

$$\cot \frac{R \times \frac{r}{r}}{r} = \cot \left(\frac{R}{r} \right) = \sqrt{3} \quad \leftarrow \quad \frac{r}{r} < 1$$

$$\sqrt{(\sqrt{3})^2 + 1}, \sqrt{4} = \underline{2} \quad \leftarrow \quad \sqrt{3} > 1$$

$$f\left(\frac{1}{a}\right) \xrightarrow{u = \frac{1}{a}} f(u), \sqrt{\frac{\frac{r}{u} - 1}{\frac{1}{u^2}}} = \sqrt{ru - u^2}$$

الف) $f \circ g\left(\frac{R}{r}\right) \rightarrow g\left(\frac{R}{r}\right), r \cos^2 \alpha, \frac{1}{r} \rightarrow f\left(\frac{1}{r}\right) = \frac{\sqrt{r}}{r}$

ب) $\frac{\sqrt{r}}{1-\sqrt{r}} = -\sqrt{r} - r \rightarrow f(-\sqrt{r} - r) : [-\sqrt{r} - r], -r$

$$f\left(\frac{R}{r}\right) : \sin \alpha, \frac{\sqrt{r}}{r} \rightarrow g\left(\frac{\sqrt{r}}{r}\right) \rightsquigarrow \frac{\sqrt{r}}{r} \sqrt{1 - \frac{r}{r}} = \frac{\sqrt{r}}{r} \times \sqrt{\frac{1}{r}} = \frac{1}{r}$$

الف) $(4, 5) \quad (2, 5) \quad (9, 12) \quad (1, 12)$

ب) $\emptyset$

ج) $\emptyset$

د) $(4, 1) \quad (2, 9) \quad (9, 1)$

$$f \circ g : f(g(r)) = r \Rightarrow a = r$$

$$g \circ f : g(f(r)) = 1 \Rightarrow b = a \quad (a, b) = (r, 5)$$

$$f(u) = au + b \Rightarrow f(f(u)) : a^2u + ab + b = fu + v$$

$$\begin{cases} a=2 \rightarrow b=1 \Rightarrow f(u) = 2u+1 \\ a=-2 \rightarrow b=-1 \Rightarrow f(u) = -2u-1 \end{cases} \quad g(f(-1))$$

$$g(-1) = -1$$

$$u \in Df, f(u) \in Dg$$

$$\{u \in \mathbb{R}, \sqrt{u+1} \neq \{0, 1\}\}$$

$$u > 0 - \{1\}$$

$$D: u \in (0, +\infty) - \{1\}$$

$$u \in Df, f(u) \in D_{f+g}$$

$$\{-1 < u < 1, 0 \leq \sqrt{1-u^2} \leq 1\} \Rightarrow D_{(f+g) \circ f} : u \in [-1, 1]$$

$$\frac{13u+1}{u-2} = t \Rightarrow u = \frac{13t+1}{t-13} \Rightarrow f(u) = 13\left(\frac{13u+1}{u-13}\right) + 1 = \frac{13^2u-11}{u-13}$$

$$\begin{aligned} \text{ب) } u + \frac{1}{u} = t & \quad \left(u + \frac{1}{u}\right)^2 = u^2 + 2 + \frac{1}{u^2} \Rightarrow u^2 + \frac{1}{u^2} = \left(u + \frac{1}{u}\right)^2 - 2 \\ u + \frac{1}{u} = u & \Rightarrow f(u) = u^2 + 13u \end{aligned}$$

$$g(f(u)) = 0, \quad g(\sqrt{13}), g(1) = 0$$

$$\Rightarrow f(u) \nearrow \sqrt{13} \Rightarrow u = 1 \Rightarrow \text{جواب: } 13-1 = 12$$