Surds - Past Paper Questions - ANSWERS

1) $\frac{4}{\sqrt{8}} = \frac{4}{\sqrt{8}} \times \frac{\sqrt{8}}{\sqrt{8}} = \frac{4\sqrt{8}}{8} = \frac{4\sqrt{4}\sqrt{2}}{8} = \frac{4\times 2\sqrt{2}}{8} = \frac{8\sqrt{2}}{8} = \sqrt{2}$

2) $\frac{12}{\sqrt{2}} = \frac{12}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2}$

3) $\frac{7}{\sqrt{2}} = \frac{7}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{7\sqrt{2}}{2}$

4) $\frac{\sqrt{3}}{\sqrt{24}} = \sqrt{\frac{3}{24}} = \sqrt{\frac{1}{8}} = \frac{\sqrt{1}}{\sqrt{8}} = \frac{1}{\sqrt{4}\sqrt{2}} = \frac{1}{2\sqrt{2}} = \frac{1}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2\times 2} = \frac{\sqrt{2}}{4}$

5) $\frac{\sqrt{24}}{\sqrt{2}} = \sqrt{\frac{24}{2}} = \sqrt{12} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$

6) $\frac{\sqrt{40}}{\sqrt{2}} = \sqrt{\frac{40}{2}} = \sqrt{20} = \sqrt{4} \times \sqrt{5} = 2\sqrt{5}$

7) $2\sqrt{75} = 2 \times \sqrt{25} \times \sqrt{3} = 2 \times 5 \times \sqrt{3} = 10\sqrt{3}$

8) $\sqrt{27} + 2\sqrt{3} = \sqrt{9}\sqrt{3} + 2\sqrt{3} = 3\sqrt{3} + 2\sqrt{3} = 5\sqrt{3}$

9) $2\sqrt{20} - 3\sqrt{5} = 2\sqrt{4}\sqrt{5} - 3\sqrt{5} = 2 \times 2\sqrt{5} - 3\sqrt{5} = 4\sqrt{5} - 3\sqrt{5} = \sqrt{5}$

10) $\sqrt{45} - 2\sqrt{5} = \sqrt{9}\sqrt{5} - 2\sqrt{5} = 3\sqrt{5} - 2\sqrt{5} = \sqrt{5}$

11) $\sqrt{40} + 4\sqrt{10} + \sqrt{90} = \sqrt{4}\sqrt{10} + 4\sqrt{10} + \sqrt{9}\sqrt{10} = 2\sqrt{10} + 4\sqrt{10} + 3\sqrt{10} = 9\sqrt{10}$

12) $\sqrt{45} + 6\sqrt{5} - \sqrt{20} = \sqrt{9}\sqrt{5} + 6\sqrt{5} - \sqrt{4}\sqrt{5} = 3\sqrt{5} + 6\sqrt{5} - 2\sqrt{5} = 7\sqrt{5}$

13) $\sqrt{63} + \sqrt{28} - \sqrt{7} = \sqrt{9}\sqrt{7} + \sqrt{4}\sqrt{7} - \sqrt{7} = 3\sqrt{7} + 2\sqrt{7} - \sqrt{7} = 4\sqrt{7}$

14) $2\sqrt{5} + \sqrt{20} - \sqrt{45} = 2\sqrt{5} + \sqrt{4}\sqrt{5} - \sqrt{9}\sqrt{5} = 2\sqrt{5} + 2\sqrt{5} - 3\sqrt{5} = \sqrt{5}$

15) $\sqrt{12} + 5\sqrt{3} - \sqrt{27} = \sqrt{4}\sqrt{3} + 5\sqrt{3} - \sqrt{9}\sqrt{3} = 2\sqrt{3} + 5\sqrt{3} - 3\sqrt{3} = 4\sqrt{3}$

16) $\sqrt{2}\left(\sqrt{3} + \sqrt{2}\right) - \sqrt{6} = \sqrt{6} + \sqrt{4} - \sqrt{6} = \sqrt{4} = 2$

17) $2\sqrt{6}$
$\sqrt{2} \times \sqrt{12} = \sqrt{2} \times \sqrt{4}\sqrt{3} = \sqrt{2} \times 2\sqrt{3} = 2\sqrt{6}$
$3\sqrt{8} = 3 \times \sqrt{4}\sqrt{2} = 3 \times 2\sqrt{2} = 6\sqrt{2}$ Different value from others
$\sqrt{24} = \sqrt{4}\sqrt{6} = 2\sqrt{6}$

18) $\sqrt{x} + \sqrt{18} = 4\sqrt{2}$
$\sqrt{x} + \sqrt{9}\sqrt{2} = 4\sqrt{2}$
$\sqrt{x} + 3\sqrt{2} = 4\sqrt{2}$
$\sqrt{x} = 4\sqrt{2} - 3\sqrt{2}$
$\sqrt{x} = \sqrt{2}$
$x = 2$

19) a) $f(x) = 4\sqrt{x} + \sqrt{2}$

$f(72) = 4\sqrt{72} + \sqrt{2}$

$f(72) = 4\sqrt{36}\sqrt{2} + \sqrt{2}$

$f(72) = 4 \times 6\sqrt{2} + \sqrt{2}$

$f(72) = 24\sqrt{2} + \sqrt{2}$

$f(72) = 25\sqrt{2}$

b) $f(t) = 4\sqrt{t} + \sqrt{2} = 3\sqrt{2}$

$4\sqrt{t} + \sqrt{2} = 3\sqrt{2}$

$4\sqrt{t} = 2\sqrt{2}$

$\sqrt{t} = \frac{2\sqrt{2}}{4}$

$\sqrt{t} = \frac{\sqrt{2}}{2}$

$t = \left(\frac{\sqrt{2}}{2}\right)^2$

$t = \frac{2}{4} = \frac{1}{2}$

20) a) $\sqrt{2} \times \sqrt{18} = \sqrt{36} = 6$

b) $\sqrt{2} + \sqrt{18} = \sqrt{2} + \sqrt{9}\sqrt{2} = \sqrt{2} + 3\sqrt{2} = 4\sqrt{2}$

c) $\frac{\sqrt{2}\times\sqrt{18}}{\sqrt{2}+\sqrt{18}} = \frac{6}{4\sqrt{2}} = \frac{3}{2\sqrt{2}} = \frac{3}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2\times2} = \frac{3\sqrt{2}}{4}$