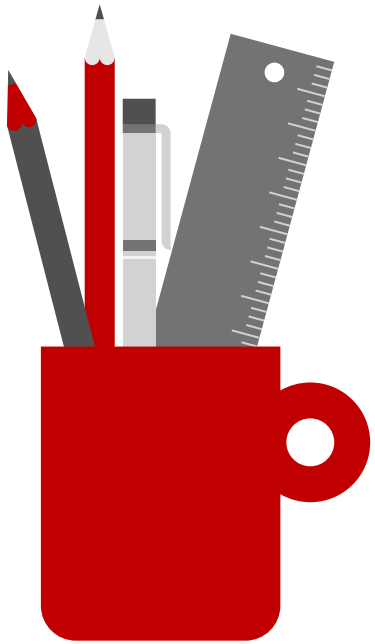

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Ex. 4.3

1. Express each of the following surd in simplest form.

i) $\sqrt{180}$

$= \sqrt{2 \times 2 \times 3 \times 3 \times 5}$

$= 2 \times 3 \sqrt{5}$

$= 6\sqrt{5}$

2	180
2	90
3	45
3	15
5	5
	1

1) ii) $\sqrt[3]{162}$

$= \sqrt[3]{2 \times 3 \times 3 \times 3 \times 3}$

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

$= 27\sqrt{2}$

2	162
3	81
3	27
3	9
3	3
	1

1.) iii) $\frac{3}{4}\sqrt[3]{128}$

$= \frac{3}{4}\sqrt[3]{2\times2\times2\times2\times2\times2\times2}$

$= \frac{3}{4\cancel{2}}\times\cancel{2}\times\cancel{2}\sqrt{2}$

$= 3\sqrt{2}$ Ans

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

i) iv) $\sqrt[5]{96x^6 \cdot y^7 \cdot z^8}$

$= \sqrt[5]{2 \times 2 \times 2 \times 2 \times 2 \times 3 \cdot x^5 \cdot x \cdot y^5 \cdot y^2 \cdot z^5 \cdot z^3}$

$= \sqrt[5]{2^5 \cdot 3 \cdot x^5 \cdot x \cdot y^5 \cdot y^2 \cdot z^5 \cdot z^3}$

$= 2xyz \sqrt[5]{3xy^2z^3}$

2	96
2	48
2	24
2	12
2	6
3	3
	1

2) (i) $\frac{\sqrt{18}}{\sqrt{3} \cdot \sqrt{2}}$ 1

$= \sqrt{\frac{18}{3 \cdot 2}}$

$= \sqrt{3}$

2) ii) $\dfrac{\sqrt{21} \cdot \sqrt{9}}{\sqrt{63}}$

$= \sqrt{\dfrac{3\cancel{21} \times \cancel{9}}{\cancel{63}\ \cancel{7}}}$

$= \sqrt{3}$

iii) $\sqrt[5]{243\,x^5\,y^{10}\,z^{15}}$

$= \sqrt[5]{3^5 \cdot x^5 \cdot y^5 \cdot y^5 \cdot z^5 \cdot z^5 \cdot z^5}$

$= 3xyyzzz$

$= 3xy^2z^3$

3	243
3	81
3	27
3	9
3	3
	1

iv) $\frac{4}{5}\sqrt[3]{125}$

$= \frac{4}{5} \times \sqrt[3]{5^3}$

$= \frac{4}{\cancel{5}} \times \cancel{5}$

$= 4$ Ans

5	125
5	25
5	5
	1

v) $\sqrt{21} \times \sqrt{7} \times \sqrt{3}$

$= \sqrt{21} \times \sqrt{21}$

$= \left(\sqrt{21}\right)^2$

$= 21$ Ans

(3) $\sqrt{45} - 3\sqrt{20} + 4\sqrt{5}$

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

$= 3\sqrt{5} - 6\sqrt{5} + 4\sqrt{5}$

$= (3 - 6 + 4)\sqrt{5}$

$= \sqrt{5}$

$=$

3) ii) $4\sqrt{12} + 5\sqrt{27} - 3\sqrt{75} + \sqrt{300}$

$= 4\sqrt{4\times3} + 5\sqrt{9\times3} - 3\sqrt{25\times3} + \sqrt{100\times3}$

$= 4\times2\sqrt{3} + 5\times3\sqrt{3} - 3\times5\sqrt{3} + 10\sqrt{3}$

$= 8\sqrt{3} + \cancel{15\sqrt{3}} - \cancel{15\sqrt{3}} + 10\sqrt{3}$

$= 8\sqrt{3} + 10\sqrt{3}$

$= (8+10)\sqrt{3} \Rightarrow 18\sqrt{3}$

iii) $\sqrt{3}(2\sqrt{3} + 3\sqrt{3})$

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

$= (\sqrt{3})^2(5)$

$= 3 \times 5$

$= 15$ Ans

iv) $2(6\sqrt{5} - 3\sqrt{5})$

$= 2 \times (6 - 3)\sqrt{5}$

$= 2 \times 3\sqrt{5}$

$= 6\sqrt{5}$

4) (i) $(3+\sqrt{3})(3-\sqrt{3})$

$\therefore (a+b)(a-b) = a^2 - b^2$

$= (3)^2 - (\sqrt{3})^2$

$= 9 - 3$

$= 6$

ii) $(\sqrt{5}+\sqrt{3})^2$ $\quad \because (a+b)^2 = a^2+b^2+2ab$

$= (\sqrt{5})^2 + (\sqrt{3})^2 + 2(\sqrt{5})(\sqrt{3})$

$= 5 + 3 + 2\sqrt{15}$

$= 8 + 2\sqrt{15}$

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

$= (\sqrt{5})^2 - (\sqrt{3})^2$

$= 5 - 3$

$= 2$ Ans

iv) $\left(\sqrt{2}+\frac{1}{\sqrt{3}}\right)\left(\sqrt{2}-\frac{1}{\sqrt{3}}\right)$

$= \left(\sqrt{2}\right)^2 - \left(\frac{1}{\sqrt{3}}\right)^2$

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

$= \frac{6-1}{3} \Rightarrow \frac{5}{3}$

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

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

$= (x-y)(x+y)(x^2+y^2)$

$= (x^2-y^2)(x^2+y^2)$

$= (x^2)^2 - (y^2)^2$

$= x^4 - y^4$ $\Rightarrow$

$\because (a+b)(a-b) = a^2 - b^2$