Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Indices and standard form

Time allowed: 35 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 26

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 26 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 **(a)** Write 0.006 54 in standard form.

..... [1]

(b) The number 1.467×10^{102} is written as an ordinary number.

Write down the number of zeros that follow the digit 7.

..... [1]

(a) Converting to and from standard form (b) Converting to and from standard form Click for more variations

1(a)	6.54×10^{-3}	**1**	
1(b)	99	**1**	

2 Simplify the following.

(a) 8^0

Answer(a) ..... [1]

(b) $(x^5)^2$

Answer(b) ..... [1]

(c) $p^{-3} \div p^4$

Answer(c) ..... [1]

(a) Laws of indices (b) Roots and indices in algebra (c) Laws of indices Click for more variations

2	**(a)** 1	1	
	(b) x^{10}	1	
	(c) p^{-7} or $\frac{1}{p^7}$	1	

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3 Here are some numbers written in standard form.

3.4×10^{-1} 1.36×10^{6} 7.9×10^{0} 2.4×10^{5} 5.21×10^{-3} 4.3×10^{-2}

From these numbers, write down

(a) the largest number,

..... [1]

(b) the smallest number.

..... [1]

(a) Converting to and from standard form (b) Converting to and from standard form Click for more variations

3(a)	1.36×10^{6} oe	**1**	
3(b)	5.21×10^{-3} oe	**1**	

4 Find the value of

(a) $(\sqrt{5})^{8}$,

Answer(a) ..... [1]

(b) $\left(\frac{1}{27}\right)^{-\frac{2}{3}}$.

Answer(b) ..... [1]

(a) Laws of indices (b) Laws of indices Click for more variations

4	**(a)**	625	**1**	
	(b)	9	**1**	

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5 **(a)** Write 0.007 09 in standard form.

..... [1]

(b) Work out $(4\times10^4)^2$.
Give your answer in standard form.

..... [2]

(a) Converting to and from standard form (b) Calculating in standard form Click for more variations

5(a)	7.09×10^{-3}	**1**	
5(b)	1.6×10^9	**2**	**B1** for 16×10^8 oe

6 Work out $(6.4\times10^7)+(9.6\times10^6)$.
Give your answer in standard form.

.....[2]

Calculating in standard form Click for more variations

6	7.36×10^7	**2**	**B1** for figs 736

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7 **(a)** Write these numbers in standard form.

(i) 0.007

..... [1]

(ii) 700 000 000

..... [1]

(b) Calculate $\dfrac{3200 \times 5.4 \times 10^{-3}}{4.8 \times 10^{-4}}$.

Give your answer in standard form.

..... [2]

(a)(i) Converting to and from standard form | (a)(ii) Converting to and from standard form | (b) Using a calculator

Click for more variations

7(a)(i)	7×10^{-3}	**1**	
7(a)(ii)	7×10^{8}	**1**	
7(b)	3.6×10^{4}	**2**	**B1** for 36 000 or for writing *their* ordinary number correctly in standard form or for 36 000 written in incorrect standard form

8 One titanium atom has a mass of 7.95×10^{-23} grams.

Calculate the number of titanium atoms in 1 kg of titanium.
Give your answer in standard form.

..... [2]

Calculating in standard form | Click for more variations

8	1.26×10^{25} or 1.257×10^{25} to 1.258×10^{25}	**2**	**M1** for $\dfrac{1000}{7.95 \times 10^{-23}}$ oe or **B1** for 1.26×10^{k} or 1.257×10^{k} to 1.258×10^{k}

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9 $a \times 10^7 + b \times 10^6 = c \times 10^6$

Find c in terms of a and b.
Give your answer in its simplest form.

Answer $c =$ ..... [2]

Calculating in standard form Click for more variations

9	$10a + b$ or $a \times 10^1 + b$ $(\times 10^0)$	2	**M1** $[a \times 10^7 + b \times 10^6] \div 10^6$

10 **(a)** $3^{3p} \times 3^{2p} = 729$

Find the value of p.

$p =$ ..... [2]

(b) Simplify.

$$(32x^{10})^{\frac{1}{5}}$$

..... [2]

(a) Laws of indices (b) Roots and indices in algebra Click for more variations

10(a)	1.2 oe	**2**	**B1** for 3^{2p+3p} or 3^6 soi
10(b)	$2x^2$ final answer	**2**	**B1** for kx^2 or $2x^k$ as final answer or correct answer spoiled

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