Surds

A surd is an irrational number. It is any number that includes a radical symbol, $\sqrt{}$, and cannot be calculated exactly.

Surd Laws

1) $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$

2) $\dfrac{\sqrt{a}}{\sqrt{b}} = \sqrt{\dfrac{a}{b}}$

3) $\left(\sqrt{a}\right)^2 = a$

e.g. $(i)\ \sqrt{50} = \sqrt{25} \times \sqrt{2}$
$= 5\sqrt{2}$

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

$(iii)\ \sqrt{\dfrac{5}{4}} = \dfrac{\sqrt{5}}{2}$

$(iv)\ \sqrt{\dfrac{20}{9}} = \dfrac{2\sqrt{5}}{3}$

Surd Arithmetic

Like surds can be added or subtracted, unlike surds cannot

e.g. $(i)\ 4\sqrt{3}+6\sqrt{2}-\sqrt{3}+2\sqrt{2}$

$=3\sqrt{3}+8\sqrt{2}$

$(ii)\ \left(3+\sqrt{2}\right)\left(6+\sqrt{3}\right)$

$=18+3\sqrt{3}+6\sqrt{2}+\sqrt{6}$

$(iii)\ \left(\sqrt{2}+1\right)\left(\sqrt{2}-1\right)$ ← conjugate surds

$=2-1$

$=1$

$(iv)\ \left(2-\sqrt{2}\right)^2$

$=4-4\sqrt{2}+2$

$=6-4\sqrt{2}$

Exercise 2C; 2adgjmp, 4adg, 5adg, 6adg, 7b, 8b

Exercise 2D; 1behk, 2adg, 3ad, 4be, 5cf, 6ad, 7be, 8ceg, 9bdf, 10ac, 12ce, 13, 15bc, 16, 17