

MULTIPLES

TARGET To identify multiples.

A multiple of a number can be divided by that number without leaving a remainder.

Example

$$24 \div 6 = 4$$

$$56 \div 6 = 9 \text{ r } 2$$

$$120 \div 6 = 20$$

$$3000 \div 6 = 500$$

24, 120 and 3000 are multiples of six. 56 is not a multiple of six.

A

Write down the first six multiples of:

1 3

3 6

2 4

4 9

Write Yes or No.

5 Is 78 a multiple of 2?

6 Is 25 a multiple of 3?

7 Is 48 a multiple of 4?

8 Is 95 a multiple of 5?

9 Is 130 a multiple of 10?

10 Is 56 a multiple of 6?

11 Is 56 a multiple of 7?

12 Is 56 a multiple of 8?

Which number should not be in the box?

13 Multiples of 5
65, 130, 151, 115

14 Multiples of 7
74, 63, 140, 56

15 Multiples of 8
64, 88, 72, 84

16 Multiples of 9
45, 39, 72, 108

B

Write down the first six multiples of:

1 7

3 15

2 12

4 99

Write True or False.

5 48 is a multiple of 3.

6 152 is a multiple of 5.

7 42 is a multiple of 4.

8 72 is a multiple of 6.

9 91 is a multiple of 7.

10 104 is a multiple of 8.

11 109 is a multiple of 9.

12 111 is a multiple of 11.

13 140 is a multiple of 20.

14 510 is a multiple of 50.

15 250 is a multiple of 100.

16 360 is a multiple of 12.

Write down:

17 the 20th multiple of 8

18 the 4th multiple of 19

19 the 13th multiple of 12

20 the 5th multiple of 22.

C

- 1 Make up a rule for recognising multiples of:

a) 2 b) 10 c) 5.

A number is a multiple of 3 if the sum of its digits is divisible by 3.

Multiples of 3 which are even are also multiples of 6.

Examples

$$8 + 7 + 3 = 18$$

(divisible by 3)

387 is a multiple of 3

378 is a multiple of 3 and 6

- 2 Which of these numbers are multiples of:

a) 3 b) 6?

534 267 463 948
715 882 171

- 3 Use these digits.

2 3 5 7 8

Make up as many three-digit and four-digit multiples of 6 as you can.

- 4 Investigate the 2 digit and 3 digit multiples of 9. What do you notice?

TARGET To find all the factors of a number and common factors of two numbers.

Factors are numbers that divide exactly into another number.

Two or more numbers may have common factors as well as 1.

The largest of these is the highest common factor.

Examples

Factors of 12

1, 2, 3, 4, 6, 12

Factors of 30

1, 2, 3, 5, 6, 10, 15, 30

Common factors of 12 and 30

1, 2, 3, 6

Highest common factor of 12 and 30 is 6.

A

Copy and complete the second factor in each pair.

1 $16 \rightarrow 2$ and

2 $35 \rightarrow 7$ and

3 $44 \rightarrow 11$ and

4 $27 \rightarrow 3$ and

5 $40 \rightarrow 5$ and

6 $24 \rightarrow 8$ and

7 $90 \rightarrow 9$ and

8 $48 \rightarrow 6$ and

9 $28 \rightarrow 4$ and

10 $72 \rightarrow 12$ and

11 $100 \rightarrow 2$ and

12 $5 \rightarrow 5$ and

Find all the factors of the following numbers. The number of factors is shown in brackets.

13 8 (4) 17 15 (4)

14 25 (3) 18 32 (6)

15 22 (4) 19 60 (12)

16 18 (6) 20 36 (9)

B

Find all the factors of:

1 98

9 90

2 52

10 132

3 66

11 140

4 63

12 108

5 48

13 127

6 84

14 117

7 102

15 124

8 78

16 112

Find the common factors of each pair of numbers.

17 $6, 9$

25 $15, 20$

18 $8, 10$

26 $14, 35$

19 $12, 16$

27 $8, 12$

20 $18, 30$

28 $6, 14$

21 $20, 30$

29 $24, 36$

22 $40, 100$

30 $12, 18$

23 $24, 32$

31 $20, 25$

24 $12, 15$

32 $27, 36$

C

Find all the factors of:

1 133

5 176

2 138

6 182

3 144

7 184

4 162

8 250

Find the highest common factor of each group of numbers.

9 $6, 12, 16$

10 $10, 25, 100$

11 $16, 24, 40$

12 $6, 12, 24$

13 $20, 50, 100$

14 $9, 12, 18$

15 $8, 16, 20$

16 $21, 28, 35$

17 $50, 75, 100$

18 $18, 36, 72$

19 $30, 60, 75$

20 $36, 48, 60$

PRIME NUMBERS

TARGET To identify prime numbers and composite numbers.

A prime number is a number which is divisible by only two different numbers: by itself and by one.

The first four prime numbers are 2, 3, 5 and 7. Notice that 1 is *not* a prime number. 4, 6, 8, 9 and 10 are not prime numbers because they are divisible by at least one of the first four prime numbers.

To find out if a two-digit number is a prime number you need to work out if it is divisible by one of the first four prime numbers, 2, 3, 5 and 7. A whole number which is not a prime number is called a composite number.

Examples

29 is not divisible by 2, 3, 5 or 7.
30 is divisible by 2, 3, and 5.

29 is a prime number.
30 is a composite number.

A

Write down the prime number in each group.

- 1 4, 5, 6
- 2 9, 10, 11
- 3 27, 28, 29
- 4 37, 38, 39
- 5 43, 44, 45
- 6 51, 52, 53
- 7 61, 62, 63
- 8 77, 78, 79
- 9 Find the next prime number:
 - a) after 20
 - b) after 32.
- 10 Find all the prime numbers below 50. There are 15. Remember, 1 is not a prime number.
- 11 Explain why 730 is not a prime number.

B

Write down the two numbers in each group which are *not* prime numbers.

- 1 1 2 3 4
- 2 16 17 18 19
- 3 21 31 41 51
- 4 27 37 47 57
- 5 63 73 83 93
- 6 61 71 81 91

Write down the next prime number after:

- | | |
|-------|--------|
| 7 8 | 11 62 |
| 8 24 | 12 80 |
| 9 38 | 13 90 |
| 10 53 | 14 74. |

- 15 Find all the prime numbers below 100. There are 25.
- 16 Explain why these numbers are composite numbers.
 - a) 1235
 - b) 9476

C

In the questions in this section you may need to work out if a number is divisible by prime numbers other than 2, 3, 5 and 7.

Example

121 is not a prime number because it is divisible by 11.

Decide whether each number is or is not a prime number.

- | | |
|-------|--------|
| 1 105 | 16 143 |
| 2 113 | 17 149 |
| 3 119 | 18 152 |
| 4 131 | 19 163 |
| 5 137 | 20 201 |

Explain why the following numbers are composite numbers.

- | | |
|--------|--------|
| 11 117 | 16 221 |
| 12 133 | 17 253 |
| 13 141 | 18 267 |
| 14 161 | 19 295 |
| 15 176 | 20 323 |

PRIME FACTORS

27

TARGET To know and use the vocabulary of prime numbers, prime factors and composite numbers.

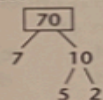
Factors are numbers that divide exactly into another number.
A prime number is a number that is only divisible by itself and one.
A composite number is a number which is not a prime number.

PRIME FACTORS

A factor which is also a prime number is a prime factor.

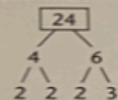
To find the prime factors of a number we can use a factor tree.

A factor tree for 70



$$70 = 7 \times 2 \times 5$$

A factor tree for 24



$$24 = 2 \times 2 \times 2 \times 3$$

A

Find all the factors of:

- | | |
|------|------|
| 1 8 | 5 25 |
| 2 10 | 6 24 |
| 3 12 | 7 18 |
| 4 21 | 8 28 |

Find all the prime numbers between:

- | |
|--------------|
| 9 10 and 20 |
| 10 20 and 30 |
| 11 30 and 40 |
| 12 40 and 50 |

Write down the next prime number after:

- | | |
|-------|-------|
| 13 54 | 17 49 |
| 14 68 | 18 85 |
| 15 80 | 19 91 |
| 16 62 | 20 74 |

Explain why these numbers are not prime numbers.

- | | |
|-------|-------|
| 21 21 | 23 49 |
| 22 38 | 24 33 |

B

Use a factor tree to find all the prime factors of:

- | | |
|------|-------|
| 1 32 | 5 48 |
| 2 49 | 6 42 |
| 3 80 | 7 75 |
| 4 66 | 8 100 |

Find a pair of prime numbers which give a total of:

- | | |
|-------|-------|
| 9 12 | 13 36 |
| 10 14 | 14 48 |
| 11 21 | 15 54 |
| 12 28 | 16 61 |

17 Find six pairs of prime numbers which give a total of 100.

Explain why these numbers are composite numbers.

- | | |
|--------|--------|
| 18 91 | 22 178 |
| 19 57 | 23 119 |
| 20 85 | 24 717 |
| 21 121 | 25 143 |

C

Use a factor tree to find all the prime factors of:

- | | |
|------|-------|
| 1 45 | 5 120 |
| 2 68 | 6 104 |
| 3 72 | 7 168 |
| 4 99 | 8 216 |

Break the second number down into prime factors to help work out:

- | | |
|-------------------|-------------------|
| 9 46×15 | 13 84×36 |
| 10 38×24 | 14 25×56 |
| 11 62×18 | 15 48×48 |
| 12 57×32 | 16 72×64 |

Explain why these numbers are composite numbers.

- | | |
|---------|---------|
| 17 3447 | 21 221 |
| 18 203 | 22 209 |
| 19 253 | 23 1857 |
| 20 3201 | 24 323 |

25 Find all the prime numbers between 100 and 150.

$\times/\div$ PROBLEMS - MENTAL METHODS

28

TARGET To multiply and divide numbers mentally.

A

3 5 6 8

Look at the above numbers.

- 1 Which of the numbers are factors of:
 - a) 25 c) 40
 - b) 30 d) 45?
- 2 What is the product of:
 - a) the two largest numbers
 - b) the three smallest numbers?
- 3 Make a square number using the above digits only.

Write Yes or No.

- 4 Is 90 a multiple of 5?
- 5 Is 56 a multiple of 2?
- 6 Is 63 a multiple of 6?
- 7 Is 46 a multiple of 3?

Complete these factor pairs of 80.

- 8 20 and
- 9 and 5
- 10 10 and
- 11 Find all eight factors of 70.
- 12 Find all seven factors of 64.
- 13 Find a number that is a multiple of both:
 - a) 4 and 9
 - b) 3 and 8.

B

4 6 7 9

Use the above digits.

- 1 Which numbers are factors of:
 - a) 54 c) 126
 - b) 84 d) 72?
- 2 Find the product of:
 - a) the 3 largest numbers
 - b) the 3 smallest numbers.
- 3 Make two 2-digit square numbers using the above digits only.

Break the second number down into factors to work out.

- 4 24×15
- 5 56×16
- 6 $1400 \div 35$
- 7 $810 \div 18$
- 8 Find two common multiples of:
 - a) 3 and 7
 - b) 6 and 11.
- 9 Find all the factors of:
 - a) 78 b) 96.
- 10 What is the smallest number with exactly:
 - a) 6 factors
 - b) 5 factors?
- 11 What is the largest 2-digit number with:
 - a) only 2 factors
 - b) only 3 factors?

C

- 1 What is the smallest number that is a common multiple of:
 - a) 2 and 7
 - b) 6 and 9
 - c) 10 and 4
 - d) 6 and 8?
- 2 Find the highest factor shared by:
 - a) 32 and 80
 - b) 42 and 56
 - c) 12 and 45
 - d) 54 and 72.
- 3 Find the smallest two-digit number with exactly:
 - a) 8 factors
 - b) 9 factors
 - c) 10 factors
 - d) 12 factors.
- 4 What is the largest two-digit number with exactly:
 - a) 7 factors
 - b) 12 factors
 - c) 9 factors
 - d) 8 factors?

2 3 6 7 9

- 5 Use the above digits. Make as many two-digit numbers as you can that are multiples of:
 - a) 6 b) 4 c) 3.
- 6 Find the largest 3-digit square number.