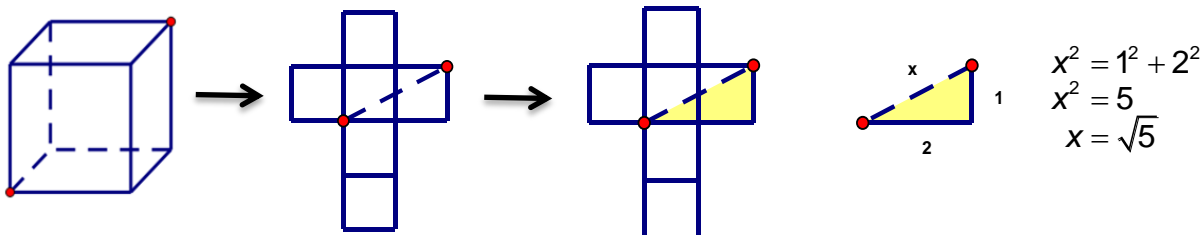


1. Unfold the cube to form the net. The shortest distance is the length of the hypoteneus of the right triangle:



Therefore the answer is **c**.

$$\begin{aligned}
 2. \quad \log_b(x) = y &\Rightarrow \underbrace{b^y = x}_{\text{Definition of logarithm}} \Rightarrow \underbrace{(b^y)^{-1} = (x)^{-1}}_{\text{Raise both sides to the -1 power}} \Rightarrow \underbrace{b^{-y} = x^{-1}}_{\text{apply laws of exponents}} \\
 &\Rightarrow \underbrace{\frac{1}{b^y} = \frac{1}{x}}_{\text{apply laws of exponents}} \Rightarrow \underbrace{\left(\frac{1}{b}\right)^y = \frac{1}{x}}_{\text{apply laws of exponents}} \Rightarrow \underbrace{\log_{\frac{1}{b}}\left(\frac{1}{x}\right) = y}_{\text{Definition of logarithm}}
 \end{aligned}$$

Therefore the answer is **b**.

3. Let the unshaded regions be x_1, x_2, x_3 . Then:

$$A_1 = \pi(3)^2 - x_1 + \pi(1)^2 - x_2 + \pi(2)^2 - x_3 = 14\pi - x_1 - x_2 - x_3 \text{ and}$$

$$A_2 = \pi(4)^2 - x_1 - x_2 - x_3 = 16\pi - x_1 - x_2 - x_3 \text{ so...}$$

$$A_2 - A_1 = (16\pi - x_1 - x_2 - x_3) - (14\pi - x_1 - x_2 - x_3) = 2\pi$$

Therefore the answer is **b**

4. $x^4 - y^4 = x^2 - y^2$

$$(x^4 - y^4) - (x^2 - y^2) = 0$$

$$(x^2 - y^2)(x^2 + y^2) - (x^2 - y^2) = 0$$

$$(x^2 - y^2)(x^2 + y^2 - 1) = 0$$

$$x^2 - y^2 = 0 \quad \Bigg| \quad x^2 + y^2 - 1 = 0$$

$$x^2 = y^2 \quad \Bigg| \quad \underbrace{x^2 + y^2 = 1}_{\text{circle with radius one}}$$

$$\underbrace{x = \pm y}_{\text{two line: } y=x \text{ and } y=-x}$$

Therefore the answer is **d**.

5. Each one that says "I don't know" is having coffee. Therefore the answer is **c**.