Prime and Composite Numbers, Simplify Calculations.

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Differentiate and Assess

Not every student will be ready to investigate this concept at this Level and so we will need to differentiate to ensure every student is learning at their leading edge. Select the Differentiate button on this screen.

Integrate

Every mathematical concept is integrally related to other mathematical concepts. Teaching and learning related concepts simultaneously develops deep relational understanding. Select the Integrate button on this screen.

Intervene

Some students may not yet be ready to investigate this concept at any Level, and so we will need to provide some intervention. Select the Intervention button on this screen.

PRIME AND COMPOSITE NUMBERS, SIMPLIFY CALCULATIONS.

EXPLICIT TEACHING PLAN OVERVIEW PAGE

THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: PLAYING CARDS,PENCIL, PAPER

WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

Children:
• explain that the factors of a prime number are 1 and itself.
• explain that composite numbers have more than two factors.
• identify that 1 is neither prime nor composite.
 	
• identify prime numbers using Eratosthenes' sieve.
 	
• explain that composite numbers are the product of prime numbers, for example, 12 = 2 x 2 x 3.
 	
• use prime numbers to simplify multiplication and division calculations,
for example, 15 x 18 = 3 x 5 x 2 x 3 x 3
for example, 114 ÷ 6 = 114 ÷ 2 ÷ 3
	Children
	• ask one another questions about identifying prime and composite numbers, for example;
	  • How could we divide these counters into an array?
	  • Are the factors of 7, 7 and 1?
	  • Is 7 a prime number?
	  • Are the factors of 6, 6 and 1, 2 and 3?
	  • Is 6 a composite number?
	  • If we cross out the multiples of prime numbers, will we identify all of the prime numbers to 100?
	
	• Are composite numbers 'composed of prime numbers'?
	• How could we record 12 as the product of its prime factors?
	• How could we multiply 15 by 18, using prime factors?
	• How could we divide 114 by 6, using prime factors?

PRIME AND COMPOSITE NUMBERS, SIMPLIFY CALCULATIONS.

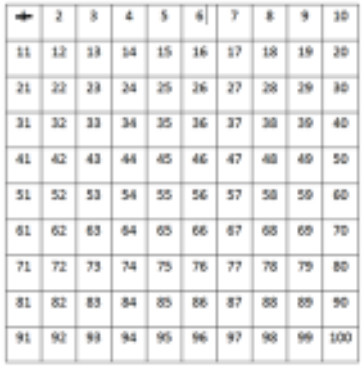
EXPLICIT TEACHING PLAN

FULL EXPLICIT TEACHING PLAN, EMBEDDING DEEP RELATIONAL UNDERSTANDING, METALANGUAGE, AND QUESTIONS THAT MAY BE USED OVER MULTIPLE LESSONS.

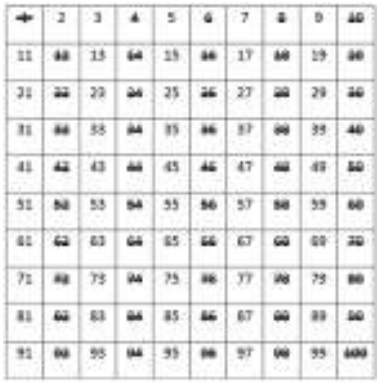
WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.	► Today brings an investigation about prime and composite numbers. ► What do you know about prime and composite numbers? ► Talk about prime and composite numbers with a friend. ► Is anyone ready to share what they are thinking about prime and composite numbers?
Display some counters from which only 1 array could be constructed, for example, 7	► **Let's divide these counters into a rectangular array.**
Allow children to divide the counters into an array, for example,  Record, for example, 7 x 1 = 7 1 x 7 = 7	► How could we describe this array? ► Is this array 1 times 7 or 7 times 1? ► Could we make any other rectangular array with 7 counters?
Record, for example, factors of 7: 7, 1	► We've investigated factors. ► And we found that a factor is a number that another number is divisible by. ► What are the factors of 7? ► Are the factors of 7, 7 and 1?
Record, for example, 7 is a prime number.	► When a number only has 1 and itself as factors, we call the number a prime number. ► Is 7 a prime number?

Record, for example, 5 is a prime number.	► What other number has only 1 and itself as factors? ► Does 5 only have 1 and 5 as factors? ► Is 5 a prime number?
Display some counters from which more than 1 array could be constructed, for example, 6 Allow children to divide the counters into arrays, for example, 	► Let's divide these counters into arrays.
Record, for example, 6 x 1 = 6 1 x 6 = 6 Record, for example, 2 x 3 = 6 3 x 2 = 6	► How could we describe these arrays? ► Is this array 1 times 6 or 6 times 1? ► Is this array 2 times 3 or 3 times 2?
Record, for example, factors of 6: 6, 1, 2, 3 Record, for example, 6 is a composite number.	► From these arrays, what are the factors of 6? ► Are the factors of 6, 1, 6, 2 and 3? ► Because 6 has more factors than just 1 and itself, we call 6 a composite number.
Record, for example, 8 is a composite number.	► Is 8 a composite number? ► What are the factors of 8? ► Are the factors of 8, 1, 8, 2 and 4?
	► What about 1? ► Is 1 prime or composite? ► What are the factors of 1? ► Is the only factor of 1, 1? ► If 1 has only 1 factor – itself – 1 must be neither prime nor composite.

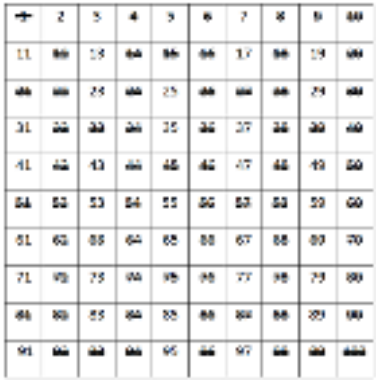
Display a hundred chart, for example,



Cross out 1, for example,



Cross out all of the multiples of 2, for example,

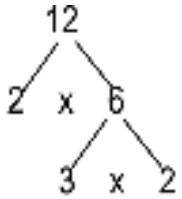


Cross out all of the multiples of 3, for example,

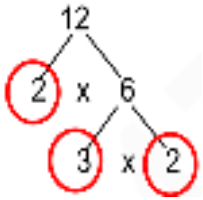
- How can we identify the prime numbers up to 100?
- Eratosthenes was a Greek mathematician, who worked out that if we use a sieve to get rid of all the composite numbers, we will be left with just prime numbers.
- Let's use a hundred chart to investigate the Sieve of Eratosthenes.
- We know 1 is not a prime number so let's cross out 1.
- We know 2 is a prime number.
- A prime number has only 1 and itself as factors.
- Let's cross out all of the multiples of 2 because all multiples of 2 have 2 as a factor, so are composite.
- We know 3 is a prime number.
- A prime number has only 1 and itself as factors.
- Let's cross out all of the multiples of 3 because all multiples of 3 have 3 as a factor, so are composite.
- If we continue crossing out the multiples of prime numbers, will we identify all of the prime numbers to 100?

Record, for example, Factors of 12: 1, 12, 2, 6, 3, 4

Record, for example,



Circle the prime factors, for example,

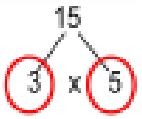


Record, for example, 2 x 2 x 3 = 12

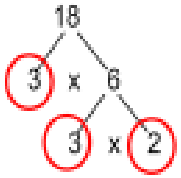
- Is 12 a prime or composite number?
- Does 12 have more factors besides 1 and itself?
- Is 12 a composite number?
- If 12 is a composite number, do you think 12 is a product of its prime factors? Let's investigate!
- Let's create a factor tree for 12.
- A factor tree is where we continue to find factors of 12 until we have found the prime factors.
- Does 2 times 6 equal 12?
- 2 is a prime number but 6 is a composite number.
- What are the factors of 6?
- Does 3 times 2 equal 6?
- Are 2 and 3 prime numbers?
- Let's circle the prime factors of 12.
- Are the prime factors of 12, 2, 2 and 3
- If we multiply the prime factors, will we get 12?
- What does 2 times 2 times 3 equal?
- Does 2 times 2 times 3 equal 12?
- Is 12 a product of its prime factors?
- Do you think all composite numbers are products of their prime factors?
- Do you think composite numbers are called composite numbers because they are 'composed of prime numbers'?
- If all composite numbers are the product of their prime factors, could we use this to make multiplication calculations simpler?

Record, for example, 15 x 18 =

Circle the prime factors, for example,



Circle the prime factors, for example,



Record, for example, 15 x 18 = 3 x 5 x 3 x 3 x 2 =

Record, for example, 15 x 18 = 10 x 27 = 270

Record, for example, 15 x 18 = 270

Record, for example, 114 ÷ 6 =

Circle the prime factors, for example,

- Imagine we want to multiply 15 times 18
- **Could we use the prime factors of 15 and 18 to help us?**
- What are the prime factors of 15?
- Are the prime factors of 15, 3 and 5?
- What are the prime factors of 18?
- Are the prime factors of 18, 3 and 3 and 2?

- Does 15 times 18 equal 3 times 5 times 3 times 3 times 2?
- Does the associative property tell us that we can multiply in any order?
- Could we multiply 2 times 5, and 3 times 3 times 3?
- Could we now use multiplicative place value to multiply 10 times 27?
- So what does 15 times 18 equal?
- Did we use prime factors of both numbers to make multiplication calculations simpler?

- If all composite numbers are the product of their prime factors, could we use this to make division calculations simpler?
- Imagine we want to divide 114 by 6.

- Could we use the prime factors of 6 to help us?
- What are the prime factors of 6?
- Are the prime factors of 6, 2 and 3?

Record, for example, 114 ÷ 6 = 114 ÷ 2 ÷ 3 = Record, for example, 114 ÷ 6 = 114 ÷ 2 ÷ 3 = 57 ÷ 3 Record, for example, 114 ÷ 6 = 114 ÷ 2 ÷ 3 = 57 ÷ 3 = 19	▶ Could we think of 114 divided by 6, as 114 divided by 2, divided by 3? ▶ What does 114 divided by 2 equal? ▶ Does 114 divided by 2 equal 57? ▶ And what does 57 divided by 3 equal? ▶ Is 57, 30 plus 27? ▶ Does 57 divided by 3 equal 10 plus 9? ▶ So does 114 divided by 6 equal 19? ▶ Did we use prime factors of one of the numbers to help us to divide?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100