# OCR 03 Indices and surds (Foundation)

1. Work out .
2. Write  using indices.
3. Simplify .
4. Calculate .
5. Write the number 245 in standard form.
6. Simplify .
7. Simplify .
8. The circumference *C* of a circle with radius *r* is given by the formula .

Calculate the circumference of a circle with radius 4 cm, giving your answer in terms of .

1. Calculate . Give your answer in the form .
2. Work out .
3. Sam writes . Is Sam correct? Explain your answer.
4. Show that .
5. Which of the following numbers is the smallest? Show how you decide.



1. Venus is km from the Sun. Mars is km from the Sun.

Zoe says “ take away  is , so Mars is 1.2 km further away from the Sun than Venus is”. Explain why Zoe’s calculation is wrong.

1. Show that .
2. A tank in the shape of a cube holds 125 m3 of water when full. What are the dimensions of the tank?
3. 32 g of sulphur contains approximately  atoms.

What is the mass of one atom of sulphur?

1. Ebru’s digital camera has  bytes of storage. She takes photos that each need

 bytes of storage.

How many photos can she store on her camera? Give your answer in standard form.

1. A square has an area of 12.25 m2. Find the perimeter of the square.
2. Chen thinks of a number. He finds the cube root of the number and then squares this answer. He now has the number 81. What number did Chen first think of?

### Answers

1. 64
2. 
3. (±)6
4. 7
5. 
6. 

 or 0.0000001

1. , 

or 6600

1. 

(cm)

1.  or 
2. 



1. Yes with correct explanation. For example, , or “the rule is when you multiply you add the indices”.
2. 
3. 0.5 because ,  and .
4. The answer should be . If correct answer not given, explanation should include the fact that she should not have subtracted the indices.
5. Both equal  or 
6.  so tank is m.
7. g
8. 



1. Side length m so perimeter m.
2. 



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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
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| AO1 | 1 | Use positive integer indices |  |  |  |  | AO1 | 1 | Use positive integer indices |  |  |  |
| AO1 | 2 | Use negative indices to represent reciprocals |  |  |  |  | AO1 | 2 | Use negative indices to represent reciprocals |  |  |  |
| AO1 | 3 | Calculate exact roots |  |  |  |  | AO1 | 3 | Calculate exact roots |  |  |  |
| AO1 | 4 | Calculate with integer powers |  |  |  |  | AO1 | 4 | Calculate with integer powers |  |  |  |
| AO1 | 5 | Convert numbers to and from standard form |  |  |  |  | AO1 | 5 | Convert numbers to and from standard form |  |  |  |
| AO1 | 6 | Calculate with integer powers |  |  |  |  | AO1 | 6 | Calculate with integer powers |  |  |  |
| AO1 | 7 | Know and apply laws of indices |  |  |  |  | AO1 | 7 | Know and apply laws of indices |  |  |  |
| AO1 | 8 | Use multiples of  in exact calculations |  |  |  |  | AO1 | 8 | Use multiples of  in exact calculations |  |  |  |
| AO1 | 9 | Use fractions in exact calculations |  |  |  |  | AO1 | 9 | Use fractions in exact calculations |  |  |  |
| AO1 | 10 | Calculate with integer powers |  |  |  |  | AO1 | 10 | Calculate with integer powers |  |  |  |
| AO2 | 11 | Know and apply the laws of indices |  |  |  |  | AO2 | 11 | Know and apply the laws of indices |  |  |  |
| AO2 | 12 | Calculate with integer powers and roots |  |  |  |  | AO2 | 12 | Calculate with integer powers and roots |  |  |  |
| AO2 | 13 | Interpret indices |  |  |  |  | AO2 | 13 | Interpret indices |  |  |  |
| AO2 | 14 | Subtract numbers in standard form |  |  |  |  | AO2 | 14 | Subtract numbers in standard form |  |  |  |
| AO2 | 15 | Know and apply laws of indices |  |  |  |  | AO2 | 15 | Know and apply laws of indices |  |  |  |
| AO3 | 16 | Recognise simple powers |  |  |  |  | AO3 | 16 | Recognise simple powers |  |  |  |
| AO3 | 17 | Calculate with numbers in standard form |  |  |  |  | AO3 | 17 | Calculate with numbers in standard form |  |  |  |
| AO3 | 18 | Divide numbers in standard form |  |  |  |  | AO3 | 18 | Divide numbers in standard form |  |  |  |
| AO3 | 19 | Calculate with roots |  |  |  |  | AO3 | 19 | Calculate with roots |  |  |  |
| AO3 | 20 | Calculate positive integer powers and exact roots |  |  |  |  | AO3 | 20 | Calculate positive integer powers and exact roots |  |  |  |