8th April **Higher Plus 5-a-day**

Corbettmaths

Solve

$$\frac{3}{x+1} = \frac{5-2x}{x-1}$$

$3(x-1) = (5-2x)(x+1)$

$3x - 3 = 5x + 5 - 2x^2 - 2x$

$2x^2 = 8$

$x^2 = 4$

$x = 2$ or $x = -2$

Cube ABCDEFGH has side length x.
A cylinder has radius y and length 8x.
The radius of the cylinder, y, is equal to the diagonal, AH, of the cube.
The volume of the cylinder is equal to the volume of a sphere.

$FG^2 = x^2 + x^2$

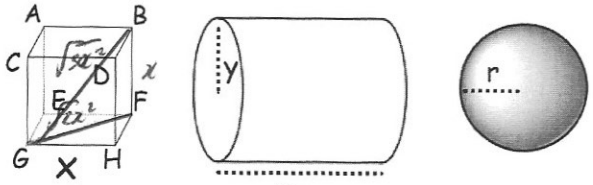
$FG^2 = 2x^2$

$FG = \sqrt{2x^2}$

$BG = \sqrt{3x^2}$

$AH = \sqrt{3x^2}$

Not to scale



$V = \pi y^2 \times 8x$

$= \pi (\sqrt{3x^2})^2 \times 8x$

Express the radius of the sphere, r, in term of x.

Cylinder $24\pi x^3$

Sphere $\frac{4}{3}\pi r^3$

$24\pi x^3 = \frac{4}{3}\pi r^3$

$18x^3 = r^3$

$r = \sqrt[3]{18x^3}$

$r = \sqrt[3]{18}\,x$

Work out

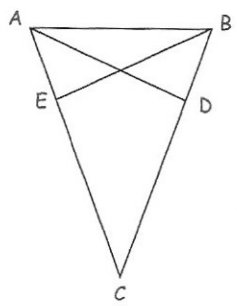
$81^{-\frac{3}{4}}$

$\frac{1}{27}$

Simplify

$(16x^8)^{\frac{3}{4}}$

$8x^6$



$AC = BC$ (isosceles triangle)

$\angle ACD = \angle BCE$ (shared)

ABC is an isosceles triangle with AC = BC.
D and E are points on BC and AC such that CE = CD.
Prove triangles ACD and BCE are congruent.

$CE = CD$ (given)

$\therefore$ SAS