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# Strategy one NUMBER SENSE

## PART ONE: Learn about number sense

Study a number that Wendy wrote in three different forms. As you study, consider how expressing numbers in different ways is useful.

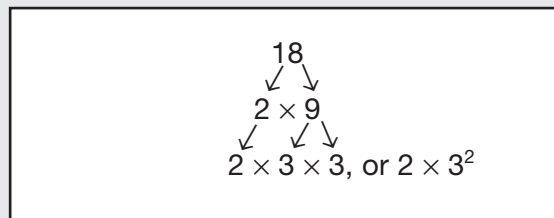
Standard form	Exponential form	Expanded form
32,768	$8^5$	$3 \times 10,000 + 2 \times 1000 + 7 \times 100 + 6 \times 10 + 8 \times 1$

Look at another way that numbers can be expressed.

You can express a number by its factors.

- A **prime number** has exactly two different factors, 1 and the number itself. Some prime numbers are 2, 13, 31 and 53. The only factors of 2 are 2 and 1; the only factors of 13 are 13 and 1; and so on.
- Integers that are greater than 1 and are not prime are **composite numbers**. The numbers 4, 22, 63 and 100 are composite. The factors of 4 are 1, 4 and 2; the factors of 22 are 1, 22 and 11; and so on.

When you factor a number, you break it down into its factors, which are all prime numbers. This is called **prime factorisation**. The composite number 18 can be broken down into the prime factors 2 and 3. The number 18 is the product of its prime factors.



You use **number sense** when you think about the ways that numbers can be expressed.

- A number can be expressed in exponential form. An exponent tells how many times the base should be multiplied by itself.
- A number can be expressed by its factors. A prime number has exactly two different factors, 1 and the number itself. Integers that are greater than 1 and are not prime are composite numbers.

Wendy wrote another number in three different forms. Study the ways that Wendy expressed the number. Then do numbers 1 to 4.

$$27,783 = 27 \times 1029$$

$$27,783 = 9 \times 3087$$

$$27,783 = 3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7$$

- The number 27 is a composite number. What are the factors of 27?  
Ⓐ 1, 3, 6, 27  
Ⓑ 1, 5, 8, 27  
Ⓒ 1, 3, 9, 27  
Ⓓ 1, 2, 7, 27
- Which of these shows the prime factorisation of 27,783?  
Ⓐ  $3^4 \times 7^3$   
Ⓑ  $7^2 \times 9^3$   
Ⓒ  $3^5 \times 7^2$   
Ⓓ  $2^2 \times 3^3$
- The number 3087 can be expressed as  $49 \times 63$ . Which number is a prime factor of both 49 and 63?  
Ⓐ 3  
Ⓑ 7  
Ⓒ 9  
Ⓓ 6
- Which group of numbers contains all primes?  
Ⓐ 17, 19, 27, 31  
Ⓑ 59, 61, 62, 67  
Ⓒ 85, 87, 89, 93  
Ⓓ 79, 83, 89, 97



Talk about your answers to questions 1–4. Explain why you chose the answers you did.

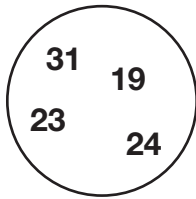
## PART TWO: Check your understanding

**Remember:** You use number sense when you think about the ways that numbers can be expressed.

- A number can be expressed in exponential form. An exponent tells how many times the base should be multiplied by itself.
- A number can be expressed by its factors. A prime number has exactly two different factors, 1 and the number itself. Integers that are greater than 1 and are not prime are composite numbers.

**Solve this problem. As you work, ask yourself, 'How is a composite number different from a prime number?'**

5. The composite number that Wendy wrote in the circle is the same as the number of students who work on the school newspaper. How many students work on the newspaper?



- Ⓐ 31 students
- Ⓑ 19 students
- Ⓒ 23 students
- Ⓓ 24 students

**Solve another problem. As you work, ask yourself, 'How can I show a number as a product of its prime factors?'**

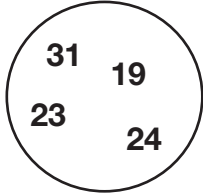
6. Wendy used the prime factorisation in the box to show how many copies of the school newspaper are printed each month. How many copies are printed?

$$2^3 \times 3^2 \times 7$$

- Ⓐ 504 copies
- Ⓑ 126 copies
- Ⓒ 360 copies
- Ⓓ 252 copies

**Look at the answer choices for each question.  
Read why each answer choice is correct or not correct.**

5. The composite number that Wendy wrote in the circle is the same as the number of students who work on the school newspaper. How many students work on the newspaper?



- Ⓐ 31 students  
*This answer is not correct because it is a prime number with exactly two different factors, 1 and 31.*
- Ⓑ 19 students  
*This answer is not correct because it is a prime number with exactly two different factors, 1 and 19.*
- Ⓒ 23 students  
*This answer is not correct because it is a prime number with exactly two different factors, 1 and 23.*
- 24 students  
*This answer is correct because it is a composite number with the factors 1, 2, 3, 4, 6, 8, 12, and 24.*

6. Wendy used the prime factorisation in the box to show how many copies of the school newspaper are printed each month. How many copies are printed?

$$2^3 \times 3^2 \times 7$$

- 504 copies  
*This answer is correct because it is the product of  $2 \times 2 \times 2 \times 3 \times 3 \times 7$ , which is the same as  $2^3 \times 3^2 \times 7$ .*
- Ⓑ 126 copies  
*This answer is not correct because its prime factorisation is  $2 \times 3^2 \times 7$ .*
- Ⓒ 360 copies  
*This answer is not correct because its prime factorisation is  $2^3 \times 3^2 \times 5$ .*
- Ⓓ 252 copies  
*This answer is not correct because its prime factorisation is  $2^2 \times 3^2 \times 7$ .*

## PART THREE: Learn more about number sense

You use number sense to simplify expressions and solve problems.

- To solve problems with square roots, first find the square root or roots. Then do all other operations.

Problem	Find the square roots	Simplify and solve
$\sqrt{144} - \sqrt{36} =$	$\sqrt{144} = 12; \sqrt{36} = 6$	$12 - 6 = 6$
$\sqrt{20.25} + 9.5 =$	$\sqrt{20.25} = 4.5$	$4.5 + 9.5 = 14$

- To solve a problem that has parentheses and exponents, perform all operations within any parentheses first.

Problem	Do operation in parenthesis	Simplify and solve
$(15 - 6)^3 =$	$15 - 6 = 9$	$(9)^3 = 9 \times 9 \times 9 = 729$

- To solve a problem that has decimals, improper fractions and mixed numbers, change all numbers to the same form.

Problem	Change to fractions or Change to decimals	Solve
$0.25 + 1\frac{3}{4} + \frac{14}{2} =$	$\frac{1}{4} + \frac{7}{4} + \frac{28}{4} =$ $0.25 + 1.75 + 7 =$	$\frac{1}{4} + \frac{7}{4} + \frac{28}{4} = \frac{36}{4} = 9$ $0.25 + 1.75 + 7 = 9$

**Wendy is a member of her school's maths team. Each week, she competes in a maths tournament and tutors students in maths. Do numbers 7 to 10.**

7. Solve this problem to find how many points Wendy scored in the maths tournament.  
 $\sqrt{625} - \sqrt{9} =$
- Ⓐ 16 points  
 Ⓑ 22 points  
 Ⓒ 34 points  
 Ⓓ 25 points
8. Wendy tutors maths for 12.25 hours a week. Which problem shows how many hours she tutors?
- Ⓐ  $\sqrt{144} + 0.5 =$   
 Ⓑ  $(0.2 \times 8) + 3.4 + 7\frac{1}{4} =$   
 Ⓒ  $\frac{3}{4} + 2.5 + \frac{84}{8} =$   
 Ⓓ  $1\frac{1}{4} + 6.25 + \frac{16}{25} =$
9. Solve this expression to find how many points Wendy's maths team scored in the last tournament.  
 $(11 - 3)^3$
- Ⓐ 196 points  
 Ⓑ 64 points  
 Ⓒ 1304 points  
 Ⓓ 512 points
10. Wendy learned that 27 students are members of the maths team. Which problem shows the number of members?
- Ⓐ  $\sqrt{30.25} + 17.25 =$   
 Ⓑ  $(10 - 8)^5 =$   
 Ⓒ  $\sqrt{56.25} + \sqrt{81} =$   
 Ⓓ  $\sqrt{289} + 10 =$