Q21 $f(x) = x^3$ $g(x) = 4x - 1$

a) Find $fg(2)$

$fg(x) = f(4x-1) = (4x-1)^3$

$fg(2)$ $= (4(2)-1)^3$

$= 7^3$

$= 343$

OR $fg(2) = f(4(2)-1)$

$= f(7)$ $= 7^3 = 343$

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b) $h(x) = fg(x) = (4x-1)^3$

Find $h^{-1}(x)$

$x \longrightarrow \boxed{\times 4} \longrightarrow \boxed{-1} \longrightarrow \boxed{\uparrow 3} \longrightarrow h(x)$

$h^{-1}(x) \longleftarrow \boxed{\div 4} \longleftarrow \boxed{+1} \longleftarrow \boxed{\sqrt[3]{}} \longleftarrow x$

$h^{-1}(x) = \dfrac{\sqrt[3]{x} + 1}{4}$

Alternatively

Let $y = (4x-1)^3$

swap
variables $x = (4y-1)^3$

$\sqrt[3]{x} = 4y - 1$

$\sqrt[3]{x} + 1 = 4y$

$\dfrac{\sqrt[3]{x} + 1}{4} = y$

$\therefore h^{-1}(x) = \dfrac{\sqrt[3]{x} + 1}{4}$

Reverse Percentages

Example

In the first week of a sale   a coat is

reduced by 15%. In the second week it is reduced by 10% of its sale price and offered for £61.20. What was its pre-sale price

Let coat original price be

$$x \times 0.85 \times 0.9 = £61.20$$

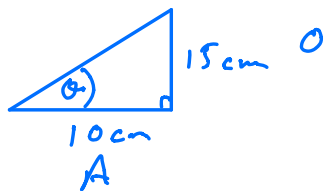$$£61.20 \div 0.9 \div 0.85 = x$$

$$x = £80$$

Q12   Vol of cylinder $= \pi r^2 h$

$$V = \pi r^2 h$$

$$\frac{V}{(\pi r^2)} = h$$

$$h = \frac{1178}{(\pi \times 5^2)}$$

$$h = 15.0 \text{ cm}$$

$$\tan \theta = \frac{15}{10}$$

$$\theta = \tan^{-1}\left(\frac{15}{10}\right)$$

$$\theta = 56.3°$$

Q7

	A	B	C	
Mass	9.94g	128.66g	138.6g	Density of B
Vol	7cm^3	125cm^3	132 cm^3	= 1.03
Density	1.42 g/cm^3	1.02928	1.05 g/cm^3	g/cm^3

Q16   10 cubes   marked

Takes 20 cubes and 3 have a mark

Assume $\frac{3}{20}$ are marked

So   10 is $\frac{3}{20}$ of population

Population = $10 \times \frac{20}{3}$ = $\frac{200}{3}$ = 66.6

Estimate 67