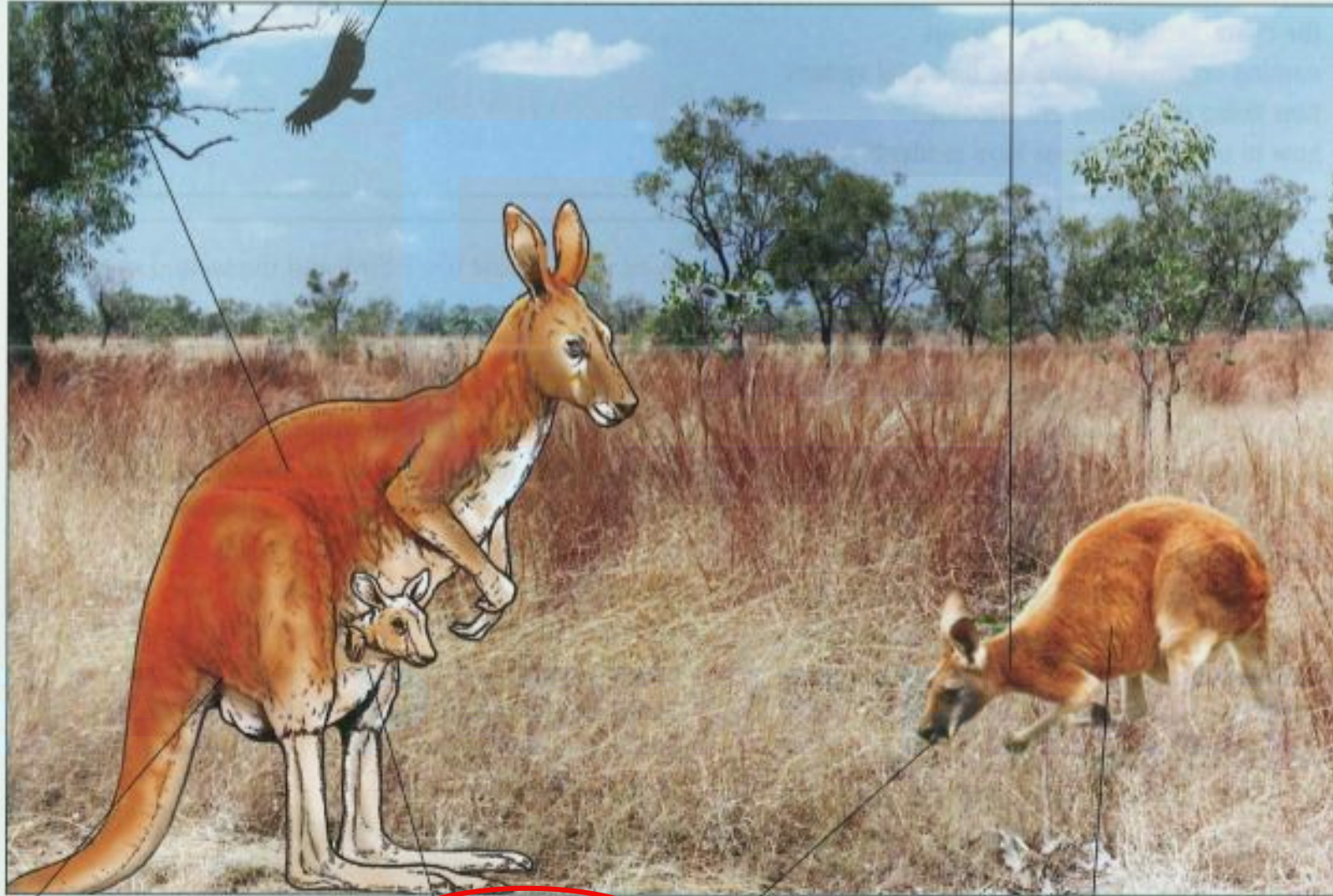


Growth All organisms begin small and get larger, by the growth of their cells and by adding new cells to their bodies.

Movement All organisms are able to move to some extent. Most animals can move their whole body from place to place, and plants can slowly move parts of themselves.

Sensitivity All organisms pick up information about changes in their environment, and react to the changes.

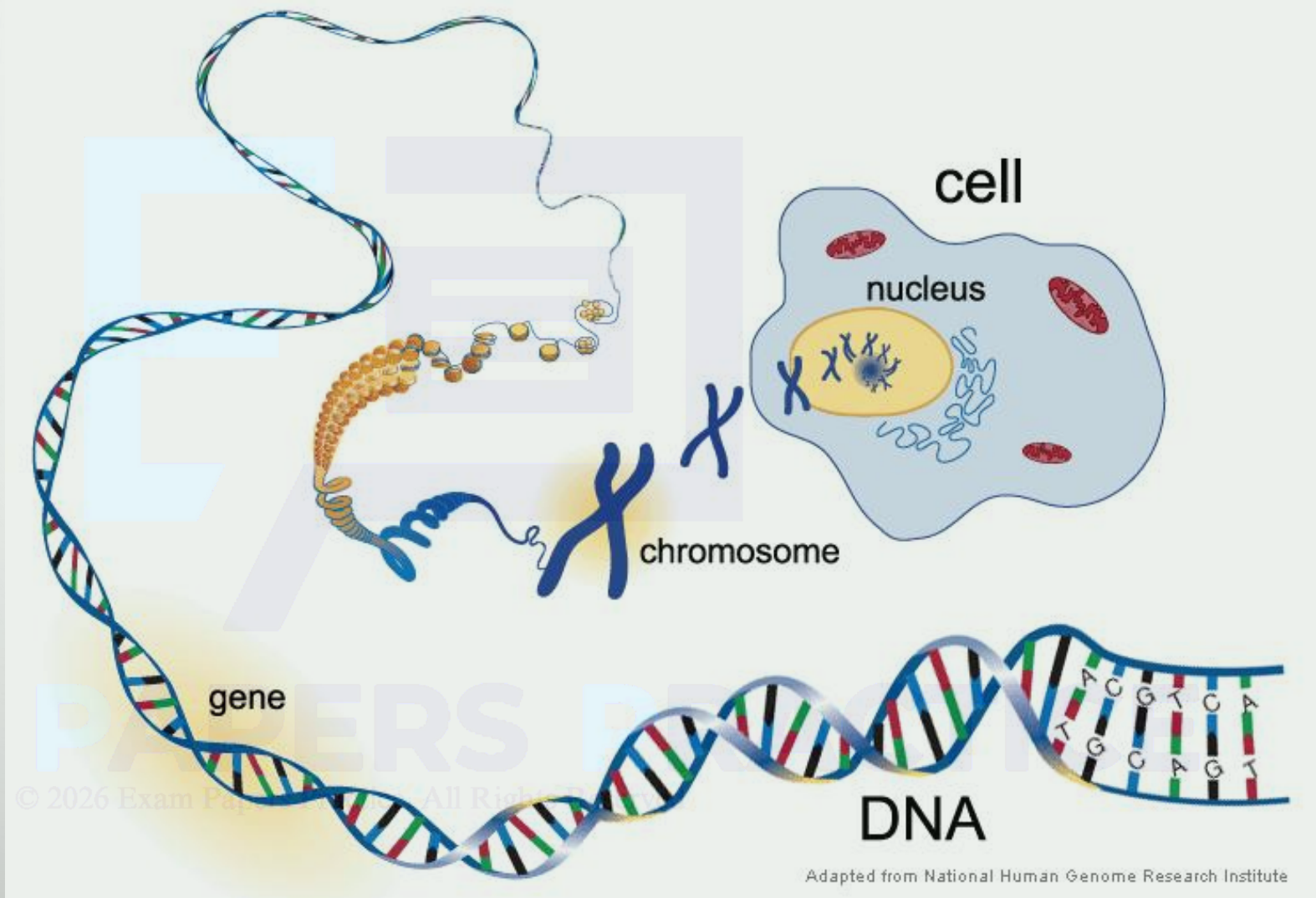


Excretion All organisms produce unwanted or toxic waste products as a result of their metabolic reactions, and these must be removed from the body.

Reproduction Organisms are able to make new organisms of the same species as themselves.

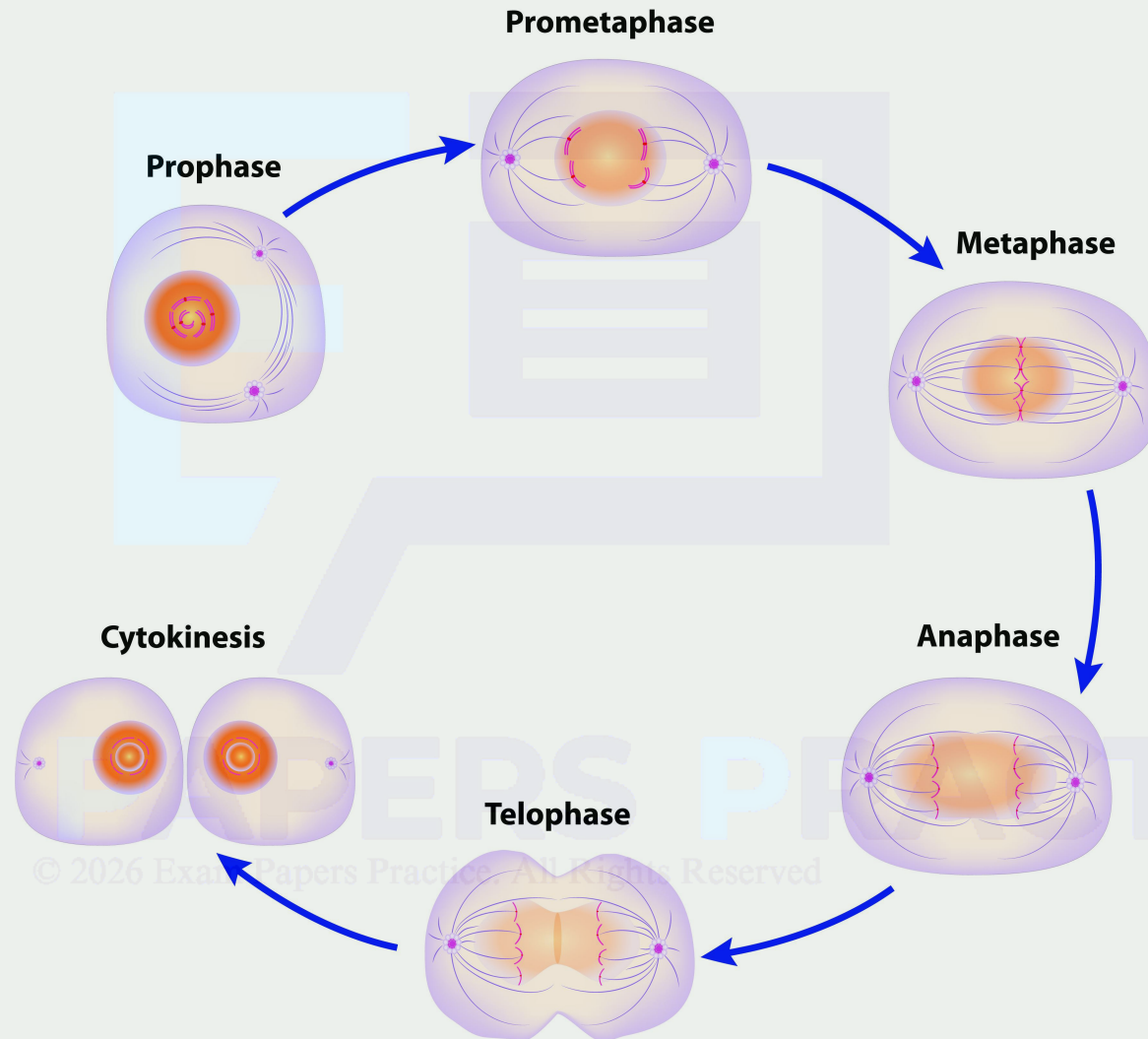
Nutrition Organisms take substances from their environment and use them to provide energy or materials to make new cells.

Respiration All organisms break down glucose and other substances inside their cells, to release energy that they can use.



chromosome 染色体
gene 基因

Cell division (mitosis)



mitosis 有丝分裂



How do bananas reproduce ?



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Sexual reproduction



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Asexual reproduction

Advantages and disadvantages of the two reproduction styles

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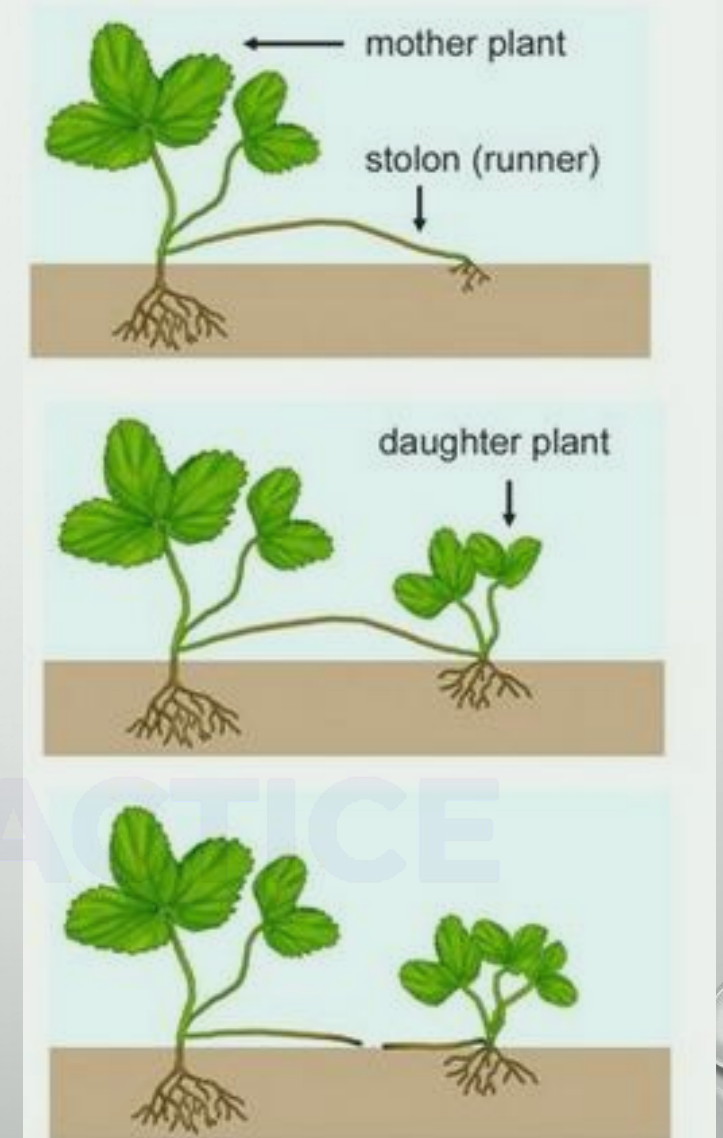
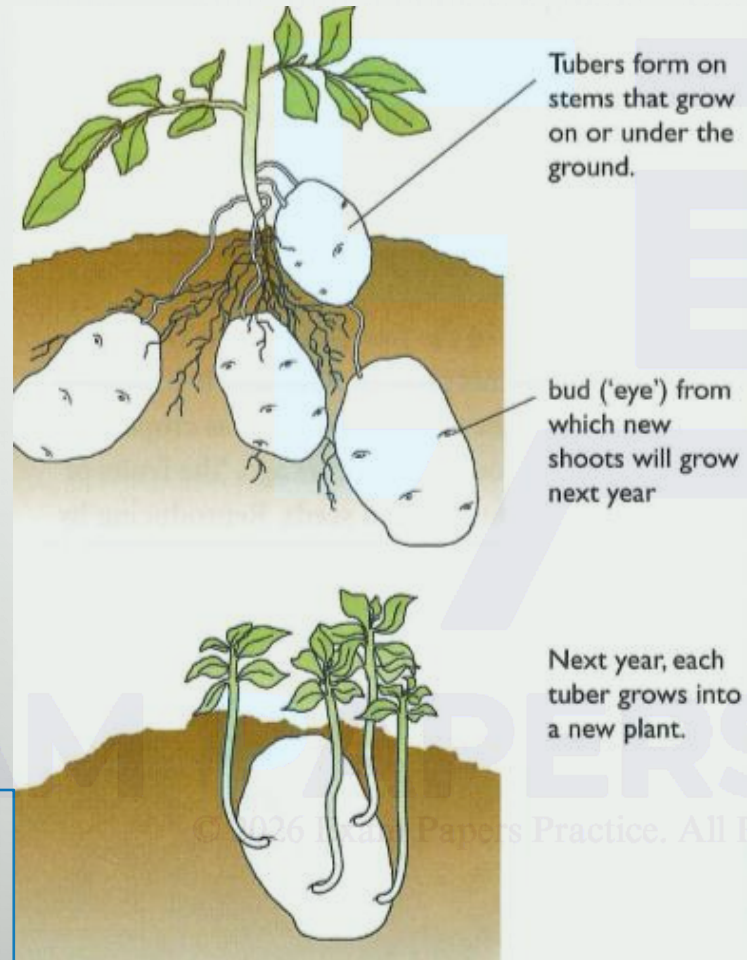
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reproduction in plants

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Asexual reproduction



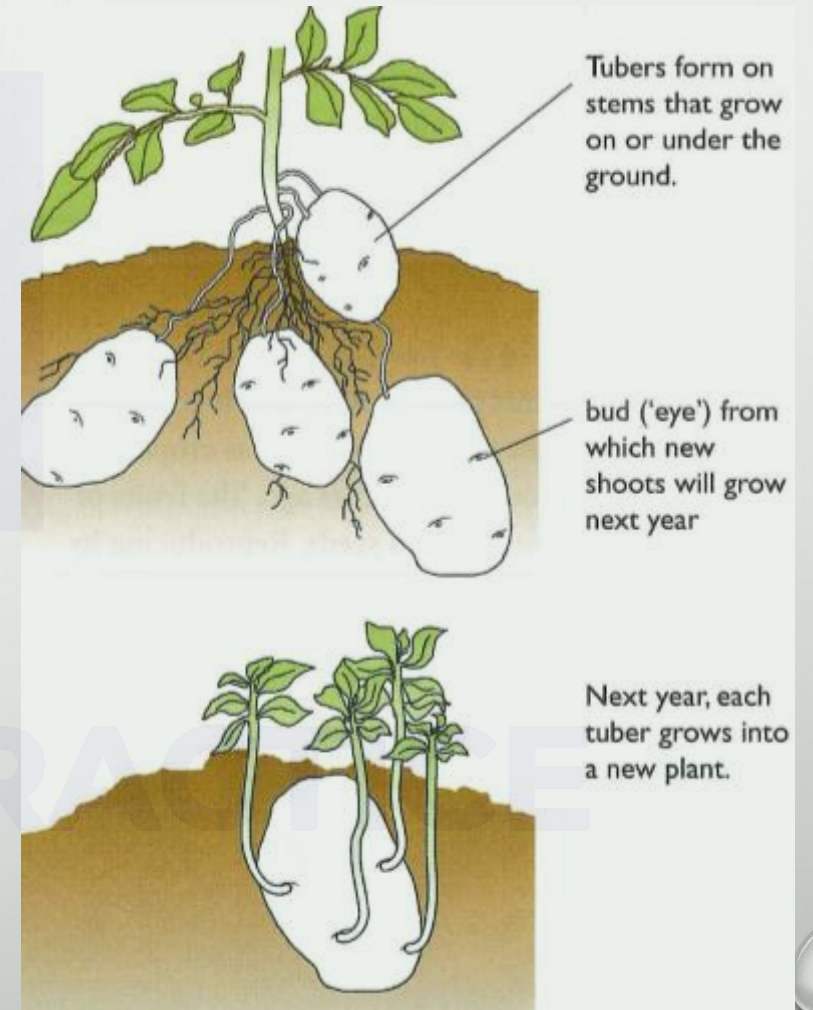
asexual reproduction 无性繁殖
tuber 块茎
Stem tuber 块茎
shoot 芽

Asexual reproduction

Asexual reproduction is a process resulting in the production of genetically identical offspring from one parent.

Why offspring produced by sexual reproduction are genetically identical to each other.

Why a gardener might choose to propagate a plant asexually?



Asexual reproduction

grafting

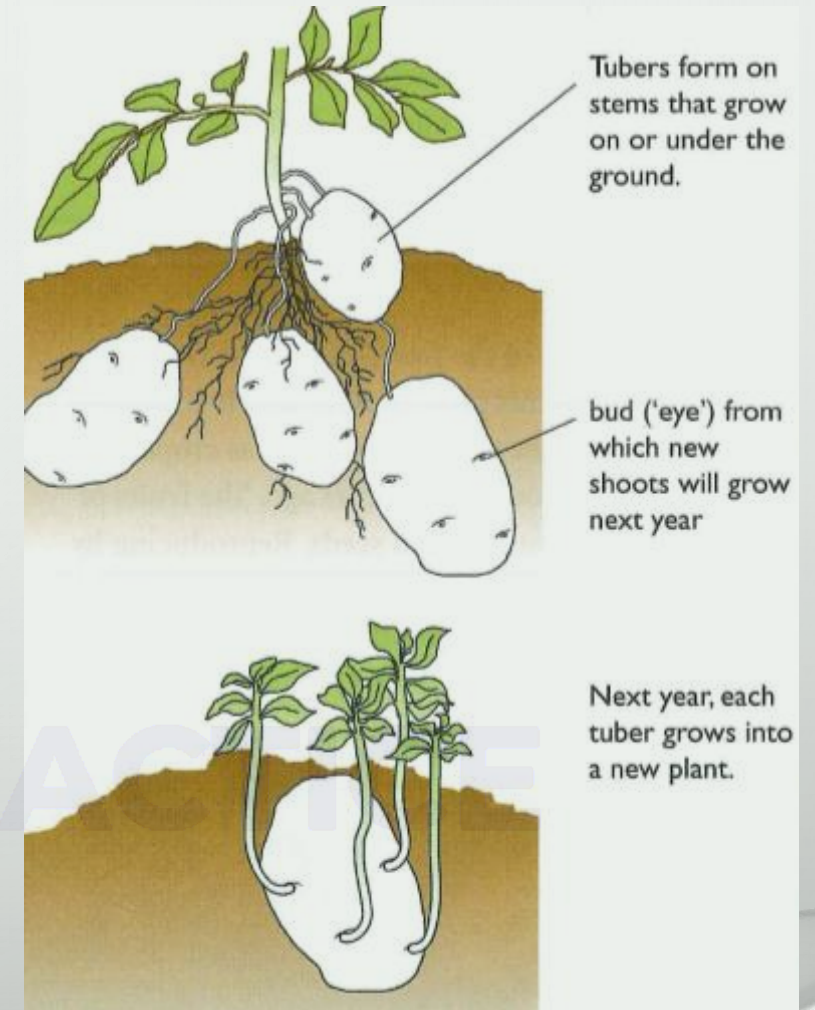


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Asexual reproduction

Why a gardener might choose to propagate a plant asexually?

- a. Sole parent (no gametes required)
- b. Genetically identical offspring (clones).
Reserve fine quality from parents).



Asexual reproduction

Is there any disadvantages of asexual reproduction?

- a. Intraspecific competition.
- b. Genetically identical.
If a disease spread no resistance and will die.
- c. Very little chance of evolution.
if environment change will not able to adapt.



sexual reproduction

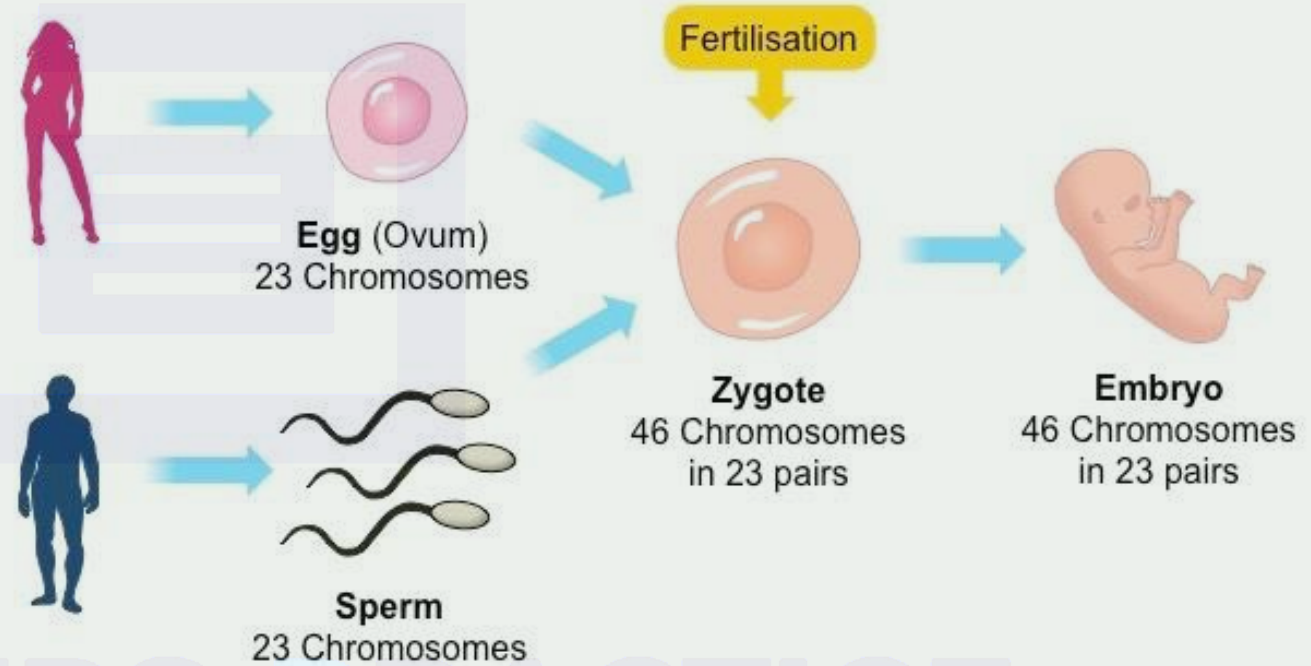
Gamete: sex cells produced by parent organisms.

Female gamete (egg/ovum)

Male gamete (sperm)

fertilization: eggs and sperms fuse together/the fusion of gamete nuclei.

zygote: the new cell which is formed by fertilization.

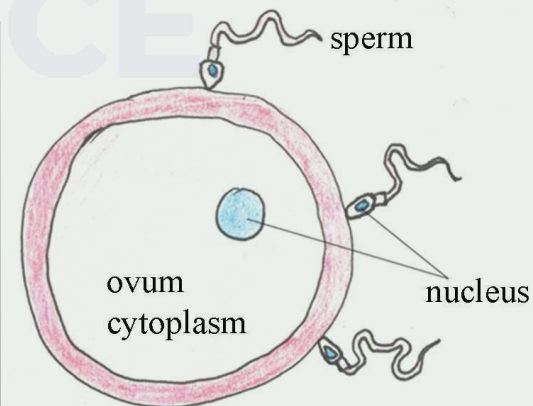


sexual reproduction 有性繁殖

gamete 配子

sperm 精子

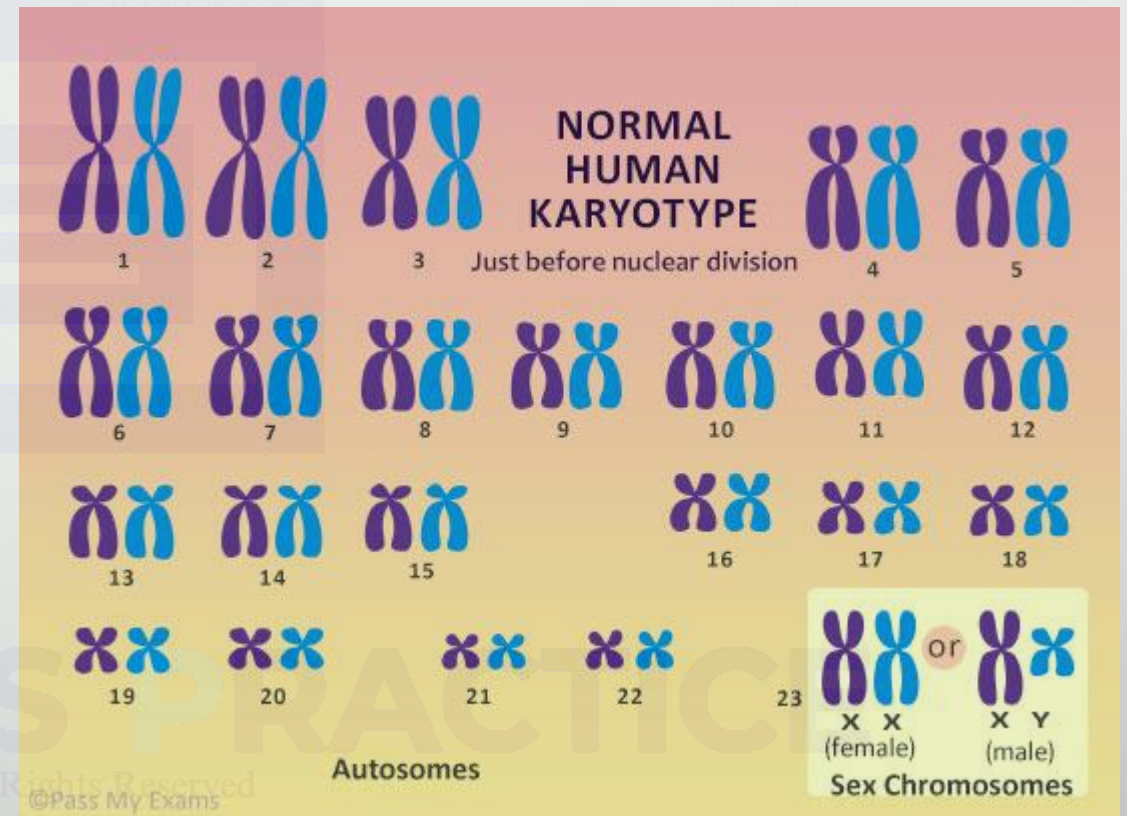
egg (ovum) 卵子



sexual reproduction

The 46 chromosomes in an ordinary human cell are of different kinds.

Two sets of chromosomes.

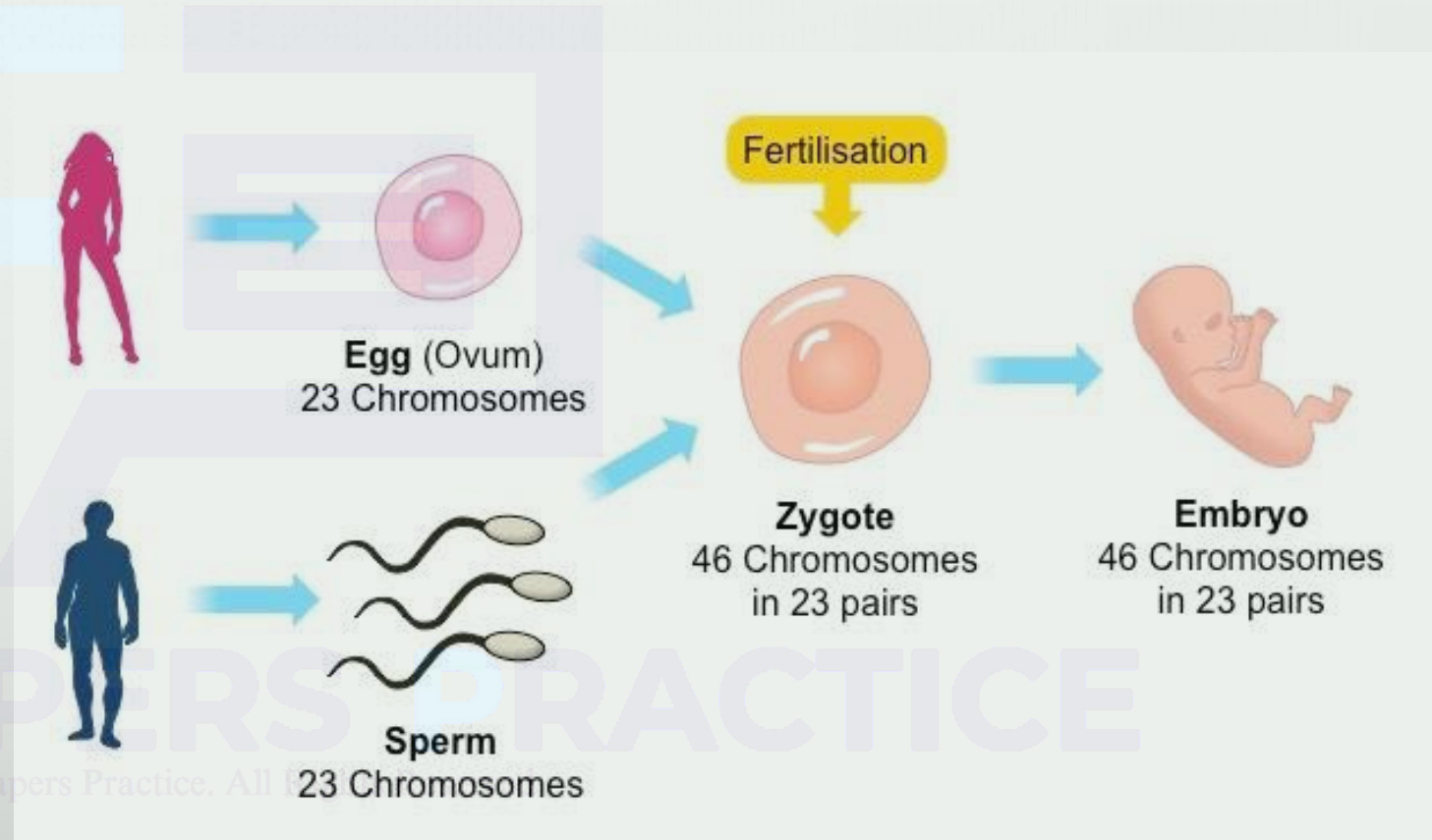


sexual reproduction

meiosis: the process produces new cells with **only half as many chromosomes** as the parent cell.

Diploid cell: a cell which has the full number of chromosomes, with two complete sets.

Haploid cell: an egg or sperm only have a single set of chromosomes.



diploid 二倍体

haploid 单倍体

meiosis 减数分裂

sexual reproduction

What is a gamete?

What is a zygote ?

Why do gamete contain only half the normal number of chromosomes?

What is meant by a diploid cell?

Name one part of your body where you have diploid cells?

What is meant by a haploid cell?

Give one example of a haploid cell?

When do cells divide by meiosis?

What is the purpose of meiosis?

Sexual reproduction in flowering plants



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sexual reproduction in flowering plants

carpel 心皮/雌蕊

stigma 柱头

style 花柱

ovary 子房

ovule 胚珠

petal 花瓣

sepal 花萼

stamen 雄蕊

anther 花药

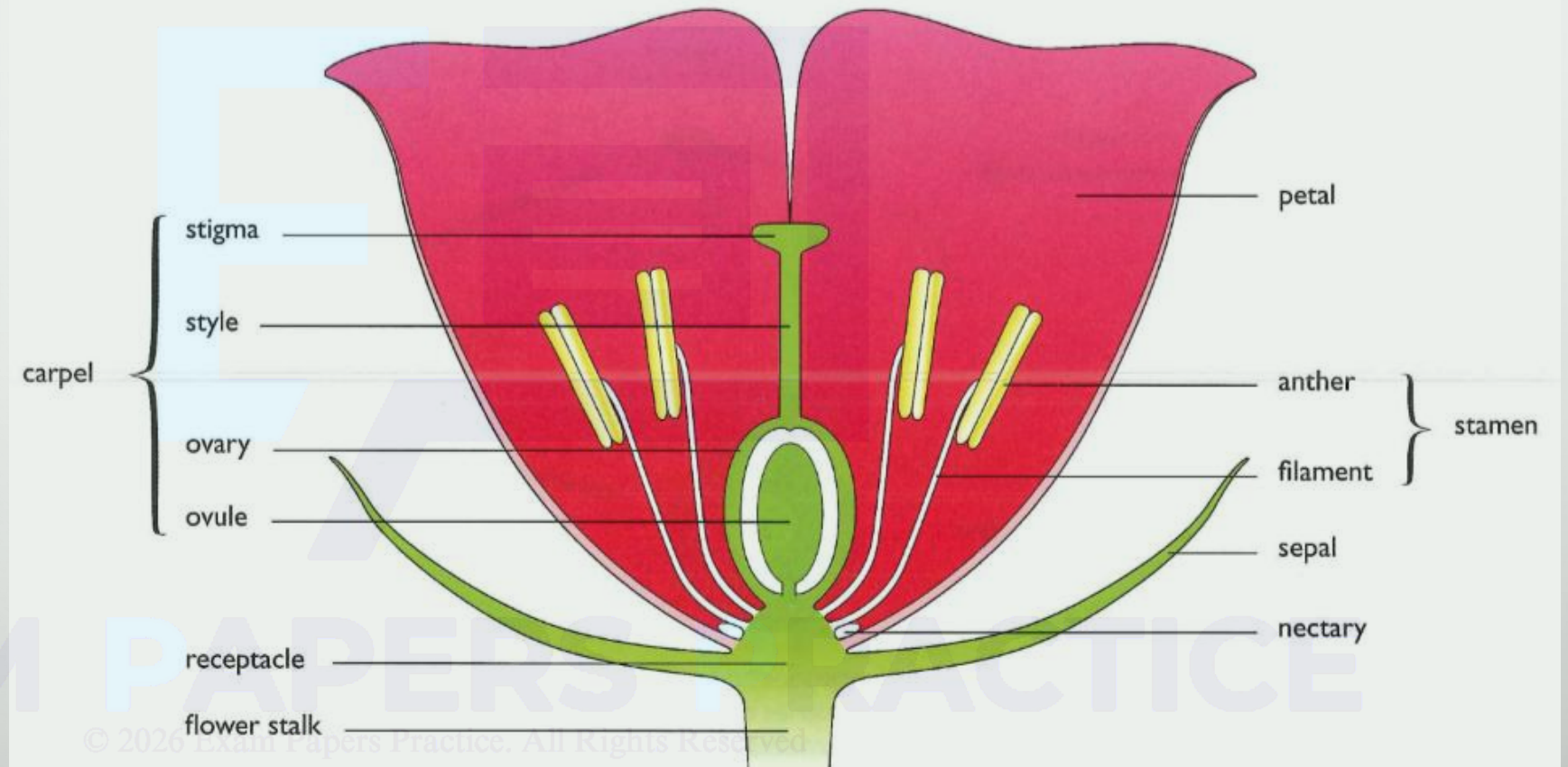
filament 花丝

nectary 蜜腺

receptacle 花托

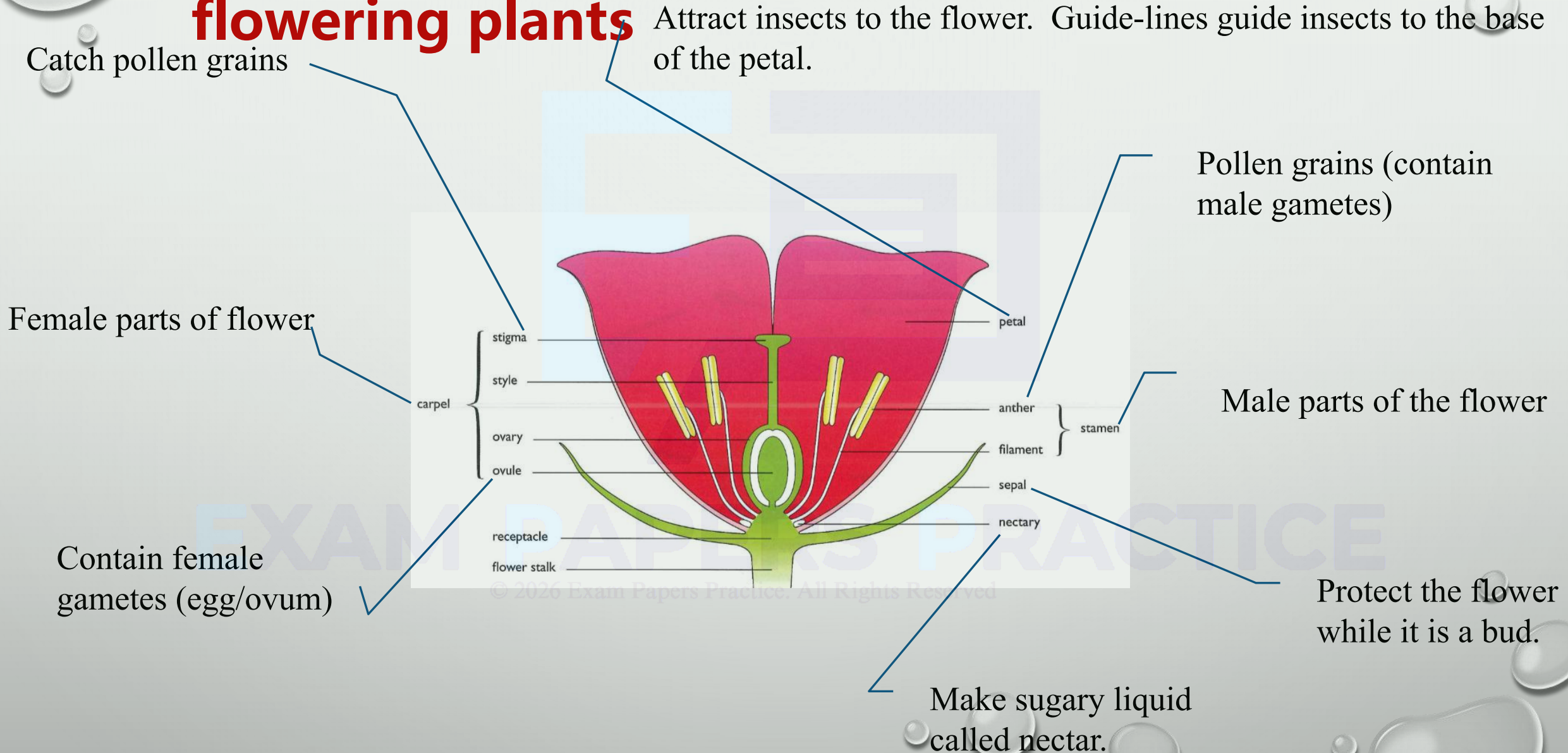
flower stalk 花柄

Hermaphrodite 雌雄同柱



Make gametes, and ensure fertilization take place.

sexual reproduction in flowering plants



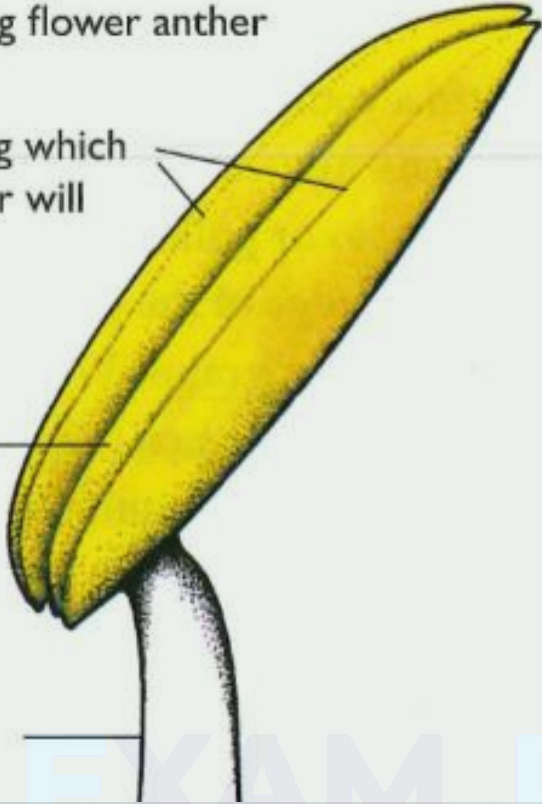
sexual reproduction in flowering plants

a A young flower anther

lines along which
the anther will
split

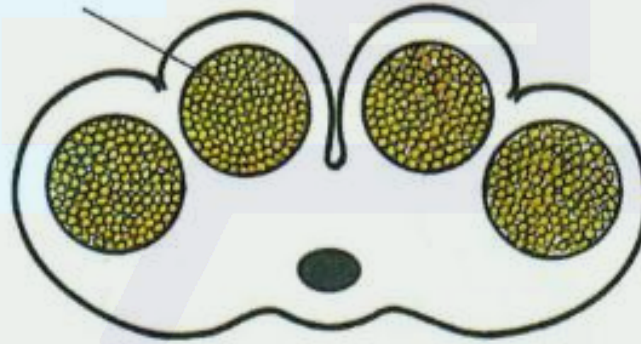
anther

filament



b Transverse section through
a young flower anther

pollen sac, containing
developing pollen grains



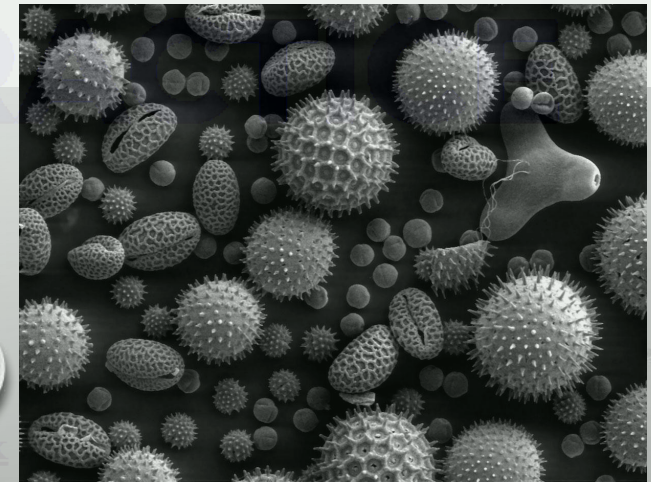
c Transverse section through
a mature flower anther

mature pollen grains



meiosis

pollen sac 花粉囊



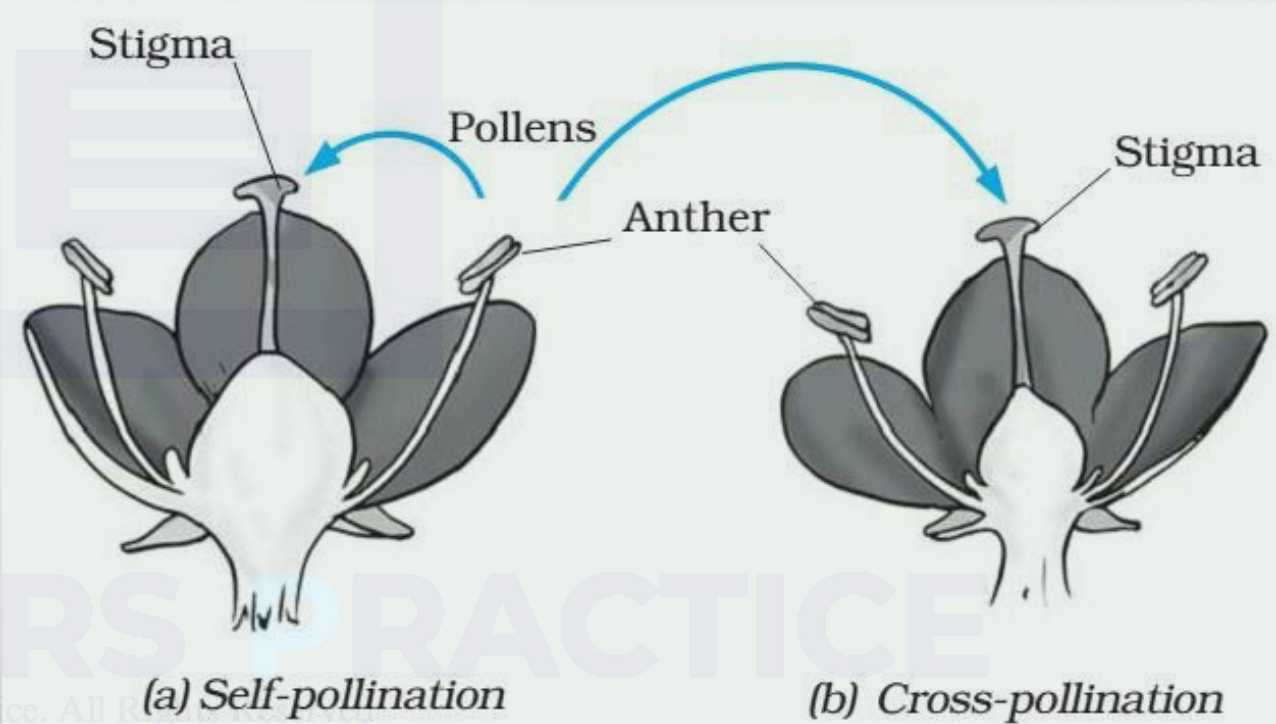
sexual reproduction in flowering plants

How does pollen (male gametes) find female gametes?

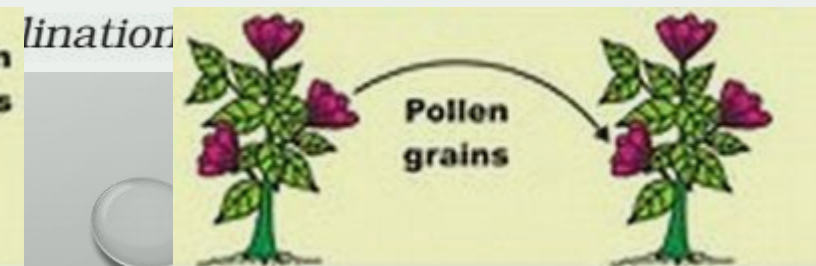
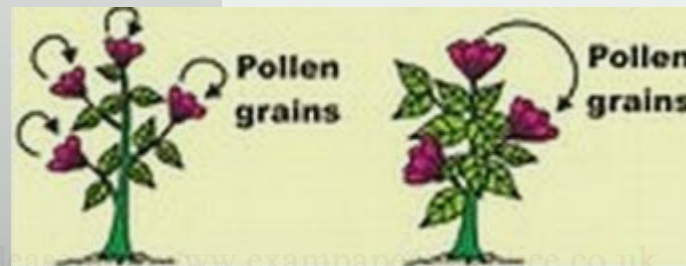
Pollination : the transfer of pollen grains from the male part of the plant (anther of stamen) to the female part of the plant (stigma)

Self-pollination : the transfer of pollen grains from the anther of a flower to the stigma of the same flower, or a different flower on the same plant.

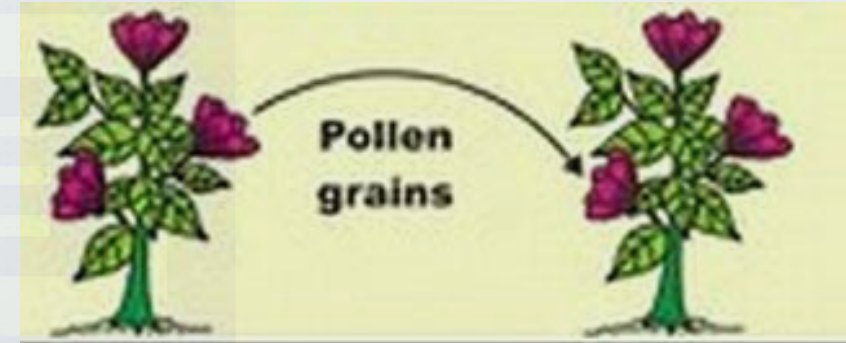
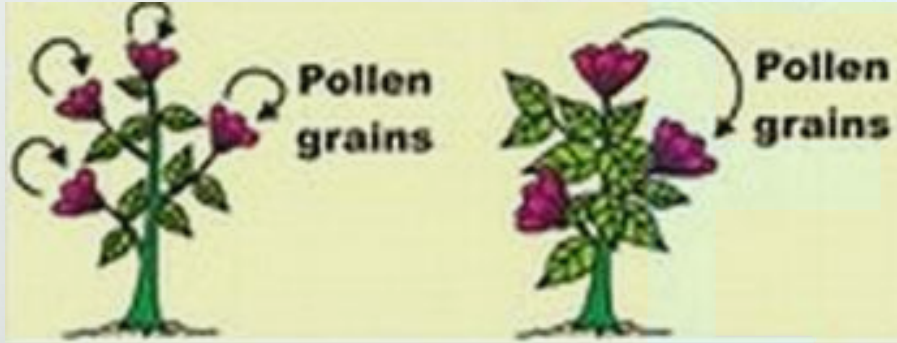
cross-pollination : the transfer of pollen grains from the anther of a flower to the stigma of a flower on a different plant of the same species.



pollination 传粉
self-pollination 自传粉
cross-pollination 异传粉



sexual reproduction in flowering plants



variation

Capacity to respond to changes in the environment

Reliance to pollinators

sexual reproduction in flowering plants

Insect-pollination



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sexual reproduction in flowering plants

wind-pollination



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sexual reproduction in flowering plants



Wind-pollinated flowers



insect-pollinated flowers

sexual reproduction in flowering plants

Adaptations of wind-pollinated flowers and insect-pollinated flowers

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sexual reproduction in flowering plants

	insect-pollinated flowers	Wind-pollinated flowers
shape		
Scent		
Nectary		
Position of anther		
Stigma		
Pollen grains		
Quantities of pollen		



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sexual reproduction in flowering plants

What is the function of a flower?

In which part of a flower are male gametes made?

In which part of a flower are female gametes made?

What is pollination? (self-pollination, cross-pollination)

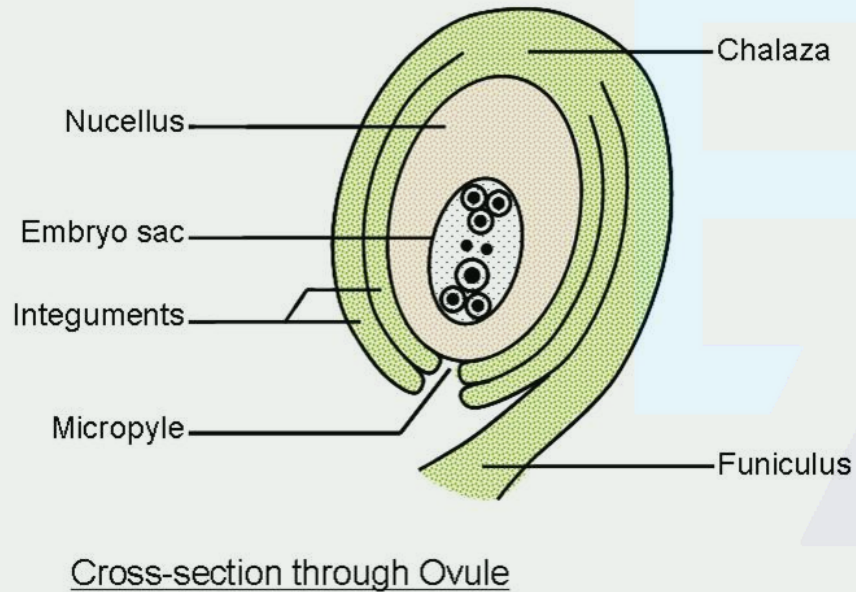
Difference between wind-pollinated flowers and insect-pollinated flowers?

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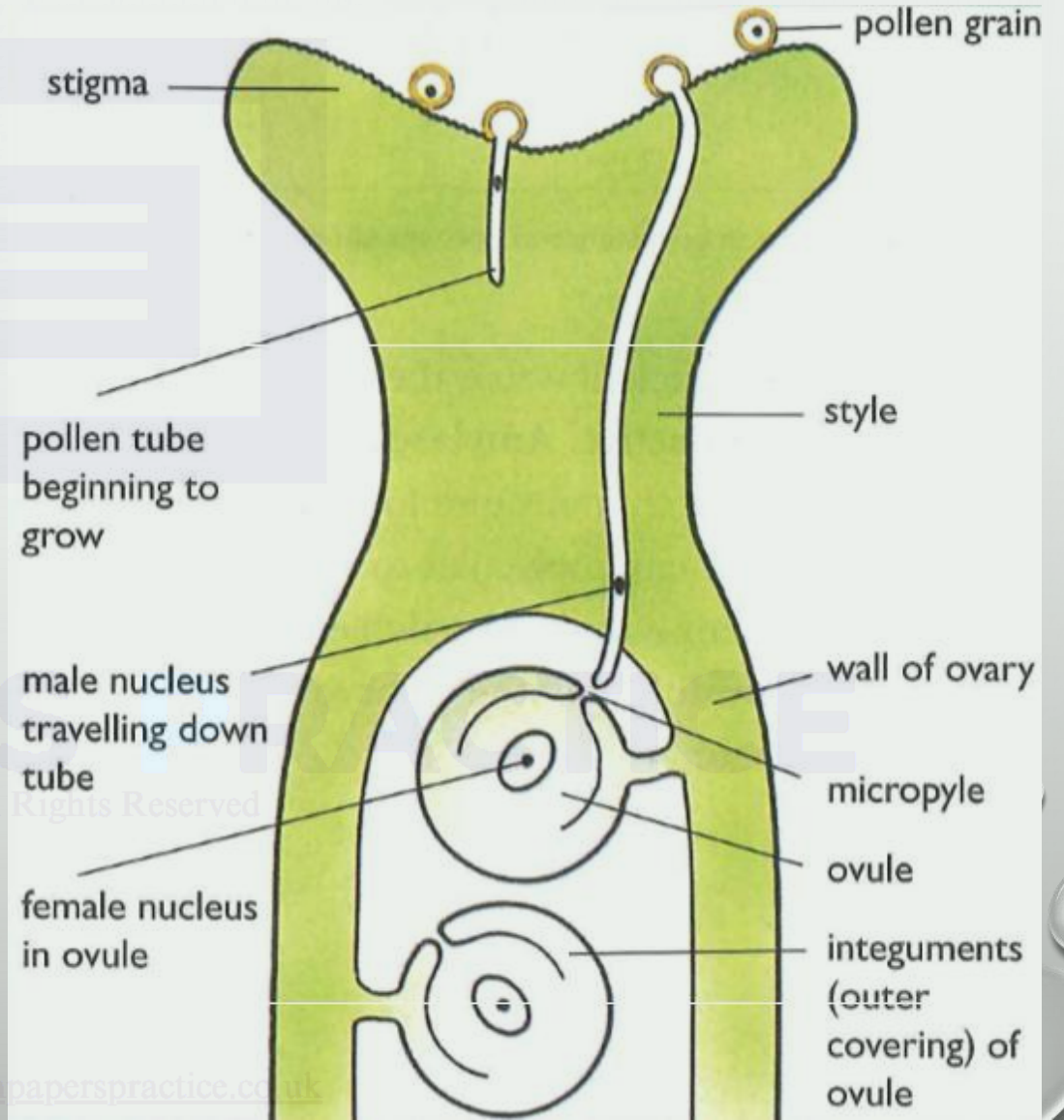
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sexual reproduction in flowering plants

fertilisation



pollen grain 花粉粒
pollen tube 花粉管
micropyle 珠孔
integument 珠被



sexual reproduction in flowering plants

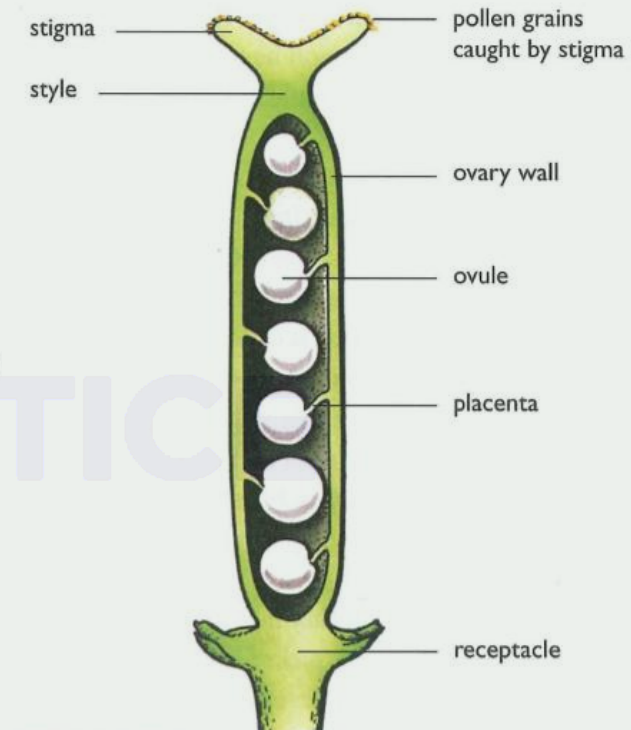
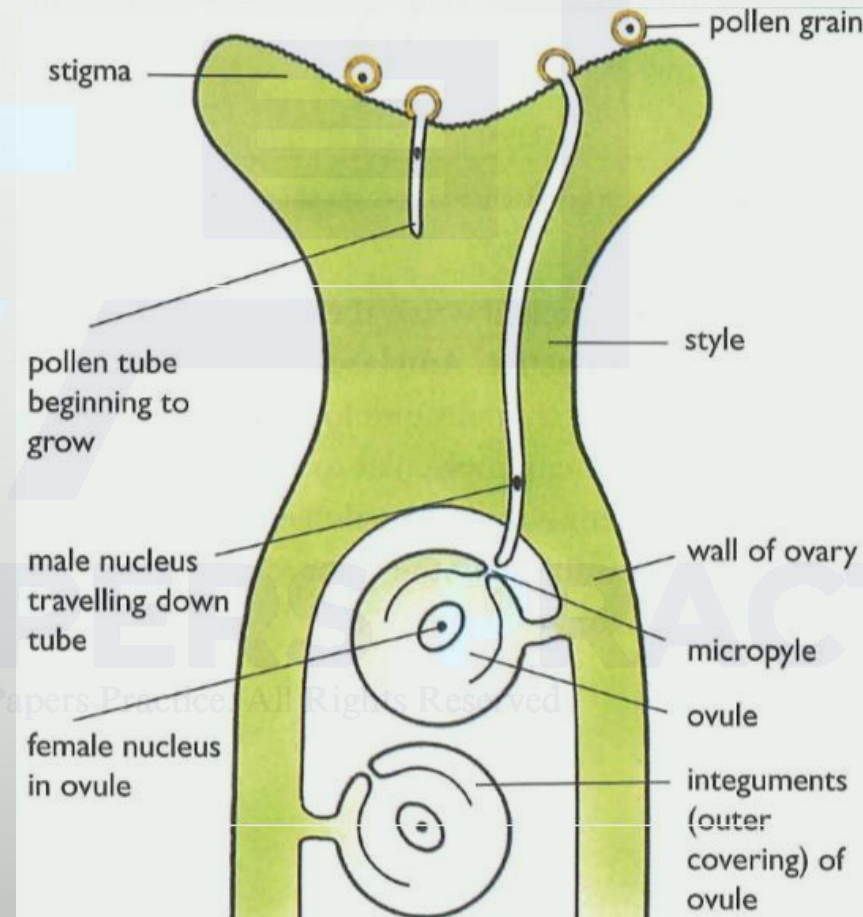
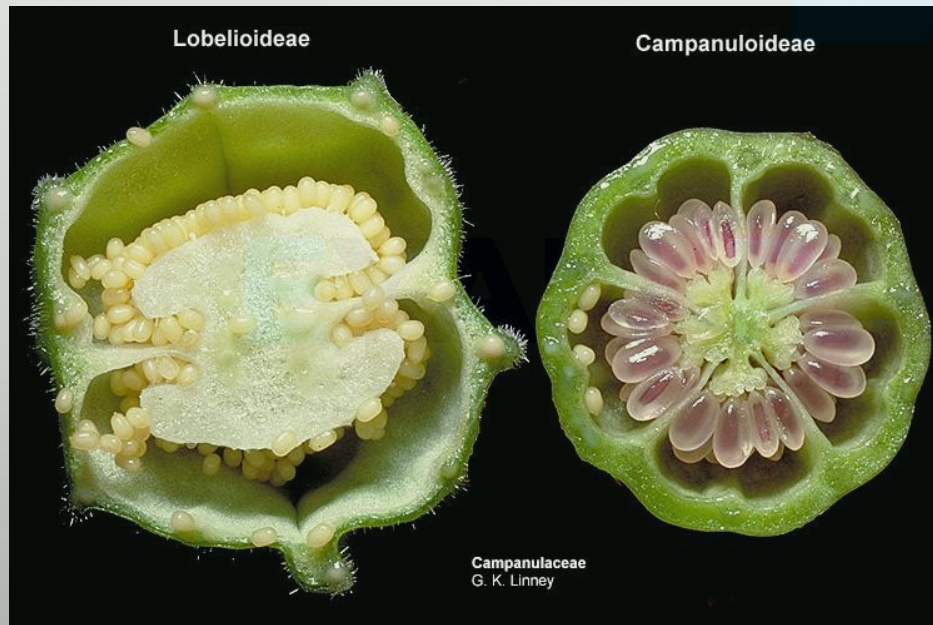
seed

Sepals, petals and stamens will wither and fall off
zygote → embryo (plumule + radicle)

ovule → seed

Integument → testa

ovary → fruit



sexual reproduction in flowering plants

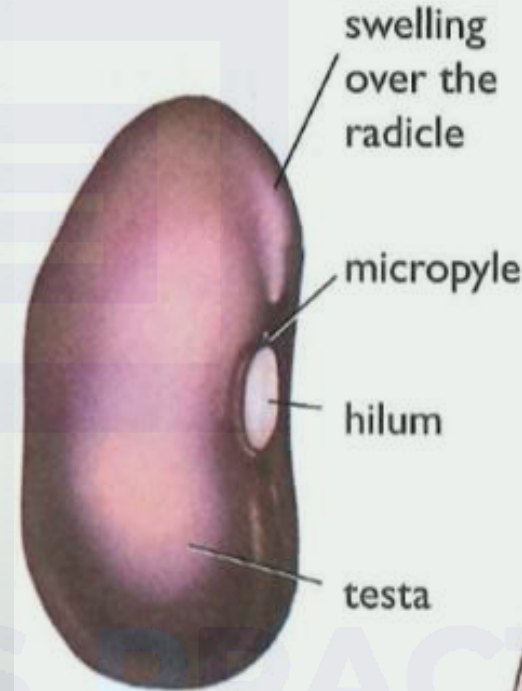
seed

Sepals, petals and stamens will wither and fall off
zygote → embryo (plumule + radicle)
ovule → seed
Integument → testa
ovary → fruit

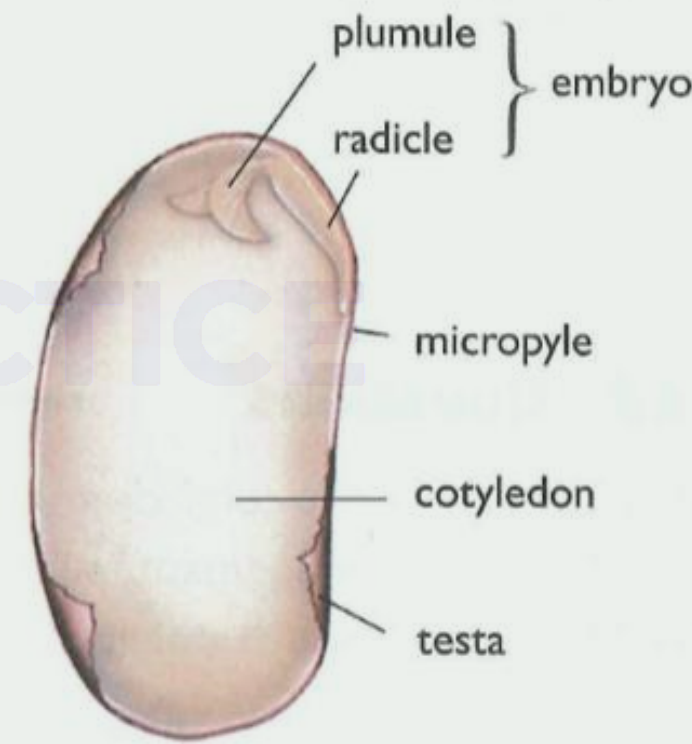
radicle 胚根
embryo 胚胎
plumule 胚芽
cotyledon 子叶

testa 种皮
plumule 胚芽
cotyledon 子叶
hilum 种脐
micropyle 珠孔

Whole bean seed



Bean seed split lengthways



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sexual reproduction in flowering plants

After pollination, how does the male gamete reach the ovule?

What is a micropyle?

What happens to each of the following once a flower's female gametes have been fertilised?

- a. Petals
- b. Stamens
- c. Zygote
- d. Ovule
- e. Integument of the ovules
- f. ovary

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sexual reproduction in flowering plants



receptacle 花托
flower stalk 花柄

Reproduction in humans



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Reproduction in humans

Human reproductive

Ovary: where eggs are made

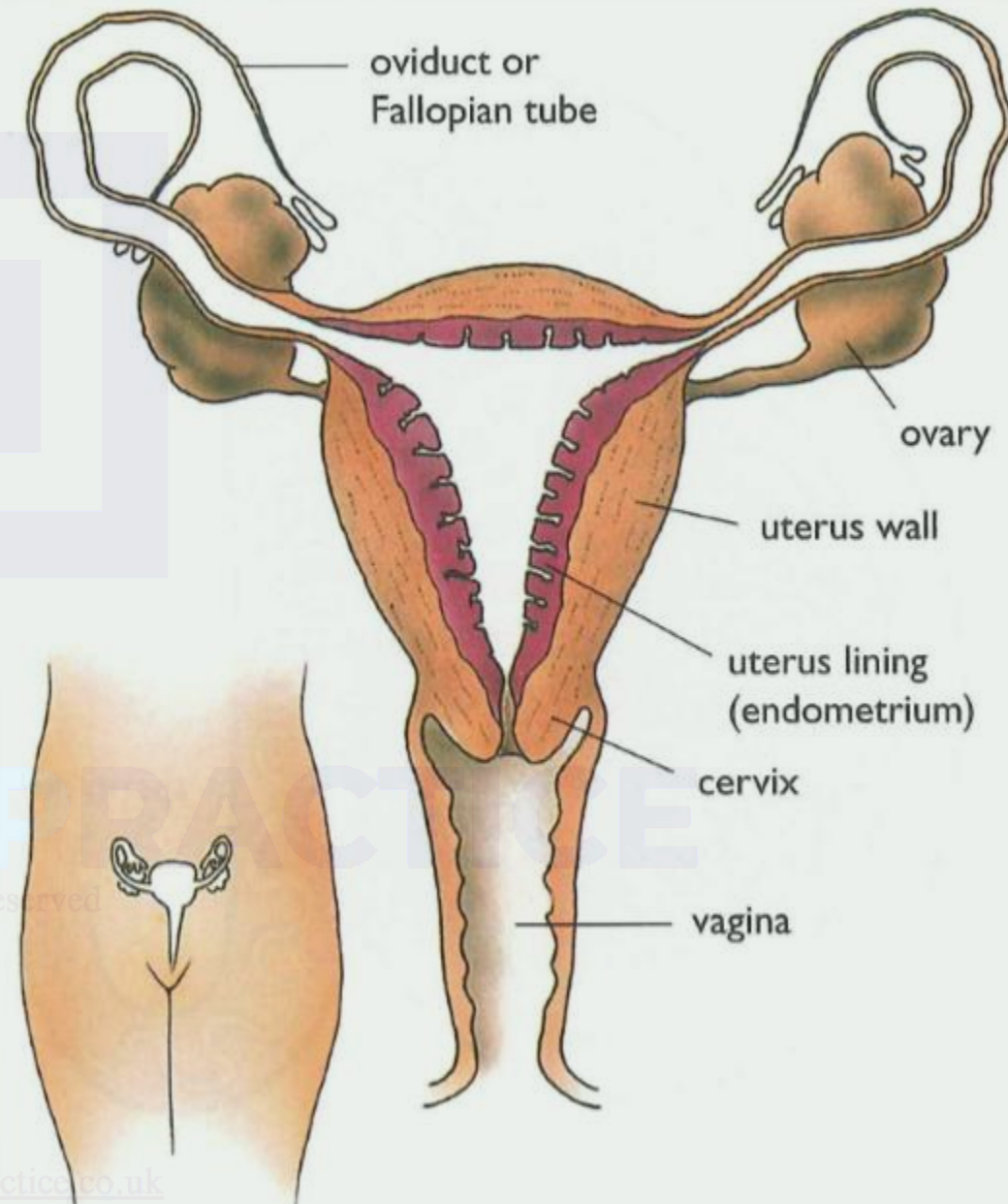
Oviduct: leads eggs to uterus

Uterus: where embryo and fetus develop (muscular walls)

Cervix: narrow opening of uterus

Vagina: opens uterus to the outside

ovary 卵巢
oviduct 输卵管
uterus 子宫
uterus lining 子宫内壁
Uterus wall 子宫壁
cervix 子宫颈
vagina 阴道
urethra 尿道
rectum 直肠



Reproduction in humans

Human reproductive organs

Testes: where make sperm

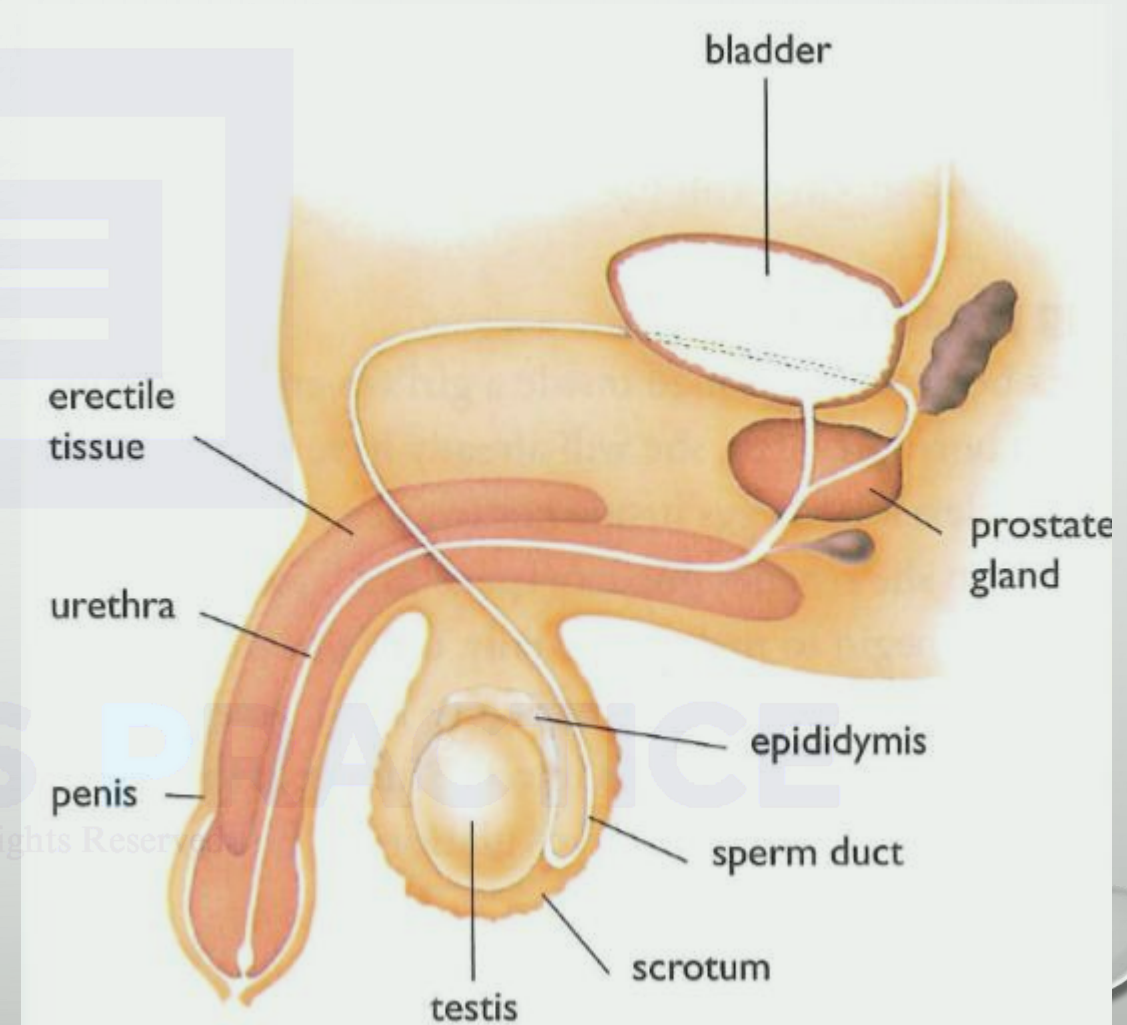
Scrotum: sacs of testes

Sperm duct: carry sperm

Prostate gland: make a fluid which the sperm swim in

Urethra : carry urine and sperm

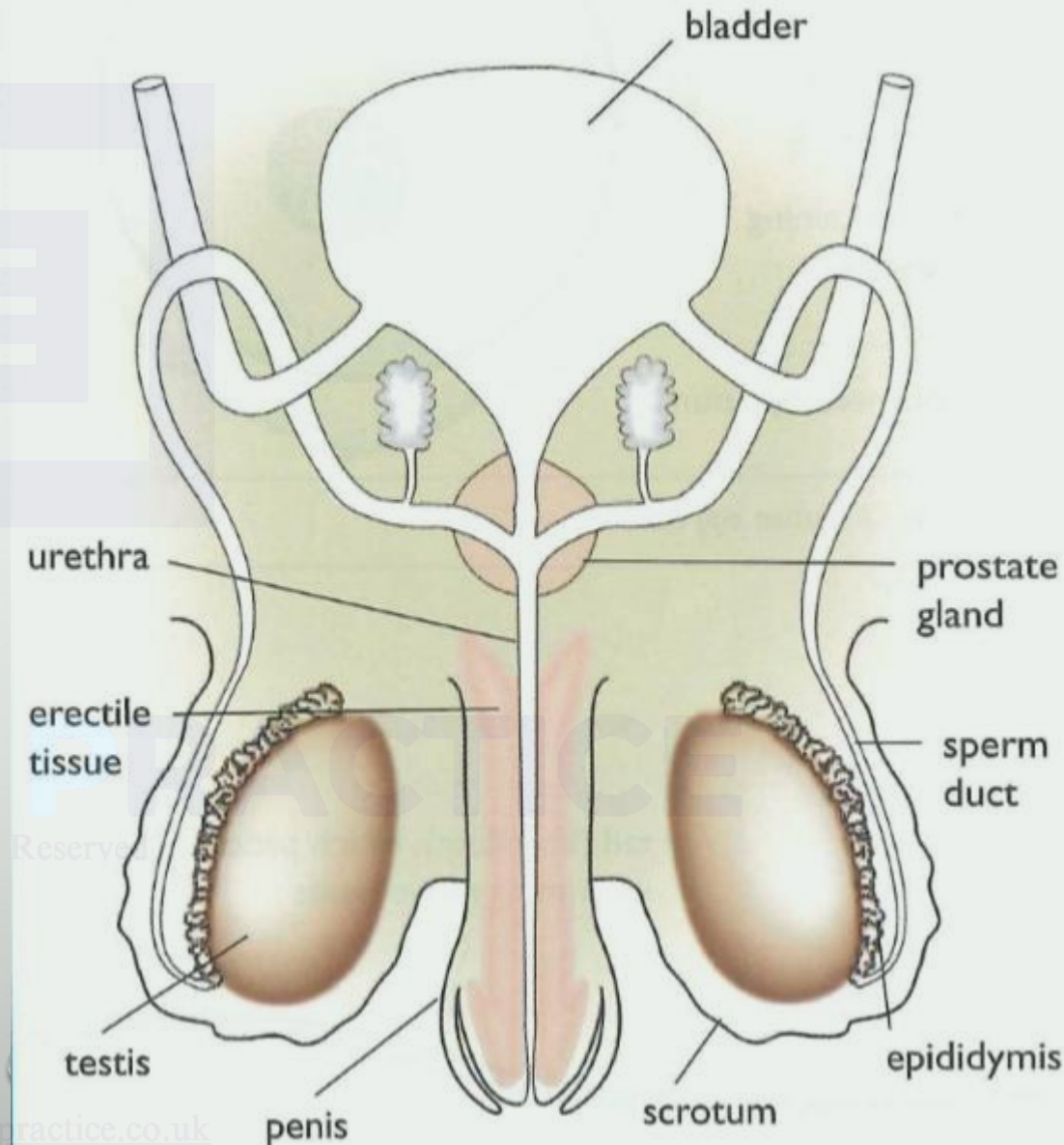
testis 睪丸
scrotum 陰囊
sperm duct 輸精管
prostate gland 前列腺
penis 阴茎
urethra 尿道



Reproduction in humans

Human reproductive organs

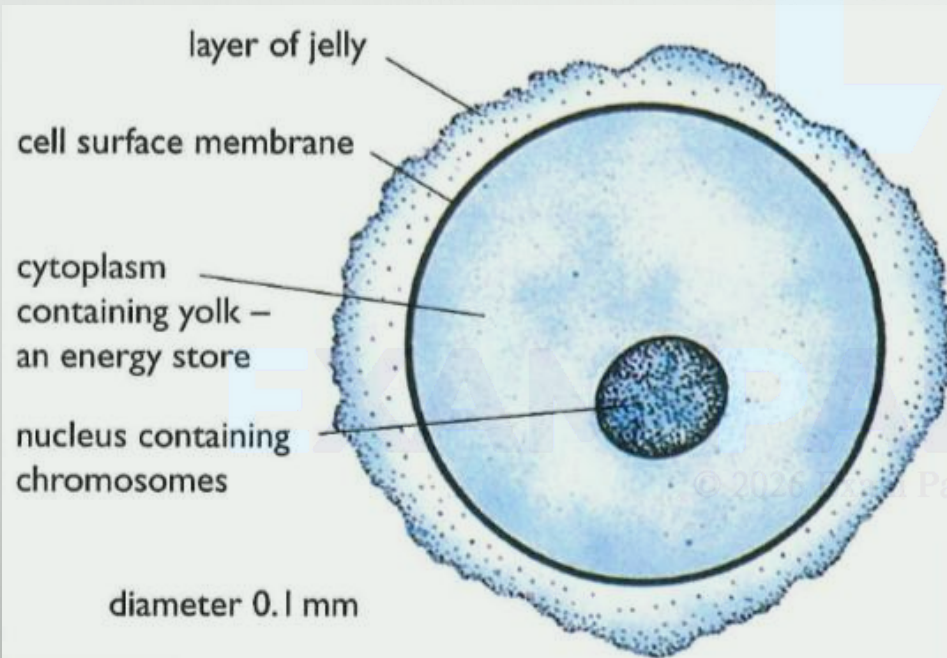
testis 睪丸
scrotum 陰囊
sperm duct 輸精管
prostate gland 前列腺
penis 阴茎
urethra 尿道



Reproduction in humans

Ovulation: when egg in ovary is mature, an egg cell bursts out of the ovary and into the funnel at the end of the oviduct.

Adaptive features of eggs
yolk : an energy store



ovulation 排卵
puberty 青春期

Human reproductive organs

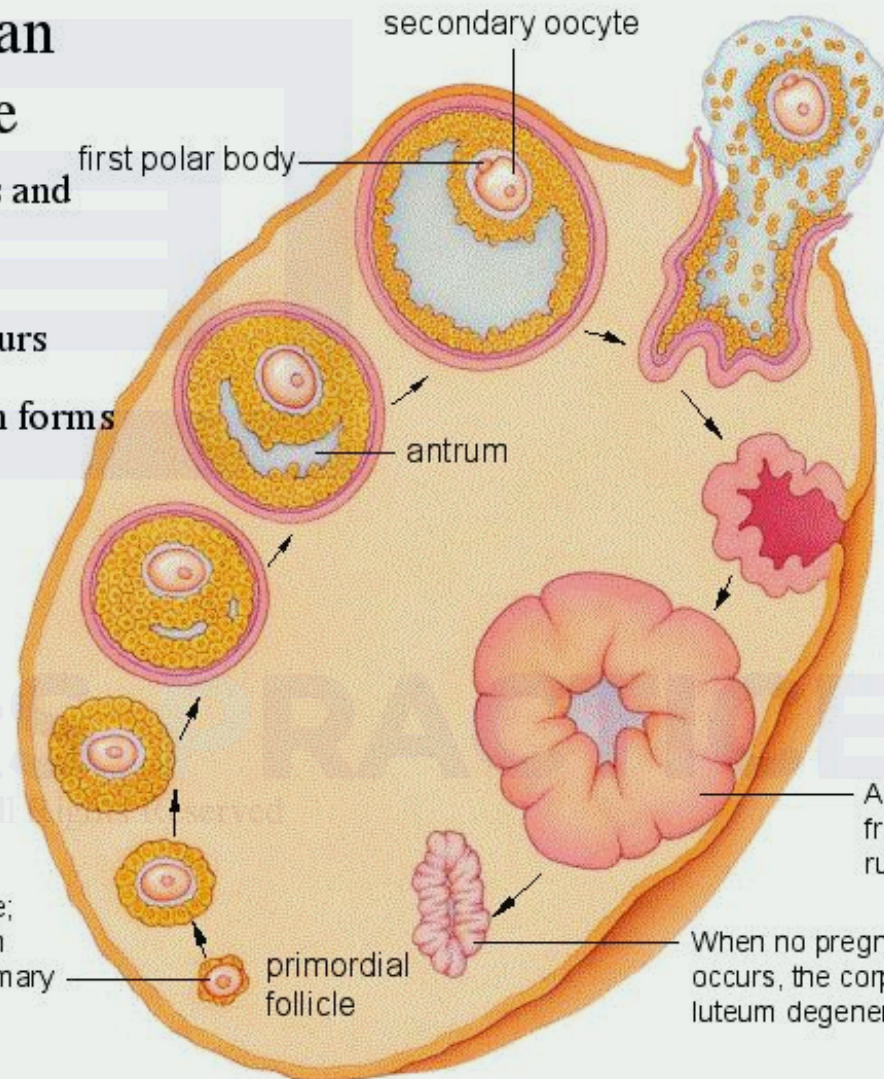
Ovarian cycle

Follicle grows and matures

Ovulation occurs

Corpus luteum forms

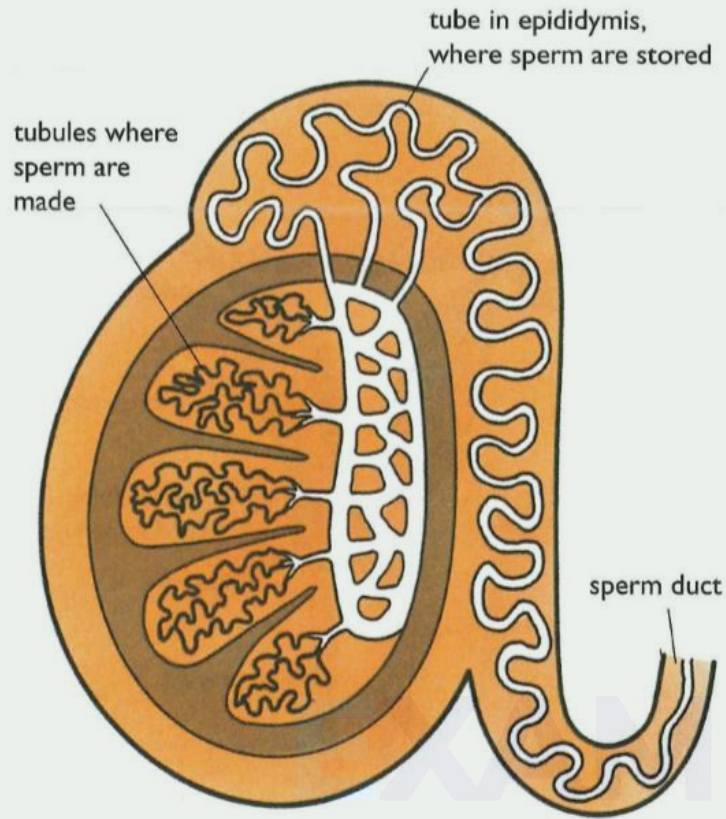
A primordial follicle; meiosis I has been arrested in the primary oocyte inside it.



Ovulation. Mature follicle ruptures and releases the secondary oocyte and the first polar body.

© 2001 Brooks/Cole - Thomson Learning

Reproduction in humans



tubule 细管

Human reproductive organs

Sperm develop from cells in the walls of the tubules in testes (meiosis)

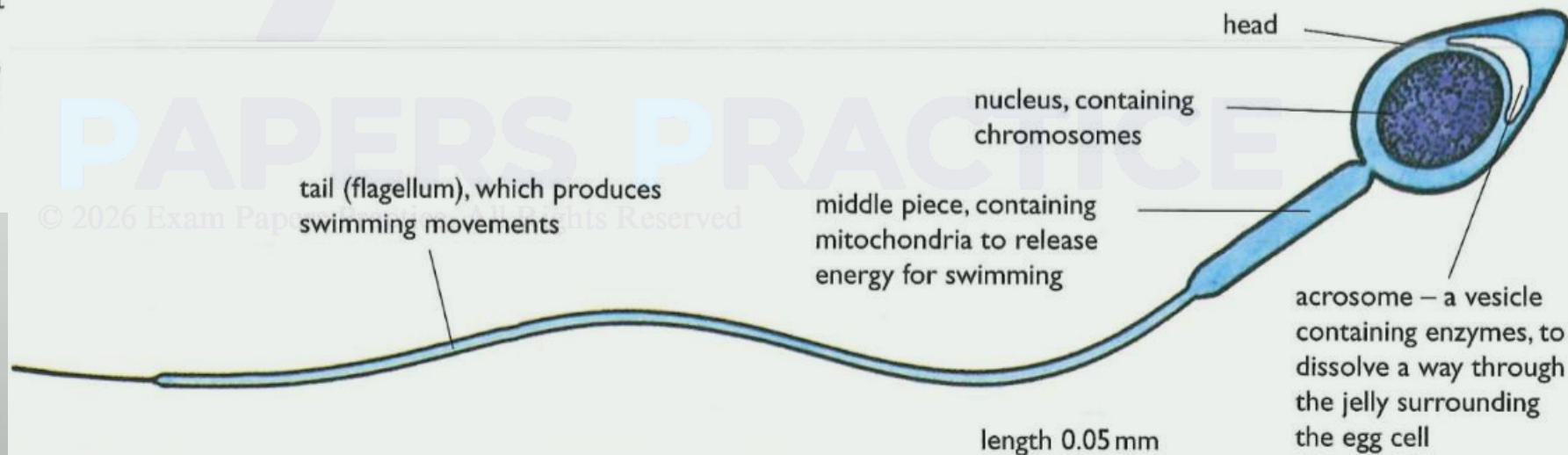
Head, middle piece, tail

Adaptive features of sperm

Acrosome(in head) : have enzymes to dissolve a way through the jelly surrounding the egg cell

tail : produce swimming movements

Middle piece : contain mitochondria to release energy



Reproduction in humans

Human reproductive organs

	sperm	ovum
Size		
Structure		
Motility		
number		

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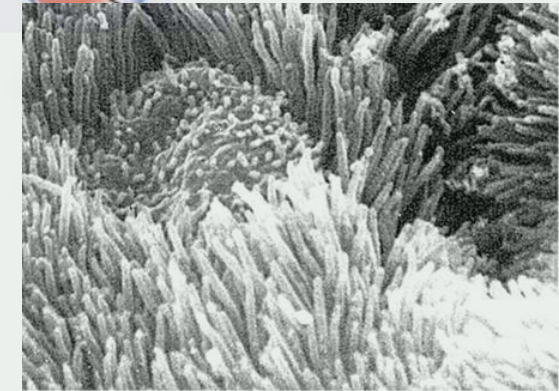
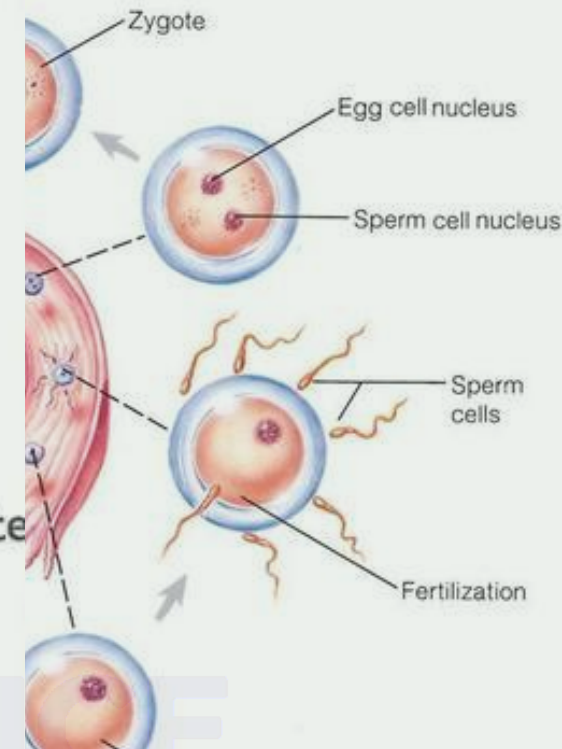
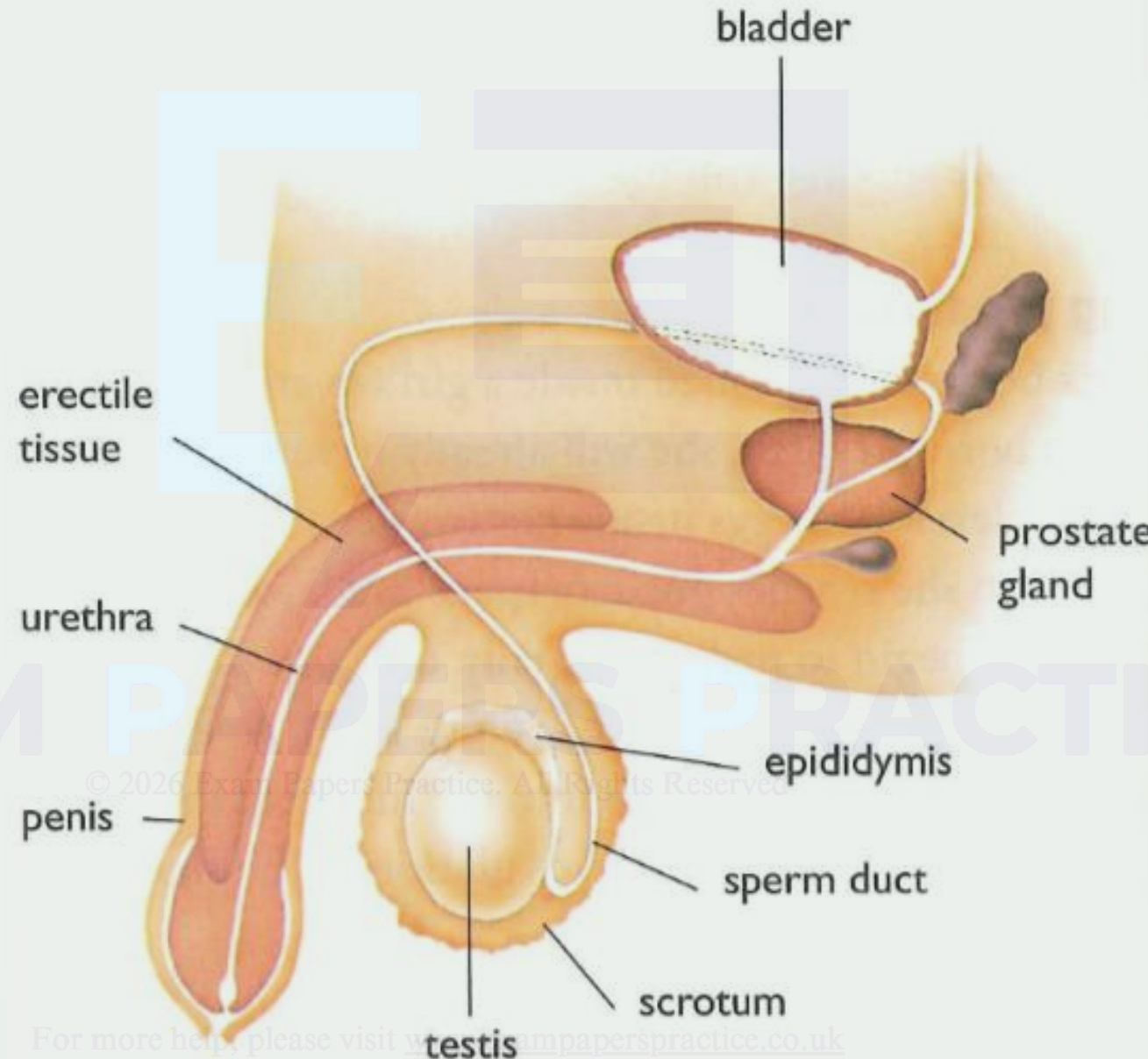
Reproduction in humans

Fertilisation

Moving eggs

- ◆ Cilia wafting
- ◆ Peristalsis of oviduct

cilium 绒毛
peristalsis 蠕动
sexual intercourse 性交
erectile tissue 勃起组织
ejaculation 射精
semen 精液



Reproduction in humans

Fertilisation

Moving eggs

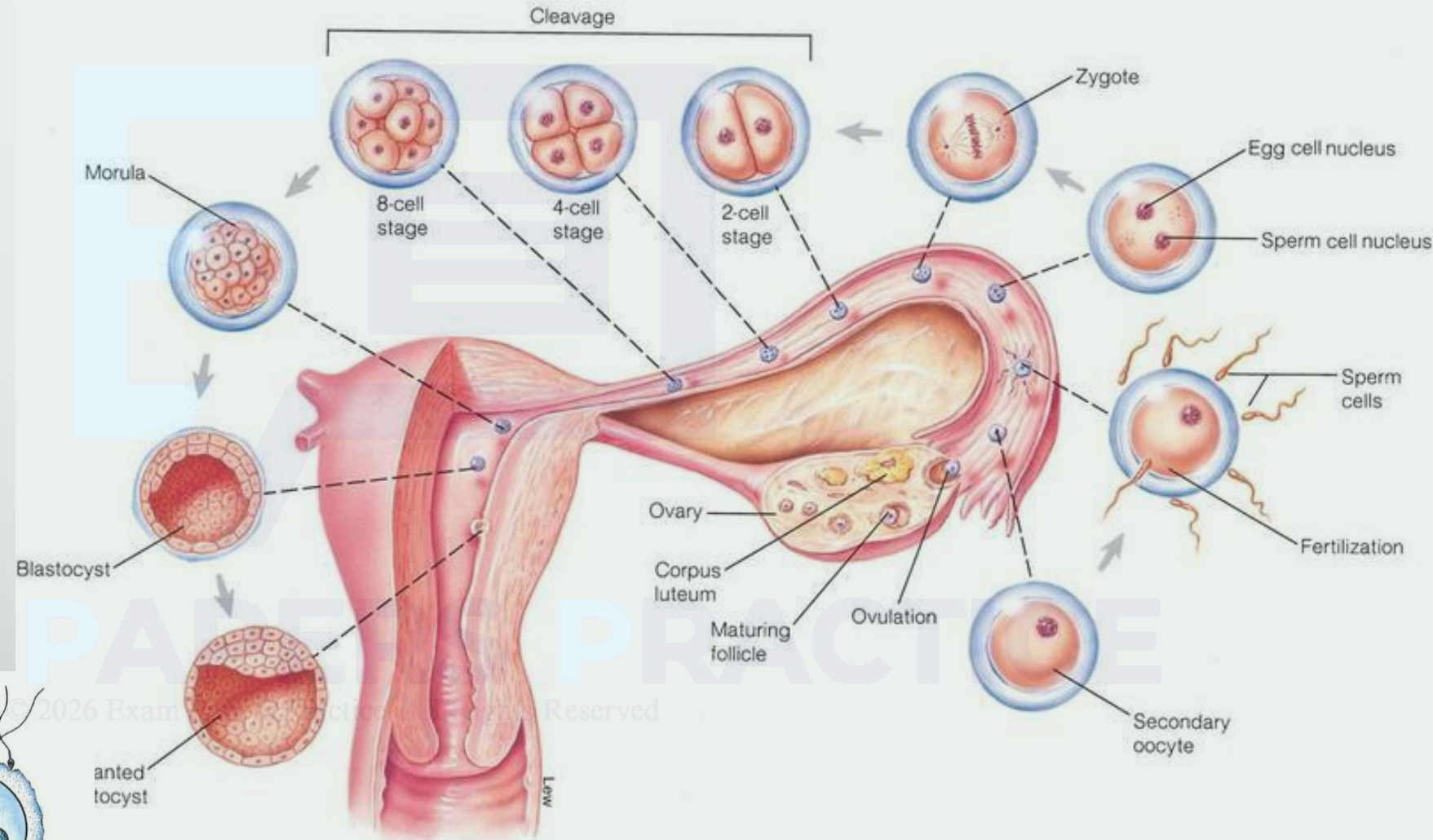
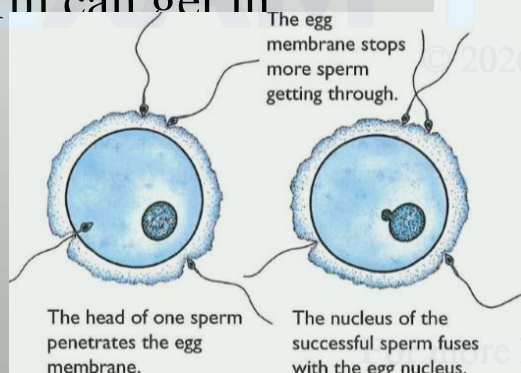
- ◆ Cilia wafting
- ◆ Peristalsis of oviduct

fertilisation

the nucleus of the sperm fuses with the nucleus of the egg

Adaptive features of eggs

- ◆ **yolk** : an energy store
- ◆ As soon as the successful sperm enters the egg, the egg membrane becomes impenetrable, so no other sperm can get in



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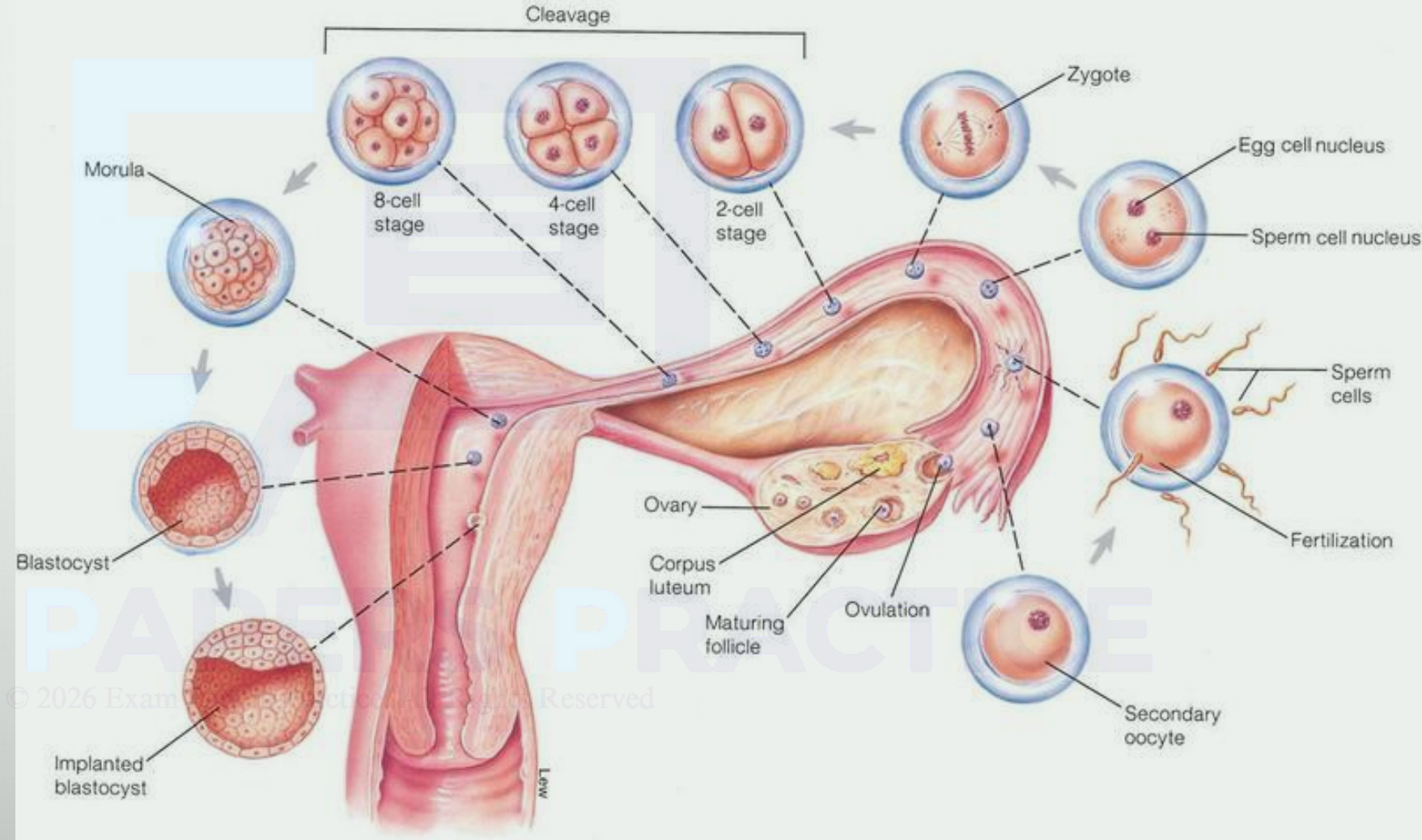
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Reproduction in humans

implantation

implantation

Embryo sinks into thin, spongy uterus lining.



embryo 胚胎
implantation 着床

Reproduction in humans

Placenta

Where substances are exchanged between the mother's blood and embryo's blood.

Umbilical cord

Blood exchange between fetus and mother.

Dissolved nutrients, gases and excretory products, and providing a barrier to toxins and pathogens

Except nicotine, carbon monoxide, rubella virus.

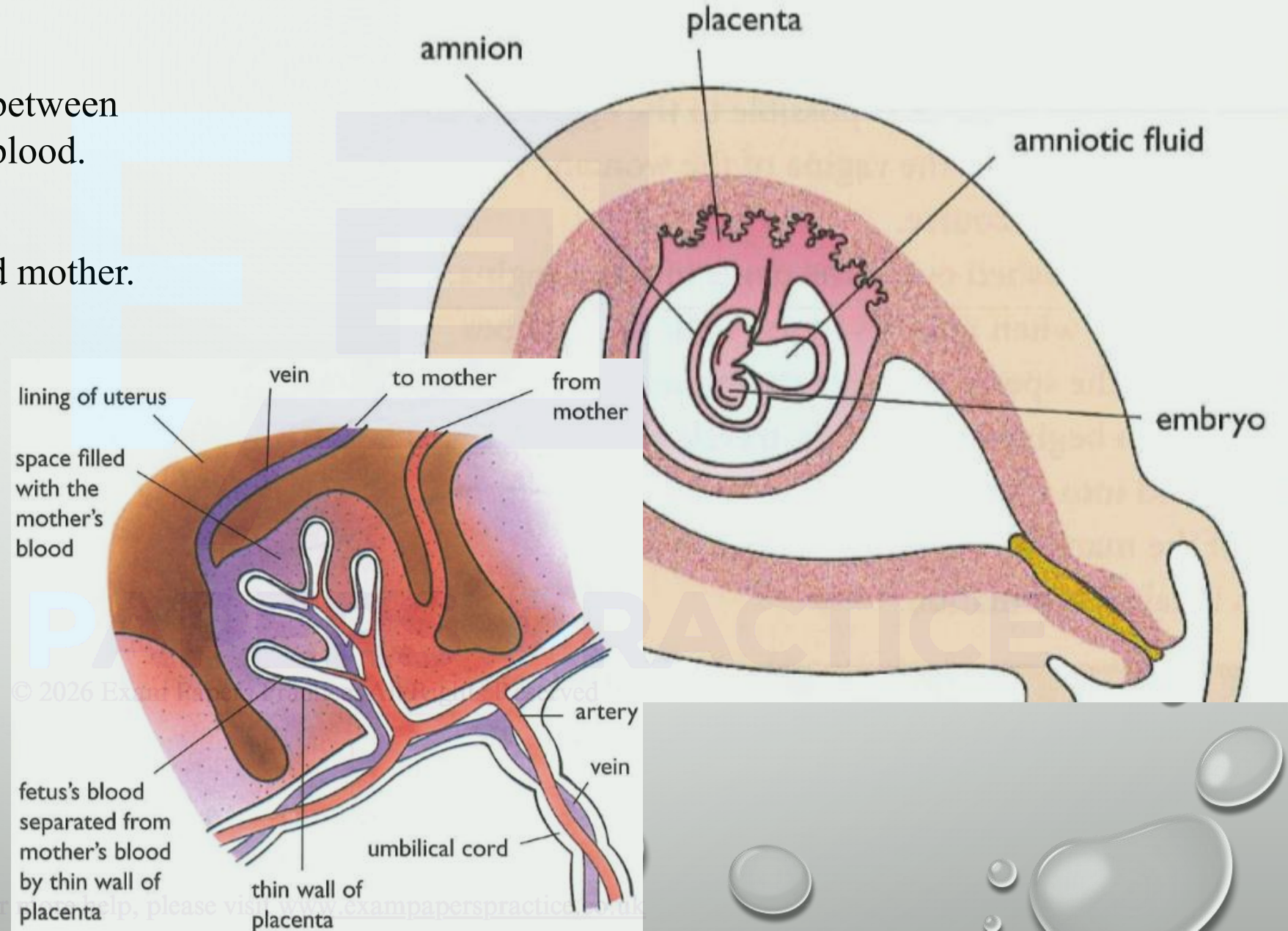
placenta 胎盘

amniotic fluid 羊水

amnion 羊膜

amnion sac 羊膜囊

Placenta and amnion



Reproduction in humans

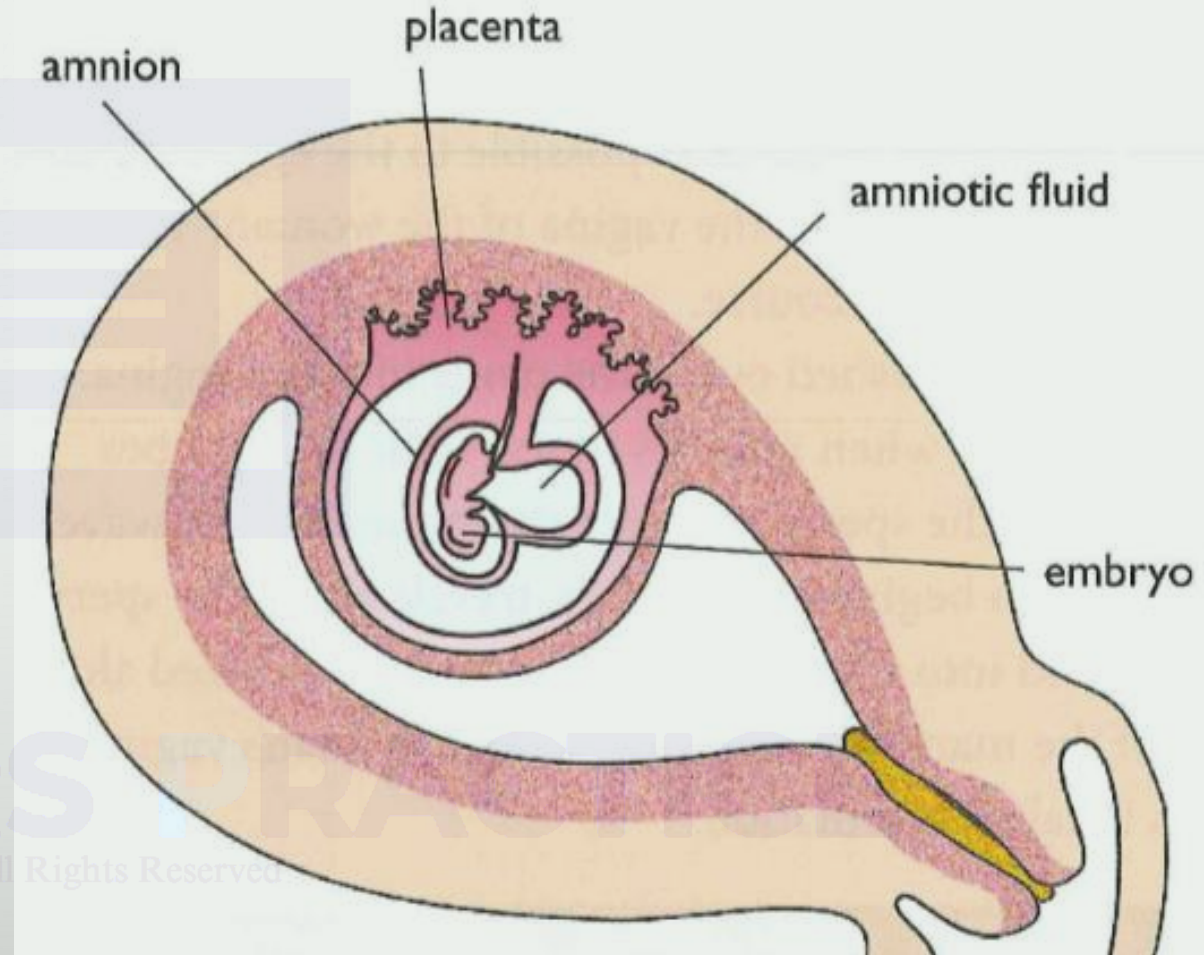
Placenta and amnion

Amnion

A strong membrane surrounding the fetus

Amnion fluid

Help to support the embryo, and to protect it.



placenta 胎盘
amniotic fluid 羊水
amnion 羊膜

Reproduction in humans

Development of the embryo

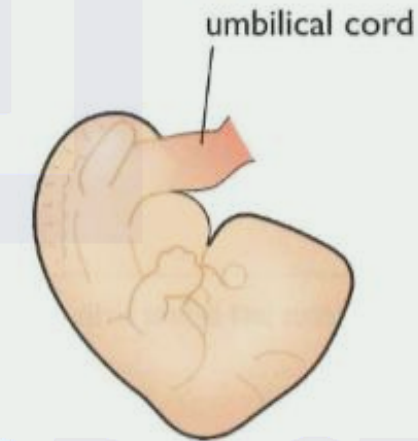
By 10 or 11 weeks, all of the organs are in place, and the embryo is now called a fetus.

fetus 胎儿



6 weeks

All the organs have begun to grow.



8 weeks

Most organs are now present. Some movements occur.



10 weeks

All organs are now developed and more movements occur.

Reproduction in humans

Diet

Calcium → bone

Iron → blood (haemoglobin)

Carbohydrate → energy

exercise

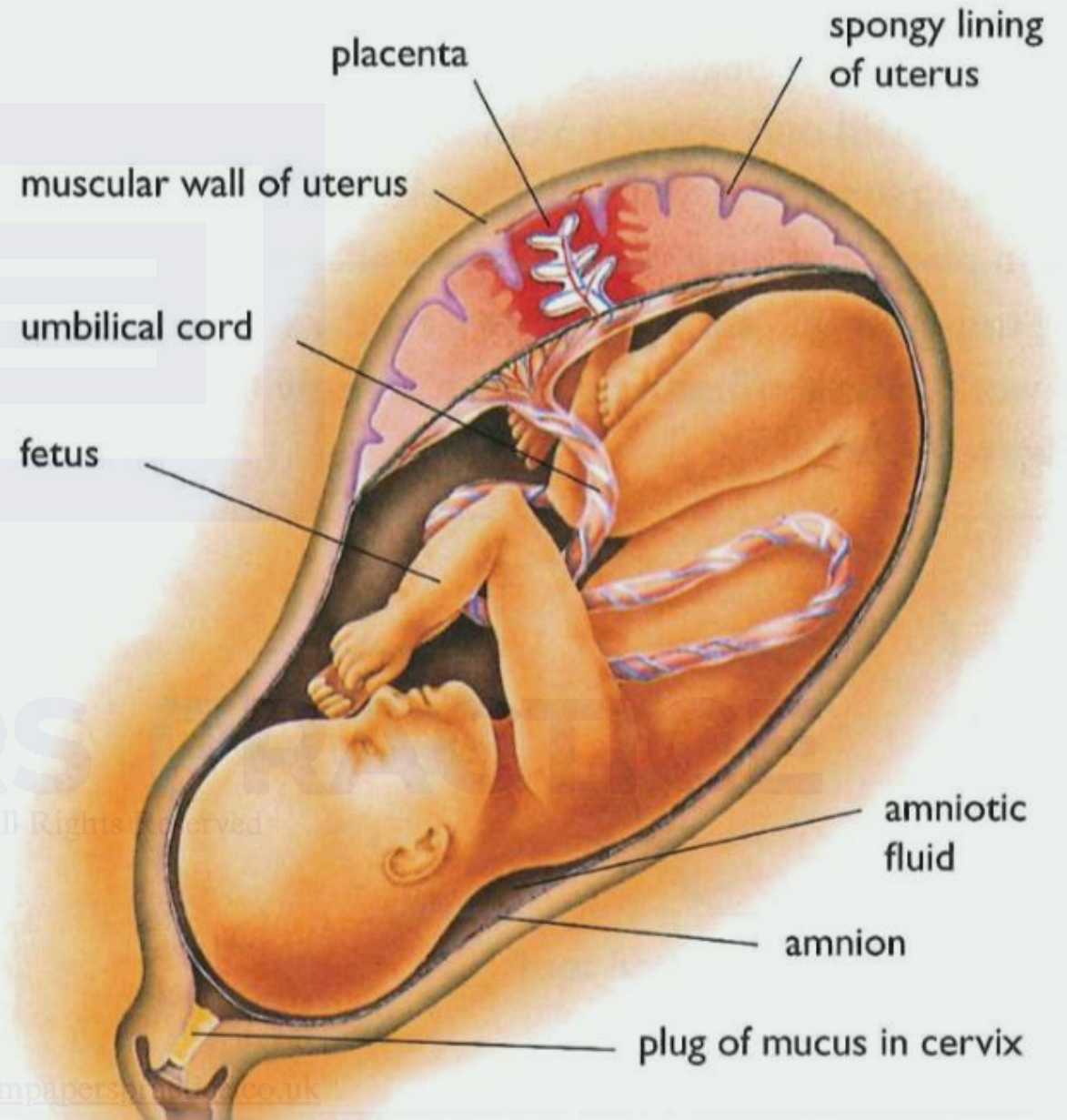
Harmful substance

Smoking (nicotine, carbon monoxide)

Some pathogen (rubella virus)

antenatal 产前的

Ante-natal care



Reproduction in humans

Birth

Breaking of the amniotic sac



Contraction of the muscles in the uterus



Dilation of the cervix



Passage through the vagina



Tying and cutting the umbilical cord



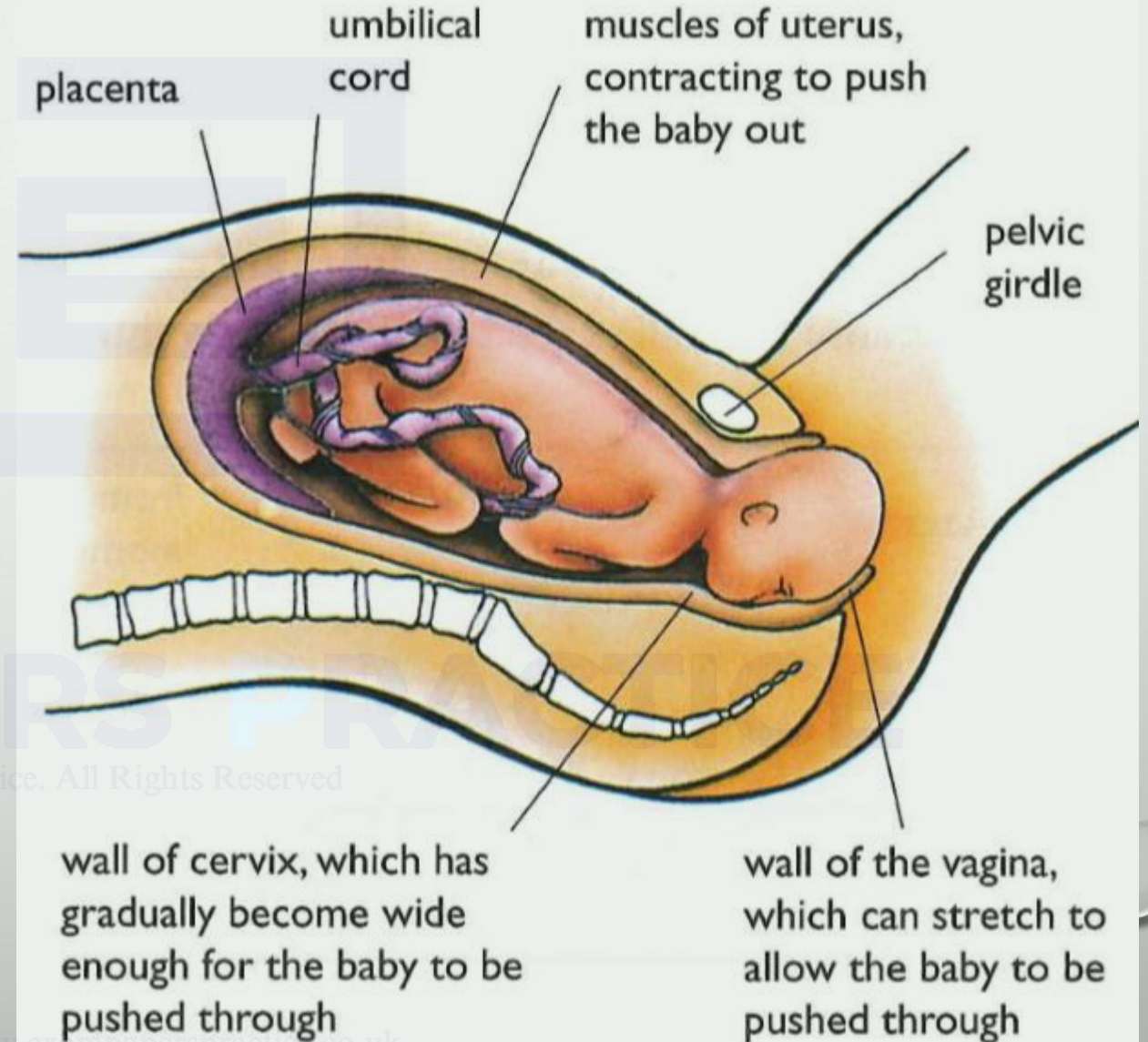
Delivery of the afterbirth

labour 分娩

navel 肚脐

dilation 扩张

afterbirth 胞衣



Reproduction in humans

Breast feeding (breast milk)

Comprehensive nutrition

Antibody

Breast milk changes as the baby grows

bottle feeding (formula milk)

Expensive

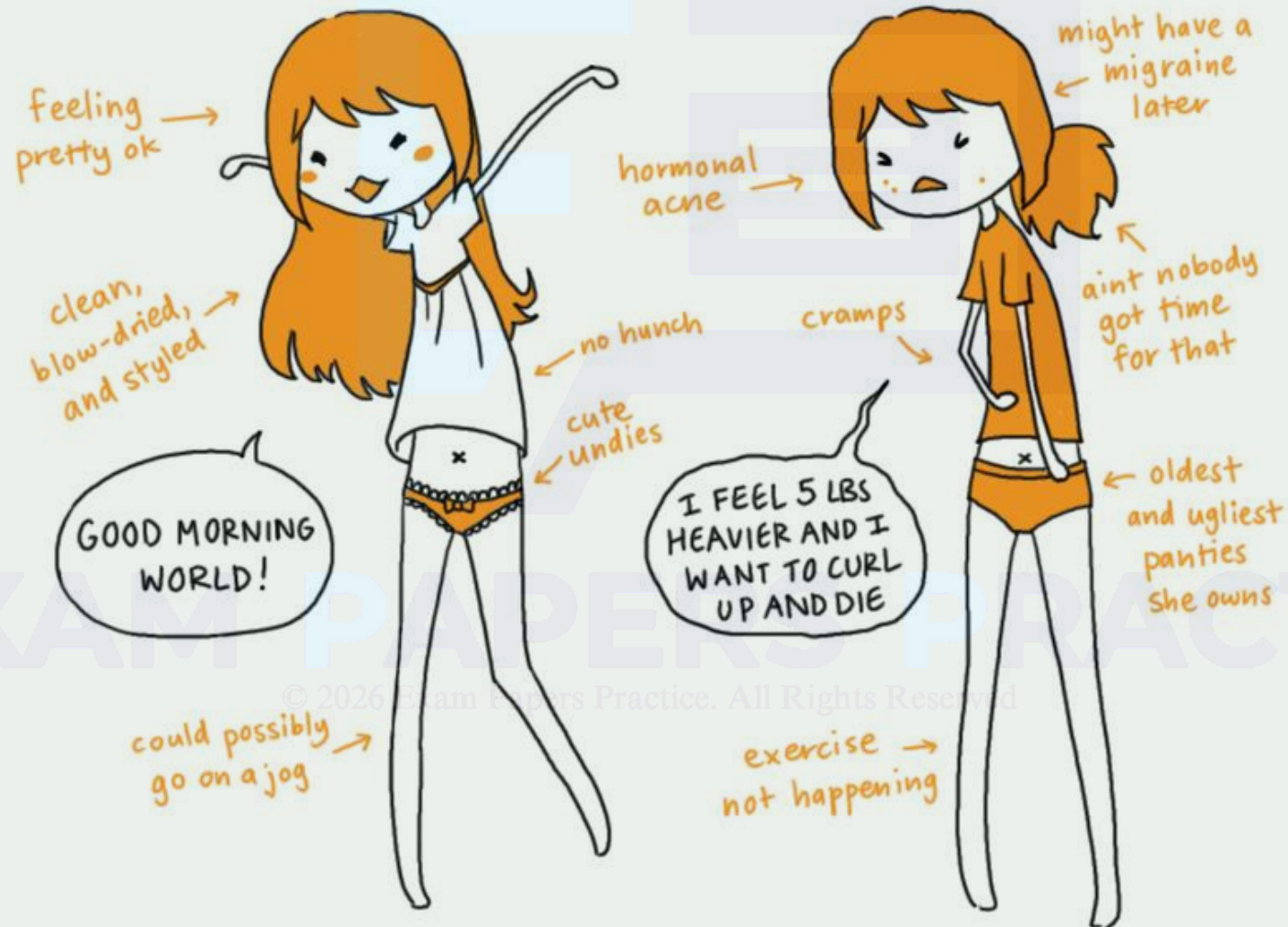
May have bacteria

Caring for a young baby



lactation 哺乳

Normal Days vs Period Days



Reproduction in adolescence humans

primary sexual characteristics
(reproductive organ)

Secondary sexual characteristics

In boys: growth of facial and pubic hair,
breaking of voice, muscular develop

In girls: breast developing, breast
develop, pelvic girdle become broader

Testosterone

Oestrogen

Puberty/adolescence 青春期

Primary sexual characteristics 第一性征

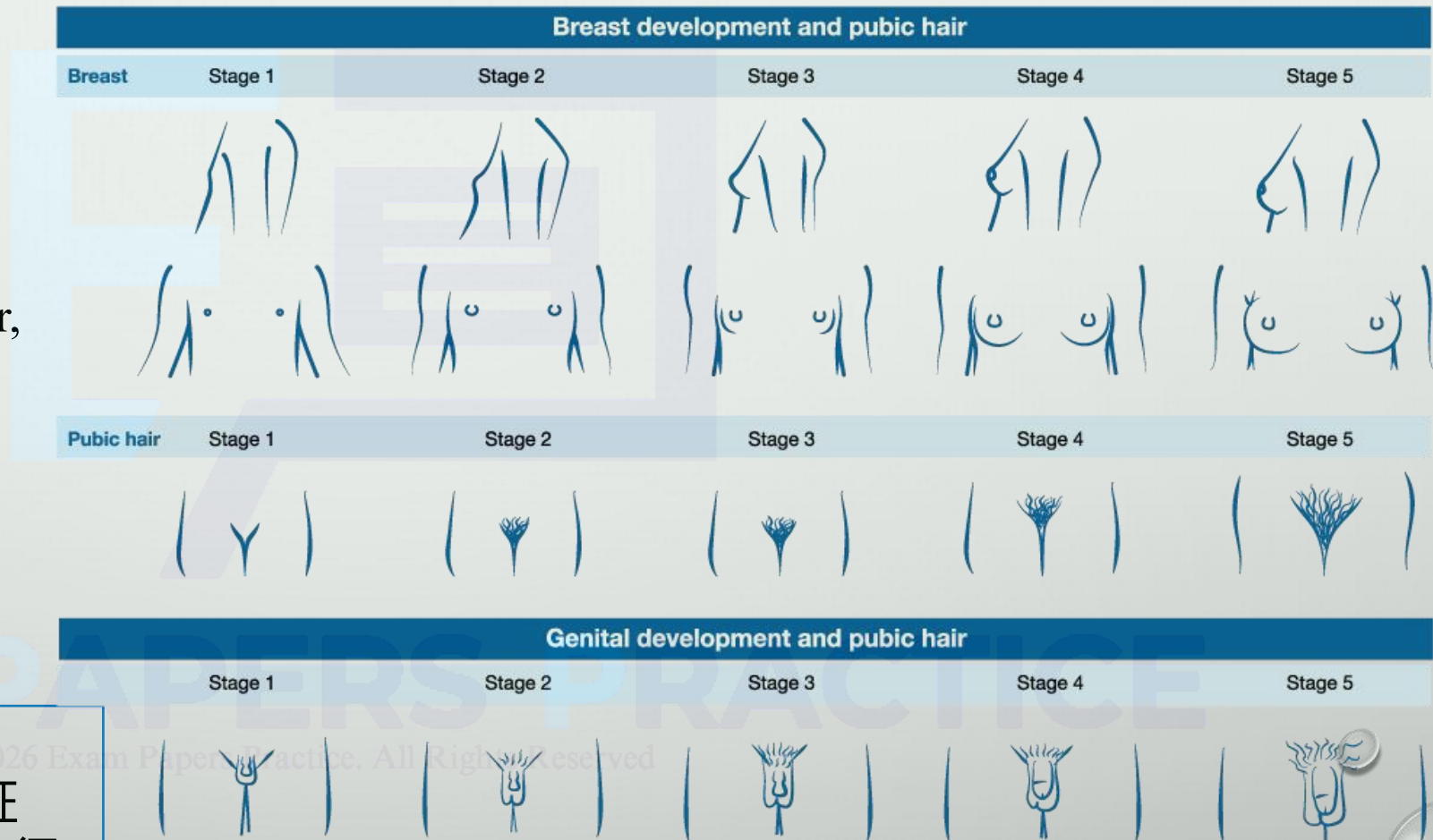
secondary sexual characteristics 第二性征

testosterone 睾酮

oestrogen 雌二醇

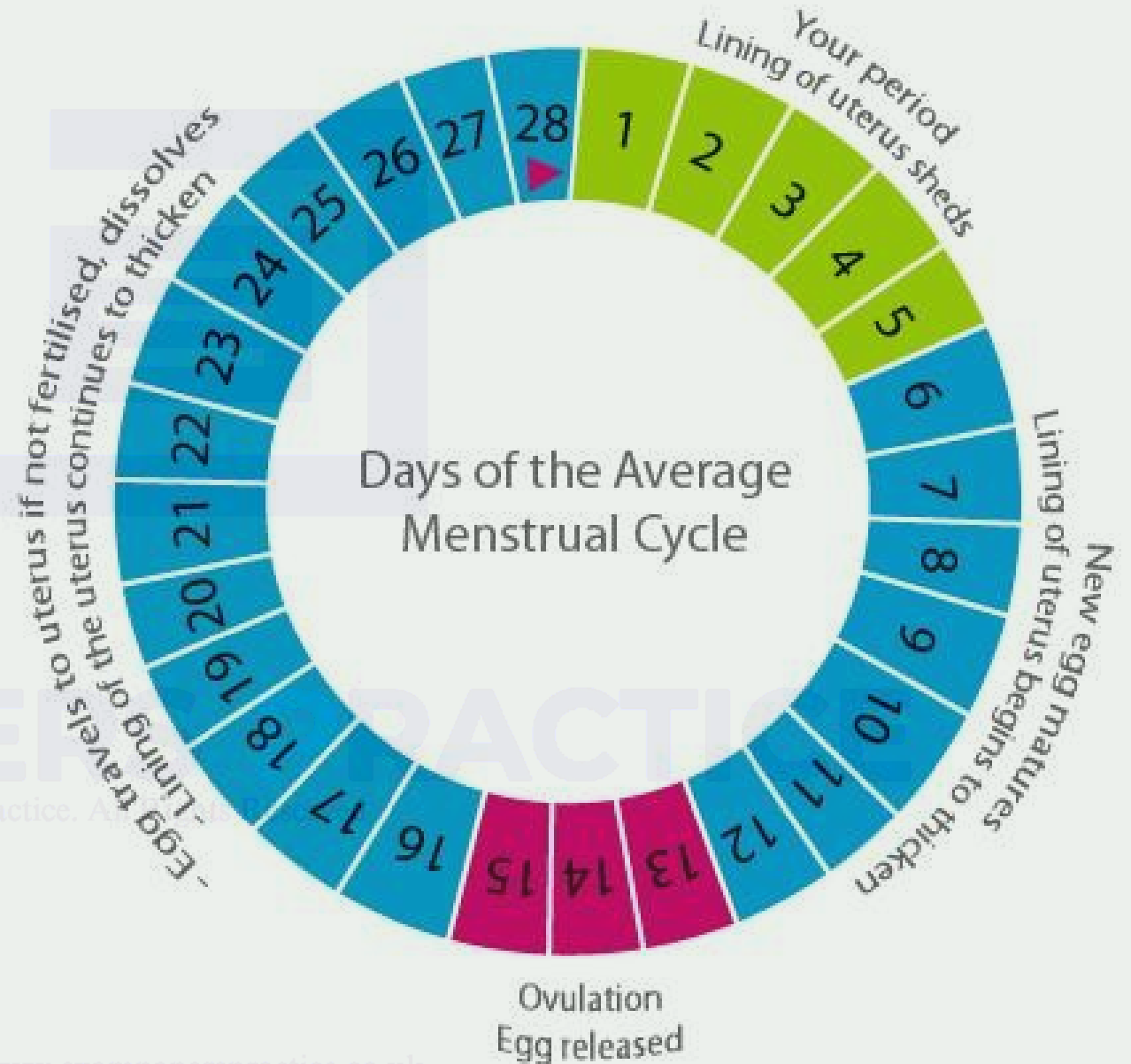
The menstrual cycle

The Tanner scale



Reproduction in humans

The menstrual cycle



menstruation 月经
menstrual cycle 月经周期

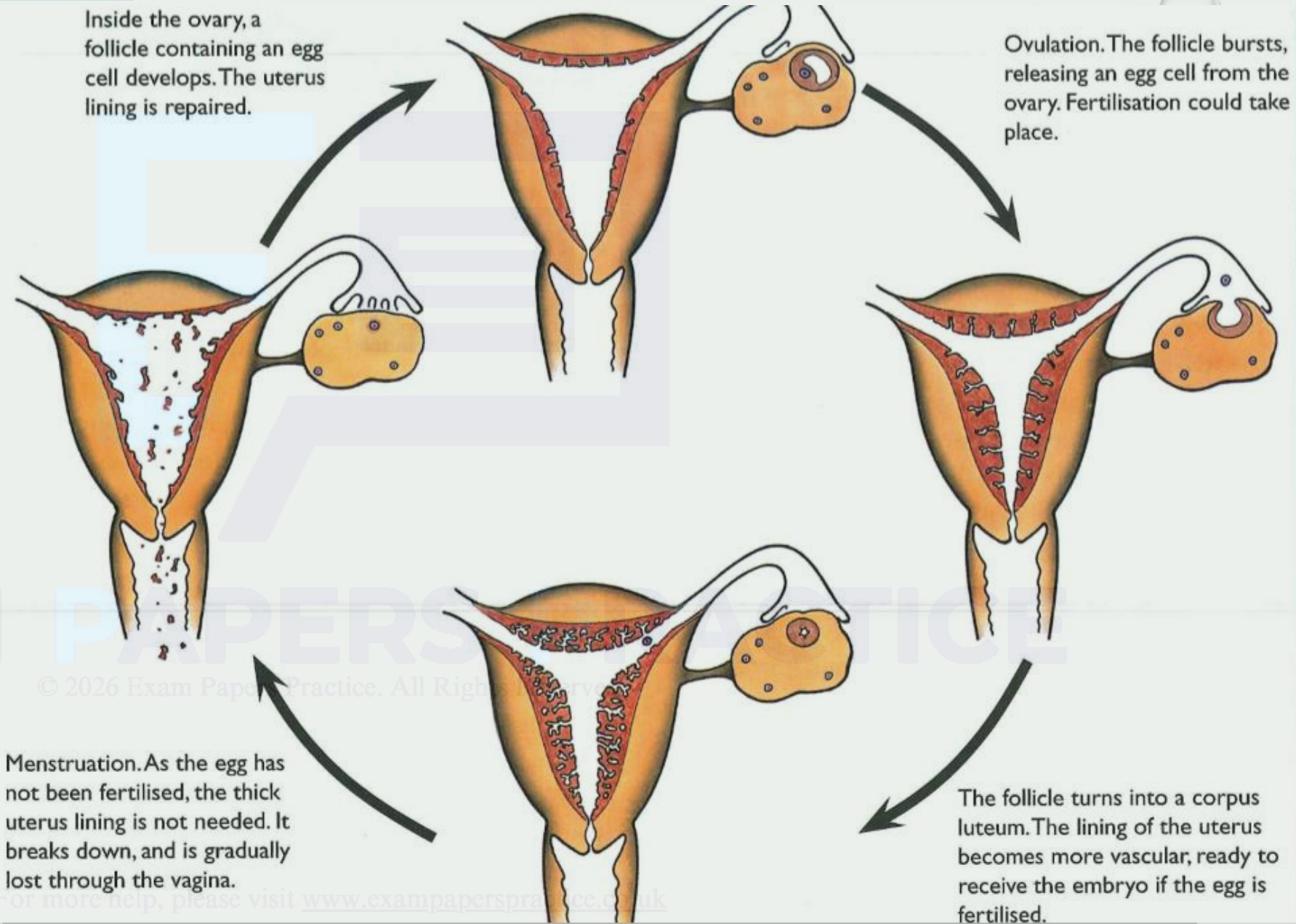
Reproduction in humans

The menstrual cycle

Menstruation (period)

As the egg has not been fertilized, the thick **uterus lining** is not needed. It breaks down, and is gradually lost through the vagina.

follicle 卵泡
corpus luteum 黄体



Reproduction in humans

FSH (pituitary gland) → follicle develop (throughout this time, **FSH** stimulate follicle to secrete **oestrogen**)

→ **oestrogen** → uterus lining grow thick and spongy

(oestrogen inhibits secretion of FSH) → follicle fully developed → surge of **LH** (secreted by pituitary gland) → cause **ovulation** → follicle change to corpus luteum (stops secreting oestrogen, levels of FSH/LH fall) → **progesterone** (keep uterus lining thick, spongy, and well supplied with blood, **corpus luteum**) → corpus luteum continue secrete progesterone until embryo sink into the uterus → **placenta** secretes progesterone (all through pregnancy)

If not fertilized, corpus luteum gradually disappears.

Progesterone is not secreted, and so the lining of uterus would break down.

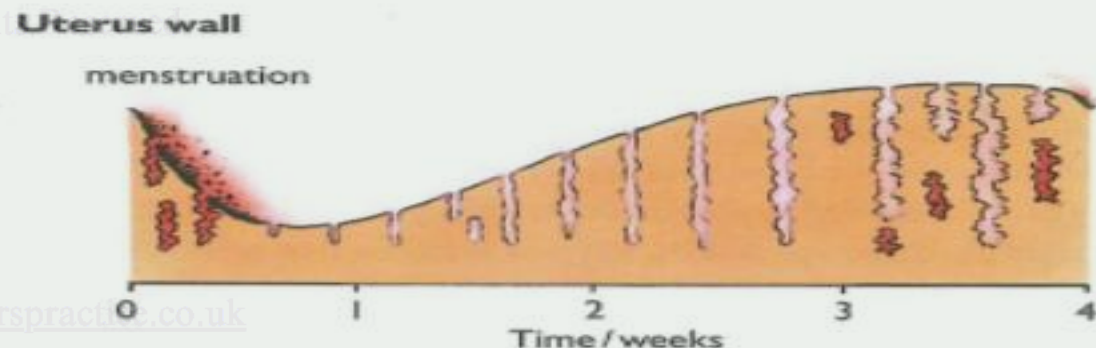
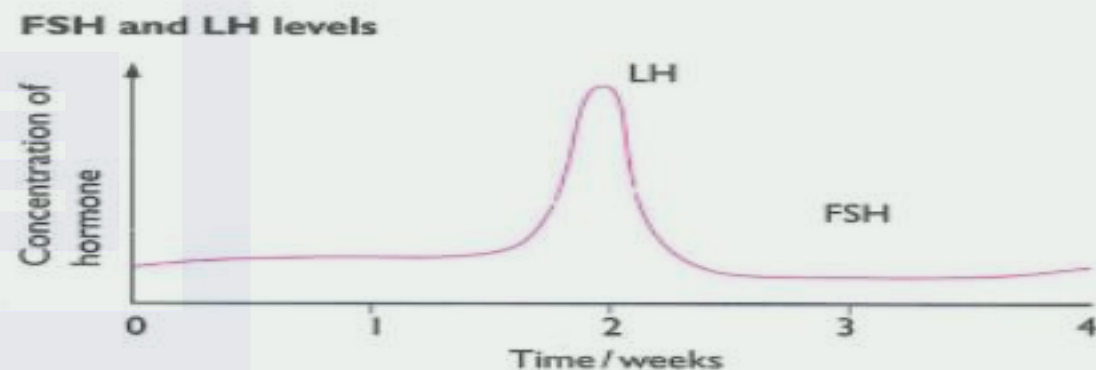
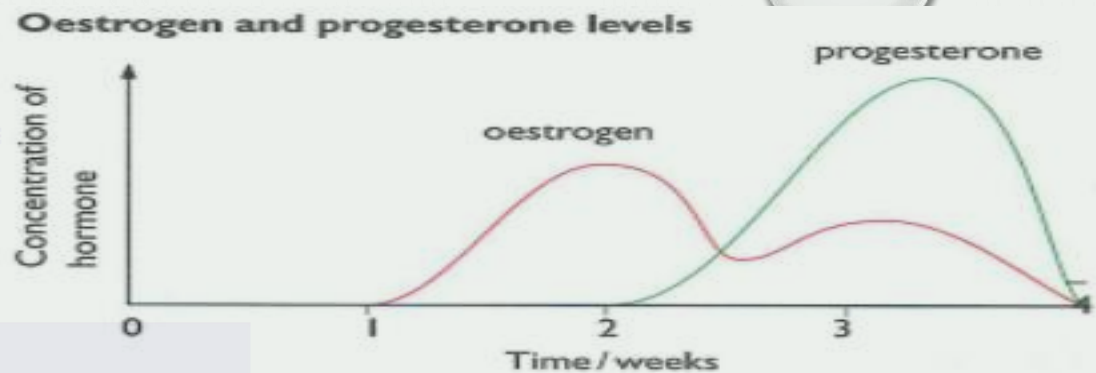
oestrogen 雌二醇

progesterone 孕酮

LH (luteinizing hormone) 黄体生成素

FSH (follicle stimulating hormone) 促卵泡生成素

pituitary gland 垂体



Reproduction in humans

The menstrual cycle

Why does the uterus wall become thick and spongy before ovulation ?

What happens if the egg is not fertilized?

Functions of FSH/LH, testosterone, oestrogen, progesterone?

EXAM PAPERS PRACTICE

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Reproduction in humans

Birth control



Reproduction in

Birth control

Most Effective Less Effective	Sterilization	Implant	IUD	Effectiveness: 99%
	Shot	Pill	Ring	Patch 91-94% depending on the method
	Diaphragm	Condoms (Internal/external)	Sponge	Cervical Cap 76-88% depending on the method
	Spermicide	Fertility awareness	Withdrawal 76-88% depending on the method	

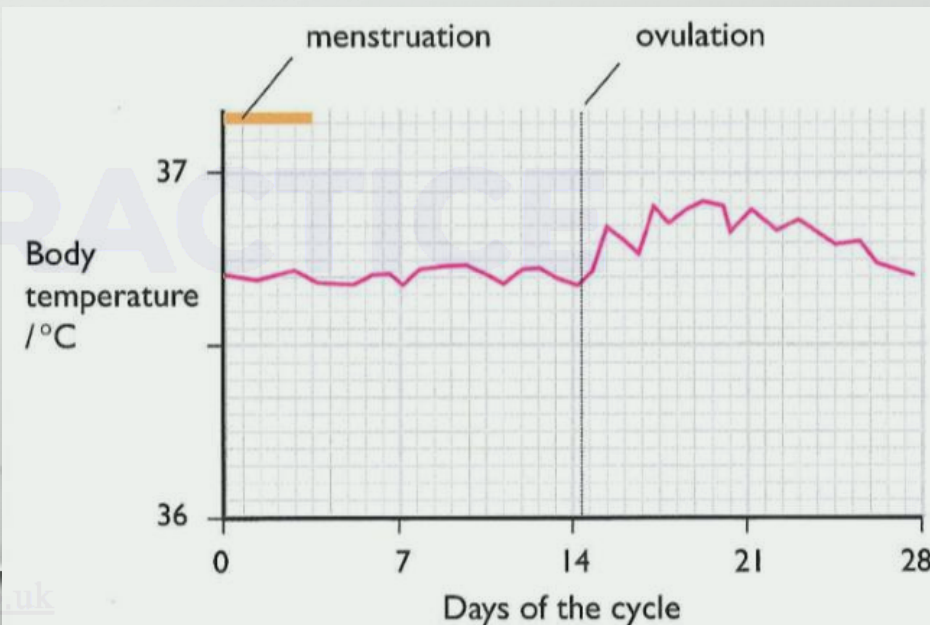
Reproduction in humans

Natural methods

- ◆ avoid sexual intercourse completely (abstinence)
or ensure that they do not have sexual intercourse when the women has an egg in her oviducts
- ◆ learn 'safe period'
record body temperature or check mucus produced in vagina

abstinence 节欲
mucus 粘液

Birth control—nature methods



Reproduction in humans

Chemical methods

◆ spermicide

Kill sperm when they enter the vagina

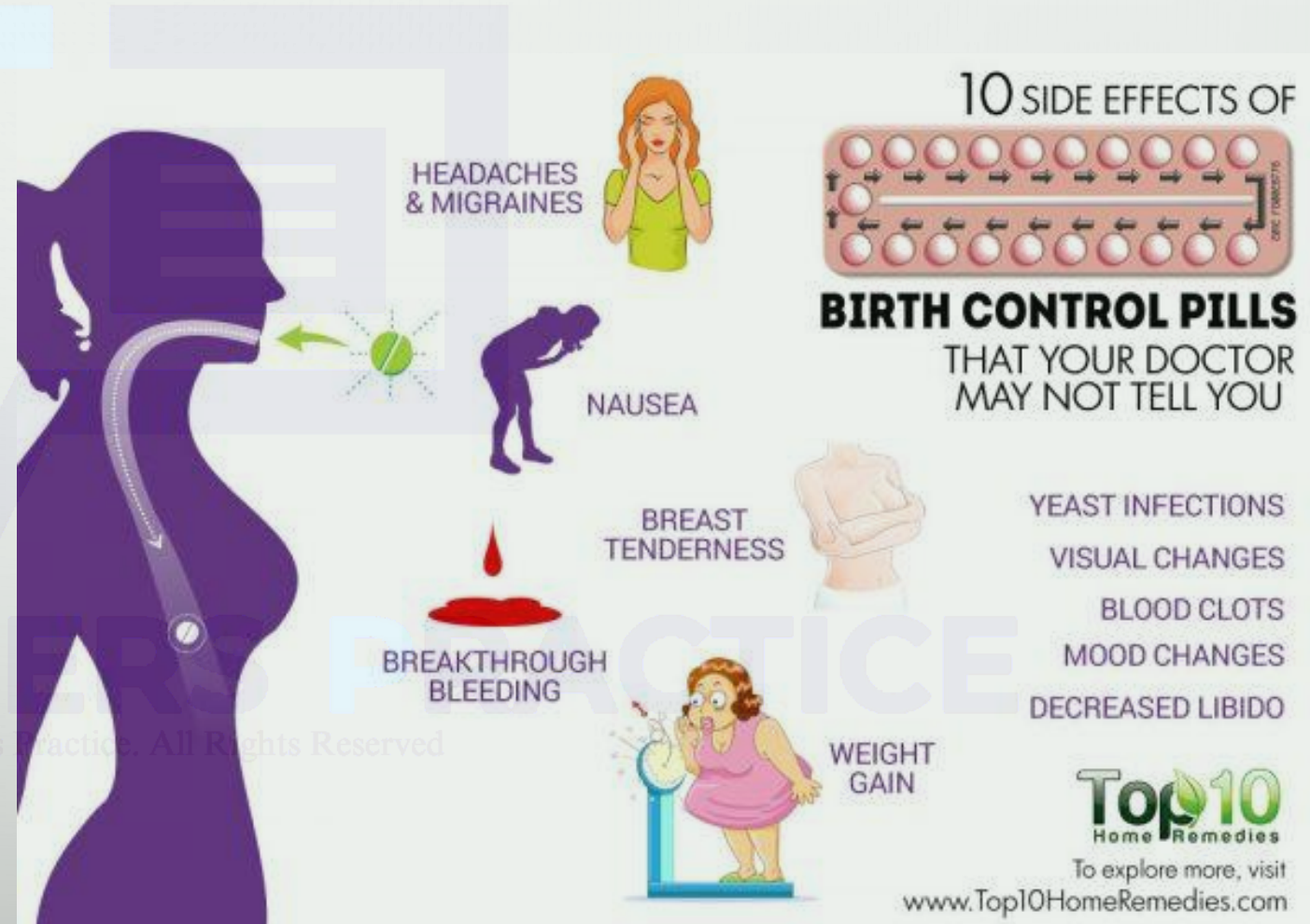
◆ sex hormones (progesterone/ oestrogen)

Disrupt the menstrual cycle.

e.g. contraceptive pill / injection (stops eggs being produced in ovaries.)

spermicide 杀精子剂

Birth control—chemical methods



Reproduction in humans

Chemical methods

- ◆ **spermicide**

Kill sperm when they enter the vagina

- ◆ **sex hormones (progesterone/ oestrogen)**

Disrupt the menstrual cycle.

e.g. contraceptive pill / injection (stops eggs being produced in ovaries.)

- ◆ **IUD (intra-uterine device, some types of IUD contain copper)**

- ◆ **IUS**

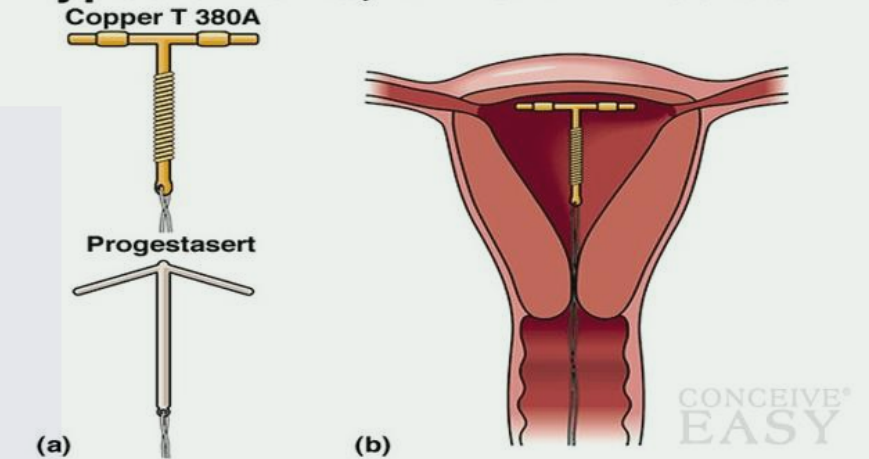
Slowly releases hormones that prevent implantation.

Interfere with the ability of sperm to find and fertilise an egg

Prevent the implantation and development of any egg that does get fertilised

Birth control—chemical

Types of IUDs; An IUD in Position



IUD(intra-uterine device) 子宫内装置

contraception 避孕

IUS 子宫内节育系统

Reproduction in humans

Birth control—mechanical methods

mechanical methods

◆ condom

Placed over the man's erect penis and stops any sperm getting into the women's vagina.

Advantage: stop any pathogens passing between the couple.

◆ femidom

Place inside the vagina

◆ diaphragm / cap

Cover the cervix, stopping sperm getting into

condom 避孕套

femidom 女性避孕套



Reproduction in humans

surgical methods

◆ vasectomy

Male (cut sperm duct, local anaesthetic)

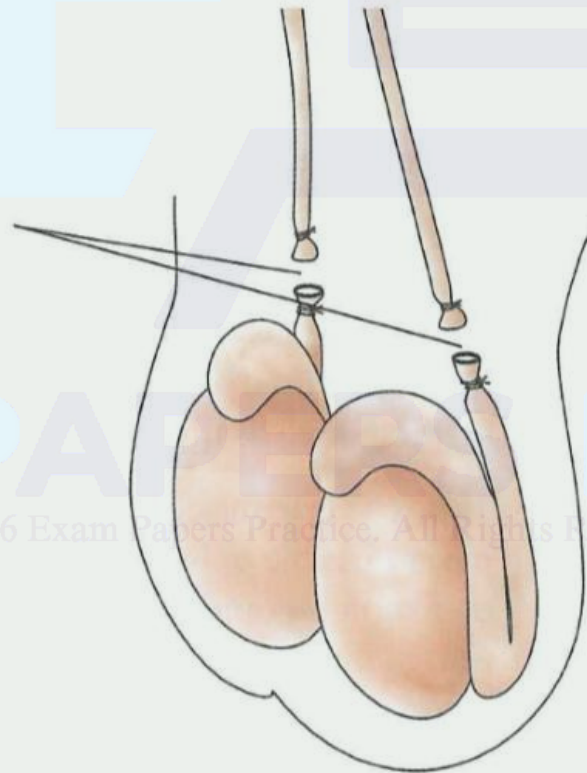
◆ surgical cutting of the oviducts

Female (cut oviduct, general anaesthetic)

Birth control—surgical methods

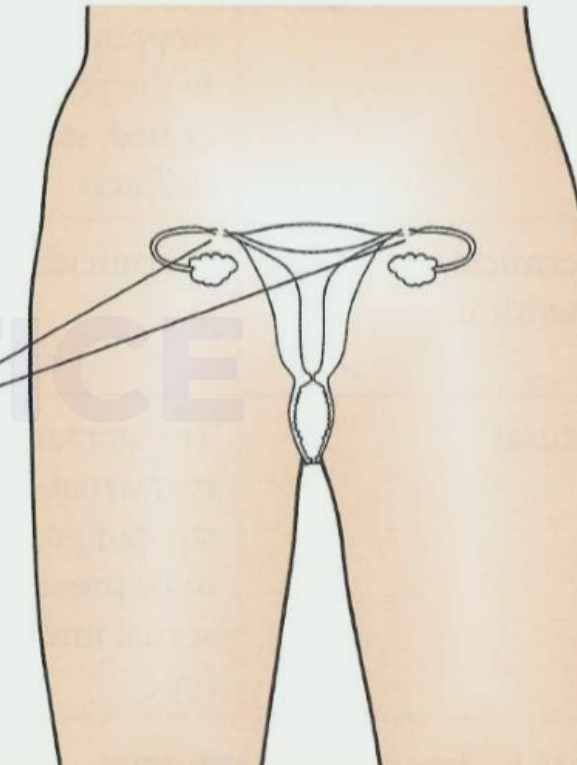
Vasectomy

sperm ducts cut
and the cut ends
tied



Surgical cutting of the oviducts

oviducts cut and
the cut ends tied



vasectomy 输精管切除术
anaesthetic 麻醉
local anaesthetic 局麻
general anaesthetic 全麻

Method	How it works	Advantages and disadvantages
Condom (mechanical)	The condom is placed over the erect penis. It traps semen as it is released, stopping it from entering the vagina.	This is a very safe method of contraception if used correctly, but care must be taken that no semen is allowed to escape before it is put on or after it is removed. It can also help to prevent the transfer of infection, such as gonorrhoea and HIV, from one partner to another.
Diaphragm, or cap (mechanical)	The diaphragm is a circular sheet of rubber, which is placed over the cervix, at the top of the vagina. Spermicidal (sperm-killing) cream is first applied round its edges. Sperm deposited in the vagina cannot get past the diaphragm into the uterus.	This is an effective method, if used and fitted correctly. Fitting must be done by a doctor, but after that a woman can put her own diaphragm in and take it out as needed.
The pill or oral contraceptive (chemical)	The pill contains the female sex hormones oestrogen and progesterone. One pill is taken every day. The hormones are like those that are made when a woman is pregnant, and stop egg production.	This is a very effective method, so long as the pills are taken at the right time. However, some women do experience unpleasant side-effects, and it is important that women on the pill have regular check-ups with their doctor.

Method	How it works	Advantages and disadvantages
Sterilisation (surgical)	In a man, the sperm ducts are cut or tied, stopping sperm from travelling from the testes to the penis. In a woman, the oviducts are cut or tied, stopping eggs from travelling down the oviducts.	An extremely sure method of contraception, with no side-effects. However, the tubes often cannot be re-opened if the person later decides that they do want to have children, so it is not a method for young people.
Spermicides (chemical)	Spermicidal cream in the vagina kills sperm.	This is quite easy to use. It is only effective, however, if used in combination with another method, such as the diaphragm.
Natural	The woman keeps a careful record of her menstrual cycle over several months, so that she can predict roughly when an egg is likely to be present in her oviducts. She must avoid sexual intercourse for several days around this time.	This is a very unsafe method, because it is never possible to be 100% certain when ovulation is going to happen. Nevertheless, it is used by many people who do not want to use one of the other contraceptive methods.

Reproduction in humans

Birth control——increasing fertility

Increasing fertility

- ◆ AI (artificial insemination)
- ◆ using fertility drugs (e.g. FSH)
- ◆ *in vitro* fertilization (IVF)

Problems:

1. quite expensive;
2. Be repeated many times before a pregnant
3. Sometimes two or three embryo develop, the couple might have twins or triplets.

AI (artificial insemination) 人工受精
IVF (*in vitro* fertilization) 体外受精

Reproduction in humans

Sexually transmitted infections

◆ definition

Infections that are transmitted via body fluids through sexual contact.

◆ AIDS (acquired immune of deficiency syndrome)

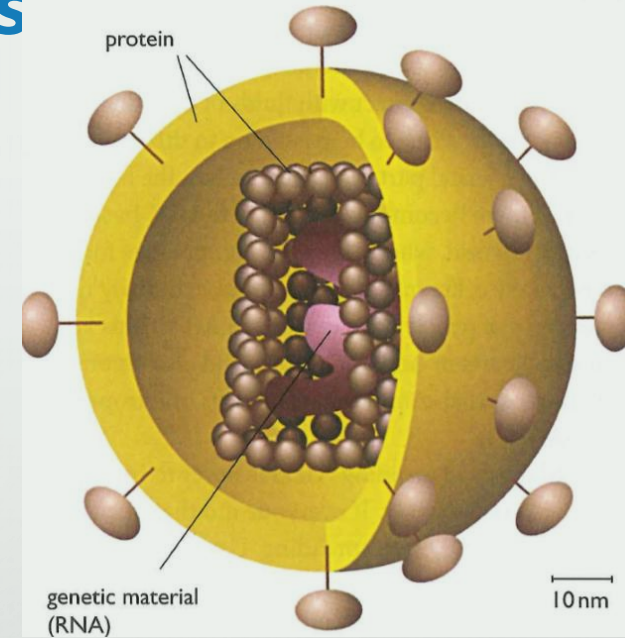
Caused by HIV

HIV infects lymphocytes, particular T cells (normally kill viruses), and reduce ability to produce antibodies.

So patients lose ability for kill pathogens.

HIV carrier → AIDS patient

Sexually transmitted infections



STIs (sexually transmitted infections) 性传播感染
AIDS (acquired immune of deficiency syndrome) 艾滋病

Reproduction in humans

Preventing HIV transmission

◆ ways of transmission

Sexual intercourse

Blood contact

◆ ways of avoiding AIDS

Not have more than one sexual partner

Using condoms/femidom

Screen blood used in transfusion

transfusion 输血

Sexual partner

Sexually transmitted infections

