

Exercise walk-through

1.5

Sets and Venn diagrams

Pearson Edexcel · International GCSE · Mathematics A

1. Topic 1 at a glance

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Foundation 1.1-1.11: integers and the four rules, fractions, decimals, indices, sets, percentages, ratio, bounds, standard form, everyday number. Higher adds recurring decimals, surds, algebraic sets, repeated percentage change and bound problems.

Must-know: multipliers $1 \pm r/100$ with reverse division; bounds $v \pm$ half the accuracy unit; standard form $a \times 10^n$ with $1 \leq a < 10$; share by parts over total.

6. Sets

Sets

Union (either), intersection (both), membership; the universal set, the empty set and the complement A' . Venn diagrams draw the regions.

Higher: subsets, $n(A)$ counting, algebraic and practical sets. 30 students, 18 cricket, 15 tennis, 7 both: regions 11, 7, 8, 4; the paper's Q11 family reads prime-factor products from regions.

Check yourself

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Directed numbers and BIDMAS; fractions with common denominators and reciprocals; FDP conversions including recurring decimals by algebra.

Indices, prime factorisation, HCF and LCM from Venns; surds simplified and rationalised; sets with complements and counts; percentages with multipliers, reverse and compound; ratio sharing and proportion; bounds chosen per question; standard form; units and calculator discipline.

Exercises 2.1·2.3

2.1 For $A = \{1, 2, 3, 4, 5\}$ and $B = \{4, 5, 6, 7\}$, find $A \cap B$ [1]

2.2 Find $A \cup B$ [2]

2.3 Write whether $3 \in B$ is true or false [1]

Exercises 2.1·2.3

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2.1 $\{4, 5\}$.

2.2 Find $A \cup B$ [2]

2.2 $\{1, 2, 3, 4, 5, 6, 7\}$.

2.3 Write whether $3 \in B$ is true or false [1]

2.3 False.

Exercises 2.4·3.2

2.4 $\mathcal{E} = \{1, \dots, 10\}$, $A = \{2, 4, 6, 8\}$: list A' [2]

3.1 (*Original.*) 30 students: 18 play cricket (C), 15 tennis (T), 7 both. (a) Fill a Venn diagram. (b) Find $n(C \cup T)$ and the number in neither region. (c) A student who plays cricket is chosen at random: find the probability they also play tennis. [5]

3.2 (*Original.*) P = multiples of 3 between 1 and 20; $Q = \{x: x \text{ is odd}\}$. (a) List P and $P \cap Q$. (b) Is $P \subset Q$? Justify. [4]

Exercises 2.4·3.2

2.4 $\mathcal{E} = \{1, \dots, 10\}$, $A = \{2, 4, 6, 8\}$: list A' [2]

2.4 $\{1, 3, 5, 7, 9, 10\}$.

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3.1 (a) Regions: cricket only 11, both 7, tennis only 8, neither 4. (b) $n(C \cup T) = 11 + 7 + 8 = 26$; neither 4. (c) $P(T \mid C) = \frac{7}{18}$ – 7 of the 18 cricketers.

3.2 (*Original.*) P = multiples of 3 between 1 and 20; $Q = \{x: x \text{ is odd}\}$. (a) List P and $P \cap Q$. (b) Is $P \subset Q$? Justify. [4]

3.2 (a) $P = \{3, 6, 9, 12, 15, 18\}$; $P \cap Q = \{3, 9, 15\}$. (b) No: 6 is a multiple of 3 but even, so not every element of P is in Q .

Exercise 3.3

3.3 (*Edexcel 4MA1 1HR June 2024 Q11 family, adapted.*) The prime factors of A fill a two-set Venn with those of B ; the overlap holds 2^2 and 3 , the rest of A holds 2^2 and 5 , and the rest of B holds 7 . (a) Find A and B . (b) Write down the HCF. [5]

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3.3 (a) $A = 2^2 \cdot 3 \cdot 2^2 \cdot 5 = 2^4 \cdot 3 \cdot 5 = 240$; $B = 2^2 \cdot 3 \cdot 7 = 84$. (b) The overlap's product: $2^2 \cdot 3 = 12$.

Local review guidance: regions filled before any counting; set notation correct ($\cap$ vs $\cup$); subset verdicts justified by an element. This is authored classroom guidance.