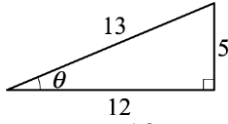


一、單一選擇題

1. 答案：(C)

解析：∵ $\tan \theta = \frac{5}{12}$ ，且 θ 為銳角
∴ 考慮如圖 5-12-13 之直角三角形

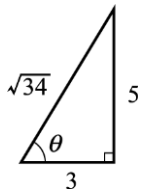


$$\Rightarrow \sin \theta = \frac{5}{13}, \cos \theta = \frac{12}{13} \Rightarrow \sin \theta - \cos \theta = -\frac{7}{13}$$

故選(C)

2. 答案：(D)

解析：∵ $\tan \theta = \frac{5}{3}$ 且 θ 為銳角
∴ 可考慮 3-5- $\sqrt{34}$ 之直角三角形
其中 θ 之對邊為 5，鄰邊為 3
由三角函數定義



$$\sin \theta = \frac{5}{\sqrt{34}}, \cos \theta = \frac{3}{\sqrt{34}}$$

$$\Rightarrow \frac{\sin \theta + \cos \theta}{4 \cos \theta + \sin \theta} = \frac{\frac{5}{\sqrt{34}} + \frac{3}{\sqrt{34}}}{4 \cdot \frac{3}{\sqrt{34}} + \frac{5}{\sqrt{34}}} = \frac{8}{17}$$

故選(D)

3. 答案：(C)

解析：由根與係數知 $\sin \theta + \cos \theta = -\frac{(-5)}{4} = \frac{5}{4}$

$$\Rightarrow (\sin \theta + \cos \theta)^2 = \left(\frac{5}{4}\right)^2 \Rightarrow \sin^2 \theta + \cos^2 \theta + 2 \sin \theta \cos \theta = \frac{25}{16}$$

$$\theta \cos \theta = \frac{25}{16}$$

$$\Rightarrow 1 + 2 \sin \theta \cos \theta = \frac{25}{16} \Rightarrow \sin \theta \cos \theta = \frac{9}{32}$$

由根與係數知 $\frac{t}{4} = \sin \theta \cos \theta = \frac{9}{32} \Rightarrow t = \frac{9}{8}$ ，故選(C)

4. 答案：(B)

解析： $f(6) = \sin^6 \theta + \cos^6 \theta = (\sin^2 \theta + \cos^2 \theta)^3 - 3 \sin^2 \theta \cos^2 \theta$

$$f(4) = \sin^4 \theta + \cos^4 \theta = (\sin^2 \theta + \cos^2 \theta)^2 - 2 \sin^2 \theta \cos^2 \theta$$

$$f(2) = \sin^2 \theta + \cos^2 \theta = 1$$

$$2f(6) - 3f(4) + 6f(2) = 2(1 - 3 \sin^2 \theta \cos^2 \theta) - 3(1 - 2 \sin^2 \theta \cos^2 \theta) + 6 = 5$$

故選(B)

5. 答案：(B)

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

$$\Rightarrow 1 - 2 \sin \theta \cos \theta = \frac{1}{4}$$

$$\Rightarrow 2 \sin \theta \cos \theta = \frac{3}{4}$$

$$\therefore (\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta = 1 + \frac{3}{4} = \frac{7}{4}$$

∵ θ 為銳角 ∴ $\sin \theta > 0, \cos \theta > 0$

$$\Rightarrow \sin \theta + \cos \theta = \frac{\sqrt{7}}{2}$$

故選(B)

6. 答案：(C)

解析： $\tan 45^\circ - \cos^2 60^\circ + \sin^2 60^\circ - \sin^2 30^\circ + \tan^2 60^\circ - \cos^2 45^\circ$

$$= 1 - \left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2 + (\sqrt{3})^2 - \left(\frac{\sqrt{2}}{2}\right)^2$$

$$= 1 - \frac{1}{4} + \frac{3}{4} - \frac{1}{4} + 3 - \frac{2}{4} = \frac{15}{4}$$

故選(C)

7. 答案：(B)

解析： $\cos 37^\circ = \sqrt{1 - \sin^2 37^\circ} = \sqrt{1 - (0.6)^2} = \sqrt{1 - 0.36} = 0.8$

$$\cos 37^\circ = \frac{5.6}{AC} \Rightarrow AC = \frac{5.6}{\cos 37^\circ} = \frac{5.6}{0.8} = 7, \text{ 則 } \overline{BC} =$$

$$\overline{AC} \sin 37^\circ = 7 \times 0.6 = 4.2$$

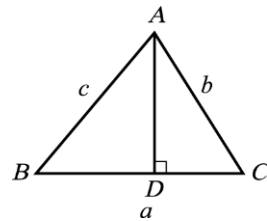
$$\text{故竹竿長度} = \overline{AC} + \overline{CB} = 7 + 4.2 = 11.2$$

故選(B)

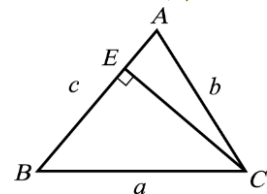
二、多重選擇題

1. 答案：(A)(B)(D)

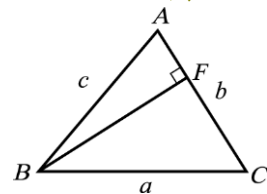
解析： $\overline{AD} = c \sin B = b \sin C$ ，如圖



$\overline{CE} = b \sin A = a \sin B$ ，如圖



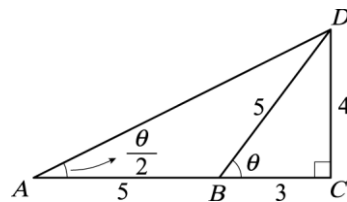
$\overline{BF} = c \sin A = a \sin C$ ，如圖



故選(A)(B)(D)

2. 答案：(B)(E)

解析：如圖，取 $\overline{AB} = \overline{BD} = 5$ ，則 $\angle DAC = \frac{\theta}{2}$



$$\text{而 } \overline{AD} = \sqrt{\overline{AC}^2 + \overline{CD}^2} = \sqrt{8^2 + 4^2} = 4\sqrt{5}$$

$$\text{因此 } \tan \theta = \frac{4}{3}, \tan \frac{\theta}{2} = \frac{\overline{CD}}{\overline{AC}} = \frac{4}{8} = \frac{1}{2},$$

$$\cos \frac{\theta}{2} = \frac{8}{4\sqrt{5}} = \frac{2\sqrt{5}}{5}, \sin^2 \frac{\theta}{2} = \left(\frac{4}{4\sqrt{5}}\right)^2 = \frac{1}{5}$$

故選(B)(E)

3. 答案：(A)(C)(D)

解析：∵ α, β 皆銳角 ∴ 90° > α > 45° > β

$$\Rightarrow 1 > \sin \alpha > \frac{1}{\sqrt{2}} > \sin \beta, 0 < \cos \alpha < \frac{1}{\sqrt{2}} < \cos \beta,$$

$$\tan \alpha > 1 > \tan \beta$$

故(A)(C)正確, (B)錯

(D) ○：由 $\tan \alpha > 1 \Rightarrow \frac{\sin \alpha}{\cos \alpha} > 1 \Rightarrow \sin \alpha > \cos \alpha$ (∵ cos α > 0)

(E) ×：∵ 0 < cos α < 1 ⇒ $\frac{\sin \alpha}{\cos \alpha} > \sin \alpha \Rightarrow \tan \alpha >$

$$\sin \alpha$$

故選(A)(C)(D)

4. 答案：(B)(D)

解析：(A) $(\sin \theta - \cos \theta)^2 = \left(\frac{1}{2}\right)^2 \Rightarrow 1 - 2 \sin \theta \cos \theta = \frac{1}{4} \Rightarrow \sin \theta \cos \theta = \frac{3}{8}$

(B)(C) $(\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta = \frac{7}{4} \Rightarrow$

$$\sin \theta + \cos \theta = \frac{\sqrt{7}}{2}$$

(D)(E) $\begin{cases} \sin \theta - \cos \theta = \frac{1}{2} \dots\dots\dots \textcircled{1} \\ \sin \theta + \cos \theta = \frac{\sqrt{7}}{2} \dots\dots\dots \textcircled{2} \end{cases}$

由 $\frac{\textcircled{1} + \textcircled{2}}{2}$ 得 $\sin \theta = \frac{1 + \sqrt{7}}{4}$

由 $\frac{\textcircled{2} - \textcircled{1}}{2}$ 得 $\cos \theta = \frac{\sqrt{7} - 1}{4}$

故選(B)(D)

5. 答案：(A)(C)(D)(E)

解析：考慮△OPB

$$\sin \theta = \frac{\overline{PB}}{\overline{OP}} = \overline{PB}, \cos \theta = \frac{\overline{OB}}{\overline{OP}} = \overline{OB} \neq \overline{CE}$$

考慮△OAD

$$\tan \theta = \frac{\overline{AD}}{\overline{OA}} = \overline{AD}$$

$$\therefore \tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\therefore \overline{AD} = \frac{\overline{PB}}{\overline{OB}} \Rightarrow \overline{AD} \times \overline{OB} = \overline{PB}$$

$$\triangle OAP = \frac{1}{2} \cdot \overline{OA} \cdot \overline{PB} = \frac{1}{2} \cdot 1 \cdot \sin \theta \Rightarrow \sin \theta = 2 \cdot$$

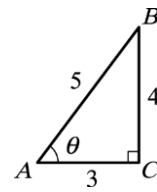
△OAP

故選(A)(C)(D)(E)

三、填充題

1. 答案： $\frac{4}{3}$

解析：如圖



$$\overline{AC} = \sqrt{5^2 - 4^2} = 3$$

$$\Rightarrow \tan \theta = \frac{\overline{BC}}{\overline{AC}} = \frac{4}{3}$$

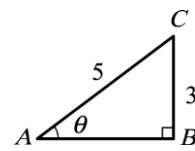
2. 答案： $\frac{41}{5}$

解析： $\frac{2 \sin \theta + 5 \cos \theta}{4 \sin \theta - \cos \theta} = \frac{2 \tan \theta + 5}{4 \tan \theta - 1} = \frac{2 \times \frac{3}{7} + 5}{4 \times \frac{3}{7} - 1} = \frac{2 \times 3 + 35}{4 \times 3 - 7}$

$$= \frac{41}{5}$$

3. 答案： $\frac{124}{35}$

解析：如圖



$$\overline{AB} = \sqrt{5^2 - 3^2} = 4$$

$$\frac{\sin \theta}{1 + \tan \theta} + \frac{\cos \theta}{1 - \tan \theta} = \frac{\frac{3}{5}}{1 + \frac{3}{4}} + \frac{\frac{4}{5}}{1 - \frac{3}{4}} = \frac{12}{35} + \frac{16}{5} = \frac{124}{35}$$