

四技二專聯合複習考試 共同科目 數學(C)卷 詳解

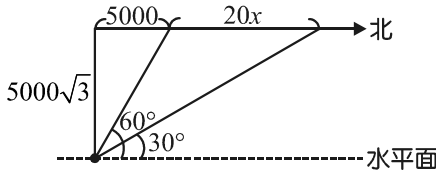
數學(C)卷

JC00-1-C

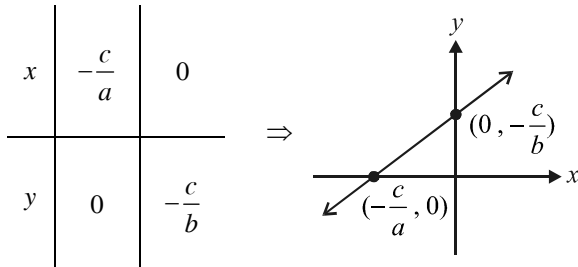
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
C	D	B	B	C	D	C	B	C	B	A	B	D	A	A	A	C	D	D	B	A	A	D	C	C

1. 設飛機速度每秒為 x 英尺

$$5000 + 20x = 15000, \quad 20x = 10000, \quad x = 500$$

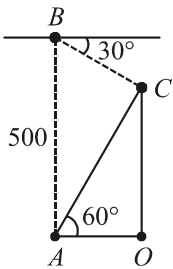


2.



$$\Rightarrow \begin{cases} -\frac{c}{a} < 0 \\ -\frac{c}{b} > 0 \end{cases} \Rightarrow \begin{cases} a \text{ 與 } c \text{ 同號} \\ b \text{ 與 } c \text{ 異號} \end{cases} \Rightarrow P \text{ 落在第四象限}$$

3. $\overline{AC} = 250\sqrt{3}$, $\overline{OC} = 375$



4. 令 $x = 0 \Rightarrow y = -6$, $\therefore A(0, -6)$

$$\text{令 } y = 0 \Rightarrow x^2 - x - 6 = 0 \Rightarrow (x-3)(x+2) = 0$$

$$\Rightarrow x = 3 \text{ 或 } x = -2, \therefore B(3, 0), C(-2, 0)$$

$$\Delta ABC = \frac{1}{2} \times 5 \times 6 = 15$$

5. 令 $3x + 1 = 7 \Rightarrow x = 2$, $f(7) = \frac{2+3}{2+4} = \frac{5}{6}$

6. ΔABC 的面積 = ΔABD 的面積 + ΔACD 的面積

$$\Rightarrow \frac{1}{2} \times 6 \times 9 \times \sin 120^\circ$$

$$= \frac{1}{2} \times 6 \times x \times \sin 60^\circ + \frac{1}{2} \times x \times 9 \times \sin 60^\circ$$

$$\Rightarrow 15x = 54 \Rightarrow x = \frac{18}{5}$$

7. 設第一個頂點 (x_1, y_1)

$$\Rightarrow \left(\frac{7+2}{2}, \frac{6+4}{2}\right) = \left(\frac{x_1+1}{2}, \frac{y_1+3}{2}\right) \Rightarrow (x_1, y_1) = (8, 7)$$

設第二個頂點 (x_2, y_2)

$$\Rightarrow \left(\frac{7+1}{2}, \frac{4+3}{2}\right) = \left(\frac{x_2+2}{2}, \frac{y_2+6}{2}\right) \Rightarrow (x_2, y_2) = (6, 1)$$

設第三個頂點 (x_3, y_3)

$$\Rightarrow \left(\frac{2+1}{2}, \frac{6+3}{2}\right) = \left(\frac{x_3+7}{2}, \frac{y_3+4}{2}\right) \Rightarrow (x_3, y_3) = (-4, 5)$$

8. $\because \cos \theta = -\frac{4}{5} \Rightarrow \sin \theta = -\frac{3}{5}$ 及 $\tan \theta = \frac{3}{4}$

$$\therefore \sin 2\theta = 2 \sin \theta \cos \theta = 2 \times \left(-\frac{3}{5}\right) \times \left(-\frac{4}{5}\right) = \frac{24}{25}$$

$$\cos 2\theta = 2 \cos^2 \theta - 1 = 2 \times \left(-\frac{4}{5}\right)^2 - 1 = \frac{7}{25}$$

$$\tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta} = \frac{2 \times \left(\frac{3}{4}\right)}{1 - \left(\frac{3}{4}\right)^2} = \frac{24}{7}$$

9. $\begin{cases} a + b - 2c = 0 \dots\dots ① \\ a - 2b + 2c = 0 \dots\dots ② \end{cases}$

$$① + ② \Rightarrow a = \frac{b}{2} \text{ 代入 } ① \text{ 得 } c = \frac{3}{4}b$$

$$\text{故 } \sin A : \sin B : \sin C = a : b : c = \frac{b}{2} : b : \frac{3}{4}b = 2 : 4 : 3$$

10. (A) 開口朝下 $\Rightarrow a < 0$

(B) 頂點坐標 $\left(-\frac{b}{2a}, \frac{4ac - b^2}{4a}\right) \Rightarrow b > 0$

(C) 與 y 軸交點 $(0, c) \Rightarrow c > 0$

(D) 與 x 軸有兩個交點 $\Rightarrow b^2 - 4ac > 0$

11. $r = 0.25$ 公尺

輪子滾動 1 圈的距離約為 $0.25 \times 2\pi \approx 1.57$ 公尺

總滾動距離約為 $1.57 \times 1000 = 1570$ 公尺

12. $\because \sin \theta + \cos \theta = \frac{\sqrt{14}}{3}$ 兩邊同時平方

$$\Rightarrow 1 + 2 \sin \theta \cos \theta = \frac{14}{9} \Rightarrow 2 \sin \theta \cos \theta = \frac{5}{9}$$

$$(\sin \theta - \cos \theta)^2 = 1 - 2 \sin \theta \cos \theta = 1 - \frac{5}{9} = \frac{4}{9}$$

$$\therefore \sin \theta - \cos \theta = -\frac{2}{3}$$

$$13. \frac{1}{2}r^2\theta = \frac{1}{2}r\theta \Rightarrow r=1$$

$$14. \text{令所求直線方程式爲 } \frac{x}{3} - \frac{y}{2} = k$$

$$\text{點}(3, 4) \text{ 代入} \Rightarrow \frac{3}{3} - \frac{4}{2} = -1 = k$$

$$\text{故所求直線方程式爲 } \frac{x}{3} - \frac{y}{2} = -1 \Rightarrow 2x - 3y + 6 = 0$$

$$15. a = \sin 1 \doteq \sin 57.3^\circ, b = \sin 0 = 0, c = \cos 0 = 1$$

$$d = \cos 1 \doteq \cos 57.3^\circ, \therefore c > a > d > b$$

$$16. f(x) = -(x^2 - 10x) + 11 = -(x-5)^2 + 36$$

$$\text{當 } x=5 \text{ 時 } M=36, x=10 \text{ 時 } m=11$$

$$\therefore M - m = 36 - 11 = 25$$

$$17. \therefore (a+b+c)(a+b-c) = ab$$

$$\Rightarrow (a+b)^2 - c^2 = ab \Rightarrow a^2 + b^2 - c^2 = -ab$$

$$\therefore \cos C = \frac{a^2 + b^2 - c^2}{2ab} = \frac{-ab}{2ab} = -\frac{1}{2} \Rightarrow \angle C = 120^\circ$$

$$18. s = \frac{6+8+10}{2} = 12, \text{ 又 } \Delta = \sqrt{s(s-a)(s-b)(s-c)} = r \times s$$

$$\sqrt{12 \times (12-6) \times (12-8) \times (12-10)} = r \times 12$$

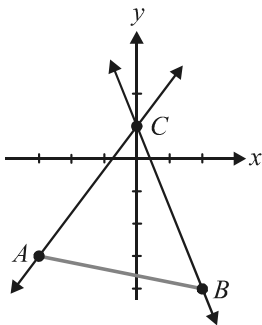
$$24 = r \times 12, \therefore r = 2$$

$$19. \text{設 } P(x, y), \left(\frac{2x+(-7)}{3}, \frac{2y+4}{3} \right) = (-1, -8)$$

$$\Rightarrow P(2, -14), \therefore \overline{PC} = \sqrt{5}$$

$$20. \text{原式} = \frac{-\sec \theta}{-\cos \theta} - \frac{\sin \theta \times \tan^2 \theta}{\sin \theta} = \sec^2 \theta - \tan^2 \theta = 1$$

$$21. \therefore m_{AC} = \frac{4}{3}, m_{BC} = -\frac{5}{2}, \therefore m \geq \frac{4}{3} \text{ 或 } m \leq -\frac{5}{2}$$



$$22. \left(\frac{3+m+(-4)}{3}, \frac{5+7+n}{3} \right) = (1, 4) \Rightarrow m=4, n=0$$

$$\Rightarrow m+n=4$$

$$23. \therefore \sin^2 50^\circ = \cos^2 40^\circ, \sin^2 60^\circ = \cos^2 30^\circ$$

$$\sin^2 70^\circ = \cos^2 20^\circ, \sin^2 80^\circ = \cos^2 10^\circ$$

$$\therefore \text{原式} = (\sin^2 10^\circ + \cos^2 10^\circ) + (\sin^2 20^\circ + \cos^2 20^\circ)$$

$$+ (\sin^2 30^\circ + \cos^2 30^\circ) + (\sin^2 40^\circ + \cos^2 40^\circ) = 4$$

$$24. m_1 = -\frac{m-2}{3}, m_2 = -\frac{3}{2m-7}$$

$$L_1 \text{ 與 } L_2 \text{ 垂直} \Rightarrow m_1 \times m_2 = -1$$

$$\Rightarrow \left(-\frac{m-2}{3}\right) \times \left(-\frac{3}{2m-7}\right) = -1 \Rightarrow m=3$$

$$25. \angle C = 180^\circ - 60^\circ - 75^\circ = 45^\circ, \overline{AB} = 10 = C$$

$$\frac{C}{\sin C} = 2R \Rightarrow \frac{10}{\sin 45^\circ} = 2R \Rightarrow R = 5\sqrt{2}$$

$$\text{外接圓面積} = \pi R^2 = \pi(5\sqrt{2})^2 = 50\pi$$