms+treatment+and+prevention) * [haemolytic uraemic syndrome](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+topics+a+-+z/haemolytic+uraemic+syndrome+hus) * [*Listeria*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/listeria+infection/listeria+infection+-+including+symptoms+treatment+and+prevention) * [*Salmonella*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/salmonella+infection/salmonella+infection+-+including+symptoms+treatment+and+prevention) * [*Shigella*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/shigella+infection/shigella+infection+-+including+symptoms+treatment+and+prevention) * [typhoid and paratyphoid](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/typhoid+and+paratyphoid/typhoid+and+paratyphoid+-+including+symptoms+treatment+and+prevention) * [*Yersinia*infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/yersinia+infection/yersinia+infection+-+including+symptoms+treatment+and+prevention). |
| Spread from a mother to her unborn child | Some infections can be spread through the placenta from a mother to her unborn child or during delivery, or both. | * [chickenpox](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/chickenpox+and+shingles/chickenpox+and+shingles+-+including+symptoms+treatment+and+prevention) * [hepatitis B](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hepatitis/hepatitis+b+-+including+symptoms+treatment+and+prevention) * [rubella](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/rubella/rubella+german+measles+-+including+symptoms+treatment+and+prevention). |
| Diseases where person-to-person spread occurs rarely, if ever  INCLUDING  Vectors | Some infectious diseases are almost never spread by contact with an infected person. These diseases are usually spread by contact with an environmental source such as animals, insects, water or soil.  Carries the antigen/pathogen but is unaffected by it | by **contact with animals**:   * [cat-scratch disease](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/cat+scratch+disease/cat-scratch+disease+-+including+symptoms+treatment+and+prevention) * [hydatid disease](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/hydatid+disease/hydatid+disease+-+including+symptoms+treatment+and+prevention) * [psittacosis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/psittacosis/psittacosis+-+including+symptoms+treatment+and+prevention) * [Q fever](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/q+fever/q+fever+-+including+symptoms+treatment+and+prevention) * [rabies](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/rabies+virus+and+australian+bat+lyssavirus/rabies+virus+and+australian+bat+lyssavirus+-+including+symptoms+treatment+and+prevention) * [toxoplasmosis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/toxoplasma+infection/toxoplasma+infection+-+including+symptoms+treatment+and+prevention).   Examples of diseases **spread by insects,** and in the examples listed below, specifically by mosquitoes:   * [Barmah Forest virus infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/barmah+forest+virus+infection/barmah+forest+virus+infection+-+including+symptoms+treatment+and+prevention) * [dengue fever](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/dengue+fever/dengue+fever+-+including+symptoms+treatment+and+prevention) * [malaria](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/malaria/malaria+-+including+symptoms+treatment+and+prevention) * [Ross River virus infection](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/ross+river+virus+infection/ross+river+virus+infection+-+including+symptoms+treatment+and+prevention).   Examples of diseases spread by **contact with water or soil**:   * [amoebic meningitis](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/amoebic+meningoencephalitis/amoebic+meningoencephalitis+-+including+symptoms+treatment+and+prevention) * legionella infection - [*Legionella pneumophila*](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/legionella+pneumophila+infection/legionella+pneumophila+infection+-+including+symptoms+treatment+and+prevention) and [*Legionella longbeachae*](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/legionella+longbeachae+infection/legionella+longbeachae+infection+-+including+symptoms+treatment+and+prevention)   [tetanus](http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/tetanus/tetanus+-+including+symptoms+treatment+and+prevention) |
|  |  |  |
|  |  |  |

<http://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/health+topics/health+conditions+prevention+and+treatment/infectious+diseases/ways+infectious+diseases+spread> accessed 20/03/16

**PART II (18 marks)**

**AIM**

The Office of Health Protection, within the [Department of Health](http://www.health.gov.au/), is responsible for the development, implementation and evaluation of Australia’s national immunisation policies and programs. **(1)**

protect millions of Australians from vaccine-preventable diseases.**(1) OR**

protecting people against harmful diseases **(1)** that can cause serious health problems in the community.

Dramatically reduces transmission in the community. **(1)**

Periodic epidemics of ubiquitous childhood infections such as measles, mumps, rubella, pertussis, chickenpox, and polio, arose because of the accrual of a critical number of susceptible individuals in populations and that epidemics could be delayed or averted by maintaining numbers of susceptible individuals below this critical density (ie, by maintaining the proportion immune above some threshold) **(1)**

The more people who are vaccinated, the fewer opportunities a disease has to spread. **(1)** “Herd Immunity” **(1)**

(The Australian Government’s Immunise Australia Program implements the) [National Immunisation Program (NIP) Schedule](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/nips), which currently includes vaccines against a total of 16 diseases. **(1)**

These include routine childhood vaccinations against diseases that were once widely fatal, **(1)** such as measles, diphtheria and whooping cough (pertussis), as well as more recently developed vaccines, such as Human Papillomavirus (HPV) and the meningococcal C vaccine.

**(Max 6 marks)**

**Vaccination protocol**

Primary - first exposure – activates immune system: **(1)**

Antibody and B memory production (and/or) **(1)**

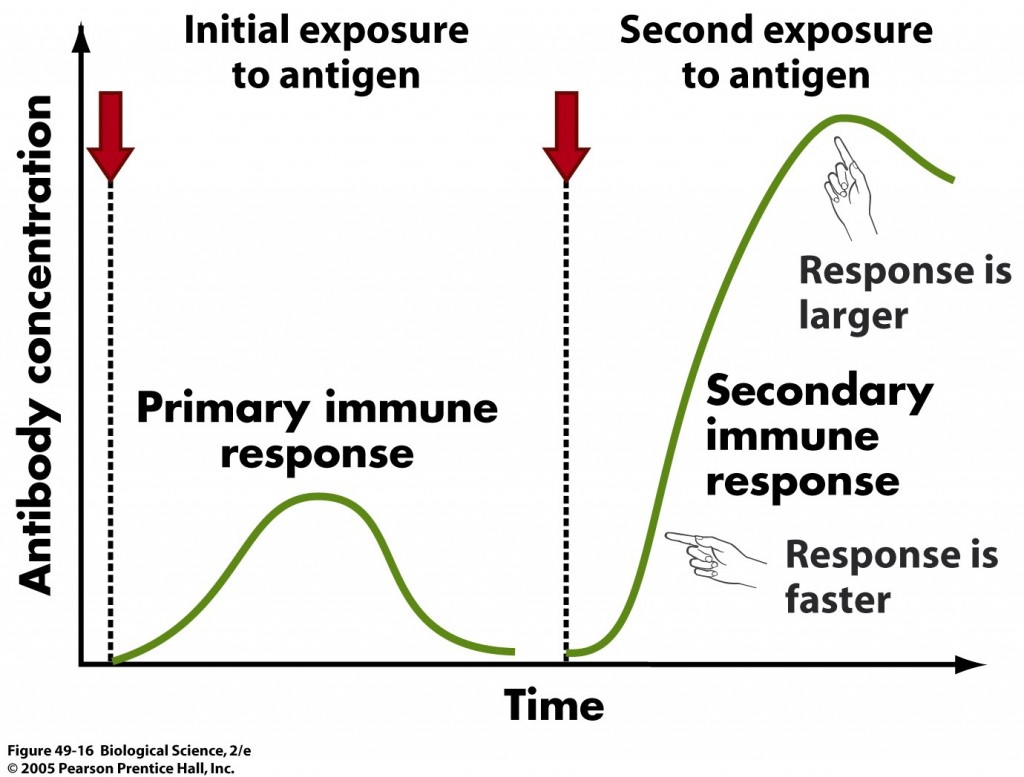
CTK T Cells, T4 Helper and memory cell production **(1)**

Secondary – second exposure – strengthens immune response **(1)**

Faster and greater production of antibodies (and/or killer & helper) due to memory cells **(1)**

↑ memory cell production **(1)**

**(6 Marks)**



2 marks for diagram

<https://www.google.com.au/search?q=immunisation+primary+and+secondary+response&espv=2&biw=1390&bih=749&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwj-oe-woM7LAhUmXqYKHQH7B-UQsAQINA&dpr=1.5#imgrc=yUGUNFz4WA1YgM%3A> accessed 20/03/16

**Immunity** – Ability of the body to resist both living and non-living agents that cause disease: resistance to disease **(1)**

**Herd Immunity** - the risk of infection among susceptible individuals **(1)** in a population is reduced **(1)**by the presence and proximity of immune individuals **(1)** (this is sometimes referred to as “indirect protection” or a “herd effect”). **(3 marks)**