**AS Mathematics Exam Questions by Topic**
**Chapter 2: Surds and Indices**

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These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: `https://amzn.to/39umfr5` and `https://amzn.to/3hE8kBL` ). There are a mixture of questions from OCR A, OCR B (MEI) and Edexcel. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

`https://mathsaurus.com/`

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OCR A AS 2018 Paper 1 Question 1:

**1 In this question you must show detailed reasoning.**

**(i)** Express $3^{\frac{7}{2}}$ in the form $a\sqrt{b}$, where $a$ is an integer and $b$ is a prime number. **[2]**

**(ii)** Express $\frac{\sqrt{2}}{1-\sqrt{2}}$ in the form $c + d\sqrt{e}$, where $c$ and $d$ are integers and $e$ is a prime number. **[3]**

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OCR B MEI AS Sample Paper 1 Question 1:

**1** Simplify $\frac{\left(2x^2y\right)^3 \times 4x^3y^5}{2xy^{10}}$. **[2]**

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## OCR A Sample Paper 2 Question 1:

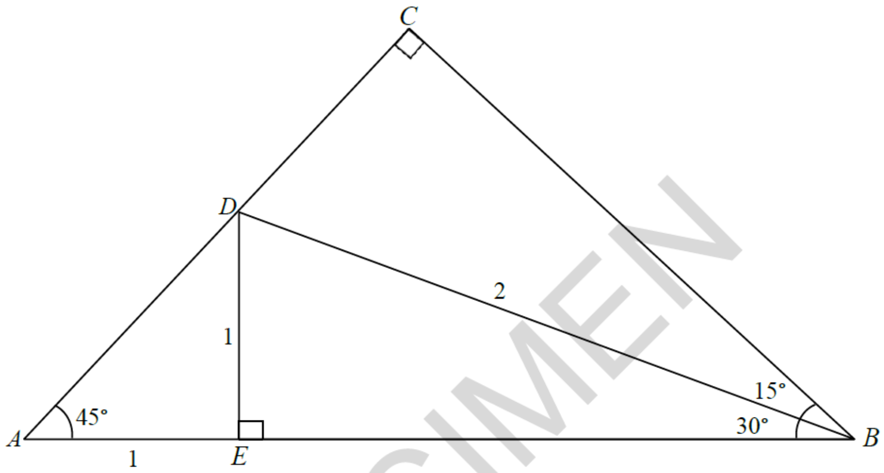
**1** Simplify fully.

**(i)** $\sqrt{a^3} \times \sqrt{16a}$ **[2]**

**(ii)** $(4b^6)^{\frac{5}{2}}$ **[2]**

## OCR A Sample Paper 3 Question 8:

**8** **In this question you must show detailed reasoning.**






The diagram shows triangle $ABC$. The angles $CAB$ and $ABC$ are each $45^\circ$, and angle $ACB = 90^\circ$. The points $D$ and $E$ lie on $AC$ and $AB$ respectively, such that $AE = DE = 1$, $DB = 2$ and angle $BED = 90^\circ$. Angle $EBD = 30^\circ$ and angle $DBC = 15^\circ$.

**(i)** Show that $BC = \dfrac{\sqrt{2}+\sqrt{6}}{2}$. **[3]**

**(ii)** By considering triangle $BCD$, show that $\sin 15^\circ = \dfrac{\sqrt{6}-\sqrt{2}}{4}$. **[3]**

## OCR B MEI 2018 Paper 2 Question 1:

**1** Show that $\sqrt{27}+\sqrt{192} = a\sqrt{b}$, where $a$ and $b$ are prime numbers to be determined. **[2]**

## OCR B MEI AS 2018 Paper 1 Question 1:

**1** Write $\dfrac{8}{3-\sqrt{5}}$ in the form $a+b\sqrt{5}$, where $a$ and $b$ are integers to be found. **[2]**