# Maths skills – M0.1 Recognise and make use of appropriate units in calculations

## Teacher answers

### Quiz – converting between units

Answers to all of these questions should use standard form e.g. use 5.6 x 103 rather than 5600, use 4.2 x 10-2 rather than 0.042.

1. How many?

| mm in a m | 1 x 103 |  | µm in a mm | 1 x 103 |
| --- | --- | --- | --- | --- |
| µm in a m | 1 x 106 |  | nm in a µm | 1 x 103 |
| nm in a mm | 1 x 106 |  | nm in a m | 1 x 109 |
| mm in a µm | 1 x 10-3 |  | m in a µm | 1 x 10-6 |
| µm in a nm | 1 x 10-3 |  | mm in a nm | 1 x 10-6 |
| µ*l* in a litre | 1 x 106 |  | m*l* in a litre | 1 x 103 |
| µ*l* in a m*l* | 1 x 103 |  | ms in a s | 1 x 103 |
| µs in a ms | 1 x 103 |  |  |  |

1. Convert each of the following into metres.

| (a) | 70 nm | 70 nm = 7 x 10-8 m |
| --- | --- | --- |
| (b) | 5 µm | 5 µm = 5 x 10-6 m |
| (c) | 1 mm | 1 mm = 1 x 10-3 m |
| (d) | 0.2 mm | 0.2 mm = 2 x 10-4 m |

1. Convert each of the following into µm.

| (a) | 4 m | 4 m = 4 x 106 μm |
| --- | --- | --- |
| (b) | 200 nm | 200 nm = 2 x 10-1 μm |
| (c) | 17 mm | 17 mm = 1.7 x 104 μm |
| (d) | 0.3 nm | 0.3 nm = 3 x 10-4 μm |

1. Areas. How many?

| (a) | μm2 in a m2 | 1 x 1012 |
| --- | --- | --- |
| (b) | μm2 in a mm2 | 1 x 106 |

1. Volumes. How many?

| (a) | mm3 in a cm3 | 1 x 103 |
| --- | --- | --- |
| (b) | μm3 in a mm3 | 1 x 109 |

1. Convert each of these into more sensible units using standard form to express your answers if appropriate.

| (a) | 0.0003 μm | 0.3 nm or 3 x 10-1 nm |
| --- | --- | --- |
| (b) | 0.004 km | 4 m |
| (c) | 4500000 nm | 4.5 mm |
| (d) | 0.0007 s | 0.7 ms or 7 x 10-1 ms |

### Quiz – Rates of change

1. Express these rates of change with the correct units:

| (a) | 2 μg per cm3 | 2 μg cm-3 |
| --- | --- | --- |
| (b) | 200 kJ per m2 per year | 200 kJ m-2 yr -1 |
| (c) | 10 g per dm3 | 10 g dm-3 |
| (d) | 15 cm3 per minute | 15 cm3 min-1 |

1. In an experiment you were measuring the growth rate of *Salmonella*. You started with 100 *Salmonella* and after 2 hours you had 6500 *Salmonella*. What is the bacterial growth rate?

| 6500 – 100 = 6400 bacteria in 2 hours$\frac{6400}{2} $= 3200 bacteria per hour= 3200 bacteria h-1 |
| --- |

1. In an experiment you were measuring the growth rate of *Salmonella*. You started with 80 *Salmonella* and after 4 hours you had 5000 *Salmonella*. What is the bacterial growth rate?

| 5000 – 80 = 4920 bacteria in 4 hours$\frac{4920}{4}$ = 1230 bacteria per hour= 1230 bacteria h-1 |
| --- |

1. How would you express the following in numbers and units?
2. A woodlouse crawled 5 cm in 10 min.

| 5 mm min-1 or 0.5 cm min-1 or 30 cm h-1 |
| --- |

1. A patient’s drip flowed with 10 drips every 30 s.

| 20 drips min-1 or 0.3 drips s-1 |
| --- |

1. The growth of a slime mould colony was 40 cells per millimetre cubed per hour.

| 40 mm-3 h-1 |
| --- |

1. A breathing rate of 20 breaths in 30 s.

| 40 breaths min-1 or 0.7 breaths s-1 |
| --- |

1. A change in temperature of 1.2 degrees over three years.

| 0.4 oC yr-1 |
| --- |

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