Trinity College

SCIENCE

NAME: Sentry 2009

Please indicate your answer with a cross (X) within the box.

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
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18	A	B	C	D	E
19	A	B	C	D	E
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21	A	B	C	D	E
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23	A	B	C	D	E
24	A	B	C	D	E
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26	A	B	C	D	E
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32	A	B	C	D	E
33	A	B	C	D	E
34	A	B	C	D	E
35	A	B	C	D	E
36	A	B	C	D	E
37	A	B	C	D	E
38	A	B	C	D	E
39	A	B	C	D	E
40	A	B	C	D	E

Q50

- Gene Mutation - changes in a single gene so that the traits normally produced by the gene are changed or destroyed. (1)

point mutation - change in just one base alter a protein or prevent it being produced or no effect (1)

eg Albinism, Duchene form of Muscular Dystrophy, Cystic fibrosis, Tay Sachs disease (TSD)
any (3) with description

- Chromosomal Mutations - deletions - loss of a part of a chromosome

- duplications - section of chromosome occurs twice.

any (3) - inversions - break occurs and pieces join back but wrong way around.

- translocation - part breaks off & rejoined to wrong chromosome.

- non disjunctions - during meiosis a pair of chromosome doesn't separate. (change in chromosome no. "aneuploidy"

eg. Downs Syndrome (Trisomy 21), Patau syndrome, Klinefelters monosomy, Cri du chat, Turners. any (2) with description

Q50 (cont)

Renal corpuscle - Filtration of blood from capillaries of glomerulus.
- Formation of filtrate in the glomerular capsule.

(3)

Proximal convoluted Tubule + Loop of Henle - Reabsorption of Na, K, Cl & HCO_3^- ions
- Reabsorption of glucose.
- Passive reabsorption of H_2O by diffusion

(3)

Distal convoluted Tubule - Reabsorption of Na ions
- Active reabsorption of H_2O depending on need
- Secretion of H^+, K^+, creatinine & certain drugs eg penicillin

(4)

Collecting Duct - Active reabsorption depending on needs.

(2)

Q51.

(c) (i) Antibiotic must be toxic to micro-organism (1) not to person's cells (1)
Act on specific target (1) infection must be bacterial (1) dosage must be correct (1)
micro-organism must not be resistant (1) (Any two points = 2)

(ii) Penicillin / Tetracycline / Erythromycin / Nystatin / Rifanpin / Quinilones
Sulphonamides / Cephalosporin (1)
Action : prevents synthesis of bacterial cell walls / inhibits protein synthesis in ribosome / interferes with cell membrane / interferes with membrane of fungal cells / block DNA synthesis / inhibit cell wall formation (Any one point = 1)

(iii) Don't work on viruses (1) not initiate allergic reaction (1)
Micro-organisms develop resistance due to (any of following) (1)
Useful flora / bacteria are killed (1) Promotion of secondary infections (1) (Any two points = 2)

24. (b) Living attenuated/less virulent/weakened microorganisms (1)
Dead microorganisms. (1)
Toxoids (inactivated bacterial toxins). (1)
Newer vaccines: Alter the DNA of the pathogen to reduce virulence (1)
Insert DNA sequences from pathogens into harmless bacteria (1)
(Any three of the above for 3 marks) (First three only marked)

Immunity provided by :
Antigen introduced into body (1) antigen binds to B cells / B cells become sensitized (1) Helper T cells (1) stimulates B cells to multiply (1). B cells transform into plasma cells (1) that produce specific antibodies for the antigen (1). Antibodies bind to and inactivate the antigens (1). Some B cells become memory cells (1) that can rapidly produce large volumes of the specific antibody (1) in response to further infections by the same antigen (1). (Any seven points for 7 marks)

25. (a) B lymphocytes/cells recognise antigens/antigen presentation (1) may also be recognised by T lymphocytes/cells (1)
B lymphocytes divide (1) two types of cells
Plasma cells (1) that will produce antibodies (1) primary response (1)
Memory cells (1) that will memorise antigen for later infections (1) secondary/more rapid response (1)
Antibodies attach to antigen (1) and either:
Inactivate toxins (1), Agglutinate/clump antigens (1), make antigens attractive to phagocytes (1)
Punch holes in membranes of pathogens (1)
Antigens are eliminated and antibodies destroyed in the liver (1) (any ten points : total 10)

Transmitted in blood (1), semen (1), breast milk (1), vagina secretions (1), organ transplants (1), infected body fluids (1), and across placenta (1)
Unprotected sex (vaginal /anal) (1)
Sharing of needles between intra-venous drug users (1)
Blood transfusions (1)
During childbirth or breast-feeding (1) (any five points : total 5)

(b) HIV infects lymphocytes (1) particularly (helper)T cells (1) these coordinate the immune response (1)
HIV infected cells are eventually destroyed (1) this reduces the numbers of helper T cells /macrophages(1) circulating antibody levels drop (1) and there is a reduction in cell mediated immunity (1).

Suppressor T cells are almost unaffected by HIV (1) so normal immune response is turned off (1) and the body is open to infection. (any five points : total 5)

26. (a) The primary immune response (1) B lymphocyte (1) contacts an antigen (1). This causes the lymphocyte to become activated / sensitized (1) and begin dividing many times (1). Some lymphocytes transform into plasma cells (1) which produce a specific antibody for the antigen (1). Helped by other lymphocytes called T helper cells (1). Cell mediated/killer T cells response (1) the antigen will be destroyed (1) or neutralised (1). Other lymphocytes become Memory cells/lymphocytes (1). which will produce the same antibody (1) more quickly (1) and in greater amounts (1) if the antigen is encountered again. This is called the secondary immune response (1) **(Any fourteen points = 14 marks)**

(b) Much of our Acquired Immunity (1) is achieved in childhood when contact with common diseases occurs (1). If we are in a protected, or clean environment we do not contact these common diseases/antigens (1) and do not have a primary immune response (1)
That establishes memory cells (1). A large portion of our immune system (the thymus) (1) decreases in size after puberty (1). T helper cells are required for the primary (and secondary) immune response but would be depleted when the antigen is contacted later in life (1). **(Any six points = 6 marks)**

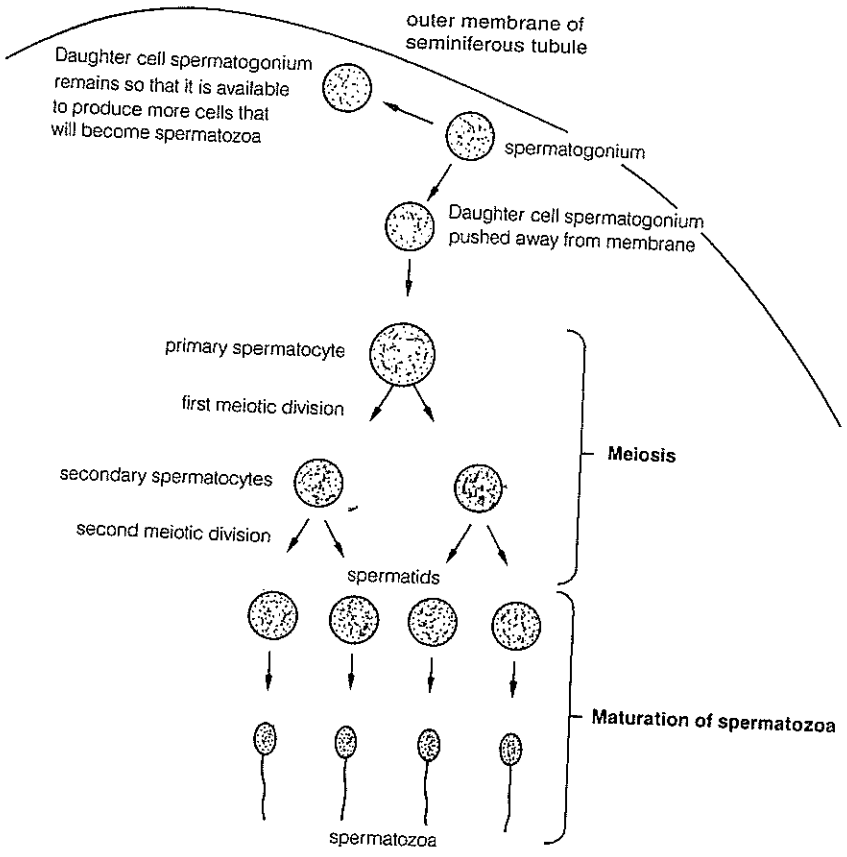
Q54 (cont'd)

Mechanism	Side Effects	E
Rhythm - egg is available for 3-5 days only so abstain 4 days before + 4 days after	none but must know cycle well inaccurate	75
Temp - Ovulation is accompanied by a slight drop in temp. So can have sex 3-4 days after ovulation.	none. But need to take temp daily, temp can ↑ due to stress, infection etc.	75
Mucus - After menstruation, vagina is dry as ovulation approaches, mucus is cloudy/sticky at ovulation becomes clear/slippery. Sex is safe when there is no mucus	none. must keep daily record of mucus changes.	75
Coitus Interruptus - withdrawal before ejaculation	none - considerable self control is required to withdraw penis before ejaculation. First squirt contains the most sperm.	75
Diaphragm: condom. cervical cap	mechanical barrier to sperm. Diaphragm can be combined with spermicide to ↑ contraception.	none - holes in condom can ↓ contraception, diaphragm + cervical cap must be in place for 6 hrs after ejaculation.	95-

any 5 - 2 each (10)

Q54 (cont'd)

Mechanism	Side effect	Eff
Hormonal (Pill, morning after) - Suppress the release of pituitary hormones, so egg is not released and alter lining of uterus. - progesterone substitute inhibit sperm by altering secretions of cervix	disturbs menstrual cycle, blood clots, headaches, mood swing, nausea/vomiting, weight gain, ↓ period pain,	96-99
IUD - causes inflammatory response so WBC's engulf sperm/ova.	can cause infection, pain, bleeding, requires surgery to insert + remove.	99%
Vasectomy / Tubal Ligation - tying of tubes to prevent sperm/egg being released.	pain, discomfort as operation is healing.	99%



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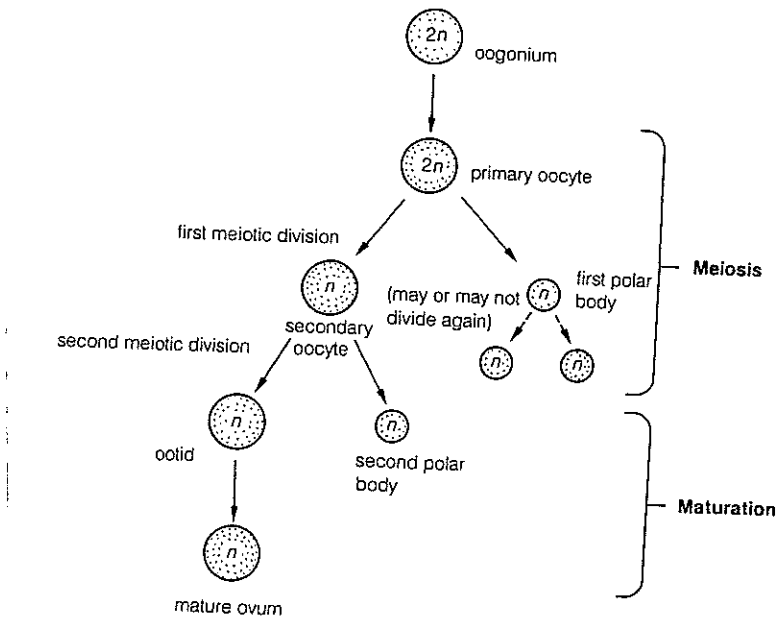

3

c) - breast become fuller, firmer, tender
- nipples become longer & darker
- nausea & vomiting (in morning)
- ↑ urination

4

(2019 Q5a)

(a) (i) - Amnion - 1st to develop (8th day), enclose a cavity + secretes amniotic fluid (for protection, shock absorbing)

(i) - Yolk Sac - contain little yolk + doesn't supply embryo with nutrients, 1st site of RBC formation.

(i) - Allantois - becomes part of umbilical cord

(ii) - Chorion - formed from outer layer of blastocyst + mesodermal cells, fuses with amnion as it enlarges, eventually become the main part of the placenta.

(i) - Placenta - supplies nutrients + removes wastes (umbilical vein carries)

(ii) - Chorionic villi - O_2 + CO$_2$ diffusion takes place. villi are surrounded by mothers blood, ↑ SA. for diffusion

b) (i) - Nerves in nipple detect sucking of infant and transmit signals to post. pituitary gland.

- Pituitary releases oxytocin in blood stream which travels to muscles around alveoli in breast.
- Muscles contract and lobules squeeze milk through nipple.
- The more milk is removed, more hormones are released and this continues to feed infant. As sucking + less frequent (when infants starts to eat food) hormone prod'n ↓ and milk prod'n is decreased.

(ii) ~~each~~

(i) - 1st Stage - cervix dilates, waters break. contractions increase in frequency, less time apart

(2) 2nd - expulsion of foetus - foetus rotates, head down and moves via birth canal, contractions help to push foetus.

(3) 3rd stage - expulsion of placenta

(19)

(4) for hormones.