

*Surds - Lesson 2*

## Simplifying Surds 2 - Multiplication and Division Rules

### LI

- Simplify surds using the 1<sup>st</sup> and 2<sup>nd</sup> Rules of Surds.

### SC

- Factorising numbers.

1<sup>st</sup> Rule of Surds

$$\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$$

2<sup>nd</sup> Rule of Surds

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

Example 1

Simplify fully :

$$\begin{aligned} & \sqrt{15} \div \sqrt{5} \\ = & \frac{\sqrt{15}}{\sqrt{5}} \\ = & \sqrt{\frac{15}{5}} \\ = & \sqrt{3} \end{aligned}$$

Example 2

Simplify fully :

$$\begin{aligned} & \frac{\sqrt{50}}{\sqrt{10}} \\ = & \sqrt{\frac{50}{10}} \\ = & \sqrt{5} \end{aligned}$$

Example 3

Simplify fully :

$$\sqrt{9} \times \frac{\sqrt{48}}{\sqrt{16}}$$

$$= \sqrt{9} \times \sqrt{\frac{48}{16}}$$

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

$$= \boxed{3\sqrt{3}}$$

Example 4

Simplify fully :

$$11 \sqrt{6} \times 8 \sqrt{12} \div 22 \sqrt{8}$$

$$= \frac{11 \sqrt{6} \times 8 \sqrt{12}}{22 \sqrt{8}}$$

$$= \frac{88 \sqrt{72}}{22 \sqrt{8}}$$

$$= 4 \times \sqrt{\frac{72}{8}}$$

$$= 4 \times \sqrt{9}$$

$$= 4 \times 3$$

$$= \boxed{12}$$

1) Simplify each of the following, leaving your answer in surd form where necessary.

a  $\sqrt{8} \div \sqrt{2}$

b  $\sqrt{32} \times \sqrt{\frac{9}{16}}$

c  $\frac{\sqrt{30}}{\sqrt{10}}$

d  $\sqrt{5} \div \sqrt{5}$

e  $\sqrt{48} \div \sqrt{3}$

f  $\frac{10\sqrt{50}}{2\sqrt{5}}$

g  $\frac{6\sqrt{28}}{3\sqrt{7}}$

h  $16\sqrt{20} \div 2\sqrt{2}$

i  $9\sqrt{7} \div 3\sqrt{7}$

2) Simplify each of the following, leaving your answer in surd form where necessary.

a  $8\sqrt{5} \times 2\sqrt{6} \div 4\sqrt{10}$

b  $12\sqrt{21} \div 2\sqrt{3} \times 3\sqrt{2}$

c  $4\sqrt{15} \div 2\sqrt{5} \times 3\sqrt{3}$

d  $\frac{10\sqrt{2} \times 3\sqrt{8}}{5\sqrt{2}}$

e  $\left(\frac{2}{\sqrt{3}}\right)^2$

f  $\left(\frac{\sqrt{7}}{5}\right)^2$

3) Simplify each of the following, leaving your answer in surd form where necessary.

a  $\sqrt{125}$

b  $\sqrt{54}$

c  $\sqrt{288}$

d  $6\sqrt{3} + \sqrt{27}$

e  $10\sqrt{7} - \sqrt{98}$

f  $\sqrt{7} \times \sqrt{8}$

g  $\sqrt{20} \times \sqrt{10}$

h  $\sqrt{56} \div \sqrt{8}$

i  $\frac{\sqrt{54}}{\sqrt{18}}$

j  $3\sqrt{6} \times 5\sqrt{2} \times 4\sqrt{3}$

k  $7\sqrt{6} \times 6\sqrt{12} \div 2\sqrt{8}$

**Answers**

1) a 2  
b  $3\sqrt{2}$   
c  $\sqrt{3}$   
d 1  
e 4  
f  $5\sqrt{10}$   
g 4  
h  $8\sqrt{10}$   
i 3

2) a  $4\sqrt{3}$   
b  $18\sqrt{14}$   
c 18  
d  $12\sqrt{2}$   
e  $\frac{4}{3}$   
f  $\frac{7}{25}$

3) a  $5\sqrt{5}$   
b  $3\sqrt{6}$   
c  $12\sqrt{2}$   
d  $9\sqrt{3}$   
e  $10\sqrt{7} - 7\sqrt{2}$   
f  $2\sqrt{14}$   
g  $10\sqrt{2}$   
h  $\sqrt{7}$   
i  $\sqrt{3}$   
j 360  
k 63