Year 9 Indices and Surds – Foundation

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Answers and worked solutions · 10 questions

A. Indices and roots

1. 12^{12}

Same base, so add the indices: 6 + 6 = 12

$= 12^{12}$

2. 10^{-1}

Same base, so subtract the indices: 4 − 5 = −1

$= 10^{-1}$

3. 1/8

A negative index means the reciprocal: $8^{-1} = 1/8^{1}$

= 1/8

4. 1/5

$5^{5} \times 5^{-6} = 5^{-1}$

= 1/5

5. 4 and 5

$4^{2} = 16$ and $5^{2} = 25$

$16 < 23 < 25$, so $\sqrt{23}$ is between 4 and 5

6. 12 and 13

$12^{2} = 144$ and $13^{2} = 169$

$144 < 157 < 169$, so $\sqrt{157}$ is between 12 and 13

7. $\sqrt[3]{100}$, π, $2 + \sqrt{3}$

Irrational numbers cannot be written as a fraction of two integers

Square roots of non-square numbers, cube roots of non-cubes and π are irrational

8. 11.3

$11.3^{2} = 127.69$ and $11.4^{2} = 129.96$, so $\sqrt{128}$ is between 11.3 and 11.4

$11.35^{2} = 128.8225$, which is more than 128, so $\sqrt{128} \approx 11.3$

9. n = −4

Subtract the indices: n − 2 = −6

n = −6 + 2 = −4

10. $\sqrt{84}$, $\sqrt[3]{840}$, 9.7, 59/6

Estimate each value as a decimal

$\sqrt[3]{840} \approx 9.44$; $9.7 \approx 9.70$; $\sqrt{84} \approx 9.17$; $59/6 \approx 9.83$

Then put them in order