

**Check out**

You should now be able to ...

✓	Write numbers in standard form.	8
✓	Calculate with standard form.	8
✓	Know and use the index laws.	7
✓	Know and use rules for surds.	8
✓	Use index notation for square and cube roots.	8

**Test it**

Questions

1, 2	8
3	8
4	7
5, 6	8
7 - 9	8



**Language Meaning Example**

<b>Power</b>	A shorthand way of writing a number multiplied by itself several times.	$a \times a = a^2$ "a squared" $b \times b \times b \times b \times b = b^5$ "b to the power 5"
<b>Index notation</b>	Writing a number as a power.	$3 \times 3 \times 3 = 3^3$
<b>Standard index form</b>	A way to write very large or small numbers as a number between 1 and 10 multiplied by a power of 10.	$34500 = 3.45 \times 10^4$ $0.000345 = 3.45 \times 10^{-4}$
<b>Order of operations</b>	A set order to perform operations (BIDMAS) brackets-powers-division then multiplication-addition and subtraction.	$3 + 2^2 \times 5 = 23$
<b>Surd</b>	A number written as a square root.	$\sqrt{3}$

1 Write each number out in full.

- a  $2.1 \times 10^7$
- b  $2.69 \times 10^5$
- c  $7.4 \times 10^{-3}$
- d  $3.73 \times 10^{-4}$

2 Write each number in standard form.

- a 26000
- b 988000
- c 0.000088
- d 0.00759
- e  $59.4 \times 10^8$
- f  $0.098 \times 10^7$
- g  $0.14 \times 10^5$
- h  $672 \times 10^{-4}$

3 Work out the following calculations without using a calculator.

- a  $(8.4 \times 10^6) + (9.5 \times 10^4)$
- b  $(5.9 \times 10^{-2}) - (7.28 \times 10^{-3})$

4 Simplify each of the following. Leave your answer as a single power of the number:

- a  $9^3 \times 9^5$
- b  $8^{-2} \times 8^{-7}$
- c  $6^3 \div 6^{-4}$
- d  $3^{-9} \div 3^2$
- e  $(4^7)^2$
- f  $(7^{-3})^5$
- g  $((3^2)^3)^3$
- h  $((4^2)^{-2})^3$

5 Calculate the following, leaving your answers in surd form where appropriate.

- a  $\sqrt{7} \times \sqrt{7}$
- b  $\sqrt{10} \times \sqrt{5}$
- c  $\sqrt{12} \times \sqrt{18}$
- d  $\sqrt{4} \times \sqrt{8}$
- e  $2\sqrt{8} \times 3\sqrt{20}$
- f  $6\sqrt{2} \times 2\sqrt{24}$

6 Write these numbers in their simplest form.

- a  $\sqrt{32}$
- b  $\sqrt{80}$
- c  $\sqrt{175}$
- d  $\sqrt{320}$

7 Write these numbers using index notation.

- a  $\sqrt{7}$
- b  $\sqrt[3]{5}$

8 Work out the value of each of these expressions.

- a  $49^{\frac{1}{2}}$
- b  $64^{\frac{1}{3}}$

9 Calculate the following, leaving your answers in index form where appropriate.

- a  $6^{\frac{1}{2}} \times 6^{\frac{1}{3}}$
- b  $7^{\frac{1}{2}} \times 7^{-2}$
- c  $5^{\frac{1}{3}} \times 5^{\frac{1}{3}}$
- d  $8^{\frac{1}{2}} \div 8^{-3}$
- e  $4^{\frac{1}{3}} \div 4^{\frac{1}{3}}$
- f  $(3^{\frac{1}{2}})^{-5}$

**What next?**

Score	0 - 4	5 - 7	8 - 9
	Your knowledge of this topic is still developing. To improve look at Formative test: 3C-11; MyMaths: 1033, 1049, 1050, 1051 and 1064	You are gaining a secure knowledge of this topic. To improve look at InvisiPen: 183, 184, 185 and 186	You have mastered this topic. Well done, you are ready to progress!