WARM-UP

1 Complete the first ten multiples of 5: 5, 10, 15, ___, ___, 30, ___, ___, ___, ___

2 Find the first ten multiples of:
a 4 **b** 7 **c** 8 **d** 9 **e** 11

3 Write the multiples of 6 between 23 and 55.

4 Write the multiples of 7 between 20 and 60.

5 Write the multiples of 9 that are less than 55.

WALT list factors (LCM and HCF) and multiples of a number
Success Criteria I know how to list factors and multiples of a number. I can calculate the lowest common factor and highest common multiple. I can use this knowledge to simplify fractions.

a Write the first twelve multiples of 6.
b Write the first twelve multiples of 5.
c List the common multiples you have found.
d What is the **lowest common multiple (LCM)** of 6 and 5?

A common multiple of two numbers is a product they both have.

a 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72
b 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60
c Common multiples are 30, 60.
d The LCM is 30.

Multiplying two numbers together gives a common multiple but not necessarily the *lowest* common multiple. For example, the LCM of 4 and 6 is 12, not 24. There is more on LCM in section F.

6 **a** Complete the multiples of 3 that are less than 50.
3, 6, 9, ___, ___, ___, 21, 24, ___, ___, ___, ___, ___, 42, ___, ___ .
b Complete the multiples of 5 that are less than 50.
5, 10, 15, ___, ___, ___, 35, 40, ___
c List the common multiples of 3 and 5 that are less than 50: ___, 30, ___ .
d The LCM of 3 and 5 is ___ .

What does LCM stand for?

7 **a** Write the first ten multiples of 3.
b Write the first ten multiples of 4.
c What is the LCM of 3 and 4?

8 Write the first ten multiples of each number, then find the LCM of:
a 7 and 5 **b** 8 and 6 **c** 9 and 6

EXAMPLE 3

Write the **factors** of 24.

The factors of a product are the numbers that can multiply together to give the product.

The factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24.

9 Complete the factors of 48: 1, 2, ___, ___, ___, 8, ___, 16, ___, 48

Divide to find the factors.

10 Find the factors of these numbers.

a 10 **b** 18 **c** 13 **d** 30 **e** 20

EXAMPLE 4

a Write the factors of 27.
b Write the factors of 36.
c List the common factors of 27 and 36.
d What is the **highest common factor** (**HCF**) of 27 and 36?

A common factor of two products is a factor they both have.

a Factors of 27 are 1, 3, 9, 27.
b Factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, 36.
c Common factors are 1, 3, 9.
d The highest common factor is 9.

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The HCF is also referred to as the **greatest common divisor** (**GCD**). There is more on HCF in section F.

11 **a** Complete the factors of 12: ____, 2, ____, 4, ____, ____
b Complete the factors of 36: 1, ____, ____, ____, 9, ____, 18, ____
c List the common factors of 12 and 36: ____, ____, 3, ____, ____, 12
d The HCF of 12 and 36 is ____ .

What does HCF stand for?

12 **a** Write the factors of 30. **b** Write the factors of 45.
c List the common factors of 30 and 45. **d** What is the HCF of 30 and 45?

13 **a** Write the factors of 12. **b** Write the factors of 18.
c What is the HCF of 12 and 18?

14 **a** Write the factors of 20. **b** Write the factors of 30.
c What is the HFC of 20 and 30?

15 **a** List a pair of numbers that have a common multiple of 18.
b List another pair of numbers that have a common multiple of 18.
c Explain a method for determining all the pairs of numbers with 18 as a common multiple. List them.
d If 18 is the lowest common multiple (LCM), what are all the possible pairs of numbers?
e Explain why the lists for parts **c** and **d** are different.

16 Repeat question **15** using 30 as the common multiple.

17 **a** List a pair of numbers with a common factor of 8.
b List five pairs of numbers with a common factor of 8.
c Is it possible to list all the pairs of numbers with a common factor of 8? Explain.
d Is it possible to list all the pairs of numbers with 8 as the HCF? Explain.

18 Two numbers have a HCF of 6 and a LCM of 90. Find the numbers.

19 Find two numbers with:

a HCF of 4 and LCM of 60 **b** HCF of 8 and LCM of 48

c HCF of 3 and LCM of 180 **d** HCF of 90 and LCM of 5400

A **prime number** has exactly two factors, itself and 1. A number with more than two factors is **composite**.

20 By finding the factors of the following numbers, decide which of them are prime numbers.

a 3 **b** 15 **c** 21 **d** 14 **e** 29

f 11 **g** 35 **h** 23 **i** 39 **j** 19

21 **a** Write the factors of 1.

b The number 1 is neither prime nor composite. Explain.

c Write the factors of 2.

d Is 2 prime or composite?

e Look at the prime numbers from question **20**. What is special about 2?

f Copy and complete the following statement.
Except for 2, all prime numbers are _____ .

g Why is 2 a unique prime number? How can you be sure?

22 From the first 30 counting numbers, write all the composite numbers that have a pair of factors other than the number and 1.

Investigation 5 Codes

Codes use large prime numbers.

1 Investigate the largest prime number.
How many digits does it have?

2 Investigate why codes need prime numbers.

Why are prime numbers important?
How are prime numbers used in real life?
What are the applications of prime numbers?
How can you tell a prime number?

Check your answers

1 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

2 **a** 4, 8, 12, 16, 20, 24, 28, 32, 36, 40
b 7, 14, 21, 28, 35, 42, 49, 56, 63, 70
c 8, 16, 24, 32, 40, 48, 56, 64, 72, 80
d 9, 18, 27, 36, 45, 54, 63, 72, 81, 90
e 11, 22, 33, 44, 55, 66, 77, 88, 99, 110

3 24, 30, 36, 42, 48, 54

4 21, 28, 35, 42, 49, 56

5 9, 18, 27, 36, 45, 54

6 **a** 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48
b 5, 10, 15, 20, 25, 30, 35, 40, 45
c 15, 30, 45 **d** 15

7 **a** 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
b 4, 8, 12, 16, 20, 24, 28, 32, 36, 40
c 12

8 **a** 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
7, 14, 21, 28, 35, 42, 49, 56, 63, 70, LCM = 35
b 8, 16, 24, 32, 40, 48, 56, 64, 72, 80
6, 12, 18, 24, 30, 36, 42, 48, 54, 60, LCM = 24
c 9, 18, 27, 36, 45, 54, 63, 72, 81, 90
6, 12, 18, 24, 30, 36, 42, 48, 54, 60, LCM = 18

9 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

10 **a** 1, 2, 5, 10 **b** 1, 2, 3, 6, 9, 18 **c** 1, 13
d 1, 2, 3, 5, 6, 10, 15, 30 **e** 1, 2, 4, 5, 10, 20

11 **a** 1, 2, 3, 4, 6, 12 **b** 1, 2, 3, 4, 6, 9, 12, 18, 36
c 1, 2, 3, 4, 6, 12 **d** 12

12 **a** 1, 2, 3, 5, 6, 10, 15, 30 **b** 1, 3, 5, 9, 15, 45
c 1, 3, 5, 15 **d** 15

13 **a** 1, 2, 3, 4, 6, 12 **b** 1, 2, 3, 6, 9, 18 **c** 6

14 **a** 1, 2, 4, 5, 10, 20 **b** 1, 2, 3, 5, 6, 10, 15, 30 **c** 10

15 **a–c** 1 and 18, 2 and 9, 2 and 6. They are any two of the factors of 18.
d 1 and 18, 2 and 9 **e** Some pairs have a smaller LCM.

16 **a–c** Any two factors of 30 will have a common multiple of 30.
d 1 and 30, 2 and 15, 3 and 10, 5 and 6
e Some pairs have a smaller LCM.

17 **a–b** Any two multiples of 8. Examples: 8 and16, 48 and 200
c–d Not possible, because the number of multiples of 8 is unlimited

18 6 and 90, 18 and 30

19 **a** 12 and 20, 4 and 60 **b** 16 and 24, 8 and 48
c 3 and 180, 9 and 60, 12 and 45, 15 and 36
d 90 and 5400, 270 and 1800, 360 and 1350, 450 and 1080

20 **a** Prime **b** Composite **c** Composite
d Composite **e** Prime **f** Prime
g Composite **h** Prime **i** Composite
j Prime

21 **a** 1 **b** It has only one factor: itself.
c 1, 2 **d** Prime
e It is the only even prime.
f Odd
g It is even. Its factors are only itself and 1, unlike all other even numbers.

22 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 27, 28, 30