Scientific notation

1. Join the prefix to its corresponding value in scientific notation.

Prefix	Scientific notation
nano (n)	10^{-2}
micro (μ)	10^{6}
milli (m)	10^{9}
centi (c)	10^{-3}
kilo (k)	10^{-9}
mega (M)	10^{3}
giga (G)	10^{-6}

2. Round off to the accuracy given:

   a) the cost of an overseas holiday is $15 387 (to the nearest $1000)

   b) the mass of a horse is 468 kg (to the nearest ten kg)

   c) a weekly wage of €610 (to the nearest €100)

   d) a distance of 5735 km (to the nearest 100 km)

   e) the monthly income for a business was $28,817 (to the nearest $1000)

   f) the box-office takings for a new movie were $6,543,722 (to the nearest hundred thousand dollars)

   g) the area of a country is 32,457 hectares (to the nearest thousand hectares)

   h) the number of times the average heart will beat in one year is 35,765,280 times (to the nearest million)

   i) a year's loss by a large mining company was $1,322,469,175 (to the nearest billion dollars).

3. Calculate the area of a rectangle with side lengths of 440 m and 75 m. Give your answer in hectares.

4. Reorganise the following muddled up table.

Quantity	Name and Symbol	SI equivalent
Time	litre (L)	$\frac{\pi}{180}$ rad
Mass	hectare (ha)	10^{-3} m^3
Capacity	minute (min)	1.852 km
Area	tonne (t)	10^4 m^2
Angle	millibar (mb)	60 s
Pressure	degree (°)	1.852 km h^{-1}
Distance at sea	Kilowatt hour (kWh)	10^3 kg
Speed at sea	Knot (kn)	10^2 Pa
Energy	Nautical mile (Nm)	3.6 MJ

What about the relation between °C and K?

5. A kilowatt hour is the accepted commercial unit for selling energy. If 60 kWh are purchased, how many joules of energy have been bought?

6. Express the following in scientific notation:

a) The Jurassic period lasted about 54 400 000 years.

b) There are about 311 900 000 different 5-card poker hands which can be dealt.

c) The wavelength of blue light is about 0.000 000 47 m.

7. Write the following numbers in scientific notation (giving the answer to 3 significant figures).

a) 299,792,458

b) 0.00000000006674

c) 5,972,000,000,000,000,000,000,000

d) 73,459,000,000,000,000,000,000

e) 385,000,000

8. Describe in words how to multiply, divide and sum two numbers that are written in scientific notation. Demonstrate this on the following examples:

   a) $8 \times 10^3 \cdot 9 \times 10^2$

   b) 12.3×0.03

   c) $12.4 \div 0.04$

   d) $3.4 \times 10^5 + 9.7 \times 10^6$

9. Newton's equation for the magnitude of the gravitational force two objects exert on each other is
$$F = \frac{Gm_1 m_2}{r^2},$$
where F is the gravitational force in newtons (N), G is the gravitation constant in $\text{Nm}^2\text{kg}^{-2}$, m_1 and m_2 are the masses of the two objects in kg, and r is the distance between the centres of mass of the two objects in metres (m).

Approximate the gravitational force between the Earth and the Moon without using a calculator (present the answer in scientific notation to an appropriate degree of precision), where

- $6.67 \times 10^{-11}\ m^3 kg^{-1} s^{-2}$ is gravitational constant,
- $5,97 \times 10^{24}\ kg$ is mass of Earth,
- $7,35 \times 10^{22}\ kg$ is mass of Moon,
- $385,000,000\ m$ is average distance between Earth and Moon.