Nanoscience – *Mark scheme*

1. (a) any **one** from: 1

- they are made of layer *do **not** accept line / rows / lattice*
- atoms / ions / particles / layers (of atoms) can slide over each other

(b) any **one** from: 1

- smaller / tiny **or** very small *do **not** allow small alone*
- correct size range 1 to 100 nanometres
- a few hundred atoms in size

if they state smaller and give a size outside range ignore size if it is less than 20,000

(c) harder 1

plus **one** from: 1

- so does not wear as quickly / erode as quickly *ignore corrode*
- less vulnerable to damage owtte

*harder to wear down = **1** mark*

- because they have a high surface area to volume ratio

or stronger (1)

plus **one** from: (1)

- less likely to break / do not break *accept withstand pressure*
- not as vulnerable to damage owtte *harder and stronger alone gains **1** mark*
- do not bend out of shape
- because they have a high surface area to volume ratio

[4]

2. (a) 1-100 nm in size 1

or a few (hundred) atoms in size

*accept very / really small / tiny **or** 10^{-9}*
*accept billionth of a metre **or** any number that implies very small*
accept measured in nanometers
if answer 'very small' ignore incorrect numerical values

(b) any **two** from: 2

- less tennis balls need to be made
- tennis balls last longer **or** don't have to replace as often
- less materials / resources / fuel used up / saves resources

accept saving materials

- less energy used **or** making tennis balls uses energy

accept saving energy

- less pollution caused

accept named pollutant; accept global warming / greenhouse effect

- less waste

eg fewer tennis balls going to landfill

[3]