11 (i) $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a - 6\sqrt{3}$

$\Rightarrow a - 6\sqrt{3} = \frac{5+2\sqrt{3}}{7+4\sqrt{3}} \times \frac{7-4\sqrt{3}}{7-4\sqrt{3}}$

$= \frac{35 - 20\sqrt{3} + 14\sqrt{3} - 8\times 3}{7^2 - (4\sqrt{3})^2}$

$= \frac{35 - 6\sqrt{3} - 24}{49 - 48}$

$\Rightarrow a - 6\sqrt{3} = 11 - 6\sqrt{3}$

equating rat. parts on both sides

$a = 11$

11 (ii) $a\sqrt{5} - \frac{19}{11} = \frac{3-\sqrt{5}}{3+2\sqrt{5}}$

$= \frac{3-\sqrt{5}}{3+2\sqrt{5}} \times \frac{3-2\sqrt{5}}{3-2\sqrt{5}}$

$= \frac{9 - 6\sqrt{5} - 3\sqrt{5} + 2\times 5}{3^2 - (2\sqrt{5})^2}$

$= \frac{19 - 9\sqrt{5}}{9 - 20}$

$= \frac{19 - 9\sqrt{5}}{-11}$

$\Rightarrow a\sqrt{5} - \frac{19}{11} = -\frac{19}{11} + \frac{9\sqrt{5}}{11}$

comp. irr. parts

$a = \frac{9}{11}$

11 (iii) $2 - b\sqrt{6} = \frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2} - 2\sqrt{3}}$

$= \frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}-2\sqrt{3}} \times \frac{3\sqrt{2}+2\sqrt{3}}{3\sqrt{2}+2\sqrt{3}}$

$= \frac{3\times 2 + 2\sqrt{6} + 3\sqrt{6} + 2\times 3}{(3\sqrt{2})^2 - (2\sqrt{3})^2}$

$= \frac{6 + 5\sqrt{6} + 6}{9\times 2 - 4\times 3}$

$= \frac{12 + 5\sqrt{6}}{18 - 12}$

$= \frac{12 + 5\sqrt{6}}{6}$

$2 - b\sqrt{6} = \frac{12}{6} + \frac{5}{6}\sqrt{6}$

comp. irr parts

$b = -\frac{5}{6}$

(iv) $a + \frac{7}{11}\sqrt{5}\, b = \frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}}$

$= \frac{(7+\sqrt{5})^2 - (7-\sqrt{5})^2}{7^2 - (\sqrt{5})^2}$

$= \frac{49 + 5 + 14\sqrt{5} - 49 - 5 + 14\sqrt{5}}{49 - 5}$

$= \frac{28\sqrt{5}}{44}$ 11

$\Rightarrow a + \frac{7}{11}\sqrt{5}\, b = 0 + \frac{7}{11}\sqrt{5}$

comparing rat and irr parts

$a = 0,\ b = 1$