If $\log_5(y) = -0.1$, $\log_5(c) = -1.8$, and $\log_5(25y^5c^5d^5) = -13.5$, what is the value of $\log_5(d)$?

A) -1.5

B) -1.4

C) -1.3

D) -1.2

....

Solution

$$-13.5 = \log_5(25y^5c^5d^5)$$
Rewrite third equation.

$$-13.5 = \log_5(25) + \log_5(y^5) + \log_5(c^5) + \log_5(d^5)$$
Rewrite using log property.

$$-13.5 = \log_5(5^2) + \log_5(y^5) + \log_5(c^5) + \log_5(d^5)$$
Rewrite 25 as 5^2.

$$-13.5 = 2\log_5(5) + 5\log_5(y) + 5\log_5(c) + 5\log_5(d)$$
Rewrite using log property.

$$-13.5 = 2(1) + 5\log_5(y) + 5\log_5(c) + 5\log_5(d)$$
Evaluate $\log_5(5)$ as 1.

$$-13.5 = 2(1) + 5(-0.1) + 5(-1.8) + 5\log_5(d)$$
Substitute $\log_5(y) = -0.1$, $\log_5(c) = -1.8$.

$$-13.5 = -7.5 + 5\log_5(d)$$
Simplify.

$$-6 = 5\log_5(d)$$
Add 7.5 to both sides.

$$-1.2 = \log_5(d)$$
Divide both sides by 5.

$$\boxed{D}$$
Answer.