**科學（中一至中三）**

**更新課程 (2017)**

**單元四：細胞、人類生殖與遺傳**

**DNA與遺傳**

**DNA編碼**

**（教師版）**

**曾美月老師**

**蕭志瑛老師**

**寶血女子中學**

**教育局課程發展處科學教育組**

科學（中一至中三）

單元四：細胞、人類生殖與遺傳

課題：DNA與遺傳

預計課堂時間：30分鐘

**DNA編碼**

**【學習目標】**

活動完結後，學生應能：

1. 了解DNA的編碼指示是由DNA上的鹼基序列決定；以及
2. 認識DNA 編碼是決定不同性狀的指示。

**活動A：解構摩斯密碼**

**I. 目的：**認識把訊息加密的常用的方法，並明白DNA編碼是由DNA上的鹼基序列決定。

**II. 所需材料：**

|  |  |  |
| --- | --- | --- |
| * 工作紙 | | 每人一張 |
| * DNA解碼表 (附頁1) | | 每人一張 |
| * 電路板及以下零件(電池、開關、蜂鳴器／燈泡)一套，以並聯型式接駁 | | 老師示範用 |
| * 短片《無線新聞主題音樂》   (可只播首25秒) | (https://www.youtube.com/watch?v=8ddEmFkROa8) | |
| * 短片《無線新聞的「News Today」摩斯密碼》(片長1分5秒) | (https://www.youtube.com/watch?v=u493fX2hYgU) | |

**III. 教學流程：**

|  |  |
| --- | --- |
| 1. | 將學生分成4人一組。 |
| 2. | 播放短片《無線新聞主題音樂》，引起學生的學習興趣。 |
| 3. | 播放短片《無線新聞的「News Today」摩斯密碼》，讓學生知道摩斯密碼的一項應用。 |
| 4. | 老師利用蜂鳴器／燈泡以摩斯密碼傳出訊息，學生參考摩斯密碼表，將老師提供的密碼解碼為英文字母。 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A | ‧－ | H | ‧‧‧‧ | O | － － － | U | ‧‧－ |
| B | －‧‧‧ | I | ‧‧ | P | ‧－ －‧ | V | ‧‧‧－ |
| C | －‧－‧ | J | ‧－ － － | Q | － －‧－ | W | ‧─ ─ |
| D | －‧‧ | K | －‧－ | R | ‧－‧ | X | －‧‧－ |
| E | ‧ | L | ‧－‧‧ | S | ‧‧‧ | Y | －‧－ － |
| F | ‧‧－‧ | M | － － | T | － | Z | － －‧‧ |
| G | ─ ─‧ | N | －‧ |  |  |  |  |
|  |  |  |  |  |  |  |  |

|  |  |
| --- | --- |
|  | （每個英文字母的摩斯密碼均由不同數目及排列次序的代碼劃「**－**」及點「‧」組成。若要把訊息以摩斯密碼加密，你要先根據對照表找出英文字母的相對代碼，然後依代碼按下電路的開關來讓蜂鳴器響起或燈泡亮起，「‧」代表按著開關1秒，，而「**－**」代表按著開關3秒。) |
| 5. | 跟學生討論並推論摩斯密碼的特色，著學生填寫於工作紙空格內。 |
| 6. | 老師介紹DNA密碼及其特色。 |
| 7. | 學生參考DNA密碼表，將老師提供的密碼解碼為英文字。 |
|  |  |

**IV. 學生工作紙及題目的建議答案：**

2. 摩斯密碼表的特色：

|  |
| --- |
| 1. 只有兩種符號 |
| 1. 符號可重複使用 |
| 1. 長短不一 |

3. DNA密碼的特色：

|  |
| --- |
| * 每\_\_\_三\_\_\_個鹼基作為一單位。 * 所有鹼基只讀取\_\_\_一\_\_\_次。 |

4. DNA鹼基序列：

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **A** | **A** | **C** | **T** | **G** | **G** | **G** | **A** | **T** | **T** | **C** | **A** | **T** | **T** | **C** | **G** | **C** | **T** | **T** | **C** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **T** | **T** | **C** | **G** | **C** | **G** | **A** | **A** | **T** | **G** | **T** | **C** | **G** | **C** | **G** | **A** | **A** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **T** | **T** | **A** | **T** | **T** | **A** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **A** | **C** | **G** | **T** |

DNA鹼基序列經解碼後的訊息：

|  |
| --- |
| **This is an apple** |

**活動B： 破解基因密碼**

1. **目的：**認識DNA 編碼是決定不同性狀的指示。
2. **所需材料：**

|  |  |  |
| --- | --- | --- |
| * DNA解碼表 (附頁1) | | 每人一張 |
| * 面部輪廓簡圖(附頁2) | | 每組一張(可隨意為每組選擇男孩或女孩面部輪廓簡圖) |
| * 某位家庭成員的面部特徵的DNA編碼紙 (附頁3a-h) | | 每組一張內容不同的DNA 編碼紙 |
| * 各面部特徵的DNA密碼總表(附頁4) | | 作老師參考 |
| * 短片《人與人之間的差異》   教育局教育電視節目《生命天書 DNA》章節1 (片長1分47秒)  (<https://www.hkedcity.net/etv/resource/7685865217>) | | |
|  |  |  |

1. **教學流程：**

|  |  |
| --- | --- |
| 1. | 將學生分成4人一組。 |
| 2. | 老師派發印有某位家庭成員的面部特徵的DNA 編碼紙(附頁3) 。 (老師亦可根據附頁4自行編排附件3的內容)。 |
| 3. | 學生參考DNA解碼表(附頁1)，把DNA編碼進行解碼，以得知該學生的面部特徵，並將特徵填寫於編碼下的空格內。 |
| 4. | 學生繼而將各特徵繪於面部輪廓簡圖(附頁2)上。 |
| 5. | 各組展示已繪上面部特徵的面部輪廓簡圖，以顯示各人的面部特徵的差異。 |
| 6. | 播放短片《人與人之間的差異》作總結。 |

**IV. 總結：**

1.DNA編碼是決定不同性狀的指示。

2. DNA的編碼指示是由DNA上的鹼基序列決定。

3. 人與人之間的差異都是由於DNA上的鹼基序列不同。

1. **活動的建議答案：**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **面部特徵** | | | |
| 3a | 第一個孩子 | Have  blue eyes | Do not have  dimples | Have  attached earlobes | Have  a cleft chin |
| 3b | 第二個孩子 | Have  blue eyes | Have  dimples | Have  attached earlobes | Have  an uncleft chin |
| 3c | 第三個孩子 | Have  brown eyes | Have  dimples | Have  free earlobes | Have  an uncleft chin |
| 3d | 第四個孩子 | Have  blue eyes | Do not have  dimples | Have  free earlobes | Have  an uncleft chin |
| 3e | 第五個孩子 | Have  brown eyes | Do not have dimples | Have  free earlobes | Have  an uncleft chin |
| 3f | 第六個孩子 | Have  brown eyes | Have  dimples | Have  attached earlobes | Have  a cleft chin |
| 3g | 第七個孩子 | Have  blue eyes | Have  dimples | Have  attached earlobes | Have  a cleft chin |
| 3h | 第八個孩子 | Have  blue eyes | Have  dimples | Have  free earlobes | Have  a cleft chin |

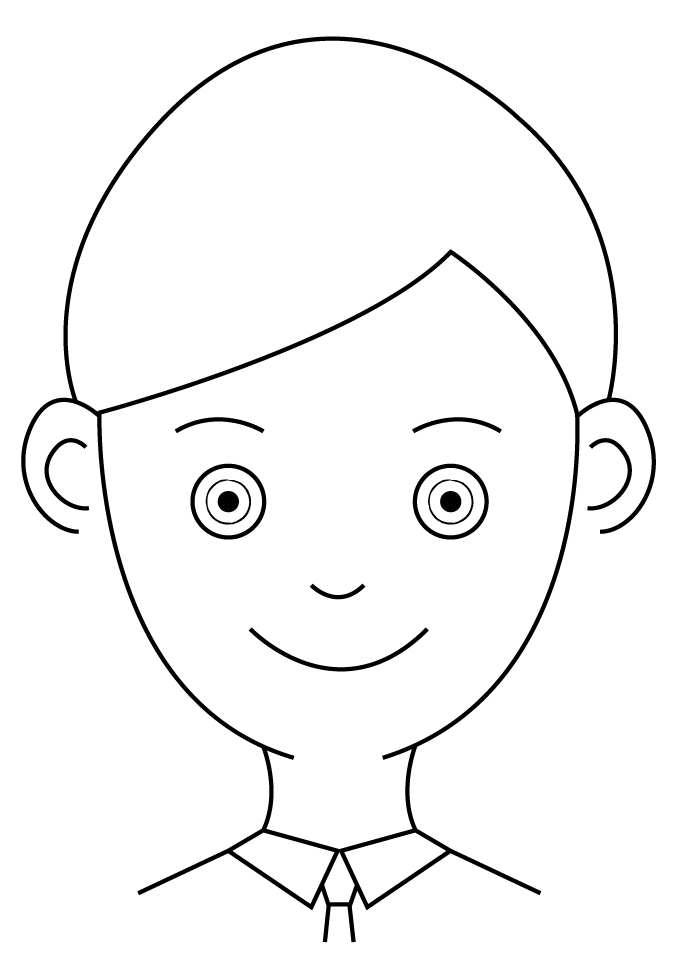
附頁1

**DNA解碼表**

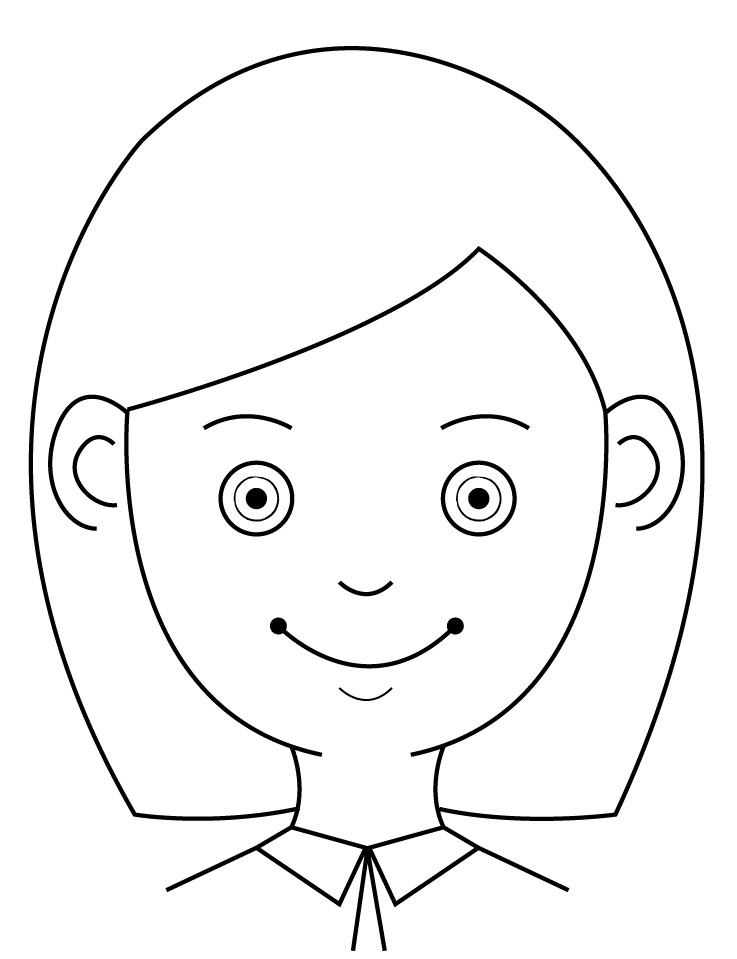
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **開始** | |  |  |  | | --- | --- | --- | | **A** | **A** | **A** | | **空格** | |  |  |  | | --- | --- | --- | | **C** | **G** | **C** | | **停止** | |  |  |  | | --- | --- | --- | | **A** | **T** | **A** | |
| **A** | |  |  |  | | --- | --- | --- | | **G** | **A** | **A** | | **I** | |  |  |  | | --- | --- | --- | | **T** | **T** | **C** | | **R** | |  |  |  | | --- | --- | --- | | **A** | **G** | **T** | |
| **B** | |  |  |  | | --- | --- | --- | | **C** | **T** | **C** | | **J** | |  |  |  | | --- | --- | --- | | **T** | **G** | **C** | | **S** | |  |  |  | | --- | --- | --- | | **A** | **T** | **T** | |
| **C** | |  |  |  | | --- | --- | --- | | **C** | **G** | **T** | | **K** | |  |  |  | | --- | --- | --- | | **C** | **G** | **G** | | **T** | |  |  |  | | --- | --- | --- | | **C** | **T** | **G** | |
| **D** | |  |  |  | | --- | --- | --- | | **C** | **A** | **G** | | **L** | |  |  |  | | --- | --- | --- | | **C** | **A** | **T** | | **U** | |  |  |  | | --- | --- | --- | | **G** | **T** | **T** | |
| **E** | |  |  |  | | --- | --- | --- | | **A** | **C** | **C** | | **M** | |  |  |  | | --- | --- | --- | | **T** | **A** | **C** | | **V** | |  |  |  | | --- | --- | --- | | **G** | **C** | **A** | |
| **F** | |  |  |  | | --- | --- | --- | | **A** | **C** | **A** | | **N** | |  |  |  | | --- | --- | --- | | **T** | **G** | **T** | | **W** | |  |  |  | | --- | --- | --- | | **A** | **T** | **G** | |
| **G** | |  |  |  | | --- | --- | --- | | **G** | **T** | **C** | | **O** | |  |  |  | | --- | --- | --- | | **G** | **T** | **G** | | **X** | |  |  |  | | --- | --- | --- | | **T** | **T** | **T** | |
| **H** | |  |  |  | | --- | --- | --- | | **G** | **G** | **A** | | **P** | |  |  |  | | --- | --- | --- | | **T** | **T** | **A** | | **Y** | |  |  |  | | --- | --- | --- | | **C** | **C** | **C** | |
|  |  | **Q** | |  |  |  | | --- | --- | --- | | **T** | **A** | **T** | | **Z** | |  |  |  | | --- | --- | --- | | **A** | **C** | **A** | |

附頁2a

**第( ) 個孩子**



附頁2b

**第( )個孩子**

**活動: 破解DNA密碼**

附頁3a

**第一個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **C** | **A** | **T** | **G** | **T** | **T** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I do not have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I do not have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **T** | **G** | **C** | **T** | **G** | **G** | **A** | **A** | **C** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **G0** | **G** | **A** | **A** | **C** | **C** | **C** | **A** | **G** | **C** | **G** | **C** | **A** | **C** | **C** | **G** | **A** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** | **A** | **C** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **G** | **C** | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3b

**第二個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **C** | **A** | **T** | **G** | **T** | **T** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **T** | **G** | **C** | **T** | **G** | **G** | **A** | **A** | **C** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **G0** | **G** | **A** | **A** | **C** | **C** | **C** | **A** | **G** | **C** | **G** | **C** | **A** | **C** | **C** | **G** | **A** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** | **A** | **C** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **T** | **G** | **T** | **C** | **G** | **C** | **G** | **T** | **T** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3c

**第三個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **A** | **G** | **T** | **G** | **T** | **G** | **A** | **T** | **G** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **C** | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **A** | **C** | **A** | **A** | **G** | **T** | **A** | **C** | **C** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **G** | **A** | **A** | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **T** | **G** | **T** | **C** | **G** | **C** | **G** | **T** | **T** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3d

**第四個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **C** | **A** | **T** | **G** | **T** | **T** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I do not have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I do not have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **A** | **C** | **A** | **A** | **G** | **T** | **A** | **C** | **C** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **G** | **A** | **A** | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **T** | **G** | **T** | **C** | **G** | **C** | **G** | **T** | **T** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3e

**第五個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **A** | **G** | **T** | **G** | **T** | **G** | **A** | **T** | **G** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **C** | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I do not have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I do not have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **A** | **C** | **A** | **A** | **G** | **T** | **A** | **C** | **C** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **G** | **A** | **A** | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **T** | **G** | **T** | **C** | **G** | **C** | **G** | **T** | **T** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3f

**第六個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **A** | **G** | **T** | **G** | **T** | **G** | **A** | **T** | **G** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **C** | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **T** | **G** | **C** | **T** | **G** | **G** | **A** | **A** | **C** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **G0** | **G** | **A** | **A** | **C** | **C** | **C** | **A** | **G** | **C** | **G** | **C** | **A** | **C** | **C** | **G** | **A** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** | **A** | **C** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **G** | **C** | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3g

**第七個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **C** | **A** | **T** | **G** | **T** | **T** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **T** | **G** | **C** | **T** | **G** | **G** | **A** | **A** | **C** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **G0** | **G** | **A** | **A** | **C** | **C** | **C** | **A** | **G** | **C** | **G** | **C** | **A** | **C** | **C** | **G** | **A** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** | **A** | **C** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **G** | **C** | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁3h

**第八個孩子面部特徵的DNA密碼**

**面部特徵1：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **C** | **A** | **T** | **G** | **T** | **T** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵2：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **A** | **G** | **T** | **T** | **C** | **T** | **A** | **C** | **T** | **T** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵3：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **A** | **C** | **A** | **A** | **G** | **T** | **A** | **C** | **C** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **G** | **A** | **A** | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**面部特徵4：**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA密碼**  **(鹼基序列)：** | **I have** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **G** | **C** | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **T** | **G** | **T** | **A** | **T** | **A** | |
| **解碼：** | **I have** |  |

**活動: 破解DNA密碼**

附頁4

**有關一些面部特徵的DNA密碼總表**

|  |  |
| --- | --- |
| **面部特徵** | **DNA密碼(鹼基序列)** |
| blue eyes | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **C** | **A** | **T** | **G** | **T** | **T** | **A** | **C** | **C** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
|  |  |
| brown eyes | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **C** | **T** | **C** | **A** | **G** | **T** | **G** | **T** | **G** | **A** | **T** | **G** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **C** | **A** | **C** | **C** | **C** | **C** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
|  |  |
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|  |  |
| attached earlobes | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **T** | **G** | **C** | **T** | **G** | **G** | **A** | **A** | **C** | **G** | **T** | **G** | **G** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **C** | **A** | **G** | **C** | **G** | **C** | **A** | **C** | **C** | **G** | **A** | **A** | **A** | **G** | **T** | **C** | **A** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **G** | **T** | **G** | **C** | **T** | **C** | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
|  |  |
| free earlobes | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **A** | **C** | **A** | **A** | **G** | **T** | **A** | **C** | **C** | **A** | **C** | **C** | **C** | **G** | **C** | **A** | **C** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **G** | **A** | **A** | **A** | **G** | **T** | **C** | **A** | **T** | **G** | **T** | **G** | **C** | **T** | **C** |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **C** | **C** | **A** | **T** | **T** | **A** | **T** | **A** | |
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| a cleft chin | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **C** | **G** | **C** | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **C** | **A** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **T** | **G** | **C** | **G** | **C** | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** | **T** | **G** | **T** | **A** | **T** | **A** | |
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| an uncleft chin | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **A** | **A** | **G** | **A** | **A** | **T** | **G** | **T** | **C** | **G** | **C** | **G** | **T** | **T** | **T** | **G** | **T** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **C** | **A** | **T** | **A** | **C** | **C** | **A** | **C** | **A** | **C** | **T** | **G** | **C** | **G** | **C** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C** | **G** | **T** | **G** | **G** | **A** | **T** | **T** | **C** | **T** | **G** | **T** | **A** | **T** | **A** | |