FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... Class .....

P6: Sets, Venn diagrams and listing

Solve problems using Venn diagrams and systematic listing

20 marks · 25 minutes · Non-calculator

1) 60 students: 35 are in the maths club, 28 in the science club and 10 in neither. Find how many are in both, and the probability that a student chosen at random is only in the maths club.

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[Question 1: 4 marks]

2) $\xi = \{1, 2, \ldots, 20\}$, A = prime numbers, B = odd numbers. Find $n(A \cap B)$ and $n(A \cup B)$.

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[Question 2: 3 marks]

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3) Two-digit numbers are made from the digits 1, 2, 3 and 4 with no repeats. How many are even and greater than 20?

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[Question 3: 3 marks]

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4) In a Venn diagram, A only has x members, $A \cap B$ has 5, B only has $2x$ and 7 are in neither. There are 30 members in total. Find x.

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[Question 4: 3 marks]

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5) A café has 3 starters (1 vegetarian) and 4 mains (2 vegetarian). How many starter-and-main combinations include at least one vegetarian dish?

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[Question 5: 3 marks]

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6) 100 people: 45 drink tea, 40 drink coffee and 20 drink both. Find the probability that a person chosen at random drinks tea or coffee.

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[Question 6: 2 marks]

7) A four-sided spinner (1–4) is spun twice. In how many ways can the total be 5?

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[Question 7: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	13; $\frac{11}{30}$	$35 + 28 - 50 = 13$ (P1, P1); maths only 22 (P1); A1.
2	7; 11	Primes 2, 3, 5, 7, 11, 13, 17, 19 (P1); odd primes 7 (A1); $8 + 10 - 7$ (A1).
3	4	Lists even numbers: 12, 14, 24, 32, 34, 42 (P1, P1); 24, 32, 34, 42 (A1).
4	6	$3x + 12 = 30$ (P1, P1); A1.
5	8	Total 12 (P1); non-vegetarian pairs $2 \times 2 = 4$ (P1); A1.
6	0.65	65 people (P1); A1.
7	4	(1,4), (2,3), (3,2), (4,1) (P1); A1.