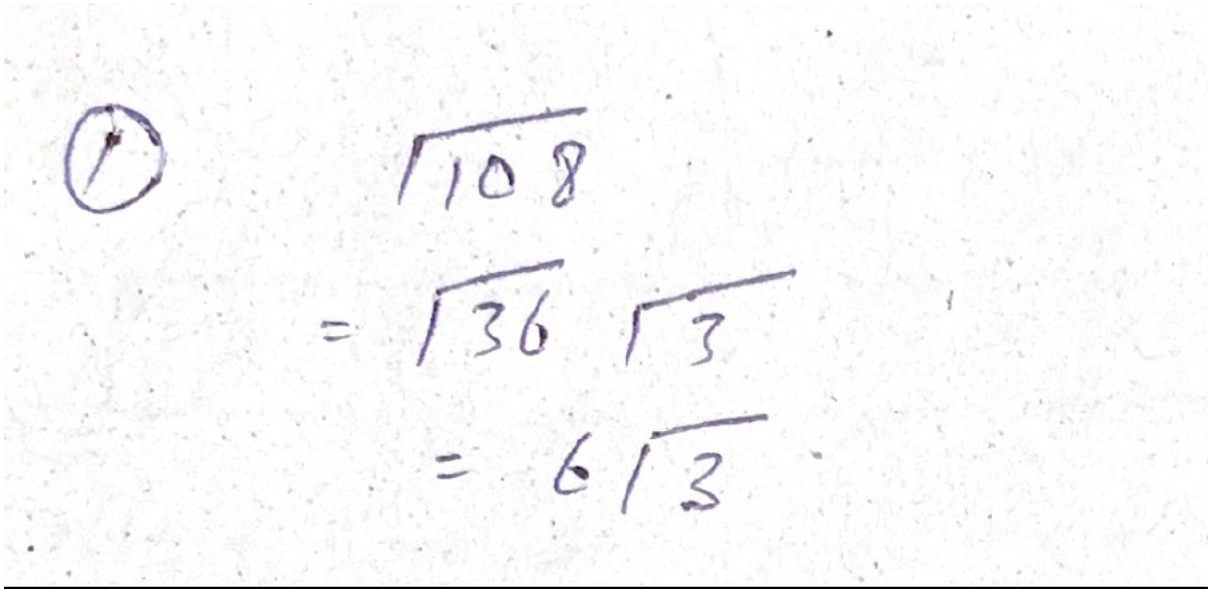
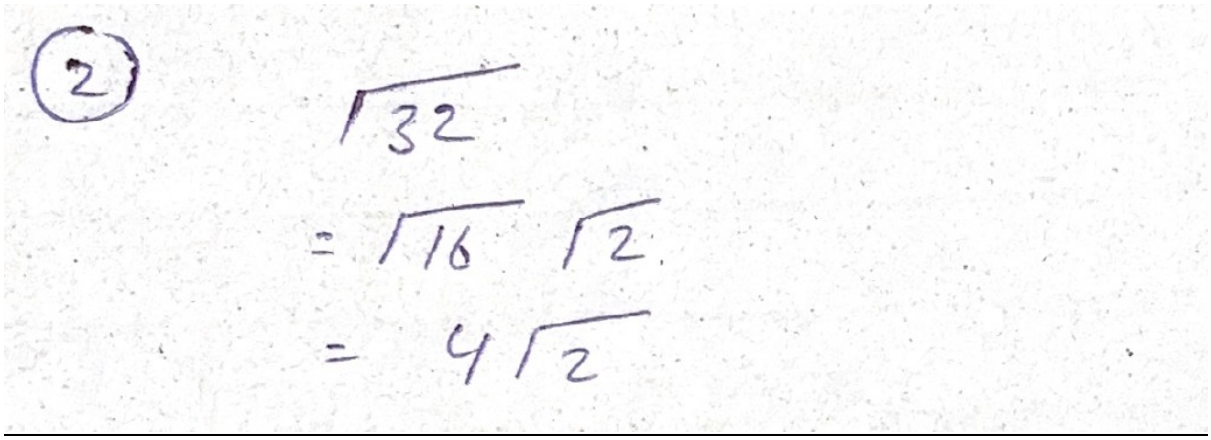
Answers Sheet

SURDS

1-



2-



3-

(3) $5\sqrt{108}$

$= 5(\sqrt{36}\sqrt{3})$

$= 5(6\sqrt{3})$

$= 30\sqrt{3}$

4-

(4) $8\sqrt{20}$

$= 7(\sqrt{4}\sqrt{5})$

$= 7(2\sqrt{5})$

$= 14\sqrt{5}$

5-

(5) $(3+\sqrt{2})(3-\sqrt{2})$

$= 9 - 3\sqrt{2} + 3\sqrt{2} - 2$

$= 7$

6-

(6) $(4+\sqrt{5})^2$

$= (4+\sqrt{5})(4+\sqrt{5})$

$= 16 + 4\sqrt{5} + 4\sqrt{5} + 5$

$= 21 + 8\sqrt{5}$

7-

(7) $(3+\sqrt{5})(2-\sqrt{5})$

$= 6 - 3\sqrt{5} + 2\sqrt{5} - 5$

$= 1 - 3\sqrt{5} + 2\sqrt{5}$

$= 1 - \sqrt{5}$

8-

(8) $(4-\sqrt{2})^2$

$= (4-\sqrt{2})(4-\sqrt{2})$

$= 16 - 4\sqrt{2} - 4\sqrt{2} + 2$

$= 18 - 8\sqrt{2}$

9-

(9) $(4+\sqrt{3})^2 - (4-\sqrt{3})^2$

$= [(4+\sqrt{3})(4+\sqrt{3})] - [(4-\sqrt{3})(4-\sqrt{3})]$

$= [16 + 4\sqrt{3} + 4\sqrt{3} + 3] - [16 - 4\sqrt{3} - 4\sqrt{3} + 3]$

$= [19 + 8\sqrt{3}] - [19 - 8\sqrt{3}]$

$= 19 + 8\sqrt{3} - 19 + 8\sqrt{3}$

$= 16\sqrt{3}$

10-

(10) $\frac{9}{\sqrt{3}}$

$= \frac{9}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{9\sqrt{3}}{3}$

$= 3\sqrt{3}$

∴ dividing and multiplying with $\sqrt{3}$

11-

(11) $\frac{y}{\sqrt{y}}$

$= \frac{y}{\sqrt{y}} \times \frac{\sqrt{y}}{\sqrt{y}}$

$= \frac{y\sqrt{y}}{y}$

$= \sqrt{y}$

12-

(12) $\frac{2+\sqrt{5}}{\sqrt{2}}$

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

$= \frac{2\sqrt{2}+\sqrt{10}}{2}$

13-

(13)

$$\frac{4+\sqrt{6}}{\sqrt{2}}$$

$$= \frac{4+\sqrt{6}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{4\sqrt{2} + \sqrt{12}}{2}$$

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

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

$$= \frac{2(2\sqrt{2} + \sqrt{3})}{2}$$

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

14-

(14)

$$\frac{(5+2\sqrt{3})(5-2\sqrt{3})}{\sqrt{18}}$$

$$= \frac{25 - 10\sqrt{3} + 10\sqrt{3} - 4(3)}{\sqrt{18}}$$

$$= \frac{13}{\sqrt{18}} \times \frac{\sqrt{18}}{\sqrt{18}}$$

$$= \frac{13\sqrt{18}}{18}$$

15-

(15)

$$\frac{6+2\sqrt{3}}{2+\sqrt{3}}$$

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

$$= \frac{12-6\sqrt{3}+4\sqrt{3}-2(3)}{4-2\sqrt{3}+2\sqrt{3}-3}$$

$$= \frac{6-2\sqrt{3}}{1}$$

$$= 6-2\sqrt{3}$$ (can be written)

16-

(16)

$$\frac{2\sqrt{2}+2}{2+\sqrt{2}}$$

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

$$= \frac{4\sqrt{2}-2(2)+4-2\sqrt{2}}{4-2\sqrt{2}+2\sqrt{2}-2}$$

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

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

$$= \sqrt{2}$$

$\therefore$ can be written

17-

(17)

$$\frac{1}{\frac{1}{\sqrt{3}} + \sqrt{3}}$$

$$= 1 \div \frac{4}{\sqrt{3}}$$

$$= 1 \times \frac{\sqrt{3}}{4}$$

$$= \frac{\sqrt{3}}{4}$$

$$\frac{1}{\sqrt{3}} + \frac{\sqrt{3}}{1} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{1}{\sqrt{3}} + \frac{3}{\sqrt{3}}$$

$$= \frac{4}{\sqrt{3}}$$

18-

(18) $\dfrac{2}{\left(\frac{1}{\sqrt{2}}+1\right)}$ ⟶ $\dfrac{1}{\sqrt{2}}+\dfrac{1}{1}\times\dfrac{\sqrt{2}}{\sqrt{2}}$

$= \dfrac{1}{\sqrt{2}}+\dfrac{\sqrt{2}}{\sqrt{2}}$

$= \dfrac{1+\sqrt{2}}{\sqrt{2}}$

$= 2 \times \dfrac{\sqrt{2}}{1+\sqrt{2}}$

$= \dfrac{2\sqrt{2}}{(1+\sqrt{2})} \times \dfrac{(1-\sqrt{2})}{(1-\sqrt{2})}$

$= \dfrac{2\sqrt{2}-2(2)}{1-\sqrt{2}+\sqrt{2}-2}$

$= \dfrac{2\sqrt{2}-4}{-1}$

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

$= 4-2\sqrt{2}$

OR

$2(2-\sqrt{2})$

19-

(19) $(\sqrt{x}+\sqrt{y})(\sqrt{x}-\sqrt{y})$

$= x-\sqrt{xy}+\sqrt{xy}-y$

$= x-y$

20-

(20) $(2x + \sqrt{y})^2$

$= (2x + \sqrt{y})(2x + \sqrt{y})$

$= 4x^2 + 2x\sqrt{y} + 2x\sqrt{y} + y$

$= 4x^2 + 4x\sqrt{y} + y$