

Number

9260 unit 3.1 full package: Core N1-N20 with Extension additions, specimen-family anchors, unsampled lines labelled specification originals

1. Unit 3.1 at a glance

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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.

3. Factors, HCF and LCM

Factors, HCF and LCM

Index form for every factor: $504 = 2^3 \times 3^2 \times 7$ and $588 = 2^2 \times 3 \times 7^2$.

HCF takes the lowest power of each common prime: $2^2 \times 3 \times 7 = 84$ - the 1E specimen answer. LCM takes the highest power of every prime: 3528.

4. Indices and surds

Indices and surds

Fractional powers (Extension): $27^{(1/3)} = 3$; $8^{(2/3)} = 4$ - root first, then power.

Exact surds (Extension): $\sqrt{50} - \sqrt{18} + \sqrt{8} = 4\sqrt{2}$; rationalise with conjugates: $5/(3 - \sqrt{2}) = 5(3 + \sqrt{2})/7$. The 1E specimen's $4 + 4\sqrt{2}$ family lives here.

5. Standard form and sets

Standard form and sets

$A \times 10^n$ with $1 \leq A < 10$: $604000 = 6.04 \times 10^5$; $0.00047 = 4.7 \times 10^{-4}$.

Calculator: full precision through the working, round at the end.

Sets: $n(A)$ counts, A' complements, union and intersection; Venn diagrams organise the counts (30 students, 18 cricket, 15 tennis, 7 both: 11, 7, 8, 4).

6. Rounding and bounds

Rounding and bounds

Round to the accuracy asked; each rounded value carries an interval of half a unit either side.

Bounds calculations (Extension) choose the extreme the question needs: the 2E specimen - floor 96 m^2 to 2 s.f. (LB 95.5), space 5.1 m^2 per person to 1 d.p. (UB 5.15), least whole people = $95.5 / 5.15 = 18.5$, so 19.

7. FDP as operators

FDP as operators

35% of 240 = 84; $\frac{3}{5}$ of a quantity multiplies by 3 and divides by 5; 7 as a percentage of 28 is 25%.

Recurring decimals (Extension, not sampled): $0.45 \text{ recurring} = \frac{45}{99} = \frac{5}{11}$ by shift-and-subtract.

8. Percentage change and compound interest

Percentage change and compound interest

Multipliers: +12% is $\times 1.12$; -17% is $\times 0.83$. Reverse percentage divides: 92 after +15% means 80 originally.

Compound interest formula (Extension, not sampled): $A = P(1 + r/100)^n$ - 2000 at 3% for 4 years gives 2251.02.

9. Ratio, rate and proportion

Ratio, rate and proportion

Simplify $45 : 60 = 3 : 4$; share 350 in $2 : 5$ (100 and 250); rates of pay: 9.20/h for 7.5 h = 69.

Direct proportion $y = kx$; inverse $y = k/x$; recipe scaling by unitary method.

10. Exponential growth and decay

Exponential growth and decay

$y = a b^t$ with $b > 1$ growing, $0 < b < 1$ decaying (Extension). From data 240, 192, 153.6 the ratio 0.8 fits $y = 240 \times 0.8^t$ (2E specimen family).

Solving: 12000×0.8^t first falls below 2500 when $t > \ln(0.2083)/\ln(0.8) = 7.0$ - during the 8th year; growth $240 \times 1.35^5 = 1076.2$.

Check yourself

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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.