1(a). Find the value of:

i. 3^4,

.....**[2]**

ii. $\sqrt[3]{64}$

.....**[1]**

(b). $2^p \times 2 = \frac{1}{2}$

Find the value of p.

p = ...**[2]**

2(a). Work out.

$\frac{1}{3} + \frac{2}{5}$

.....**[2]**

(b). Work out.

$\frac{6}{7} \times \frac{9}{10}$

Give your answer in its simplest form.

.....**[2]**

3(a). The table shows some numbers each written as a power of 9.

Number	… as a power of 9		… as a power of 3	
9	9	9^1	3×3	3^2
81	9×9	9^2		
729	$9 \times 9 \times 9$	9^3		

Complete the table to show 81 and 729 each written as a power of 3.

[2]

(b). A number is written as 9^{15}.

Use a pattern in the table to help you write this number as a power of 3.

..... **[1]**

4(a).

Write 0.01204 in standard form.

..... **[1]**

(b). A weather blogger writes:

- 1.495×10^{11} raindrops fall in a storm.
- the mass of each raindrop is 6×10^{-5} grams.

Calculate the total mass of all of the raindrops that fall in the storm.
Give your answer in standard form in kilograms.

..... kilograms **[4]**

5. Use your calculator to work out.

i. 4^6

..... **[1]**

ii. $\sqrt{361}$

..... **[1]**

6. Work out.

$(^{-}6)^2$

..... **[1]**

7(a). Work out the following, giving the answer as a fraction in its simplest form.

$\frac{7}{15} - \frac{1}{3}$

..... **[2]**

(b). $\frac{7}{12} + \frac{7}{8}$

..... **[3]**

8(a). Complete the statement by writing the missing power in the box.

$5^2 \times 5^6 = 5\square$

[1]

(b). $(3^3)^2 = 3\square$

[1]

9(a). Find the value of:

i. 2^5,

..... **[2]**

ii. $\sqrt[3]{1000}$.

..... **[1]**

(b).

$5^p \times 5 = \frac{1}{5}$

Find the value of p.

p = ... **[2]**

10(a). Work out.

$\frac{1}{3} + \frac{2}{7}$

..... **[2]**

(b). Work out.
Give your answer in its simplest form.

$\frac{5}{8} \times \frac{7}{10}$

..... **[2]**

11(a). The table shows some numbers each written as a power of 4.

Number	... as a power of 4		... as a power of 2	
4	4	4^1	2 × 2	2^2
16	4 × 4	4^2		
64	4 × 4 × 4	4^3		

Complete the table to show 16 and 64 each written as a power of 2.

[2]

(b). A number is written as 4^{20}.

Use a pattern in the table to help you write this number as a power of 2.

..... **[1]**

12(a). Write 0.001 025 in standard form.

..... **[1]**

(b). A weather blogger writes:

- 1.655×10^{12} raindrops fall in a storm
- the mass of each raindrop is 6×10^{-5} grams.

Calculate the total mass of all of the raindrops that fall in the storm.
Give your answer in standard form in kilograms.

..... kilograms **[4]**

13. $3^6 \times 3^m = \frac{1}{3}$

Find the value of m.

m = ... **[2]**

14. Work out.

2^6

. ..... **[2]**

15. Use your calculator to work out.

i. 6^4

..... **[1]**

ii. $\sqrt{529}$

..... **[1]**

16(a). Work out the following, giving your answer as a fraction in its simplest form.

$\frac{7}{16} - \frac{1}{4}$

..... **[2]**

(b). $\frac{5}{12} \div \frac{5}{9}$

..... **[3]**

17(a). Complete the statement by writing the missing power in the box.

$6^3 \times 6^4 = 6^{\square}$

[1]

(b). $(2^2)^4 = 2^{\square}$

[1]

18. $(^-4)^2$

..... **[1]**

19(a). 10^2 is written in words as 'one hundred'.

Write 10^5 in words.

..... **[2]**

(b). Work out $(2.7 \times 10^{-1}) \times 1000$, giving your answer in standard form.

..... **[2]**

20(a). Complete each statement by writing the missing power in the box.

i. $5 \times 5 \times 5 \times 5 = 5^{\square}$

[1]

ii. $8 = 2^{\square}$

[1]

(b). Work out.

$3^2 \times \sqrt{25}$

…… **[3]**

21(a). The table below shows the approximate population of three countries in 2022.

Country	Population
China	1.41×10^9
Kiribati	1.31×10^5
Tuvalu	1.13×10^4

Calculate the approximate total population of Kiribati and Tuvalu in 2022.
Give your answer in standard form, correct to **3** significant figures.

…… **[4]**

(b). Show that in 2022 the population of China was approximately 125 000 times the population of Tuvalu.

[2]

22(a). Write these numbers in order, starting with the smallest.

3.5×10^2 1.2×10^3 9.3×10^{-1} 6.4×10^1

,

,

,

[2]

smallest

(b). Work out.

$4\times10^2 + 5 \times 10^3$

Give your answer in standard form.

..... **[2]**

23(a).

$2a = \sqrt{b}$ where b is a positive integer from 24 to 37.

Given that a is a positive integer, find its value.
You must show your working.

a = ... **[2]**

(b). How would your answer to **part (a)** change if a was only described as an integer?

---------- **[1]**

24. Work out

$\sqrt[3]{27} \times \left(\frac{1}{3}\right)^2$

..... **[3]**

25(a). Work out.

i. 4^4

..... **[1]**

ii. $\sqrt[3]{3375}$

..... **[1]**

(b). Find the value of y.

$972 = 4 \times 3^y$

..... **[2]**

(c). Write 6^{-1} as a fraction.

..... **[1]**

26(a). Complete the box to show the power of 10.

One thousand = $10^{\square}$

[1]

(b). One hundredth = $10^{\square}$

[1]

27(a). Complete the power of 2.

$$\frac{1}{16} = 2^{\square}$$

[1]

(b). Work out.

$\sqrt{64} \times 3^2$

..... **[3]**

28. Use your calculator to work out.

5^4

..... **[1]**

29. $2^7 \times 2^m = \frac{1}{2}$

Find the value of m.

m = ... **[2]**

30. Work out.

3^4

..... **[2]**

31(a).

Write these numbers in order, starting with the smallest.

2.4×10^2 1.3×10^3 $4.9 \times 10^-$ 9.5×10^1

..... , ... , ... , ... **[1]**

smallest

(b). Work out.

$5 \times 10^2 + 4 \times 10^3$

Give your answer in standard form.

..... [2]

32(a).

$2a = \sqrt{b}$ where b is a positive integer from 8 to 17.

Given that a is a positive integer, find its value.
You must show your working.

a = ... **[2]**

(b). How would your answer to **part (a)** change if a was only described as an integer?

---

[1]

33. Work out.

$\sqrt[3]{64} \times \left(\frac{1}{2}\right)^2$

..... **[3]**

34(a). Work out.

i. 3^5

..... **[1]**

ii. $\sqrt[3]{2744}$

..... **[1]**

(b). Find the value of y.

$384 = 6 \times 4^y$

..... **[2]**

(c). Write 3^{-1} as a fraction.

..... **[1]**

35(a). 10^2 is written in words as 'one hundred'.

Write 10^4 in words.

..... **[2]**

(b). Work out $(3.5 \times 10^{-1}) \times 100$, giving your answer in standard form.

..... **[2]**

36(a). Complete each statement by writing the missing power in the box.

i. $6 \times 6 \times 6 = 6^{\square}$

[1]

ii. $16 = 2^{\square}$

[1]

(b). Work out.

$5^2 \times \sqrt{36}$

..... **[3]**

37(a). The table below shows the approximate population of three countries in 2020.

Country	Population
China	1.44×10^9
Kiribati	1.19×10^5
Tuvalu	1.18×10^4

Calculate the approximate total population of Kiribati and Tuvalu in 2020.
Give your answer in standard form, correct to **3** significant figures.

..... **[4]**

(b). Show that in 2020 the population of China was approximately 120 000 times the population of Tuvalu.

[2]

38(a). Complete the box to show the power of 10.

One million = $10^{\square}$ **[1]**

(b).

One thousandth = $10^{\square}$ **[1]**

39(a). This table shows the names and areas of five lakes.

Name of Lake	Area in km^2
Ladoga	1.81×10^4
Mweru	5.12×10^3
Tana	3.20×10^3
Topozero	9.86×10^2
Victoria	6.89×10^4

Write the area of Lake Mweru as an ordinary number.

..... km^2 **[1]**

(b). Write the lakes in the order of their area, starting with the **smallest**.

.... **[2]**

smallest *largest*

(c). Calculate the difference between the areas of Lake Ladoga and Lake Tana.
Give your answer in standard form, correct to **2** significant figures.

..... km^2 **[4]**

40. Use your calculator to work out.

4^5

..... **[1]**

41(a). Complete the power of 2.

$\frac{1}{8} = 2^{\square}$ **[1]**

(b). Work out.

$\sqrt{81} \times 2^3$

..... **[3]**

END OF QUESTION PAPER