因式分解 想法源頭：CA 設計者：陳梅仙 修改：余秉橙

|  |  |
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| 從**分開算**變成**一起算(因式分解)** | 從**一起算**變成**分開算(乘法展開)** |
| 6×2+6×8=6×(2+8) | 6×(2+8)= 6×2+6×8 |
| 6×(2+8)+3×(2+8)=(6+3)×(2+8) | (6+3)×(2+8)= 6×(2+8)+3×(2+8) |

1.甲班每人買1個蛋糕和1杯飲料，總共花費？

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| (1) **一起算 ⇨ 分開算**一起算：甲 × (蛋糕+飲料) A × ( B + C )⇨ 分開算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ | (2) **分開算 ⇨ 一起算**分開算：甲×蛋糕 + 甲×飲料 A×B + A×C⇨ 一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ |

2. **分開算 ⇨ 一起算**

(1)分開算：5*ab*－*a* **⇨**  *a*×5*b*－*a*× (2) 分開算：*y*2＋2*y*（*y*＋1）**⇨** y×y＋y×2（y＋1）

 一起算： 一起算：＝*y*〔*y*＋2（*y*＋1）〕

 ⇨一起算： *a*（5*b*－1） ⇨ 一起算： *y（3y＋2）* \_

(3) 分開算：（*x*－1）（3*x*－2）－（*x*－1）（*x*＋1）(4) 分開算：*x*（*x*＋4）－（*x*＋4）

 一起算： 一起算：

 ⇨一起算： ⇨ 一起算：\_

3.甲、乙兩班每人買1個蛋糕和1杯飲料，總共花費？

|  |  |
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| (1) **一起算 ⇨ 分開算**一起算：(甲+乙) × (蛋糕+飲料)⇨ 分開算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_⇨ 再次分開算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | (2) **分開算 ⇨ 一起算**分開算：甲×蛋糕+甲×飲料+乙×蛋糕+乙×飲料 ⇨一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ⇨再次一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

4. **分開算 ⇨ 一起算**

 (1) 分開算：*x*2＋*ax*＋*bx*＋*ab*  (2) 分開算：*x*3－3*x*2＋2*x*－6

 ⇨ 一起算： ⇨ 一起算：\_

 ⇨再次一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ⇨ 再次一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (3) 拆開來：（*a*2*x*＋*x*）＋（*ax*2＋*a*） (4) 拆開來：（3*xy*＋8）－2（*x*＋6*y*）

 ⇨分組分開算： ⇨ 分組分開算：\_

 ⇨ 一起算： ⇨ 一起算：\_

 ⇨再次一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ⇨ 再次一起算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| 5.計算23×23=6. 將400+12+9變回原本的樣子(不考慮進位)

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| --- | --- | --- |
|  | 2 | 3 |
| × | 2 | 3 |
|  |  |  |
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| --- | --- | --- |
|  |  |  |
| × |  |  |
|  |  |  |
|  |  |  |
| 1 | 6 | 9 |

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7. **一起算 ⇨ 分開算**

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| (1) 一起算：(x+3)×(x+3)⇨ 分開算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_+3x×一起算分開算分開算x+3 | (2) 一起算：(x－4)×(x－4)⇨ 分開算：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_－4xx×一起算分開算分開算－4 |

8. **分開算 ⇨ 一起算**

|  |  |
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| (1) 一起算：(\_\_\_\_\_\_\_)×(\_\_\_\_\_\_\_)⇨ 分開算：x2+8x+16×一起算分開算分開算+16+8xx2 | (2) 一起算：(\_\_\_\_\_\_\_)×(\_\_\_\_\_\_\_)⇨ 分開算：x2－10x+25×一起算分開算分開算－10xx2+25 |

10. **分開算 ⇨ 一起算**

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| --- | --- |
| (1) 一起算：(\_\_\_\_\_\_\_)×(\_\_\_\_\_\_\_)⇨ 分開算：x2+14x+\_\_\_\_\_\_\_×一起算分開算分開算+14xx2 | (2) 一起算：(\_\_\_\_\_\_\_)×(\_\_\_\_\_\_\_)⇨ 分開算：x2－2x+\_\_\_\_\_\_\_×一起算分開算分開算－2xx2 |

11. **分開算 ⇨ 一起算**

|  |  |
| --- | --- |
| (1) 一起算：(\_\_\_\_\_\_\_)×(\_\_\_\_\_\_\_)⇨ 分開算：x2+5x+\_\_\_\_\_\_\_×一起算分開算分開算+5xx2 | (2) 一起算：(\_\_\_\_\_\_\_)×(\_\_\_\_\_\_\_)⇨ 分開算：x2－7x+\_\_\_\_\_\_\_×一起算分開算分開算－7xx2 |

9. 請在空格中填入適當的答案，讓算式可以成功的完成因式分解

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- |
| (1) |  | x | +2 |
|  | ×) | x | +5 |
|  |  | +5x | +10 |
|  | x2 | +2x |  |
|  | x2 | +7x | +10 |

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|  |  |  |  |
| --- | --- | --- | --- |
| (2) |  | x | +3 |
|  | ×) | x | +2 |
|  |  | □ | □ |
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| (3) |  | x | □ |
|  | ×) | x | □ |
|  |  | □x | □ |
|  | x2 | □x |  |
|  | x2 | +8x | +12 |

 |
| (x+2)(x+5)= x2+7x+10x2+7x+10=(x+2)(x+5) | (x+3)(x+2)=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_=(x+3)(x+2) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)= x2+8x+12x2+8x+12=(\_\_\_\_\_\_)(\_\_\_\_\_\_) |
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| (4) |  | x | □ |
|  | ×) | x | □ |
|  |  | □x | □ |
|  | x2 | □x |  |
|  | x2 | -7x | +12 |

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|  |  |  |  |
| --- | --- | --- | --- |
| (5) |  | x | □ |
|  | ×) | x | □ |
|  |  | □x | □ |
|  | x2 | □x |  |
|  | x2 | +2x | -15 |

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| --- | --- | --- | --- |
| (6) |  | x | □ |
|  | ×) | x | □ |
|  |  | □x | □ |
|  | x2 | □x |  |
|  | x2 | -5x | -24 |

 |
| (\_\_\_\_\_\_)(\_\_\_\_\_\_)= x2-7x+12x2-7x+12=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)= x2+2x-15x2+2x-15=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)= x2-5x-24x2-5x-24=(\_\_\_\_\_\_)(\_\_\_\_\_\_) |

10.請在空格中填入適當的答案，讓算式可以成功的完成因式分解

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- |
| (1) |  | 3x | +4 |
|  | ×) | 2x | +7 |
|  |  | +21x | +28 |
|  | 6x2 | +8x |  |
|  | 6x2 | +29x | +28 |

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| --- | --- | --- | --- |
| (2) |  | 5x | +2 |
|  | ×) | 4x | +3 |
|  |  | □ | □ |
|  | □ | □ |  |
|  | □ | □ | □ |

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| --- | --- | --- | --- |
| (3) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 15x2 | +22x | +8 |

 |
| (3x+4)(2x+7)= 6x2+29x+286x2+29x+28=(3x+4)(2x+7) | (5x+2)(4x+3)=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_=(5x+2)(4x+3) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)=15x2+22x+815x2+22x+8=(\_\_\_\_\_\_)(\_\_\_\_\_\_) |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- |
| (4) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 3x2 | -7x | +2 |

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|  |  |  |  |
| --- | --- | --- | --- |
| (5) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 6x2 | +11x | -10 |

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| --- | --- | --- | --- |
| (6) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 15x2 | -6x | -21 |

 |
| (\_\_\_\_\_\_)(\_\_\_\_\_\_)= 3x2-7x+23x2-7x+2=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)= 6x2+11x-106x2+11x-10=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)= 15x2-6x-2115x2-6x-21=(\_\_\_\_\_\_)(\_\_\_\_\_\_) |

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| --- | --- | --- | --- |
| (7) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 4x2 | -12x | +9 |

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|  |  |  |  |
| --- | --- | --- | --- |
| (8) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 25x2 | +20x | +4 |

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| --- | --- | --- | --- |
| (9) |  | □x | □ |
|  | ×) | □x | □ |
|  |  | □x | □ |
|  | □x2 | □x |  |
|  | 49x2 |  | -36 |

 |
| (\_\_\_\_\_\_)(\_\_\_\_\_\_)= 4x2-12x+94x2-12x+9=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)=25x2+20x+425x2+20x+4=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (\_\_\_\_\_\_)(\_\_\_\_\_\_)= 49x2-3649x2-36=(\_\_\_\_\_\_)(\_\_\_\_\_\_) |

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| (10) |  | □ | □ |
|  | ×) | □ | □ |
|  |  | □ | □ |
|  | □ | □ |  |
|  | 10x2 | -4xz | -6yz |
|  | +15xy |  |

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| (11) |  | □ | □ | □ |
|  | ×) |  | □ | □ |
|  |  | □ | □ | □ |
|  | □ | □ | □ |  |
|  | x3 |  |  | +1 |

 |
| (\_\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_\_)=10x2－4xz＋15xy－6yz10x2－4xz＋15xy－6yz =(\_\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_\_) | (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)=x3+1x3+1=(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) |

11.請在空格中填入適當的答案，讓算式可以成功的完成因式分解

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  | □x | □ |
| ×) | □x | □ |
|  | □x | □ |
| □x2 | □x |  |
| □x2 | □x | □ |

 | (1) x2+12x+36=(\_\_\_\_\_\_\_)2(2) x2-8x+16=(\_\_\_\_\_\_\_)2(3) x2+14x+49=(\_\_\_\_\_\_\_)2(4) x2-2x+1=(\_\_\_\_\_\_\_)2 | (5) x2+7x+$\frac{49}{4}$=(\_\_\_\_\_\_\_)2(6) x2-11x+=(\_\_\_\_\_\_\_)2(7) 2x2+6x+\_\_\_\_\_\_= 2(\_\_\_\_\_\_\_)2(8) 3x2-12x+\_\_\_\_\_\_=\_\_(\_\_\_\_\_\_\_)2 |
|

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|  | □x | □ |
| ×) | □x | □ |
|  | □x | □ |
| □x2 | □x |  |
| □x2 | □x | □ |

 | (1)x2+7x-18=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(2)x2－x－6=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(3)6x2＋17x＋5=(\_\_\_\_\_\_)(\_\_\_\_\_\_)(4)4x2＋11x－3=(\_\_\_\_\_\_)(\_\_\_\_\_\_) | (5)6x2－x－12=(\_\_\_\_\_\_)(\_\_\_\_\_\_)(6)3x2－7x＋2=(\_\_\_\_\_\_)(\_\_\_\_\_\_)(7)12x2－8x－15=(\_\_\_\_\_)(\_\_\_\_\_)(8)6x2-5x-6=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_) |

12.請在空格中填入適當的答案，讓算式可以成功的完成因式分解

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
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|  |  |  |
| --- | --- | --- |
|  | x | □ |
| ×) | x | □ |
|  | □x | □ |
| x2 | □x |  |
| x2 | -5x | □ |

 | (1)x2-5x+\_\_\_\_\_\_\_=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(2)x2-5x+\_\_\_\_\_\_\_=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(3)x2-5x+\_\_\_\_\_\_\_=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(4)x2-5x+\_\_\_\_\_\_\_=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_) |

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| --- | --- | --- |
|  | x | □ |
| ×) | x | □ |
|  | □x | □ |
| x2 | □x |  |
| x2 | □x | -12 |

 | (5)x2+\_\_\_\_\_\_\_x-12=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(6)x2+\_\_\_\_\_\_\_x-12=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(7)x2+\_\_\_\_\_\_\_x-12=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_)(8)x2+\_\_\_\_\_\_\_x-12=(\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_) |

13.將　4x2－ax＋9　因式分解，可得（2x－b）2　的形式，請試著算出a, b的值。

14.若　481x2＋2x－3　可因式分解成（13x＋a）（bx＋c），其中　a、b、c　均為整數，請試著算出a, b, c的值

15. 請將下列各式因式分解

|  |  |  |
| --- | --- | --- |
| (1)a2b－ab2＋5a－5b | (2)2x3＋3x2－8x－12　 | (3) 4x2－12xy＋9y2－25 |

16. 已知3*x*2＋2*x*－8＝（*x*＋2）（3*x*－4），下列哪些是3*x*2＋2*x*－8的因式？

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| □ | *x*＋2 | □ | 2（*x*＋2） | □ | 2（*x*－2） | □ | （*x*＋2）2 |
| □ | （*x*＋2）（4－3*x*） | □ | （3*x*－4） | □ | （*x*＋2） | □ | （*x*＋2）（3*x*－4） |

17. 請寫出　22x7－83x6＋21x5　的因式

18.如果　x－2　是　5x2－11x＋a　和　x2＋bx－2　的公因式，請試著算出a, b的值。

19.有兩多項式　A＝x2（2x－3）（5x＋6），B＝（5x＋6）2（4x2－9）

請寫出A和B的公因式和公倍式