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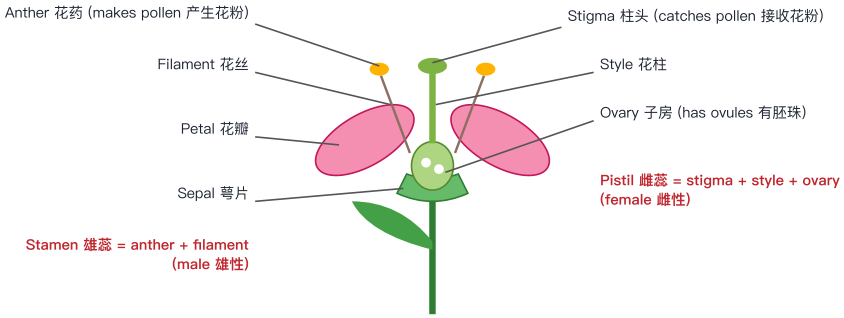
9 CHAPTERS · 135 QUESTIONS + ANSWERS

NEW · KP2027 EDITION · 108 Q · FROM PAGE 44

- **Complete notes, all chapters** — 9 Form 1 Science chapters, every English block followed by a 中文 explanation
- **135 practice questions** — 15 per chapter (objective + structured) with answers and reasons, English + 中文
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- **考 + 记忆法 boxes + diagrams** — the parts that come out most + easy ways to remember

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4.7 Reproduction in plants 植物的生殖 (考)



Part 部分	Function 功能
Petal 花瓣	Brightly coloured, attracts insects 颜色鲜艳，吸引昆虫
Sepal 萼片	Protects the flower bud 保护花蕾
Anther (stamen) 花药（雄蕊）	Produces **pollen grains** (contain the male gamete) 产生花粉（含雄配子）
Stigma (pistil) 柱头（雌蕊）	Sticky; receives pollen 有黏性，接收花粉
Ovary (pistil) 子房（雌蕊）	Contains **ovules** (each contains a female gamete); becomes the **fruit** 含胚珠（内有雌配子）；会变成果实

Pollination 授粉 (考)

Pollination = transfer of pollen grains from the **anther** to the **stigma**.

授粉 = 花粉从花药传到柱头。

- **Self-pollination**: to the stigma of the same flower or same plant
  自花授粉：传到同一朵花或同一棵植物的柱头
- **Cross-pollination**: to the stigma of another plant of the same species → more variety, healthier offspring
  异花授粉：传到同种另一棵植物 → 后代变异多、较健康

Insect-pollinated flower 虫媒花	Wind-pollinated flower 风媒花
Large, brightly coloured petals, scent, nectar 花瓣大而鲜艳、有香味、有花蜜	Small, dull or no petals, no scent, no nectar 花瓣小、暗淡或没有，无香味、无花蜜
Few, large, sticky pollen grains 花粉少、大、有黏性	Many, small, light, dry pollen grains 花粉多、小、轻、干
Stigma inside the flower, sticky 柱头在花内、有黏性	Feathery stigma hanging outside 羽毛状柱头垂在花外
Hibiscus, orchid, sunflower 大红花、兰花、向日葵	Grass, paddy, maize 草、稻、玉米

Fertilisation in plants 植物的受精 (考)

Pollen lands on stigma → pollen tube grows down the style → male nucleus fuses with the ovum nucleus in the ovule → zygote → embryo

花粉落在柱头 → 花粉管沿花柱往下长 → 雄核与胚珠里的卵核结合 → 合子 → 胚

- After fertilisation: **ovule → seed**, **ovary → fruit**; petals, stamens and stigma wither
  受精后：胚珠 → 种子，子房 → 果实；花瓣、雄蕊和柱头枯萎

4.8 Germination of seeds 种子的发芽 (考)

- Seed parts: **testa** (seed coat, protects), **cotyledon** (food store), **plumule** (becomes the shoot), **radicle** (becomes the root), **micropyle** (small hole: water enters)
  种子结构：种皮（保护）、子叶（储存养分）、胚芽（变成茎叶）、胚根（变成根）、珠孔（让水进入）
- Conditions needed: **water**, **oxygen (air)**, **suitable temperature**. Light is **not** needed for germination
  发芽条件：水、氧（空气）、适当温度；发芽不需要光
- Light is needed **after** germination for the seedling to photosynthesise
  发芽后幼苗需要光进行光合作用

记忆法 **W-O-T**: **W**ater, **O**xygen, **T**emperature = germination. 发芽三要素：水、氧、温度（不用光）。

Applications of plant reproduction research 植物生殖研究的应用

- **Tissue culture**: grow many identical plants quickly from small pieces of tissue (orchids, bananas)
  组织培养：用小块组织快速培育大量相同的植物（兰花、香蕉）
- **Cross-breeding** to get better varieties: high-yield paddy, oil palm with more oil (e.g. Tenera = Dura × Pisifera)
  杂交育种：高产稻米、出油多的油棕（Tenera = Dura × Pisifera）
- Grafting, cuttings and marcotting to keep good qualities
  嫁接、扦插、圈枝保留优良特性

> **华文一句话：**有性生殖要两个亲体和受精，后代有变异；无性生殖只要一个亲体，后代一样。人的受精在输卵管，胎儿在子宫发育；花的授粉是花粉到柱头，受精后胚珠变种子、子房变果实。

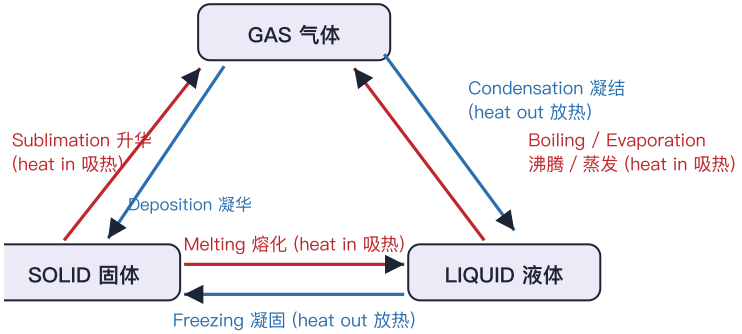
Key Terms 关键词 (考)

English	中文	BM
Reproduction	生殖	Pembiakan
Sexual reproduction	有性生殖	Pembiakan seks
Asexual reproduction	无性生殖	Pembiakan aseks
Binary fission	二分裂	Belahan dedua
Budding	出芽生殖	Pertunasan
Gamete	配子	Gamet

液体：高锰酸钾晶体放在水中——紫色几分钟内散开

- **Gas**: perfume or durian smell fills a room quickly
  气体：香水或榴莲的味道很快充满房间
- **Solids expand when heated**: particles vibrate more and move slightly apart
  固体受热膨胀：粒子振动更大、距离稍变大
- Rate of diffusion: **gas > liquid > solid**; faster at **higher temperature**
  扩散速度：气体 > 液体 > 固体；温度越高越快

Changes of state 物态变化 考



Change 变化	From → To 由 → 到	Heat 热	Example 例子
Melting 熔化	Solid → liquid 固 → 液	Absorbed 吸热	Ice melts at **0 °C** 冰在 0 °C 熔化
Freezing 凝固	Liquid → solid 液 → 固	Released 放热	Water freezes in the freezer 水在冰格结冰
Boiling / evaporation 沸腾 / 蒸发	Liquid → gas 液 → 气	Absorbed 吸热	Water boils at **100 °C** 水在 100 °C 沸腾
Condensation 凝结	Gas → liquid 气 → 液	Released 放热	Water droplets outside a cold glass 冰水杯外的水珠
Sublimation 升华	Solid → gas directly 固 → 气	Absorbed 吸热	Iodine, naphthalene (mothballs), dry ice 碘、樟脑丸、干冰
Deposition (also called sublimation in some books) 凝华	Gas → solid directly 气 → 固	Released 放热	Iodine vapour forms crystals on a cold surface 碘蒸气在冷的表面形成晶体

- During melting and boiling the **temperature stays the same**: the heat is used to **overcome the forces** between particles
  熔化和沸腾时温度保持不变：热用来克服粒子间的吸引力
- Heating → particles gain **kinetic energy** and move faster; cooling → particles lose energy
  加热 → 粒子获得动能，运动更快；冷却 → 粒子失去能量

Evaporation and boiling 蒸发与沸腾 考

Evaporation 蒸发	Boiling 沸腾
At **any temperature** 任何温度	Only at the **boiling point** 只在沸点
Only at the **surface** 只在液体表面	Throughout the liquid (bubbles) 整个液体（有气泡）
Slow 慢	Fast 快

- Faster evaporation: **higher temperature**, **larger surface area**, **moving air (wind)**, **lower humidity**
  加快蒸发：温度高、表面积大、有风、湿度低
- Evaporation causes **cooling** (sweating; wet hands feel cold)
  蒸发会降温（流汗；湿手觉得凉）

记忆法 Solid "**sits**" (vibrates), liquid "**slides**", gas "**flies**". 固体原地振动、液体滑来滑去、气体到处飞。

> **华文一句话：**物质由不停运动的粒子组成：固体排得最紧最整齐，气体最散最快；吸热使物质由固变液变气，放热则相反。

Key Terms 关键词 考

English	中文	BM
Matter	物质	Jirim
Physical property	物理性质	Sifat fizik
Chemical property	化学性质	Sifat kimia
Particle	粒子	Zarah
Kinetic theory of matter	物质分子运动论	Teori kinetik jirim
Diffusion	扩散	Resapan
Melting point	熔点	Takat lebur
Boiling point	沸点	Takat didih
Evaporation	蒸发	Penyejatan
Condensation	凝结	Kondensasi
Sublimation	升华	Pemejalwapan
Freezing	凝固	Pembekuan
Compress	压缩	Memampatkan

Melting and boiling points 熔点与沸点	Usually high (**mercury is a liquid** at room temperature) 通常高（水银在室温是液体）	Usually low (many are gases; **bromine is a liquid**) 通常低（很多是气体；溴是液体）
Examples 例子	Iron, copper, aluminium, gold 铁、铜、铝、金	Oxygen, sulphur, carbon, chlorine 氧、硫、碳、氯

UASA Tip 考试贴士 Exceptions come out often: **mercury** = liquid metal; **graphite** = non-metal that conducts electricity; **bromine** = liquid non-metal. 例外常考：水银是液态金属；石墨是能导电的非金属；溴是液态非金属。

- Uses: copper — electrical wires; aluminium — window frames, cans, aeroplanes (light, does not rust); gold — jewellery; silicon (metalloid) — computer chips
  用途：铜做电线；铝做窗框、罐子、飞机（轻、不生锈）；金做首饰；硅做电脑芯片

6.2 Mixtures 混合物 (考)

A **mixture** has two or more substances **mixed physically** (not chemically joined). Each substance **keeps its own properties**, and the mixture can be **separated by physical methods**.

混合物 = 两种或以上物质物理地混合在一起，各自保持原来的性质，可用物理方法分开。

- Examples: air, sea water, soil, sand + iron filings, salad, orange juice
  例子：空气、海水、泥土、沙和铁粉、沙拉、橙汁

Separating mixtures 分离混合物的方法 (考)

Method 方法	Used to separate 用来分离	Example 例子
Magnet 磁铁	Magnetic metals (iron, nickel, cobalt) from others 磁性金属（铁、镍、钴）与其他物质	Iron filings + sulphur powder 铁粉 + 硫粉
Filtration 过滤	An insoluble solid from a liquid 不溶于水的固体与液体	Sand + water 沙 + 水
Evaporation 蒸发	A dissolved solid from its solution 溶解的固体与溶液	Salt from salt water 从盐水取盐
Distillation 蒸馏	A pure liquid from a solution / liquids with different boiling points 从溶液取纯液体 / 沸点不同的液体	Pure water from sea water 从海水取纯水
Chromatography 色层分析法	Different dyes in an ink 墨水里的不同染料	Black marker ink 黑色马克笔墨水
Sieving 筛	Small particles from large particles 大小不同的颗粒	Rice from sand / flour 米与沙、面粉
Separating funnel / decanting 分液漏斗 / 倾析	Liquids that do not mix 互不相溶的液体	Oil + water 油 + 水
Sedimentation 沉淀	Heavy solid settles at the bottom 重的固体沉到底部	Muddy water left to stand 泥水静置

- Mixture of **salt + sand**: add water and stir (salt dissolves) → **filter** (sand stays on the filter paper) → **evaporate** the filtrate (salt left)
  盐和沙：加水搅拌（盐溶解）→ 过滤（沙留在滤纸上）→ 蒸发滤液（得盐）

6.3 Compounds 化合物 (考)

A **compound** has two or more elements **chemically combined** in a **fixed ratio**. It has **new properties** different from its elements and can only be separated by **chemical methods** (e.g. electrolysis).

化合物 = 两种或以上元素以固定比例化学结合，性质与原来的元素不同，只能用化学方法（如电解）分开。

- **Water** (H_2O) = hydrogen (flammable gas) + oxygen (gas that helps burning) → a liquid that puts out fire
  水 = 氢（易燃气体）+ 氧（助燃气体）→ 能灭火的液体
- **Sodium chloride** (table salt) = sodium (very reactive metal) + chlorine (poisonous gas) → safe to eat
  氯化钠（食盐）= 钠（非常活泼的金属）+ 氯（有毒气体）→ 可以吃
- **Iron sulphide**: heat iron filings + sulphur → a black solid that is **not attracted by a magnet**
  硫化铁：加热铁粉和硫粉 → 黑色固体，不被磁铁吸引
- Other compounds: carbon dioxide (CO_2), sugar, calcium carbonate (limestone, chalk, eggshell)
  其他化合物：二氧化碳、糖、碳酸钙（石灰石、粉笔、蛋壳）

Mixture vs compound 混合物与化合物 (考)

Mixture 混合物	Compound 化合物
Physically mixed 物理混合	Chemically combined 化学结合
Any ratio 任何比例	**Fixed** ratio 固定比例
Keeps the properties of each substance 保持各物质的性质	**New** properties 新的性质
No new substance, little or no heat change 没有新物质，几乎没有热变化	New substance formed; heat often given out or taken in 形成新物质，通常放热或吸热
Separated by **physical** methods 用物理方法分离	Separated only by **chemical** methods 只能用化学方法分离

记忆法 Mixture = **salad** (you can pick out each part). Compound = **cake** (you cannot take the eggs back out). 混合物像沙拉（能挑出来），化合物像蛋糕（拿不回鸡蛋）。

> **华文一句话：**元素是最简单的纯物质，按质子数排在周期表上；混合物是物理混合、可用过滤蒸馏等分开；化合物是化学结合、性质全新、只能用化学方法分开。

燃烧蜡烛、汽油、天然气（碳氢化合物）→ 二氧化碳 + 水 + 热 + 光

- Not enough oxygen → **incomplete combustion** → **carbon monoxide** (poisonous) and **soot**
  氧不够 → 燃烧不完全 → 一氧化碳（有毒）和烟灰

Experiment: candles under jars 实验：瓶罩蜡烛 (考)

Jar size 瓶子大小	Volume of air 空气体积	Burning time 燃烧时间
Small 小	Less oxygen 氧较少	Shortest 最短
Large 大	More oxygen 氧较多	Longest 最长

- Conclusion: the **more oxygen**, the **longer** the candle burns
  结论：氧越多，蜡烛燃烧越久

Fighting fires 灭火 (考)

Method 方法	Removes 去除	Use for 适用于
Water 水	**Heat** 热	Wood, paper, cloth — **not** oil or electrical fires 木、纸、布——不可用于油火或电火
Fire blanket / wet cloth / sand 防火毯 / 湿布 / 沙	**Oxygen** 氧	Small fires, a pan of oil, clothes on fire 小火、油锅着火、衣服着火
Carbon dioxide extinguisher 二氧化碳灭火器	**Oxygen** (and some heat) 氧（和部分热）	**Electrical** fires 电火
Foam / dry powder extinguisher 泡沫 / 干粉灭火器	**Oxygen** 氧	Oil and petrol fires 油火、汽油火
Cut a firebreak / turn off the gas 开防火道 / 关掉煤气	**Fuel** 燃料	Forest fires, gas stove fires 森林火灾、煤气炉着火

UASA Tip 考试贴士 Never pour water on burning oil: the water sinks, boils instantly and splashes burning oil everywhere. 千万不要用水浇油火：水沉下去立即沸腾，把着火的油溅得到处都是。

Fire safety 防火安全

- Do not overload power sockets; switch off electrical appliances after use
  插座不要超载；用完电器要关掉
- Keep matches and lighters away from children; check gas cylinders for leaks
  火柴、打火机远离小孩；检查煤气桶是否漏气
- In a fire: stay low (smoke rises), cover nose with a wet cloth, call **994** (Bomba)
  遇到火灾：压低身体（烟往上升），用湿布掩住口鼻，拨 994（消防局）

7.3 Air pollution 空气污染 (考)

Air pollution happens when **harmful substances** (pollutants) are added to the air and harm living things and the environment.

空气污染 = 有害物质（污染物）进入空气，伤害生物和环境。

Pollutant 污染物	Source 来源	Effect 影响
Carbon monoxide 一氧化碳	Vehicle exhaust, incomplete burning 车辆废气、燃烧不完全	Joins with haemoglobin → blood carries less oxygen → headache, death 与血红蛋白结合 → 血液运氧减少 → 头痛、死亡
Sulphur dioxide 二氧化硫	Factories and power stations burning coal or oil 燃烧煤或油的工厂、发电站	**Acid rain**; breathing problems 酸雨；呼吸问题
Nitrogen oxides 氮氧化物	Vehicle engines, power stations 汽车引擎、发电站	Acid rain, haze, irritates the lungs 酸雨、烟霾、刺激肺部
Smoke, haze, dust (particulate matter) 烟、烟霾、灰尘（悬浮颗粒）	Open burning, forest fires, construction 露天焚烧、森林火灾、建筑工程	Asthma, eye irritation, poor visibility 哮喘、眼睛不适、能见度低
Chlorofluorocarbons (CFCs) 氯氟碳化合物	Old refrigerators, air conditioners, aerosol sprays 旧冰箱、冷气机、喷雾罐	Thin the **ozone layer** → more UV rays → skin cancer 破坏臭氧层 → 紫外线增加 → 皮肤癌
Carbon dioxide (too much) 二氧化碳（过多）	Burning fossil fuels, cutting forests 燃烧化石燃料、砍伐森林	Greenhouse effect → **global warming** 温室效应 → 全球暖化

- **Acid rain**: sulphur dioxide and nitrogen oxides dissolve in rain → corrodes buildings and metal, makes lakes and soil acidic, kills fish and plants
  酸雨：二氧化硫和氮氧化物溶于雨水 → 腐蚀建筑和金属、使湖泊土壤变酸、鱼和植物死亡

Air Pollutant Index (API) Malaysia 马来西亚空气污染指数 (考)

API	Status 状况
0–50	Good 良好
51–100	Moderate 中等
101–200	Unhealthy 不健康
201–300	Very unhealthy 非常不健康
Above 300 300 以上	Hazardous 危险

Preventing air pollution 预防空气污染 (考)

- Use public transport, carpool, cycle, walk; electric or hybrid vehicles
  搭公共交通、共乘、骑脚车、走路；电动或混合动力车

左右相反——救护车上的 AMBULANCE 反着写，司机从镜子里看就是正的

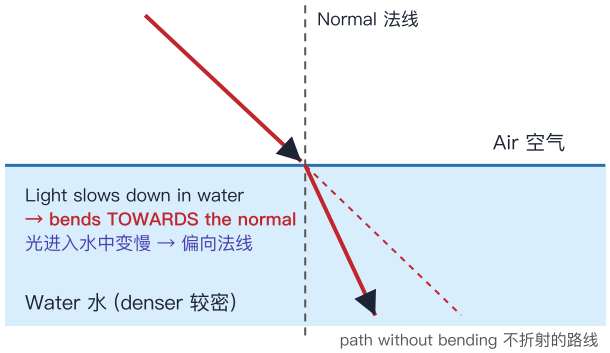
- The image is **as far behind** the mirror as the object is **in front**
  像在镜后的距离 = 物体在镜前的距离

> **记忆法** Plane mirror image = **S-U-V-L**: **S**ame size, **U**pright, **V**irtual, **L**aterally inverted. 平面镜像：等大、正立、虚像、左右相反。

8.4 Refraction of light 光的折射 (考)

Refraction = the **bending** of light when it passes from one medium to another of different **optical density**, because its **speed changes**.

折射 = 光从一种介质进入另一种光密度不同的介质时，因速度改变而弯曲。



From → to 由 → 到	Speed 速度	Bends 偏折
Air → water / glass (less dense → denser) 空气 → 水 / 玻璃（疏 → 密）	Slows down 变慢	**Towards** the normal 偏向法线
Water / glass → air (denser → less dense) 水 / 玻璃 → 空气（密 → 疏）	Speeds up 变快	**Away from** the normal 偏离法线
Along the normal (at 90° to the surface) 沿法线（垂直入射）	Changes 改变	**No bending** 不偏折

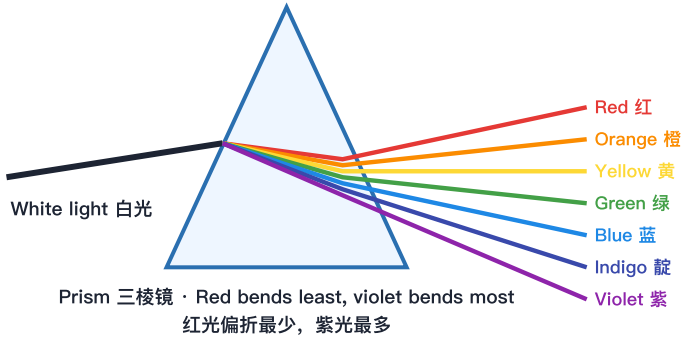
Effects of refraction 折射现象 (考)

- A swimming pool looks **shallower** than it really is (**apparent depth** < real depth)
  游泳池看起来比实际浅（视深小于实深）
- A straw in a glass of water looks **bent** at the water surface
  杯里的吸管在水面处看起来弯折
- A coin in a cup "appears" when water is poured in
  往杯中倒水，原本看不到的硬币「出现」了
- A fisherman spears **below** where the fish appears to be
  渔夫要往鱼的像下方刺
- Lenses in spectacles, cameras and microscopes use refraction
  眼镜、相机和显微镜的透镜都利用折射

8.5 Dispersion of light 光的色散 (考)

Dispersion = **white light splits** into its **seven colours** (the spectrum) when it passes through a **prism**, because each colour is refracted by a different amount.

色散 = 白光通过三棱镜分成七种颜色（光谱），因为每种颜色的折射程度不同。



- Order: **Red, Orange, Yellow, Green, Blue, Indigo, Violet** (red bends least, violet bends most)
  顺序：红、橙、黄、绿、蓝、靛、紫（红光偏折最少，紫光最多）
- **Rainbow**: raindrops act like tiny prisms; seen with the **Sun behind you** after rain
  彩虹：雨滴像小三棱镜；雨后背对太阳才看得到
- A second prism turned the other way can **recombine** the colours into white light
  倒放的第二个三棱镜能把七色光重新合成白光

> **记忆法** **ROY G BIV** = Red Orange Yellow Green Blue Indigo Violet. 红橙黄绿蓝靛紫。

8.6 Scattering of light 光的散射 (考)

Scattering = light is spread out in many directions when it hits tiny particles (gas molecules, dust) in the air. **Blue light is scattered the most**, red light the least.

散射 = 光碰到空气中的微小粒子（气体分子、灰尘）向各方向散开；蓝光散射最多，红光最少。

- **Blue sky** in the day: blue light is scattered all over the sky
  白天天空是蓝色：蓝光散布满天
- **Red / orange sunset**: sunlight passes through a much thicker layer of air; most blue light is scattered away, so red and orange reach our eyes
  日落红橙色：阳光穿过很厚的空气层，蓝光大多被散射掉，红橙光到达眼睛
- **No air on the Moon** → no scattering → the sky is black even in the day
  月球没有空气 → 没有散射 → 白天天空也是黑的
- Red is used for **warning and stop signals** because it is scattered least and can be seen from far
  红色用作警告和停止信号，因为散射最少、远处也看得见

The rock cycle 岩石循环 (考)

Magma → (cools) igneous rock → (weathering, erosion, deposition, compaction) sedimentary rock → (heat + pressure) metamorphic rock → (melts) magma

岩浆 →（冷却）火成岩 →（风化、侵蚀、沉积、压实）沉积岩 →（高温高压）变质岩 →（熔化）岩浆

- Any rock can become any other type over millions of years
  经过数百万年，任何岩石都能变成另一种岩石
- Uses: granite — buildings, kitchen tops; marble — floors, statues; limestone — cement; slate — roof tiles
  用途：花岗岩建屋、做厨房台面；大理岩做地板、雕像；石灰岩制水泥；板岩做屋瓦

9.3 Main processes of the Earth 地球的主要作用 (考)

Endogenic processes 内营力作用	Exogenic processes 外营力作用
Driven by **heat from inside** the Earth 由地球内部的热推动	Driven by **energy from the Sun** and gravity, on the surface 由太阳能和地心引力推动，在地表进行
Movement of **tectonic plates**, **earthquakes**, **volcanic eruptions**, folding and faulting, mountain building 板块移动、地震、火山爆发、褶皱与断层、造山运动	**Weathering**, **erosion**, transportation, **deposition** by water, wind, ice and waves 风化、侵蚀、搬运、沉积（水、风、冰、海浪）
Builds up the land 使地面升高、形成地貌	Wears down the land 使地面降低、被磨平

Weathering and erosion 风化与侵蚀 (考)

- **Weathering** = rocks **break down in place** (do not move)
  风化 = 岩石在原地破碎（没有移动）
- **Physical** weathering: heating by day and cooling at night makes rocks crack; plant roots grow into cracks
  物理风化：日热夜冷使岩石破裂；植物根部长进裂缝
- **Chemical** weathering: rain water with dissolved carbon dioxide (weak acid) **dissolves limestone** → caves with **stalactites** (hang down) and **stalagmites** (grow up), e.g. Batu Caves, Gua Niah, Gua Tempurung
  化学风化：含二氧化碳的雨水（弱酸）溶解石灰岩 → 形成有钟乳石（往下垂）和石笋（往上长）的石洞，例如黑风洞、尼亚石洞、淡布隆洞
- **Biological** weathering: roots, burrowing animals, lichens
  生物风化：树根、挖洞动物、地衣
- **Erosion** = broken rock and soil are **carried away** by water, wind, ice or waves
  侵蚀 = 碎石和泥土被水、风、冰或海浪带走
- **Deposition** = the carried material is **dropped** (deltas, beaches, sand dunes)
  沉积 = 被带走的物质沉下来（三角洲、海滩、沙丘）

UASA Tip 考试贴士 Weathering = breaks, stays. Erosion = moves away. 风化 = 碎了留在原地；侵蚀 = 被带走。两者常被混淆。

9.4 Geohazards 地质灾害 (考)

Geohazards are natural Earth events that can harm people and property.

地质灾害 = 可能伤害人命和财产的地球自然事件。

Geohazard 地质灾害	Cause 原因	Malaysian link 与马来西亚有关
Earthquake 地震	Sudden movement of rocks along plate boundaries or faults 板块边界或断层的岩石突然移动	Ranau, Sabah, 5 June 2015 (near Mount Kinabalu) 2015 年 6 月 5 日沙巴兰瑙（神山附近）
Tsunami 海啸	Giant waves from an undersea earthquake 海底地震引起的巨浪	26 Dec 2004 tsunami hit Penang and Kedah coasts 2004 年 12 月 26 日海啸冲击槟城和吉打海岸
Landslide 土崩	Soil and rock slide down a slope, often after heavy rain or on cleared slopes 大雨后或山坡被开垦，泥石滑下	Common on hill slopes in the monsoon 季候风期间山坡常发生
Sinkhole 地陷（天坑）	Ground collapses into a hole, often over limestone that has been dissolved 地面塌陷，常在被溶解的石灰岩上方	Can happen in limestone areas 石灰岩地区可能发生
Volcanic eruption 火山爆发	Magma escapes through the crust 岩浆冲出地壳	Malaysia has no active volcano, but haze/ash may come from neighbours 马来西亚没有活火山，但可能受邻国火山灰影响
Land subsidence / mud flood 地层下陷 / 泥流	Land sinks slowly / mud flows downhill 地面慢慢下沉 / 泥浆往下流	— —

- Reduce the risk: do not build on steep slopes; build **retaining walls** and **terraces**; plant trees and grass on slopes; **early warning systems** (tsunami warning); follow evacuation drills
  减低风险：不在陡坡建屋；建挡土墙和梯田；在山坡种树种草；预警系统（海啸预警）；参与疏散演习

9.5 The age of the Earth 地球的年龄 (考)

- The Earth is about **4.6 billion years** old
  地球大约 46 亿岁
- **Fossils** = remains or traces of organisms that lived long ago, preserved in **sedimentary rock** (bones, shells, leaf prints, footprints)
  化石 = 古代生物的遗体或遗迹，保存在沉积岩中（骨头、贝壳、叶印、脚印）
- In undisturbed rock layers, the **lower layers are older** than the upper layers
  在没有被扰动的岩层中，下层比上层古老
- **Radiometric (radioactive) dating** measures the age of rocks and fossils accurately
  放射性定年法能准确测出岩石和化石的年龄
- Fossils show how life and the environment changed (e.g. sea-shell fossils on a mountain → the land was once under the sea)
  化石显示生命和环境的变化（例如山上有贝壳化石 → 那里曾是海底）
- **Geological time scale**: Precambrian → Palaeozoic → Mesozoic (age of dinosaurs) → Cenozoic (age of mammals; humans appear)
  地质年代：前寒武纪 → 古生代 → 中生代（恐龙时代）→ 新生代（哺乳动物时代，人类出现）

Answers 答案与解析

Chapter 1 — Practice · Introduction to Scientific Investigation

1. C — Meteorology is the study of weather and climate.
气象学研究天气与气候。

2. A — It is a corrosive substance; concentrated acids are corrosive.
这是腐蚀性标志；浓酸有腐蚀性。

3. B — The S.I. unit of temperature is the kelvin (K).
温度的国际单位是开尔文（K）。

4. D — 1 km = 1 000 m, so 2.5 × 1 000 = 2 500 m.
2.5 × 1000 = 2500 米。

5. A — The micrometer screw gauge reads to 0.01 mm, good for very small lengths.
螺旋测微器可读到 0.01 mm，适合量很小的长度。

6. C — More air gives complete burning: a blue, hotter flame with no soot.
空气充足，燃烧完全，火焰蓝色、较热、没有烟灰。

7. B — Mass is the amount of matter; weight depends on gravity, which is weaker on the Moon.
质量是物体所含物质的多少；重量取决于引力，月球引力较小。

8. B — The eye is not level with the bottom of the meniscus, so it is a parallax error.
视线没有与凹液面最低点同高，是视差。

9. D — The five base quantities are length, mass, time, temperature and electric current.
五个基本量是长度、质量、时间、温度和电流。

10. A — The time is what changes because of the length and is measured.
时间因绳长而改变，是被测量的。

11. 5×10^{-5} m — Move the decimal point 5 places to the right: 5×10^{-5}.
小数点向右移 5 位，得 5×10^{-5}。

12. (a) 0.8 g/cm³ (b) Floats — (a) Density = 48 ÷ 60 = 0.8 g/cm³. (b) 0.8 g/cm³ is less than the density of water (1 g/cm³), so it floats.
(a) 48 ÷ 60 = 0.8 g/cm³；(b) 比水的密度 1 g/cm³ 小，所以会浮。

13. Any two — Mass is the amount of matter, weight is the gravitational force; mass is in kg, weight in N; mass does not change with place, weight changes with gravity; mass is measured with a beam balance, weight with a spring balance.
质量是物体所含物质的多少，重量是作用在物体上的地心引力；单位 kg 与 N；质量不随地方改变，重量会变；天平量质量，弹簧秤量重量。

14. Any two — Point the mouth of the test tube away from yourself and others; hold it with a test-tube holder; heat gently while shaking it; wear goggles.
管口不可对着自己或别人；用试管夹夹住；一边摇一边轻轻加热；戴护目镜。

15. 12 cm³; water displacement method — 42 – 30 = 12 cm³. The rise in water level equals the volume of the stone.
42 – 30 = 12 cm³；水位上升量 = 石头体积，叫排水法。

Chapter 2 — Practice · Cell as the Basic Unit of Life

1. D — The nucleus contains genetic material and controls the cell.
细胞核含遗传物质，控制细胞。

2. A — Only plant cells have a cell wall, chloroplasts and a large central vacuole.
只有植物细胞有细胞壁、叶绿体和大液泡。

3. B — Methylene blue stains animal cells; iodine is used for onion cells.
动物细胞用亚甲蓝；洋葱细胞用碘液。

4. C — Paramecium is made of one cell; the others are multicellular.
草履虫只有一个细胞，其他是多细胞生物。

5. B — Similar cells form tissues, tissues form organs, organs form systems.
细胞组成组织，组织组成器官，器官组成系统。

6. A — Chloroplasts contain chlorophyll that absorbs light.
叶绿体含叶绿素，吸收光能。

7. C — Glucose + oxygen → carbon dioxide + water + energy.
葡萄糖 + 氧 → 二氧化碳 + 水 + 能量。

8. D — Long and thin = larger surface area for absorbing water.
细长 = 表面积大，吸收更多水。

9. B — The heart is made of different tissues working together.
心脏由不同的组织一起工作组成。

10. D — Iodine turns blue-black with starch.
碘液遇淀粉变蓝黑色。

11. Membrane controls movement in/out; wall gives shape and support — The cell membrane controls substances entering and leaving the cell; the cell wall gives the plant cell a fixed shape and support.
细胞膜控制物质进出；细胞壁给植物细胞固定形状和支持。

12. Carbon dioxide + water → glucose + oxygen (with light and chlorophyll) — Light energy and chlorophyll are needed.
二氧化碳 + 水 →（光、叶绿素）→ 葡萄糖 + 氧。

13. Red blood cell — Biconcave shape (larger surface area) / no nucleus (more space) / contains haemoglobin.
红血球：双凹形（表面积大）/ 没有细胞核（更多空间）/ 含血红素。

14. To avoid air bubbles — Air bubbles block the view of the cells.
气泡会挡住细胞，看不清楚。

15. Any two — Respiration in all cells, photosynthesis only in green cells; mitochondria vs chloroplasts; respiration releases energy, photosynthesis stores energy; respiration day and night, photosynthesis only in light; respiration uses oxygen, photosynthesis gives out oxygen.
所有细胞 vs 绿色细胞；线粒体 vs 叶绿体；释放能量 vs 储存能量；日夜 vs 只在有光时；用氧 vs 放出氧。

Chapter 3 — Practice · Coordination and Response

1. A — Homeostasis keeps conditions such as temperature and water content steady.
体内平衡保持温度、水分等稳定。

2. B — Normal body temperature is about 37 °C.
正常体温约 37 °C。

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