# Higher Check In - 3.02 Standard form

**Do not use a calculator for questions 1-5.**

1. Calculate (1.2 × 10−3) ÷ 203 giving your answer in standard form.
2. Each edge of a cube is (4 × 102) mm long. Find the volume of the cube in m3, giving your answer in standard form.
3. Work out , giving your answer in standard form.
4. How many times bigger is 203 compared to (0.2)3? Give your exact answer in standard form.
5. Write the following expressions in order from smallest to largest.

   

1. The UK population is rising by 7% each decade. In 2010 the UK population was   
   6.277 × 107. A newspaper headline in 2010 said, “UK population will be 72 million   
   by 2030”. Show that the headline is correct.
2. Alan works out (3.2 × 105) ÷ (8.0 × 10−2) and gives the answer 4 × 102. Without doing the calculation, explain how you know the answer is wrong.
3. A bus company wants to buy a large quantity of fuel. Two companies are selling the fuel at the below prices.

| **Fuel Solutions** | **Value Fuels** |
| --- | --- |
| 3 × 103 dekalitres for £1239  (1 dekalitre = 10 litres) | 1.2 × 103 hectolitres for £4980  (1 hectolitre = 100 litres) |

Which company is offering the best value for money? Show all your working.

1. A grain of sand has radius 3.1 × 10−3 mm. Use the formula for the volume of a sphere, V = , to estimate the number of grains of sand in a 1 m3 bag.
2. The Earth travels approximately 9.4 × 108 km in its orbit around the sun. Calculate the average speed of the Earth around the sun in metres per second.

**Extension**

The speed of light is 6.7 × 108 miles per hour.

Show that this is approximately the same as 3.0 × 105 m/s.

[1 mile = 1.609 km]

Answers

1. 1.5 × 10−7
2. 6.4 × 10−2 m3
3. 6 × 105
4. 1 × 106
5.  [smallest]





 [largest]

1. 6.277 × 107 × 1.072 = 71 865 373 ≈ 72 million so it is correct to 2sf.
2. E.g. The divisor is much smaller than 3.2 × 105 so will go into it many times. However, the answer is smaller than 3.2 × 105 (102 < 105) so it cannot be correct.

E.g. so Alan’s answer looks too small oe.

1.  and  oe. Fuel Solutions is better value at 4.13p per litre.
2. 

 (3sf)

1.  m/s (3sf)

**Extension**

m/s

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Divide numbers in standard form |  |  |  |  | AO1 | 1 | Divide numbers in standard form |  |  |  |
| AO1 | 2 | Cube a number in standard form, ensuring answer in standard form |  |  |  |  | AO1 | 2 | Cube a number in standard form, ensuring answer in standard form |  |  |  |
| AO1 | 3 | Divide numbers in standard form |  |  |  |  | AO1 | 3 | Divide numbers in standard form |  |  |  |
| AO1 | 4 | Compare numbers using standard form |  |  |  |  | AO1 | 4 | Compare numbers using standard form |  |  |  |
| AO1 | 5 | Order numbers in standard form |  |  |  |  | AO1 | 5 | Order numbers in standard form |  |  |  |
| AO2 | 6 | Calculate with standard form and percentage |  |  |  |  | AO2 | 6 | Calculate with standard form and percentage |  |  |  |
| AO2 | 7 | Use standard form in estimations |  |  |  |  | AO2 | 7 | Use standard form in estimations |  |  |  |
| AO2 | 8 | Use a calculator to perform calculations with numbers in standard form |  |  |  |  | AO2 | 8 | Use a calculator to perform calculations with numbers in standard form |  |  |  |
| AO3 | 9 | Use standard form in standard unit measurement calculations |  |  |  |  | AO3 | 9 | Use standard form in standard unit measurement calculations |  |  |  |
| AO3 | 10 | Use standard form in compound unit measurement calculations |  |  |  |  | AO3 | 10 | Use standard form in compound unit measurement calculations |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Divide numbers in standard form |  |  |  |  | AO1 | 1 | Divide numbers in standard form |  |  |  |
| AO1 | 2 | Cube a number in standard form, ensuring answer in standard form |  |  |  |  | AO1 | 2 | Cube a number in standard form, ensuring answer in standard form |  |  |  |
| AO1 | 3 | Divide numbers in standard form |  |  |  |  | AO1 | 3 | Divide numbers in standard form |  |  |  |
| AO1 | 4 | Compare numbers using standard form |  |  |  |  | AO1 | 4 | Compare numbers using standard form |  |  |  |
| AO1 | 5 | Order numbers in standard form |  |  |  |  | AO1 | 5 | Order numbers in standard form |  |  |  |
| AO2 | 6 | Calculate with standard form and percentage |  |  |  |  | AO2 | 6 | Calculate with standard form and percentage |  |  |  |
| AO2 | 7 | Use standard form in estimations |  |  |  |  | AO2 | 7 | Use standard form in estimations |  |  |  |
| AO2 | 8 | Use a calculator to perform calculations with numbers in standard form |  |  |  |  | AO2 | 8 | Use a calculator to perform calculations with numbers in standard form |  |  |  |
| AO3 | 9 | Use standard form in standard unit measurement calculations |  |  |  |  | AO3 | 9 | Use standard form in standard unit measurement calculations |  |  |  |
| AO3 | 10 | Use standard form in compound unit measurement calculations |  |  |  |  | AO3 | 10 | Use standard form in compound unit measurement calculations |  |  |  |