1. Describe what a physical quantity is. (2)

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2. Describe what SI base and derived units are. (2)

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3. Recall the SI base units (6) and derived units (9) for physical quantities including the unit symbols.

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| **SI base units** |
| **physical quantity** | **unit name** | **unit symbol** |
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| **Derived units** |
| **physical quantity** | **derived unit** | **abbreviation** |
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4. Put the following prefixes for multiples and submultiples in the correct order of size with the largest first. (3)

**micro, nano, kilo, giga, mega, milli, centi**

5. Write the following in the shortest form using multiples and submultiples e.g. 45 000W = 45kW (5)

1. 0.000 05 V
2. 12000 g

1. 0.000025 m

1. 11 000 000 V
2. 0.000 0079 A

6. Write the following values without using multiples or submultiples e.g. 5.2 kW = 5200 W (5)

1. 6.8 kV

1. 15 mA

1. 30 μ Ω

1. 20 kHz

1. 17.5 nA

7. Convert the following. (5)

1. 7.5 minutes into seconds

1. 3.5 hours into seconds

1. 12 minutes into seconds

1. 4.25 hours into seconds

1. 0.45 hours into seconds

8. The masses of the four “gas giants” are given in the table. (4)

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| --- | --- | --- | --- | --- |
| **Planet** | Jupiter | Saturn | Uranus | Neptune |
| **Mass (kg)** | $$1.90×10^{27}$$ | $$5.96×10^{26}$$ | $$8.68×10^{25}$$ | $$1.02×10^{26}$$ |

1. Arrange the four planets by order of mass, from the lightest to the heaviest.

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1. The mass of the Earth is $5.98×10^{24}$ kg. (2)

 Approximately how many times greater is Saturn’s mass than that of the Earth?

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 c. i. The radius of Neptune is $2.43×10^{7}$ m.

 Use the equation

**volume of a sphere =** $\frac{4}{3}×πr^{3}$

to find the volume of Neptune in m3.

 Use 3.14 as the value for *π*. (2)

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ii.Calculate the density of Neptune.

 Give your answer in kg/m3. (3)

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9.An estimate for the thickness of a layer of graphene is 0.335 nanometres.

 1 nanometre is the same as $10^{-9}$ metres.

 What is the thickness of a sheet made from 6 500 layers of graphene?

 Give your answer in metres, to 3 significant figures, in standard form. (3)

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