Exercise 2.3

1. Find characteristic of the following numbers:

(i)	**5287**	**(ii)**	**59.28**
(iii)	**0.0567**	**(iv)**	**234.7**
(v)	**0.000049**	**(vi)**	**145000**

Solution: The characteristic of a number refers to the integer part of its logarithm when the number is expressed in scientific notation. Let's find the characteristic for each of the given numbers.

(i) 5287

To find the characteristic, we express 5287 in scientific notation:

$$5287 = 5.287 \times 10^3$$

The characteristic is the integer part of the exponent in the scientific notation. Here, the exponent is 3.

Thus, the characteristic of 5287 is:

$$\boxed{3}$$

(ii) 59.28

Now, express 59.28 in scientific notation:

$$59.28 = 5.928 \times 10^1$$

The exponent in the scientific notation is 1.

Thus, the characteristic of 59.28 is:

$$\boxed{1}$$

(iii) 0.0567

Express 0.0567 in scientific notation:

$$0.0567 = 5.67 \times 10^{-2}$$

The exponent in the scientific notation is -2.

Thus, the characteristic of 0.0567 is:

$$\boxed{-2}$$

(iv) 234.7

Now, express 234.7 in scientific notation:

$$234.7 = 2.347 \times 10^{2}$$

The exponent in the scientific notation is 2.

Thus, the characteristic of 234.7 is:

$$\boxed{2}$$

(v) 0.000049

Express 0.000049 in scientific notation:

$$0.000049 = 4.9 \times 10^{-5}$$

The exponent in the scientific notation is -5.

Thus, the characteristic of 0.000049 is:

$$\boxed{-5}$$

(vi) 145000

Now, express 145000 in scientific notation:

$$145000 = 1.45 \times 10^{5}$$

The exponent in the scientific notation is 5.

Thus, the characteristic of 145000 is:

$$\boxed{5}$$

2. Find logarithm of the following numbers:

(i)	**43**	**(ii)**	**579**
(iii)	**1.982**	**(iv)**	**0.0876**
(v)	**0.047**	**(vi)**	**0.000354**

Solution: To find the logarithms of the given numbers, we'll assume you are asking for the base 10 logarithm (common logarithms). The logarithmic values will typically be rounded to a few decimal places.

(i) $\log_{10}43$

Using a calculator or logarithmic table:

$$\log_{10}43 \approx 1.6335$$

Thus, the logarithm of 43 is:

$$\boxed{1.6335}$$

(ii) $\log_{10}579$

Using a calculator or logarithmic table:

$$\log_{10}579 \approx 2.7627$$

Thus, the logarithm of 579 is:

$$\boxed{2.7627}$$

(iii) $\log_{10}1.982$

Using a calculator or logarithmic table:

$$\log_{10}1.982 \approx 0.2971$$

Thus, the logarithm of 1.982 is:

$$\boxed{0.2971}$$

(iv) $\log_{10}0.0876$

Using a calculator or logarithmic table:

$$\log_{10}0.0876 \approx -1.058 = \bar{2}.9425 = -1.0575$$

Thus, the logarithm of 0.0876 is:

$$\boxed{-1.058}$$

(v) $\log_{10}0.047$

Using a calculator or logarithmic table:

$$\log_{10}0.047 \approx -1.3279$$

$$\log_{10}0.047 = \bar{2}6721 = -1.3279$$

Thus, the logarithm of 0.047 is:

$$\boxed{-1.3279}$$

(vi) $\log_{10}0.000354$

Using a calculator or logarithmic table:

$$\log_{10}0.000354 \approx -3.451 = \bar{4}5490 = -3.4510$$

Thus, the logarithm of 0.000354 is:

$$\boxed{-3.4510}$$

3. If log 3.177 = 0.5019, then find:

(i) log 3177 (ii) log 31.77 (iii) log 0.03177

Solution: Given that $\log 3.177 = 0.5019$, let's solve the following:

(i) log3177

We can express 3177 as:

$$3177 = 3.177 \times 10^3$$

Using the logarithmic property $\log(ab) = \log a + \log b$, we can rewrite log 3177 as:

$$\log 3177 = \log(3.177 \times 10^3) = \log 3.177 + \log 10^3$$

Since $\log 10^3 = 3$, we have:

$$\log 3177 = 0.5019 + 3 = 3.5019$$

Thus, the value of log3177 is:

$$\boxed{3.5019}$$

(ii) log31.77

We can express 31.77 as:

$$31.77 = 3.177 \times 10$$

Using the logarithmic property $\log(ab) = \log a + \log b$, we can rewrite log31.77 as:

$$\log 31.77 = \log(3.177 \times 10) = \log 3.177 + \log 10$$

Since $\log 10 = 1$, we have:

$$\log 31.77 = 0.5019 + 1 = 1.5019$$

Thus, the value of log31.77 is:

$$\boxed{1.5019}$$

(iii) log0.03177

We can express 0.03177 as:

$$0.03177 = 3.177 \times 10^{-2}$$

Using the logarithmic property $\log(ab) = \log a + \log b$, we can rewrite log0.03177 as:

$$\log 0.03177 = \log(3.177 \times 10^{-2}) = \log 3.177 + \log 10^{-2}$$

Since $\log 10^{-2} = -2$, we have:

$$\log 0.03177 = 2.5019 = 0.5019 - 2 = -1.4981$$

Thus, the value of log0.03177 is:

$$\boxed{-1.4981}$$

4. Find the value of x.

(i)	$\log x = 0.0065$	**(ii)**	$\log x = 1.192$
(iii)	$\log x = -3.434$	**(iv)**	$\log x = -1.5726$
(v)	$\log x = 4.3561$	**(vi)**	$\log x = -2.0184$

Solutions:

(i) $\log x = 0.0065$

The equation $\log x = 0.0065$ is in base 10. To find x, we use the property of logarithms:

$$\log x = 0.0065 \quad \Rightarrow \quad x = 10^{0.0065}$$

Now, calculate $10^{0.0065}$ using a calculator:

$$x \approx 1.0153$$

Thus, the value of x is:

$$x \approx \boxed{1.0153}$$

(ii) $\log x = 1.192$

Again, using the property of logarithms:

$$\log x = 1.192 \quad \Rightarrow \quad x = 10^{1.192}$$

Now, calculate $10^{1.192}$:

$$x \approx 15.559$$

Thus, the value of x is:

$$x \approx \boxed{15.559}$$

(iii) $\log x = -3.434$

For this equation, we have:

$$\log x = -3.434 \quad \Rightarrow \quad x = 10^{-3.434}$$

Now, calculate $10^{-3.434}$:

$$x \approx 0.000369$$

Thus, the value of x is:

$$x \approx \boxed{0.000369}$$

(iv) $\log x = -1.5726$

For this equation:

$$\log x = -1.5726 \quad \Rightarrow \quad x = 10^{-1.5726}$$

Now, calculate $10^{-1.5726}$:

$$x \approx 0.0267$$

Thus, the value of x is:

$$x \approx \boxed{0.0267}$$

(v) $\log x = 4.3561$

For this equation:

$$\log x = 4.3561 \quad \Rightarrow \quad x = 10^{4.3561}$$

Now, calculate $10^{4.3561}$:

$$x \approx 22684.3$$

Thus, the value of x is:

$$x \approx \boxed{22684.3}$$

(vi) $\log x = -2.0184$

For this equation:

$$\log x = -2.0184 \quad \Rightarrow \quad x = 10^{-2.0184}$$

Now, calculate $10^{-2.0184}$:

$$x \approx 0.000095$$

Thus, the value of x is:

$$x \approx \boxed{0.000095}$$