

Exercise walk-through

# 1.2

## Indices, surds, standard form and sets

---

OxfordAQA · International GCSE · Mathematics

# 1. Unit 3.1 at a glance

## Unit 3.1 at a glance

Core N1-N20: ordering, four operations, factors and indices, standard form, sets, calculator use, rounding, FDP operators, percentage change, ratio and proportion.

Extension additions: index-form factors, fractional powers, exact surds, bounds calculations, recurring decimals, reverse percentage, the compound interest formula, exponential growth and decay.

NO formulae sheet in 9260 - the recall list is the specification itself. Spec lines with no specimen marks are taught as specification originals and labelled.

## 2. Ordering and the four operations

### Ordering and the four operations

Order on the number line with  $=$ , not-equal,  $<$ ,  $>$  - convert to one form first ( $3/5 = 0.6$ ). Formal methods for integers, decimals, fractions and mixed numbers:  $2 \frac{1}{3} + 1 \frac{1}{4} = 43/12 = 3 \frac{7}{12}$ .

Inverse operations cancel early:  $(15/28) \times (7/9) = 5/12$  after cancelling the 7 and the 3.

# Check yourself

## Check yourself

Ordering and formal methods; inverse cancellation; index-form factors with HCF and LCM; fractional powers; exact surds and rationalising; standard form; sets with counts; rounding.

Bounds choosing the right extremes; FDP operators; recurring decimals; reverse percentage; compound interest; ratio sharing and rates; direct and inverse proportion; exponential models fitted and solved.

## Exercises 2.1·2.3

---

**2.1** Work out  $27^{1/3}$  and  $8^{2/3}$  [2]

---

**2.2** Simplify  $\sqrt{50} - \sqrt{18} + \sqrt{8}$  [3]

---

**2.3** Rationalise  $\frac{5}{3 - \sqrt{2}}$  [3]

## Exercises 2.1·2.3

---

**2.1** Work out  $27^{1/3}$  and  $8^{2/3}$  [2]

**2.1** 3 and 4.

---

**2.2** Simplify  $\sqrt{50} - \sqrt{18} + \sqrt{8}$  [3]

**2.2**  $5\sqrt{2} - 3\sqrt{2} + 2\sqrt{2} = 4\sqrt{2}$ .

---

**2.3** Rationalise  $\frac{5}{3 - \sqrt{2}}$  [3]

**2.3** Multiply by the conjugate:  $\frac{5(3 + \sqrt{2})}{9 - 2} = \frac{5(3 + \sqrt{2})}{7}$ .

## Exercises 2.4·3.1

---

**2.4** Write 0.00047 in standard form

[1]

---

**2.5** For  $A = \{1, 2, 3, 4, 5\}$ ,  $B = \{4, 5, 6, 7\}$ : find  $n(A \cup B)$

[2]

---

**3.1** (*Original, 1E surd family.*) Show that  $\frac{12}{\sqrt{2}} + \sqrt{18}$  can be written in the form  $c\sqrt{2}$ , and find  $c$ .

[3]

## Exercises 2.4·3.1

---

**2.4** Write 0.00047 in standard form [1]

**2.4**  $4.7 \times 10^{-4}$ .

---

**2.5** For  $A = \{1, 2, 3, 4, 5\}$ ,  $B = \{4, 5, 6, 7\}$ : find  $n(A \cup B)$  [2]

**2.5**  $A \cup B = \{1, \dots, 7\}$ , so  $n(A \cup B) = 7$ .

---

**3.1** (*Original, 1E surd family.*) Show that  $\frac{12}{\sqrt{2}} + \sqrt{18}$  can be written in the form  $c\sqrt{2}$ , and find  $c$ . [3]

**3.1**  $\frac{12}{\sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2}$  and  $\sqrt{18} = 3\sqrt{2}$ , so the total is  $9\sqrt{2}$ :  $c = 9$ .

## Exercises 3.2·3.3

---

**3.2** (*Original.*) Work out  $(3 \times 10^5) \times (4 \times 10^{-3})$ , giving the answer in standard form. [2]

---

**3.3** (*Original, specification line not sampled by the specimens: fractional powers.*) Work out  $\left(\frac{16}{25}\right)^{1/2}$  and  $\left(\frac{8}{27}\right)^{2/3}$ . [4]

## Exercises 3.2·3.3

---

**3.2** (*Original.*) Work out  $(3 \times 10^5) \times (4 \times 10^{-3})$ , giving the answer in standard form. [2]

**3.2**  $12 \times 10^2 = 1.2 \times 10^3$ .

---

**3.3** (*Original, specification line not sampled by the specimens: fractional powers.*) Work out  $\left(\frac{16}{25}\right)^{1/2}$  and  $\left(\frac{8}{27}\right)^{2/3}$ . [4]

**3.3**  $\sqrt{\frac{16}{25}} = \frac{4}{5}$ . For the second, take the cube root first:  $\left(\frac{8}{27}\right)^{1/3} = \frac{2}{3}$ , then square:  $\frac{4}{9}$ .

Local review guidance: roots before powers in fractional indices; exact surd forms; set answers give the count, not the list. This is authored classroom guidance.