Name:

1. What is the smallest number that has three different prime factors?

   _____

2. What is the smallest number that has the factors:

   a) 2, 3, 5 and 7

   b) 2, 3, 5, 6 and 7

3. Comment on your answers to parts (a) and (b) in the previous question:

   _____

   _____

   _____

4. What is the smallest number that has the factors:

   a) 2, 4, 6 and 7

   b) 2, 4, 7 and 12

   c) Comment on your answers to parts (a) and (b).
      Include a discussion about how you obtained your answers:

   _____

   _____

   _____

   _____

5. What is the smallest number that contains all the numbers from 1 to 20 as its factors?

   _____

   _____

   _____

   _____

6. The following numbers are relatively large. A systematic approach should be used to identify the prime factors. Mathematical shorthand is also appropriate for the prime factor expression.

    Write down the prime factorisation of each of the following:

    a) 512 _____

    b) 497664 _____

    c) 6561 _____

    d) 119744 _____

    e) 31104 _____

    f) 15625000 _____

7. Explain any strategies you used in question 6 to determine the prime factorisation of each number:

    _____

    _____

    _____

8. Write down the prime factorisation of your home phone number.
    Does anyone in your class have a prime phone number?

    _____

    _____

    _____

9. Write down the prime factorisation of this year:

    _____

10. When is the next prime year?
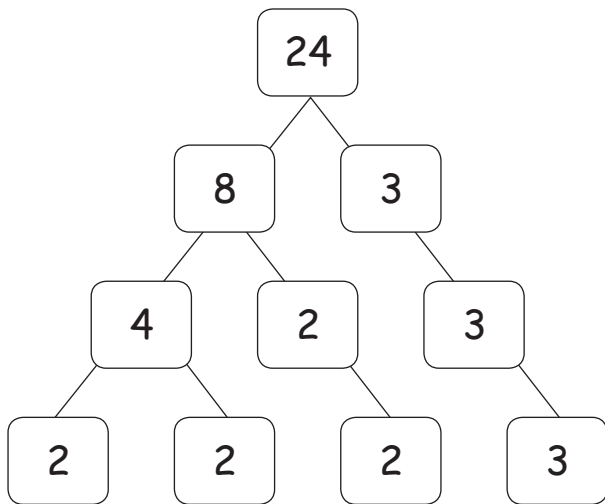
    _____

Name:

A factor tree is a visual way to represent the factors of a number. The last row of factors have something in common, they are all prime numbers. Factor trees are helpful in finding the 'prime factors' of a number.

A factor tree for the number 24 is shown below:

```
              24
            /    \
          8        3
        /   \    /   \
       4     2      3
      / \   / \    / \
     2   2 2   3
```

Observations:

1. The first line: 8 × 3 is not the only possibility.

2. The product of each line is 24:

    8 × 3 = 24
    4 × 2 × 3 = 24
    2 × 2 × 2 × 3 = 24

3. The last line consists of prime numbers.[1]
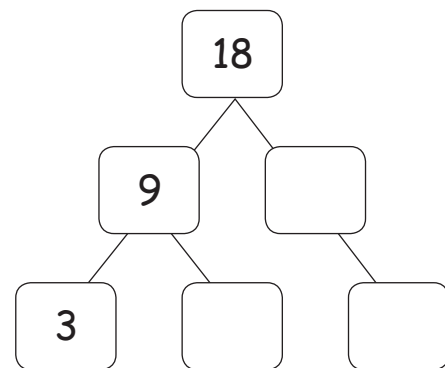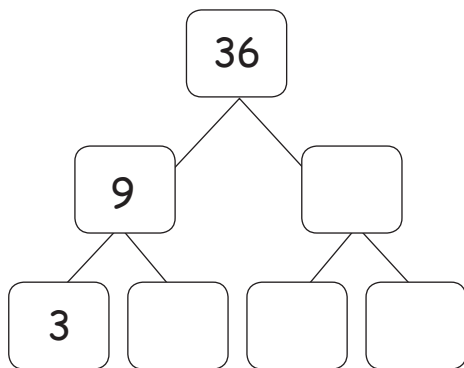
1. Fill in the missing numbers for these factor trees:

```
              24
            /    \
         12       [ ]
        /   \    /   \
       4    [ ]  [ ]
      / \
    [ ] [ ] [ ]  [ ]
```
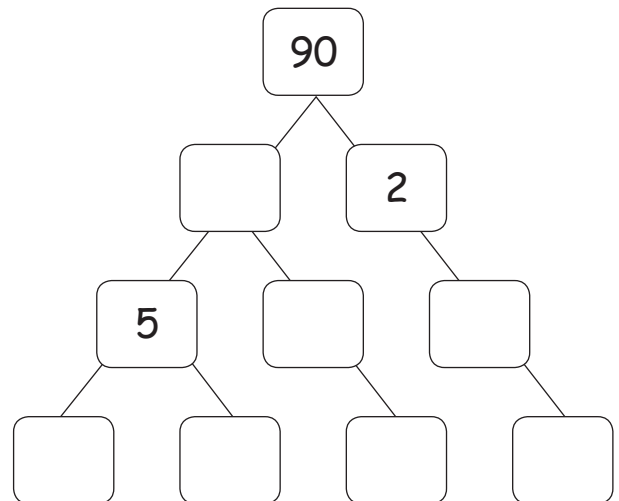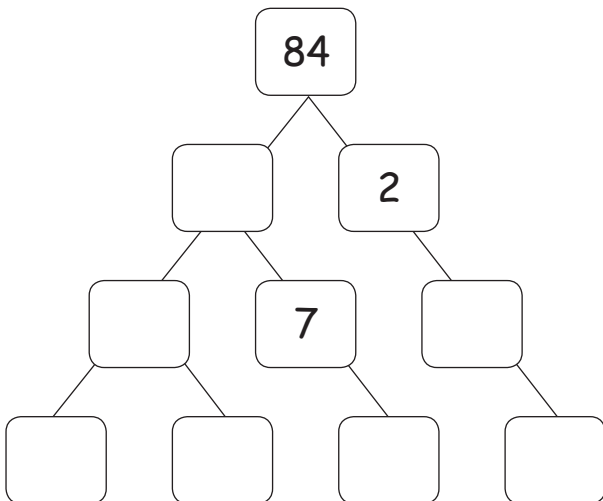
```
              24
            /    \
        [ ]      [ ]
        /   \    /   \
       3    [ ]  [ ] [ ]
```
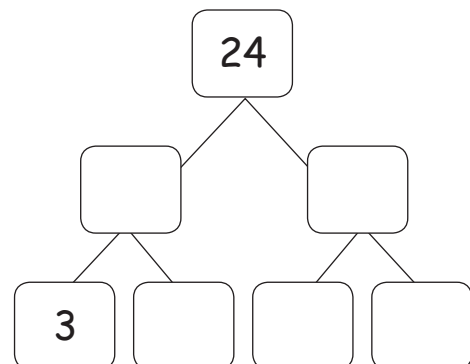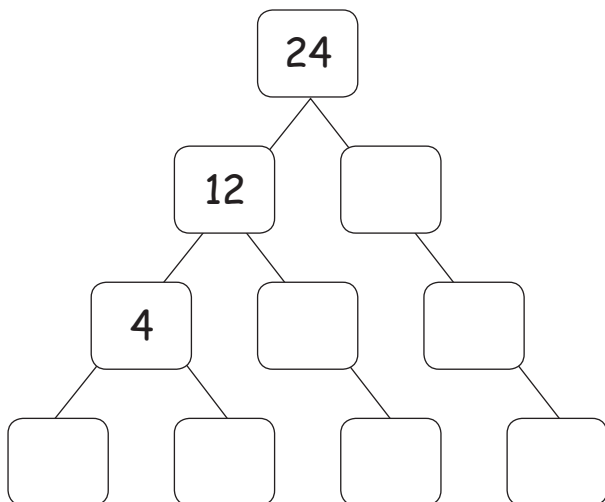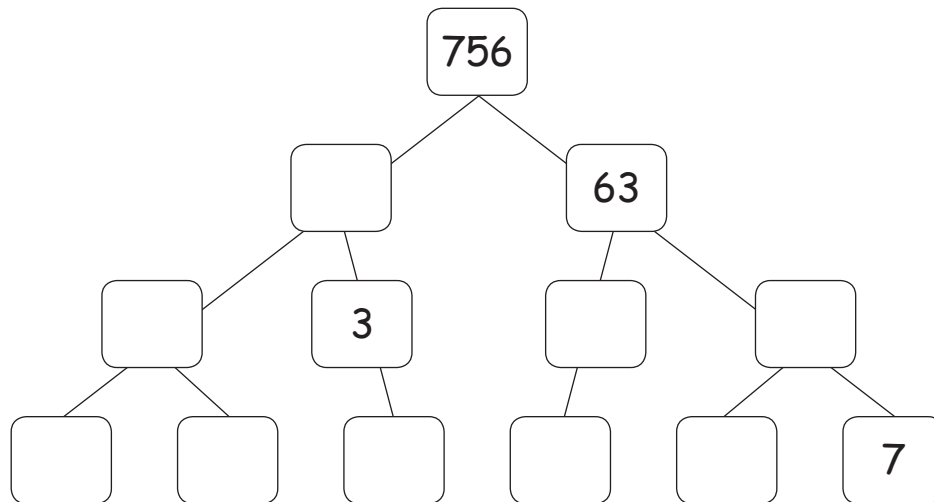
2. Write down any observations you can make about the bottom row of factors for each of the factor trees for the number 24?

   _____

   _____

   _____

3. Complete the factorisation trees for each of the following:
    Check that the product of the factors in each line equals the original number.

```
              ┌─────┐
              │ 756 │
              └─────┘
             /       \
        ┌────┐        ┌────┐
        │    │        │ 63 │
        └────┘        └────┘
        /    \         /    \
   ┌────┐   ┌───┐  ┌────┐   ┌────┐
   │    │   │ 3 │  │    │   │    │
   └────┘   └───┘  └────┘   └────┘
   /    \      \      \      /    \
┌───┐ ┌───┐  ┌───┐  ┌───┐ ┌───┐  ┌───┐
│   │ │   │  │   │  │   │ │   │  │ 7 │
└───┘ └───┘  └───┘  └───┘ └───┘  └───┘
```

4. Complete the factorisation trees for each of the following:

   a) 21 _____

   b) 45 _____

   c) 60 _____

   d) 49 _____

   e) 64 _____

   f) 81 _____

5. Write down the original number for each of the following prime factor expressions:

   a) 2 × 2 × 2 × 3 _____

   b) 3 × 3 × 5 × 7 _____

   c) 2 × 2 × 3 × 5 _____

   d) 2 × 3 × 3 × 11 _____

   e) 5 × 7 × 11 _____

   f) 13 × 17 _____

6. Write down all the prime numbers between 1 and 60:

   _____

   _____

7. Write down the prime factorisation of each of the following:

   a) 42 _____

   b) 225 _____

   c) 180 _____

   d) 490 _____

   e) 640 _____

   f) 243 _____

8. Compare your answers from question 4 to those in question 7:

   _____

   _____

   _____

   _____

   _____

9. Use your answers to question 7 to help write down the prime factorisation of each of the following:

   a) 294 _____

   b) 4725 _____

   c) 2520 _____

   d) 16170 _____

   e) 14080 _____

   f) 18711 _____