



# Multiplying Surds

1 Write down the value of each of the following calculations.

a)  $\sqrt{4} \times \sqrt{4}$

b)  $(\sqrt{4})^2$

c)  $\sqrt{9} \times \sqrt{9}$

d)  $(\sqrt{9})^2$

e)  $\sqrt{5} \times \sqrt{5}$

f)  $(\sqrt{5})^2$

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

h)  $(\sqrt{10})^2$

i)  $\sqrt{1.2} \times \sqrt{1.2}$

j)  $(\sqrt{1.2})^2$

k)  $\sqrt{4215} \times \sqrt{4215}$

l)  $(\sqrt{4215})^2$

m)  $\sqrt{6} \times \sqrt{6}$

n)  $(\sqrt{6})^2$

o)  $\sqrt{6} \times \sqrt{6} \times \sqrt{6} \times \sqrt{6}$

p)  $(\sqrt{6})^4$

q)  $\sqrt{6} \times \sqrt{6} \times \sqrt{6}$

r)  $(\sqrt{6})^3$

s)  $\sqrt{\frac{1}{2}} \times \sqrt{\frac{1}{2}} \times \sqrt{\frac{1}{2}} \times \sqrt{\frac{1}{2}}$

t)  $\left(\sqrt{\frac{1}{2}}\right)^4$

2

a) Write down the value of  $2^2$  and  $(\sqrt{4})^2$ .

b) What do you notice about your answers to part a)? Why is this the case?

c) Write down three more pairs of numbers that follow this rule.

d) Write down an algebraic generalisation of this rule.

**3**

a) Write down the value of  $2^3$  and  $(\sqrt[3]{8})^3$ .

b) What do you notice about your answers to part a)? Why is this the case?

c) Write down three more pairs of numbers that follow this rule.

d) Write down an algebraic generalisation of this rule.

**4** Write down the value of  $n$  (and  $p$ ) in each of the following.

a)  $3 = (\sqrt{3})^n$

b)  $5 = (\sqrt{5})^n$

c)  $6 = (\sqrt{6})^n$

d)  $6 = (\sqrt[n]{6})^2$

e)  $8 = (\sqrt[n]{8})^3$

f)  $8 = (\sqrt[3]{8})^n$

g)  $12 = (\sqrt[3]{12})^n$

h)  $16 = (\sqrt[n]{16})^4$

i)  $16 = (\sqrt[4]{16})^n$

j)  $4^2 = (\sqrt[n]{16})^4$

k)  $4^2 = (\sqrt[n]{4^2})^4$

l)  $5^2 = (\sqrt[n]{p})^4$

**5** Here is a rule involving surds:

$$a = (\sqrt[m]{a})^n$$

If this rule is true, what do we know about the values of  $m$  and  $n$ ?

**6** Here is a different rule involving surds:

$$a = (\sqrt[m]{b})^n$$

If your rule from question **5** is true, what do we know about the values of  $a$  and  $b$ ?

7 Calculate each of the following. Write your final answer in the form  $a\sqrt{b}$  wherever possible.

a)  $\sqrt{2} \times \sqrt{4}$

b)  $\sqrt{2} \times \sqrt{9}$

c)  $\sqrt{2} \times \sqrt{16}$

d)  $\sqrt{3} \times \sqrt{16}$

e)  $\sqrt{5} \times \sqrt{16}$

f)  $\sqrt{10} \times \sqrt{8}$

g)  $\sqrt{20} \times \sqrt{4}$

h)  $\sqrt{20} \times \sqrt{5}$

i)  $\sqrt{20} \times \sqrt{10}$

j)  $\sqrt{20} \times \sqrt{5} \times \sqrt{2}$

k)  $\sqrt{100} \times \sqrt{5} \times \sqrt{2}$

l)  $\sqrt{25} \times \sqrt{20} \times \sqrt{2}$

m)  $\sqrt{100} \times \sqrt{10} \times \sqrt{1}$

n)  $\sqrt{50} \times \sqrt{10} \times \sqrt{2}$

o)  $\sqrt{200} \times \sqrt{10} \times \sqrt{\frac{1}{2}}$

8 Calculate each of the following. Write your final answer in the form  $a\sqrt{b}$  wherever possible.

a)  $\sqrt{4} \times \sqrt{5}$

b)  $2 \times \sqrt{5}$

c)  $2 \times 2 \times \sqrt{5}$

d)  $2 \times 2 \times \sqrt{9}$

e)  $2 \times \sqrt{16} \times 2 \times \sqrt{9}$

f)  $3 \times \sqrt{16} \times 2 \times \sqrt{9}$

g)  $3 \times \sqrt{16} \times 2 \times \sqrt{16}$

h)  $3 \times \sqrt{17} \times 2 \times \sqrt{17}$

i)  $3 \times \sqrt{19} \times 2 \times \sqrt{19}$

9 Calculate each of the following. Write your final answer in the form  $a\sqrt{b}$  wherever possible.

a)  $2\sqrt{2} \times 2$

b)  $2\sqrt{2} \times \sqrt{4}$

c)  $2\sqrt{2} \times \sqrt{3}$

d)  $\sqrt{8} \times \sqrt{4}$

e)  $\sqrt{24} \times \sqrt{4}$

f)  $2\sqrt{6} \times \sqrt{4}$

g)  $2\sqrt{6} \times \sqrt{9}$

h)  $2\sqrt{6} \times \sqrt{18}$

i)  $2\sqrt{6} \times 3\sqrt{2}$

j)  $3\sqrt{6} \times 2\sqrt{2}$

k)  $3\sqrt{6} \times 3\sqrt{2}$

l)  $4\sqrt{6} \times 3\sqrt{2}$

m)  $6\sqrt{6} \times 2\sqrt{2}$

n)  $6\sqrt{6} \times 2\sqrt{3}$

o)  $\sqrt{6} \times 2\sqrt{3}$

p)  $\sqrt{24} \times 3\sqrt{3}$

q)  $\sqrt{72} \times 3\sqrt{3}$

r)  $\sqrt{72} \times 3\sqrt{3} \times \sqrt{6}$

s)  $\sqrt{72} \times 3\sqrt{3} \times 2\sqrt{6}$

t)  $12\sqrt{2} \times 3\sqrt{3} \times \sqrt{6}$

u)  $2\sqrt{2} \times 2\sqrt{3} \times 3\sqrt{6}$

### Extension Question

A cuboid has a volume of  $48\sqrt{6} \text{ cm}^3$ .

Write down as many different possibilities for the length, width and height of the cuboid.