

110 學年度四技二專第一次聯合模擬考試 共同科目 數學(A)卷 詳解

數學(A)卷

110-1-A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
B	B	D	C	A	C	A	D	C	B	A	D	C	D	A	B	A	C	D	B	A	D	D	B	C

1. $\because A$ 在第四象限 $\therefore a > 0$ 且 $b < 0$

$\Rightarrow \frac{a}{b} < 0$ 且 $a - b > 0$ \therefore 點 $B(-, +)$ 在第二象限

故選(B)

2. $\because 2\overline{AC} = 3\overline{BC}$ $\therefore \overline{AC} : \overline{BC} = 3 : 2$

$\Rightarrow C(\frac{3 \times 4 + 2 \times (-1)}{5}, \frac{3 \times 1 + 2 \times 6}{5}) = (2, 3)$ ，故選(B)

3. 令 $L : 3x + 4y + k = 0$

$(0, -3)$ 代入 $L : 0 - 12 + k = 0 \Rightarrow k = 12$

$\therefore L : 3x + 4y + 12 = 0$ ，故選(D)

4. 令 $C(k, 0)$ $\because A, B, C$ 三點共線

$\therefore m_{\overline{AB}} = m_{\overline{AC}} \Rightarrow \frac{2-12}{-2-3} = \frac{2-0}{-2-k} \Rightarrow k = -3$ ，故選(C)

5. $L_1 : 3x + 4y - 1 = 0 \Rightarrow 6x + 8y - 2 = 0$

$L_2 : 6x + 8y + 3 = 0$

$\therefore d(L_1, L_2) = \frac{|-2-3|}{\sqrt{6^2+8^2}} = \frac{1}{2}$ ，故選(A)

6. $(3x^2 - 2x + 5)(x^2 + 3x - 2)$

x^3 項： $3x^2 \cdot 3x + (-2x) \cdot x^2 = 7x^3$

$\therefore x^3$ 之係數為 7，故選(C)

$$\begin{array}{r}
 2+1+2 \\
 1+2-1 \overline{) 2+5+2+a+b} \\
 \underline{2+4-2} \\
 1+4+a \\
 \underline{1+2-1} \\
 2+(a+1)+b \\
 \underline{2+4 } \\
 (a-3)+(b+2)
 \end{array}$$

\because 整除 $\therefore \begin{cases} a-3=0 \\ b+2=0 \end{cases} \Rightarrow \begin{cases} a=3 \\ b=-2 \end{cases}$

可知 $a + 2b = 3 + 2 \times (-2) = -1$ ，故選(A)

8. (A) $f(2) = (2+1)^{100} - 1 \neq 0$

(B) $f(1) = (1+1)^{100} - 1 \neq 0$

(C) $f(-1) = (-1+1)^{100} - 1 \neq 0$

(D) $f(-2) = (-2+1)^{100} - 1 = 0$

$\therefore x + 2$ 是 $f(x)$ 之因式，故選(D)

9. \because 斜率 $m = \frac{2-4}{-1-0} = 2$ 且 y 截距為 4

$\therefore L : y = 2x + 4 \Rightarrow$ 與 x 軸交於 $(-2, 0)$

由上可知： x 截距為 -2 且 y 截距為 4

$\therefore a = -2$ 且 $b = 4 \Rightarrow a + b = 2$ ，故選(C)

10. $y = (x-4)^2 + 2(x-1)^2 = x^2 - 8x + 16 + 2(x^2 - 2x + 1)$

$= 3x^2 - 12x + 18 = 3(x-2)^2 + 6$

\therefore 在 $x = 2$ 時， y 有最小值 $= 6 \Rightarrow a = 2$ 且 $b = 6$

$\Rightarrow a + b = 8$ ，故選(B)

11. $m_{L_1} = \frac{-2}{a}$ 且 $m_{L_2} = -(a+1)$

$\because L_1 \perp L_2 \therefore m_{L_1} \times m_{L_2} = \frac{-2}{a} \times [-(a+1)] = -1$

$\Rightarrow \frac{2a+2}{a} = -1 \Rightarrow 3a = -2 \Rightarrow a = \frac{-2}{3}$ ，故選(A)

12. $m_{\overline{AB}} = \frac{5-(-3)}{3-(-1)} = 2$ $\because L \parallel \overline{AB} \therefore m_L = m_{\overline{AB}} = 2$

$\Rightarrow L : y - 6 = 2(x-1)$ ，即 $2x - y + 4 = 0$

$\therefore a = 2, b = 4 \Rightarrow 2a - b = 0$ ，故選(D)

13. \because 平分 $\triangle ABC$ 之面積

\therefore 直線 L 一定通過 \overline{AC} 中點 D

而 \overline{AC} 中點 $D = (\frac{5+(-7)}{2}, \frac{3+1}{2}) = (-1, 2)$

又 $m_L = m_{\overline{BD}} = \frac{2-(-2)}{-1-1} = -2$

$\therefore L : y - (-2) = -2(x-1) \Rightarrow 2x + y = 0$

可知： $a = 2$ 且 $c = 0 \Rightarrow a - 2c = 2 - 0 = 2$ ，故選(C)

14. 由題意知： $f(x) = g(x) \cdot q(x) + r(x)$

$\therefore 3f(x) = 3 \cdot g(x) \cdot q(x) + 3 \cdot r(x)$

$= 5g(x) \cdot [\frac{3}{5}q(x)] + 3 \cdot r(x)$

由上式可知： $3f(x) \div 5g(x)$ 之餘式為 $3r(x)$ ，故選(D)

15. 令 $x = 7$ \therefore 原式 $= x^5 - 3x^4 - 7x^3 - 17x^2 - 880x - 220$

而 $f(7)$ 即 $f(x) \div (x-7)$ 所得之餘式

$$\begin{array}{r}
 1-3-7-17-880-220 \overline{) 7} \\
 \underline{+7+28+147+910+210} \\
 1+4+21+130+30 \\
 \underline{1+4+21+130+30} \\
 -10
 \end{array}$$

$\therefore f(7) = -10$ ，故選(A)

16. $\because \frac{-3-\sqrt{5}}{2} < x < \frac{-3+\sqrt{5}}{2}$

$\therefore (x - \frac{-3-\sqrt{5}}{2})(x - \frac{-3+\sqrt{5}}{2}) < 0 \Rightarrow x^2 + 3x + 1 < 0$

$\therefore a = 3$ 且 $b = 1 \Rightarrow a + b = 4$ ，故選(B)

17. $\because f(x)$ 恆負

$$\therefore 3^2 - 4 \times (-1) \times k < 0 \Rightarrow k < \frac{-9}{4}, \text{ 故選(A)}$$

18. \therefore 路程最短

\therefore 取 $(0, 0)$ 到 $3x + 4y + 60 = 0$ 之垂直線段長即為所求

$$\Rightarrow \frac{|0+0+60|}{\sqrt{3^2+4^2}} = 12 \text{ 單位長} \Rightarrow 12 \times 50 = 600 \text{ 公尺}$$

故選(C)

19. $\therefore f(1) = f(2) = 0 \quad \therefore f(x)$ 有因式 $x-1$ 、 $x-2$

$$\text{令 } f(x) = k(x-1)(x-2)$$

$$\therefore f(4) = 12 \quad \therefore k(4-1)(4-2) = 12 \Rightarrow k = 2$$

$$\text{可知: } f(x) = 2(x-1)(x-2)$$

$$\therefore f(5) = 2(5-1)(5-2) = 24, \text{ 故選(D)}$$

20. 已知: $f(-3) = -5$ 且 $f(\frac{1}{2}) = 9$

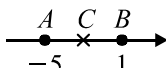
$$\text{令 } f(x) = (2x^2 + 5x - 3)Q(x) + ax + b$$

$$= (2x-1)(x+3)Q(x) + ax + b$$

$$\therefore f(-3) = -5 \quad \therefore -3a + b = -5$$

$$\text{又: } f(\frac{1}{2}) = 9 \quad \therefore \frac{1}{2}a + b = 9$$

$$\begin{cases} -3a + b = -5 \\ \frac{1}{2}a + b = 9 \end{cases} \Rightarrow \begin{cases} a = 4 \\ b = 7 \end{cases} \quad \therefore \text{餘式} = 4x + 7, \text{ 故選(B)}$$

21. 如右圖, \overline{AB} 之中點 $C = \frac{-5+1}{2} = -2$ 

$$\text{且 } \overline{AC} = \overline{BC} = 3$$

$$\therefore \text{可以表示成 } |x - (-2)| \leq 3 \Rightarrow a = -2 \text{ 且 } b = 3$$

$$\Rightarrow a + b = -2 + 3 = 1, \text{ 故選(A)}$$

$$22. \text{ 首先 } \begin{cases} 2 + E = -2 \\ B + 8 = 4 \\ 6 + G = 10 \\ -2 \times D = 8 \end{cases} \Rightarrow \begin{cases} E = -4 \\ B = -4 \\ G = 4 \\ D = -4 \end{cases}$$

$$\begin{array}{r} A \quad 2 \quad -4 \quad C \quad 6 \\ \hline \therefore \quad -4 \quad 8 \quad F \quad 4 \\ \hline H \quad -2 \quad 4 \quad J \quad 10 \end{array}$$

$$\text{接下來, } \begin{cases} A = H \\ H \times (-4) = -4 \\ J \times (-4) = 4 \\ F = 4 \times (-4) \\ J = C + F \end{cases} \Rightarrow \begin{cases} A = H = 1 \\ J = -1 \\ F = -16 \\ C = 15 \end{cases}$$

$$\text{由上可知: } A + B + C = 1 + (-4) + 15 = 12, \text{ 故選(D)}$$

23. 設距離地面 x 公尺時, 溫度為 y °C

$$\text{由題意知: } y = 30 - 0.6 \times \frac{x}{100}$$

$$\therefore 22.8 = 30 - \frac{0.6x}{100} \Rightarrow x = 1200, \text{ 故選(D)}$$

24. 設上山時速 x km/hr, 下山時速 $(x+2)$ km/hr

$$\therefore \frac{6}{x} + \frac{6}{x+2} = \frac{192}{60} \Rightarrow \frac{6}{x} + \frac{6}{x+2} = \frac{16}{5}$$

同乘 $5x(x+2)$

$$\Rightarrow 30(x+2) + 30x = 16x(x+2)$$

$$\Rightarrow 30x + 60 + 30x = 16x^2 + 32x \Rightarrow 16x^2 - 28x - 60 = 0$$

$$\Rightarrow 4x^2 - 7x - 15 = 0 \Rightarrow (x-3)(4x+5) = 0$$

$$\therefore x = 3 \text{ 或 } -\frac{5}{4} \text{ (不合), 故選(B)}$$

25. 如右圖

$$\text{由 } \frac{x}{5} + \frac{y}{3} = 1 \Rightarrow 3x + 5y = 15$$

$$\text{當 } x = 1 \Rightarrow y = \frac{12}{5}$$

$$\Rightarrow \text{有 } (1, 1), (1, 2) \text{ 兩點}$$

$$\text{當 } x = 2 \Rightarrow y = \frac{9}{5}$$

$$\Rightarrow \text{有 } (2, 1) \text{ 一點}$$

$$\text{當 } x = 3 \Rightarrow y = \frac{6}{5} \Rightarrow \text{有 } (3, 1) \text{ 一點}$$

$$\therefore \text{一共有 4 個格子點, 故選(C)}$$

