

### 1 Squares and square roots ☐

- a) Work out  $\sqrt{0.81} \times 20^2$   
b)  $n^2 = 289$ . Write down both values of  $n$ .

a)  $0.9 \times 400 = 360$   
b)  $n = 17$  or  $n = -17$

### 2 Cubes and cube roots ☐

- a) Work out  $\sqrt[3]{1000} - 4^3$   
b) A cube has a volume of  $0.125 \text{ m}^3$ .  
Work out its surface area.

a)  $10 - 64 = -54$   
b)  $\sqrt[3]{0.125} = 0.5 \text{ m}$ ,  $0.5^2 = 0.25$   
b)  $6 \times 0.25 = 1.5 \text{ m}^2$

### 3 Estimating roots ☐

- a)  $\sqrt[3]{90}$  lies between two whole numbers  
next to each other. Which numbers?  
b) Which is closer to 8,  $\sqrt{60}$  or  $\sqrt{70}$ ?  
Explain how you know.

a)  $64 < 90 < 125$ , so 4 and 5  
b) 60 is 4 below 64, 70 is 6 above  
b)  $\sqrt{60}$  ( $\sqrt{60} \approx 7.7$ ,  $\sqrt{70} \approx 8.4$ )

### 4 Index laws ☐

- a) Simplify  $\frac{(2x^3y)^4}{4x^5y^2}$   
b) Write  $9^3 \times 27^2$  as a single power of 3.

a)  $\frac{16x^{12}y^4}{4x^5y^2} = 4x^7y^2$   
b)  $3^6 \times 3^6 = 3^{12}$

### 5 Fractional indices ☐

- a) Work out  $\left(\frac{16}{81}\right)^{-\frac{3}{4}}$   
b) Write  $4\sqrt{2}$  as a power of 2.

a)  $\frac{81}{16}$  to the power  $\frac{3}{4}$ :  $\frac{3}{2}$  cubed  
b)  $2^2 \times 2^{\frac{1}{2}}$   
a)  $\frac{27}{8}$  b)  $2^{\frac{5}{2}}$

## Indices, standard form and surds revision mat answers

Higher A

### 6 Simplifying surds ☐

- a) Simplify  $\sqrt{75} - \sqrt{12}$   
b) Expand and simplify  $(\sqrt{5} + 3)(2\sqrt{5} - 1)$

a)  $5\sqrt{3} - 2\sqrt{3} = 3\sqrt{3}$   
b)  $10 - \sqrt{5} + 6\sqrt{5} - 3$   
b)  $7 + 5\sqrt{5}$

### 7 Rationalising denominators ☐

- a) Rationalise the denominator of  $\frac{12}{\sqrt{6}}$   
b) Rationalise and simplify  $\frac{6}{3 - \sqrt{7}}$

a)  $\frac{12\sqrt{6}}{6} = 2\sqrt{6}$   
b)  $\frac{6(3 + \sqrt{7})}{9 - 7} = 3(3 + \sqrt{7})$   
b)  $9 + 3\sqrt{7}$

### 8 Standard form (large) ☐

- a) Write 40 600 000 in standard form.  
b) Sam says  $52 \times 10^5$  is in standard form.  
Is Sam right? Write it in standard form.

a)  $4.06 \times 10^7$   
b) No, 52 is not between 1 and 10  
b)  $5.2 \times 10^6$

### 9 Standard form (small) ☐

- a) Write 0.000 708 in standard form.  
b) Write in order, smallest first.  
 $3.2 \times 10^{-4}$  0.000 35  $2.9 \times 10^{-3}$   
 $0.4 \times 10^{-4}$

a)  $7.08 \times 10^{-4}$   
b)  $0.4 \times 10^{-4}$ ,  $3.2 \times 10^{-4}$ ,  
0.000 35,  $2.9 \times 10^{-3}$

### 10 Standard form calculations ☐

- Give your answers in standard form.  
a) Work out  $(3 \times 10^4) \times (7 \times 10^{-9})$   
b) A grain of sand has a mass of  
 $6.4 \times 10^{-4}$  g. How many grains are in  
3.2 kg of sand?

a)  $21 \times 10^{-5} = 2.1 \times 10^{-4}$   
b)  $3200 \div 0.00064 = 5 \times 10^6$