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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Indices in algebra

Time allowed: 40 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

/ 31

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 31 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 Simplify.

(a) $(y^5)^3$

..... [1]

(b) $w^7 \div w^{-2}$

..... [1]

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

2 Simplify.

$$4p^5q^3 \times p^2q^{-4}$$

..... [2]

Roots and indices in algebra Click for more variations

3 Simplify $8t^8 \div 4t^4$.

..... [2]

Roots and indices in algebra Click for more variations

4 **(a)** Write $\dfrac{1}{2\times2\times2\times2\times2}$ as a power of 2.

..... [1]

(b) **(i)** $3^{18} \div 3^t = 3^6$

Find the value of t.

$t =$ ..... [1]

(ii) Simplify.

$$8w^{10} \times 6w^5$$

..... [2]

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

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5 Simplify.

(a) $3t^5 \times 5t^3$

..... [2]

(b) $\left(64u^{36}\right)^{\frac{5}{6}}$

..... [2]

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

6 Simplify.

$$\left(\frac{x^3}{8}\right)^{-\frac{4}{3}}$$

..... [2]

Roots and indices in algebra Click for more variations

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7 $\sqrt[3]{y^2} = \sqrt[6]{x}$ and $y = \sqrt[n]{x}$.

Find the value of n.

$n =$ ..... [2]

Fractional and negative indices Click for more variations

8 Solve.

$$\left(\frac{1}{3}\right)^x = 9^{x+4}$$

$x =$ ..... [3]

Fractional and negative indices Click for more variations

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9 **(a)** Simplify.

$$\frac{x^{\frac{2}{3}}}{x^{\frac{8}{3}}}$$

..... [1]

(b) $16 = 64^k$

Find the value of k.

$k =$ ..... [1]

(c) Solve.

$$3^{3x} \times \left(\frac{1}{9}\right)^{4-3x} = 3$$

$x =$ ..... [3]

(a) Laws of indices (b) Fractional and negative indices (c) Fractional and negative indices Click for more variations

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10 **(a)** $3^{-2} \times 3^{x} = 81$

Find the value of x.

$x =$ ..... [2]

(b) $x^{-\frac{1}{3}} = 32x^{-2}$

Find the value of x.

$x =$ ..... [3]

(a) Laws of indices (b) Fractional and negative indices Click for more variations

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