Reasoning and Problem Solving
Prime Numbers

National Curriculum Objectives:

Mathematics Year 5: (5C5b) Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers

Mathematics Year 5: (5C8a) Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes

Differentiation:

Questions 1, 4 and 7 (Problem Solving)
Developing Use 4 digit cards to make composite numbers up to 100.
Expected Use 4 digit cards to make composite numbers up to 50 with a specified prime factor.
Greater Depth Use 4 digit cards to make composite numbers up to 50 with prime factors that meet specified criteria.

Questions 2, 5 and 8 (Problem Solving)
Developing Place numbers on a Venn diagram identifying prime and composite numbers up to 100.
Expected Place numbers on a Venn diagram identifying prime and composite numbers up to 100 and identifying the prime factors in numbers.
Greater Depth Place numbers on a Venn diagram identifying prime and composite numbers up to 100. Identify prime factors in numbers and recognise the sum of prime factors.

Questions 3, 6 and 9 (Reasoning)
Developing Explain whether a statement about prime or composite numbers up to 100 is correct.
Expected Explain whether a statement about prime or composite numbers up to 100 is correct, including identifying prime factors in numbers.
Greater Depth Explain whether a statement about prime or composite numbers up to 100 is correct, including identifying prime factors in numbers and recognising the sum of prime factors.

Prime Numbers

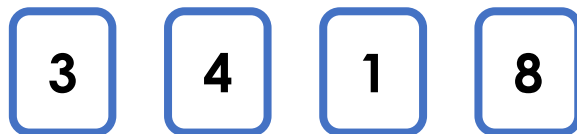**1a.** Choose from the digit cards below to create composite numbers up to 100.

| 6 | 2 | 9 | 7 |
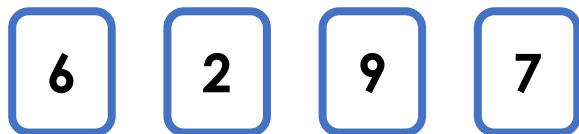
Find all the possibilities.

⭐D | PS

1b. Choose from the digit cards below to create composite numbers up to 100.

| 3 | 4 | 1 | 8 |

Find all the possibilities.

⭐D | PS

2a. Place the numbers below on the Venn diagram.

Prime numbers   **Multiples of 2**

| 18 | 53 | 27 | 7 | 2 | 28 | 47 |
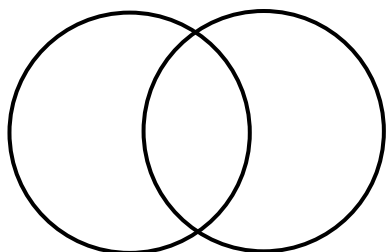
⭐D | PS

2b. Place the numbers below on the Venn diagram.

Composite numbers   **Multiples of 3**

| 73 | 62 | 19 | 69 | 56 | 40 | 39 |
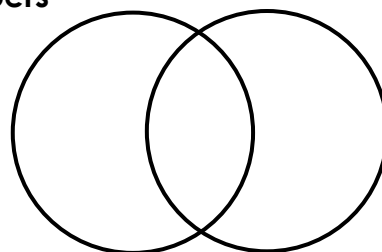
⭐D | PS

3a. True or false?

Luna

> The largest prime number less than thirty is 29.

Explain your answer.

⭐D | R

3b. True or false?

Jacob

> All odd numbers are prime numbers.

Explain your answer.

⭐D | R

Prime Numbers

4a. Choose from the digit cards below to create composite numbers up to 50 that have a prime factor of 2.

| 4 | 6 | 3 | 1 |

Find all the possibilities.

☆ PS

4b. Choose from the digit cards below to create composite numbers up to 50 that have a prime factor of 3.

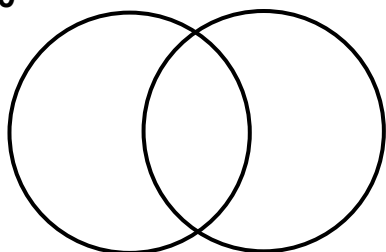| 8 | 1 | 2 | 7 |

Find all the possibilities.

☆ PS

5a. Place the numbers below on the Venn diagram.

Prime factors of 20   Prime factors of 30
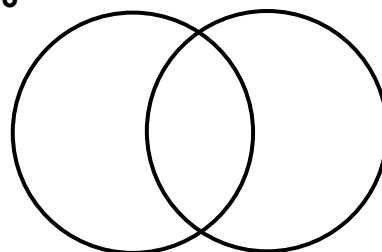
| 20 | 2 | 15 | 5 | 3 | 30 | 10 |

☆ PS

5b. Place the numbers below on the Venn diagram.

Prime factors of 66   Prime factors of 63

| 33 | 7 | 11 | 22 | 2 | 31 | 3 |

☆ PS

6a. True or false?

> Every odd composite number has 3 as a prime factor.

Alfie

Explain your answer.

☆ R

6b. True or false?

> 2 is the only even prime number.

Grace

Explain your answer.

☆ R

Prime Numbers

7a. Choose from the digit cards below to create composite numbers up to 50 that have a 2-digit prime factor.
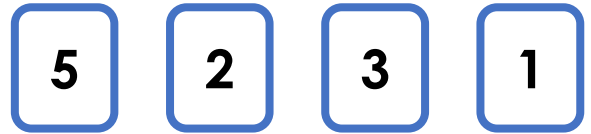
6	1	3	4

Find all the possibilities.

7b. Choose from the digit cards below to create composite numbers up to 50 that have only two prime factors.
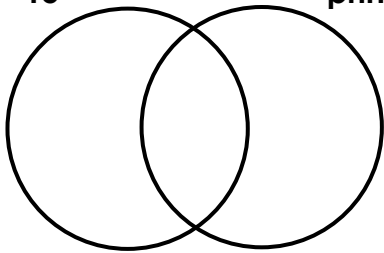
5	2	3	1

Find all the possibilities.

8a. Place the numbers below on the Venn diagram.

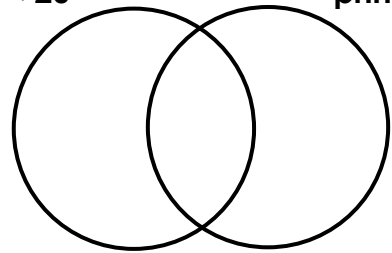**Sum of prime factors > 15**   **Has 2 as a prime factor**

39	26	46	33	38	49	34

8b. Place the numbers below on the Venn diagram.

Sum of prime factors < 20   **Has 5 as a prime factor**

26	15	38	35	85	55	14

9a. True or false?

> All 2-digit composite numbers have a prime factor of 2.

Judy

Explain your answer.

9b. True or false?

> The sum of the prime factors of any composite number is always odd.

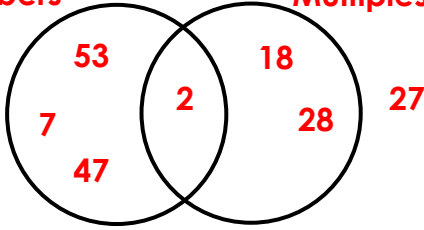Theo

Explain your answer.

Prime Numbers

Developing

1a. 26, 27, 62, 69, 72, 76, 92, 96

2a.

Prime numbers / Multiples of 2

53, 7, 47 | 2 | 18, 28, 27

3a. True; 29 is only divisible by itself and 1 therefore it is a prime number. There is no larger prime number less than 30.

Developing

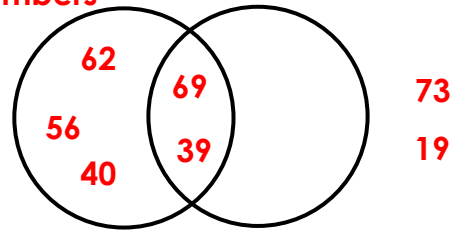**1b.** 14, 18, 34, 38, 48, 81, 84

2b.

Composite numbers / Multiples of 3

62, 56, 40 | 69, 39 | 73, 19

3b. False; while 2 is the only even prime number, many odd numbers are composite, for example, 15 is a multiple of 3 and 5.
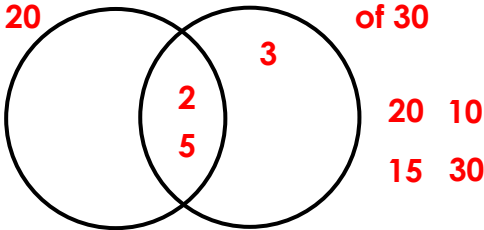
Expected

4a. 4, 6, 14, 16, 34, 36, 46

5a.

Prime factors of 20 / Prime factors of 30

2, 5 | 3 | 20, 10, 15, 30

6a. False; 25, 35 and 49 do not have 3 as a prime factor.

Expected

4b. 12, 18, 21, 27

5b.

Prime factors of 66 / Prime factors of 63

11, 2 | 3 | 7 | 22, 31, 33
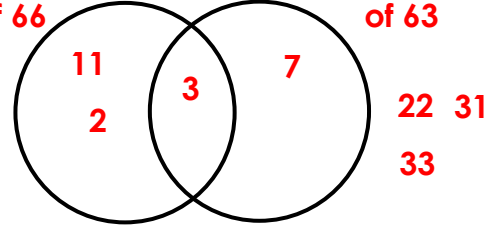
6b. True; all other prime numbers are odd, for example, 3, 5 and 7. All other even numbers are composite as they can be divided by 2.
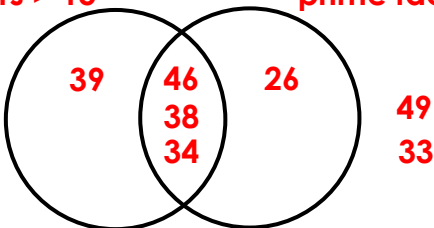
Greater Depth

7a. 34 and 46

8a.

Sum of prime factors > 15 / Has 2 as a prime factor

39 | 46, 38, 34 | 26 | 49, 33

9a. False; all 2-digit even composite numbers have a prime factor of 2, all 2-digit odd composite numbers do not have a prime factor of 2.
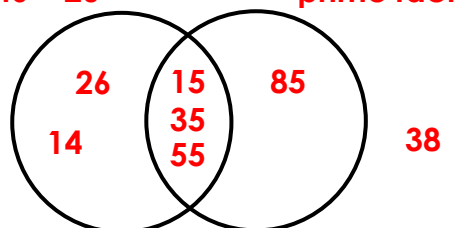
Greater Depth

7b. 15, 21, 25 and 35

8b.

Sum of prime factors < 20 / Has 5 as a prime factor

26, 14 | 15, 35, 55 | 85 | 38

9b. False; the sum of the prime factors of any composite number can be odd or even. For example, the prime factors of 10 are 2 and 5 which make 7 altogether however the prime factors of 15 are 3 and 5 which make 8 altogether.