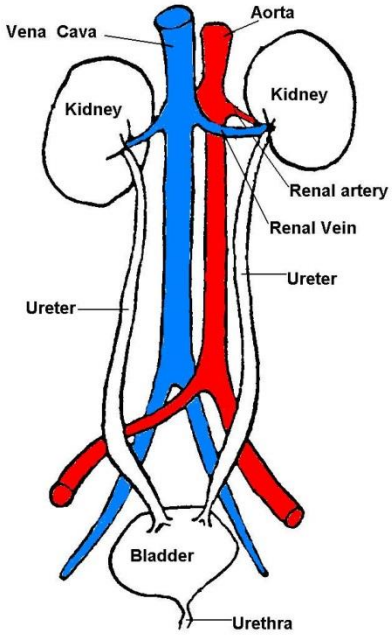
GCSE 9-1 Biology Revision Topic 7 part 2 – Kidneys, Menstrual Cycle and Adrenaline

Kidneys and excretion – they are important in homeostasis

Excretion definition:



The _____ artery supplies blood to the kidneys. This is a branch of the _____

Blood leaves the kidney in the renal _____ and this joins the _____ _____ which returns blood to the _____

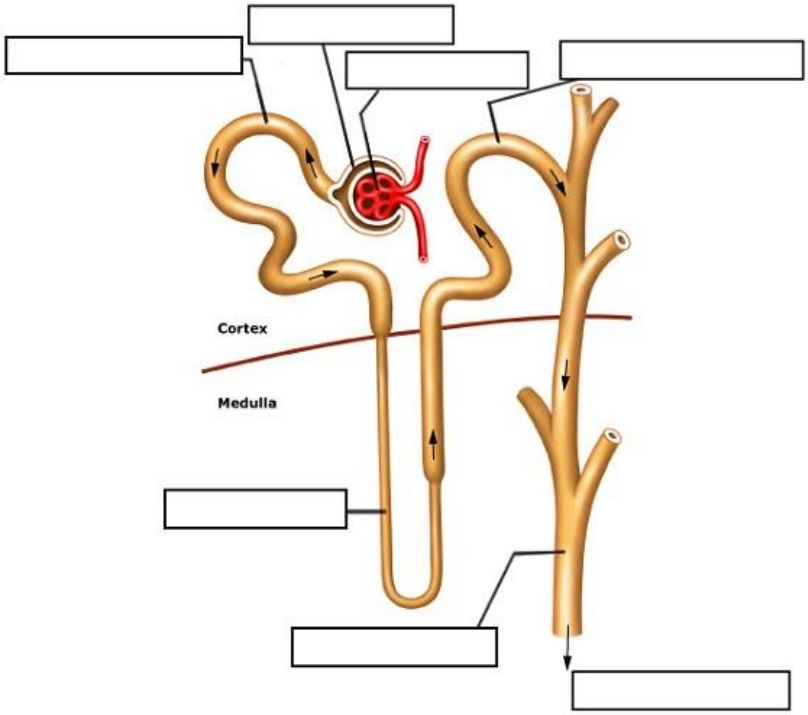
Urine leaves the kidney in the _____

Urine is stored in the _____

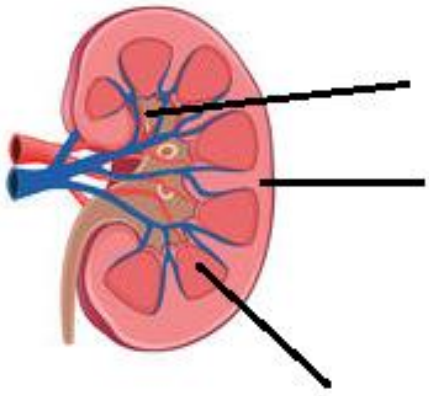
Urine leaves the body in the _____. Urine contains: _____, ions, _____ (waste product from the breakdown of excess amino _____, formed in the _____ by the process of deamination), and hormones

The kidney is made of 1000s of _____

The Nephron: complete the boxes using the following labels: *PCT (Proximal Convoluted Tubule), loop of Henle, Glomerulus, collecting duct, DCT (2nd tubule – Distal Convoluted Tubule), Bowman's capsule, ureter*



Can you label the cortex, medulla and pelvis tissues, ureter, on this diagram:



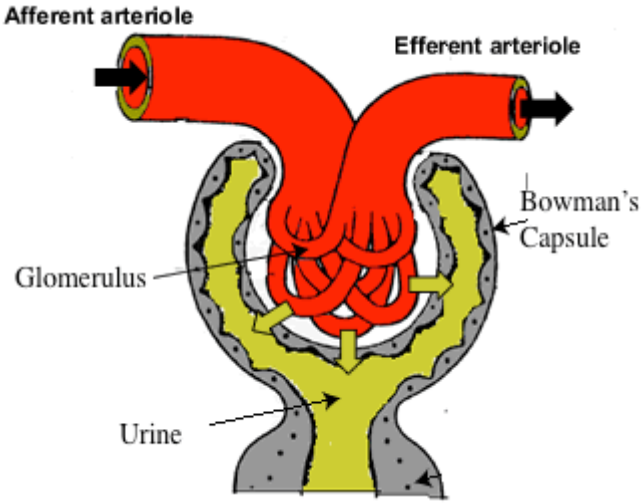
Now add on to show where the following processes occur: *ultrafiltration, selective reabsorption, ADH acts to reabsorb more water*

What is in the blood that must be removed as it is toxic?

Where is this molecule produced and by what process?

What other molecules are in urine?

Key processes in urine formation:



Step 1: Ultrafiltration:

Due to _____ pressure (resulting from the wider arteriole leading _____ the glomerulus and the narrower arteriole leading ____) small molecules, such as _____, _____, _____, _____ _____ and _____ are squeezed out of the blood in the glomerulus and enter the _____ _____.

Large molecules and cells such as _____ proteins, ____ blood cells, _____ blood cells and platelets are too large to leave the blood and leave in the _____ arteriole.

Q: If someone had high blood pressure what may be present in the fluid in the Bowman's capsule?

Q: If someone had an infection what blood cells would increase in number and may end up undergoing ultrafiltration and enter the fluid in the Bowman's capsule and then the urine?

Step 2: Selective reabsorption:

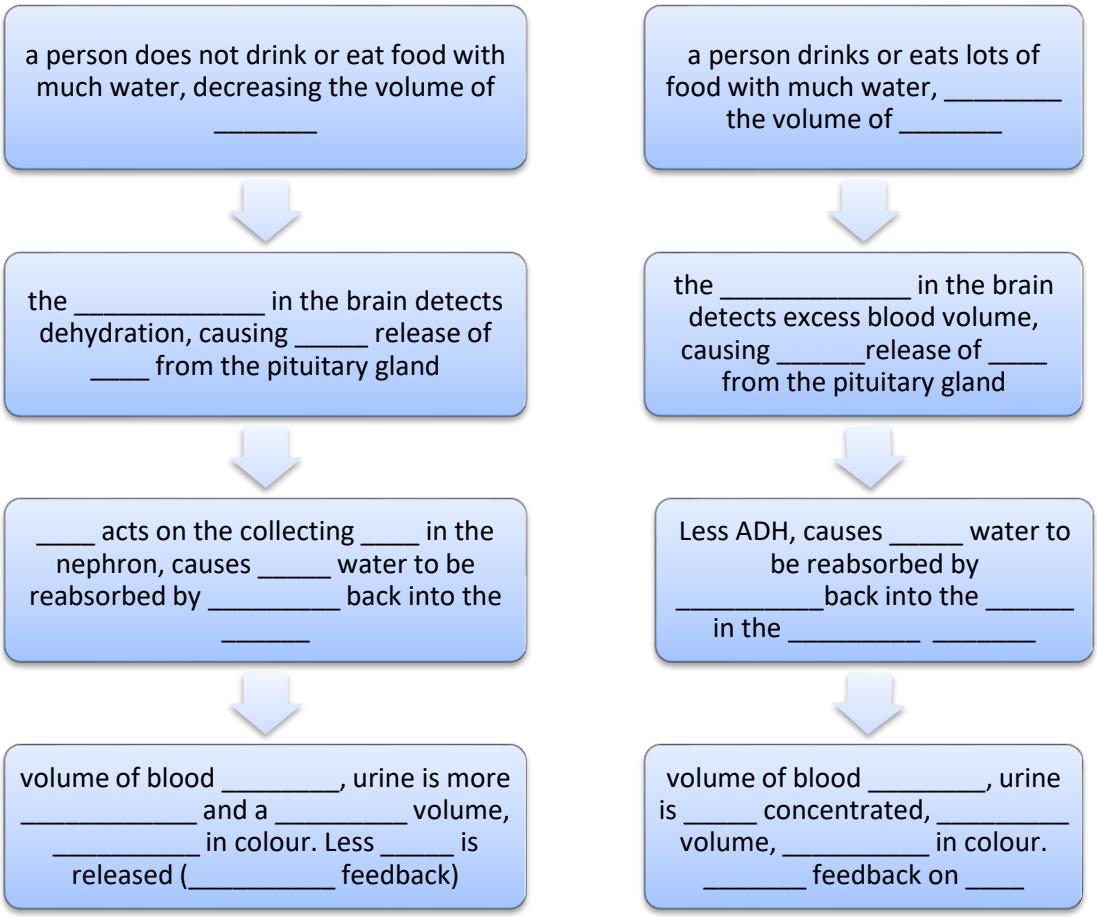
In the _____ useful substances are reabsorbed back into the _____:

All the glucose is reabsorbed by _____ transport (this uses _____, so the cells that form the PCT have many _____) and is used for _____, as are amino _____ which are used for _____ synthesis. Some _____ is reabsorbed by _____

In the loop of Henle some _____ is reabsorbed by _____and some mineral ions.

This leaves in the filtrate at the end of the loop of Henle the following molecules: the toxic _____, some _____, some _____ _____ (eg Na^+, Cl^-), the quantity will depend on diet. This will go on to form the _____

Step 3: Balance of water in urine and blood: controlled by the hormone _____



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Kidney failure and treatment

As the kidney is responsible for the removal of waste from the blood, damage (either from accidents or disease) leads to a build-up of poisonous waste products in the body. We can survive without one kidney quite well, but total kidney failure would be fatal if not treated. Treatment can take the form of:

Kidney dialysis machine	**Kidney transplant**
A dialysis machine can keep a patient alive until a transplant becomes available. The patient's blood is passed through the machine and is cleaned of waste products the kidneys would have removed. Small molecules (such as_____, excess _____ _____ pass by _____ through the selectively permeable _____ into dialysis fluid. Blood cells and proteins are too _____ to move through. **Disadvantages:** • they are expensive • the patient must be connected to the machine for several hours each week • patients must follow a very strict diet (low in salts and normal protein level) to avoid complications • they only work for a limited time for a patient	A kidney transplant can save the patient's life, and after a transplant the patient can live a relatively normal life, eating what they like and without restrictions. **Disadvantages:** • any major surgery carries some risk • the kidney may be rejected by the body of the patient so _____ _____ drugs are used constantly to help prevent rejection • a precise match of tissue type is needed (about half the donated kidneys come from family members) • there is a severe shortage of _____ • lots of check-ups needed

Questions:

1. What is the difference between urea and urine?

2. What is the difference between the urethra and ureter?

3. Starting with the renal artery what structures will urea pass through in the urinary system, list them in order

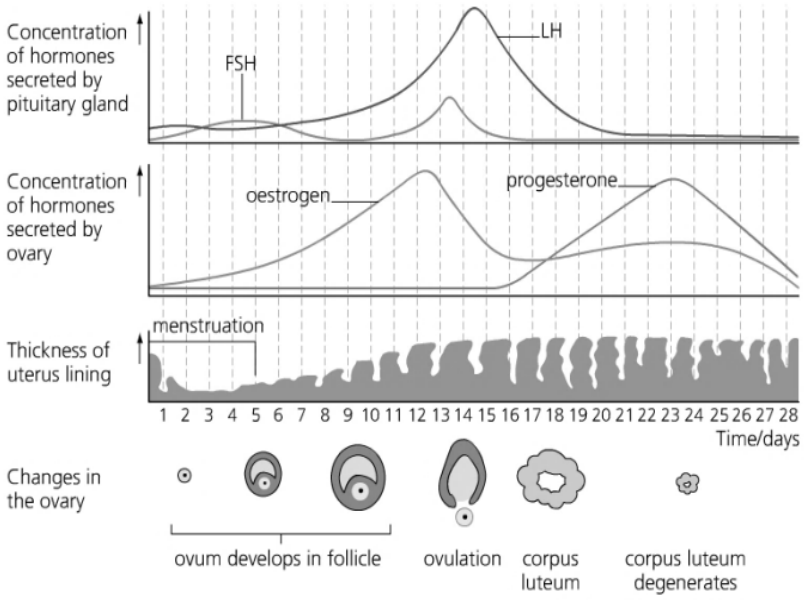
4. Blood samples were taken from a person 30 minutes after they had been exercising and again after they had drunk a large glass of water, explain which sample contained the most ADH

5. Why does dialysis fluid have the same concentration of glucose as the blood?

6. Compare dialysis with the way a healthy nephron functions (*remember with comparing to include similarities and differences*)

Menstrual cycle

Purpose of menstrual cycle:



Key dates: Day 1 = 1st day of _____ . Uterine lining builds up days ___ to ____ . Day 14 = _____

Uterine lining remains thick for about ____ days in case of _____ of an embryo.

If no implantation occurs the cycle begins again at day 1, with _____

If implantation occurs progesterone levels remain _____

Hormone (in order of peaking)	Produced by	Role	Switched on by	Peak in hormone switches off hormone
FSH		Stimulates follicle development, maturing an ovum	Low progesterone	
Oestrogen	Follicle (in ovary)			FSH
LH			High oestrogen	
Progesterone	Corpus luteum (in ovary, left over follicle)			

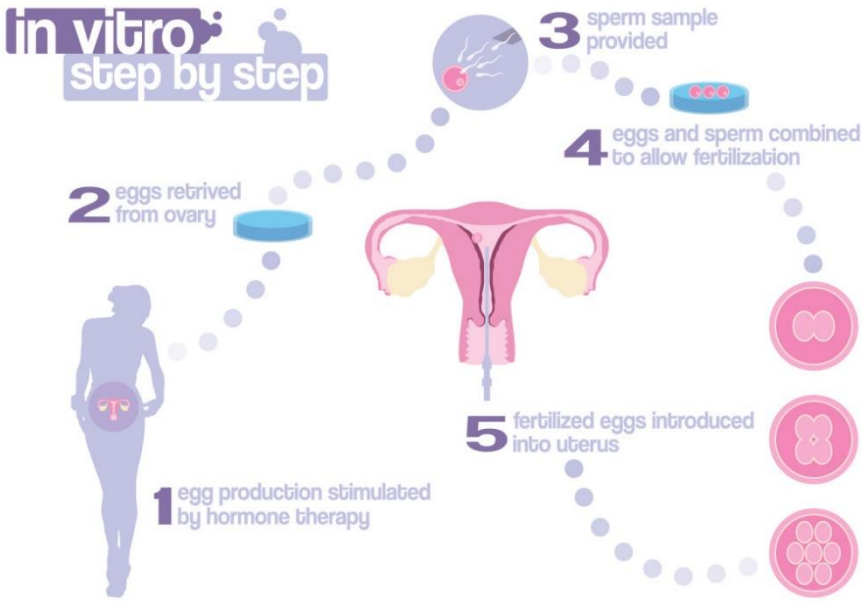
Assisted Reproductive Therapy – includes hormone treatment, clomifene and IVF

Aim is to increase fertility

Use of hormones - some women don't produce enough _____ to allow their ova to mature. 'Fertility drugs' contain high FSH, which stimulates more ova to mature in the ovary. It may fail or give rise to conceptions, with twins or triplets being expected. This increases the risk of complications in pregnancy and childbirth, and may lead to premature or underweight babies.

Clomifene therapy – clomifene is a drug that acts on the ovaries and increases levels of ____ to mature more ova and increases levels of ___ to stimulate _____ (the release of an ovum from the _____), both of these hormones are made in the _____ gland), this increases the likelihood of fertilisation as more ova produced

In vitro fertilisation (IVF) –



If a couple are having difficulty conceiving a child because the quantity or quality of the man's sperm is poor, or the woman has blocked fallopian tubes then IVF can be used.

1. What hormone will be used in step 1?
2. Why is the process called in vitro?
3. What is a fertilised ovum called?
4. What process do the cells divide by?

Donation of ova – Some women donate a small number (about 10) of their ova. Women are given hormones to help their ova mature before they are removed. The medical risk is small. Donated ova are normally then fertilised in vitro and implanted into the mother's uterus.

iv) Use of surrogate mothers – women who agree to become pregnant for another couple who are infertile. There are different laws that relate to this process in different countries. Surrogate mothers usually become pregnant from IVF treatment. The woman could decide to keep the child.

Contraception: no method is 100% other than abstinence at preventing pregnancy or transmission of STIs**.**
Divided into **barrier methods** eg _____
These prevent the_____ from reaching the _____ and prevent fertilisation.
Depend on correct use

And **hormonal methods** eg _____ , coil, implants, injection
The contraceptive pill (in pill form, implant, patch or injection) contains oestrogen and progesterone to prevent pregnancy
What hormone does high oestrogen cause negative feedback on?
What does this prevent from happening?
What hormone does high progesterone cause negative feedback on?
What does this prevent from happening?
High progesterone also prevents the release of which hormone?
So how does the pill prevent pregnancy?

Adrenaline
Adrenaline is a _____ and is secreted into the _____ from the _____ glands

that sit on top of the _____. This is in response to _____ , for example:

The effect is known as the _____ or _____ response.

Effect on the heart rate

Effect on cardiac output

Effect on blood pressure

Effect on blood vessels to intestines

Effect on blood vessels to skeletal muscles

Effect on glycogen stored in the cells of the liver

Effect on blood glucose

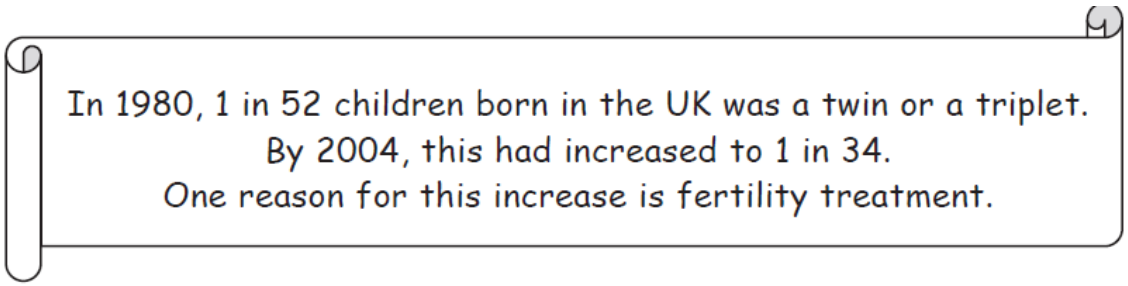
Effect on airways

Effect on respiration rate

How does adrenaline aid athletes in competitions?

B3 6 mark questions (previous Edexcel specification but still relevant, mark schemes on sharpoint)

Sample paper Q6



*(d) Discuss the benefits and drawbacks of using follicle stimulating hormone (FSH) as a fertility treatment.

(6)

Additional sample paper Q6 Edexcel

*(b) Water is reabsorbed from the collecting duct.
The rate of reabsorption of water varies depending on the water content of the blood.

Explain how the body regulates the reabsorption of water for a person who has not been drinking for 24 hours.

(6)

May 2014 Q5 Edexcel

*(b) (iii) Explain how the menstrual cycle is controlled by hormones and negative feedback.

(6)

May 2015 Q5 Edexcel

*(b) Explain the role of ADH in regulating the water content of the blood.

(6)