

Questions

Q1.

A person's heart beats approximately 10^5 times each day.
A person lives for approximately 81 years.

(a) Work out an estimate for the number of times a person's heart beats in their lifetime.

Give your answer in standard form correct to 2 significant figures.

2×10^{12} red blood cells have a total mass of 90 grams.

(b) Work out the average mass of 1 red blood cell.

Give your answer in standard form.

.....
(2)

..... grams
(2)

(Total for question = 4 marks)

(Q10 1MA1/3H, Nov 2020)

Q2.

One uranium atom has a mass of 3.95×10^{-22} grams.

(a) Work out an estimate for the number of uranium atoms in 1kg of uranium.

.....
(3)

(b) Is your answer to (a) an underestimate or an overestimate?
Give a reason for your answer.

.....
.....
(1)

(Total for question = 4 marks)

(Q11 1MA1/1H/N, Specimen papers)

Q3.

Work out $(13.8 \times 10^7) \times (5.4 \times 10^{-12})$
Give your answer as an ordinary number.

.....

(Total for question = 2 marks)

(Q07 1MA1/3H, Nov 2017)

Q4.

Work out $\frac{0.06 \times 0.0003}{0.01}$

Give your answer in standard form.

.....

(Total for question = 3 marks)

(Q21 1MA1/1F, Nov 2017)

Q5.

Work out $(13.8 \times 10^7) \times (5.4 \times 10^{-12})$
Give your answer as an ordinary number.

.....
(Total for question = 2 marks)

(Q25 1MA1/3F, Nov 2017)

Q6.

A metal box has a weight of 8×10^3 grams.
Find, in standard form, the weight of 10 of these metal boxes.

..... grams

(Total for question = 1 mark)

(Q25 1MA1/1F/M2, Specimen papers)

Q7.

The distance from the Earth to the Sun is 1.496×10^{11} metres.
The speed of light is 3×10^8 metres per second.

(a) Show that, correct to 3 significant figures, light will take 0.139 hours to travel from the Sun to the Earth.

(3)

1 googol is 1×10^{100}

Danesh says,

" When I multiply 1.496×10^{11} by 6.68×10^9 I get nearly 1 googol because $1.496 \times 10^{11} \times 6.68 \times 10^9 = 9.99 \times 10^{99}$ "

(b) Is Danesh correct?

Give a reason for your answer.

(1)

(Total for question = 4 marks)

(Q28 1MA1/2F/M2, Specimen papers)

Q8.

The distance from the Earth to the Sun is 1.496×10^{11} metres.
The speed of light is 3×10^8 metres per second.

(a) Show that, correct to 3 significant figures, light will take 0.139 hours to travel from the Sun to the Earth.

1 googol is 1×10^{100}

Danesh says,

" When I multiply 1.496×10^{11} by 6.68×10^9 I get nearly 1 googol because $1.496 \times 10^{11} \times 6.68 \times 10^9 = 9.99 \times 10^{99}$ "

(b) Is Danesh correct?

Give a reason for your answer.

.....
.....

(3)

(1)

(Total for question = 4 marks)

(Q07 1MA1/2H/M2, Specimen papers)

Q9.

Write 0.000068 in standard form.

.....

(Total for question = 1 mark)

(Q08 1MA1H/3H/N, Specimen papers)

Q10.

(a) Write 3.6×10^4 as an ordinary number.

.....

(1)

(b) Work out the value of $(2.8 \times 10^{-2}) \div (4.7 \times 10^5)$

Give your answer in standard form correct to 3 significant figures.

.....

(2)

(Total for question = 3 marks)

(Q09 1MA1/2H/M1, Specimen papers)

Q11.

(a) Write 0.000 423 in standard form.

.....
(1)

(b) Write 4.5×10^4 as an ordinary number.

.....
(1)

(Total for question is 2 marks)

(Q19 1MA1/3H/S1, Specimen papers)

Q12.

(a) Write 4.7×10^{-1} as an ordinary number.

.....
(1)

(b) Work out the value of $(2.4 \times 10^3) \times (9.5 \times 10^5)$
Give your answer in standard form.

.....
(2)

(Total for question = 3 marks)

(Q15 1MA1/2F, June 2017)

Q13.

The mass of Jupiter is 1.899×10^{27} kg.
The mass of Saturn is 0.3 times the mass of Jupiter.

- (a) Work out an estimate for the mass of Saturn.
Give your answer in standard form.

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..... kg
(3)

- (b) Give evidence to show whether your answer to (a) is an underestimate or an overestimate.

.....
.....
(1)

(Total for question is 4 marks)

(Q08 1MA1/1H/S1, Specimen papers)

Q14.

(a) Write 6.75×10^{-4} as an ordinary number.

(b) Work out
$$\frac{2.56 \times 10^6 \times 4.12 \times 10^{-3}}{1.6 \times 10^{-2}}$$

Give your answer in standard form.

.....
(1)

.....
(2)

(Total for question = 3 marks)

Q15.

$$\frac{2.645 \times 10^9}{1.15 \times 10^3}$$

Work out the value of

Give your answer in standard form.

.....
(Total for question = 2 marks)

(Q18 1MA1/3F, June 2018)

Q16.

Work out the value of $(9 \times 10^{-4}) \times (3 \times 10^7)$ Give your answer in standard form.

.....
(Total for question = 2 marks)

(Q09 1MA1/1H/N, Specimen papers)

Q17.

(a) Write 6.75×10^{-4} as an ordinary number.

.....
(1)

$$\frac{2.56 \times 10^6 \times 4.12 \times 10^{-3}}{1.6 \times 10^{-2}}$$

(b) Work out

$$\frac{2.56 \times 10^6 \times 4.12 \times 10^{-3}}{1.6 \times 10^{-2}}$$

Give your answer in standard form.

.....
(2)

(Total for question = 3 marks)

(Q09 1MA1/3H, Nov 2022)

Q18.

(a) Write $(9 \times 10^4) : (4.5 \times 10^6)$ in the form $1 : n$ where n is an integer.

.....
(2)

(b) Write the following numbers in order of size.

Start with the smallest number.

5.625×10^4

5625

56250×10^{-3}

0.005625×10^5

.....
(2)

(Total for question = 4 marks)

(Q28 1MA1/3F, June 2023)

Q19.

The surface gravity of a planet can be worked out using the formula

$$g = \frac{6.67 \times 10^{-11} m}{r^2}$$

where

m kilograms is the mass of the planet

r metres is the radius of the planet

For the Earth and Jupiter here are the values of m and r .

Earth	Jupiter
$m = 5.98 \times 10^{24}$	$m = 1.90 \times 10^{27}$
$r = 6.378 \times 10^6$	$r = 7.149 \times 10^7$

Work out the ratio of the surface gravity of Earth to the surface gravity of Jupiter.

Write your answer in the form 1: n

.....
(Total for question = 3 marks)

(Q10 1MA1/3H/S2, Specimen papers)

Q20.

(a) Write 0.00549 in standard form.

.....
(1)

(b) Find the value of $(8 \times 10^3)^2$
Give your answer in standard form.

.....
(2)

(c) Find the value of $(7.6 \times 10^5) + (8.7 \times 10^4)$
Give your answer in standard form.

.....
(2)

(Total for question = 5 marks)

(Q07 1MA1/1H/M3, Specimen papers)

Q21.

(a) Write 2.673×10^4 as an ordinary number.

.....
(1)

(b) Write 0.0704 in standard form.

.....
(1)

(c) Calculate $(4.515 \times 10^6) \div (3.01 \times 10^{-2})$
Give your answer in standard form.

.....
(2)

(Total for question = 4 marks)

Q22.

(a) Write the number 0.000 075 47 in standard form.

.....
(1)

(b) Write 3.42×10^4 as an ordinary number.

.....
(1)

(c) Work out $\frac{2.3 \times 10^4 \times 6.7 \times 10^3}{5 \times 10^{-8}}$

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.....
(2)

(Total for question = 4 marks)

(Q27 1MA1/2F, Nov 2018)

Q23.

(a) Write 0.00562 in standard form.

.....
(1)

(b) Write 1.452×10^3 as an ordinary number.

.....
(1)

(Total for question = 2 marks)

(Q27 1MA1/2F, June 2019)

Q24.

Work out $(3.42 \times 10^{-7}) \div (7.5 \times 10^{-6})$
Give your answer in standard form.

.....
(Total for question = 2 marks)

(Q07 1MA1/2H, Nov 2019)

Q25.

(a) Write 32 460 000 in standard form.

.....
(1)

(b) Write 4.96×10^{-3} as an ordinary number.

.....
(1)

Asma was asked to compare the following two numbers.

$$A = 6.212 \times 10^8 \quad \text{and} \quad B = 4.73 \times 10^9$$

She says,

"6.212 is bigger than 4.73 so A is bigger than B ."

(c) Is Asma correct?

You must give a reason for your answer.

.....
.....
.....

(1)

(Total for question = 3 marks)

Q26.

Write these numbers in order of size.
Start with the smallest number.

$$6.72 \times 10^5 \quad 67.2 \times 10^{-4} \quad 672 \times 10^4 \quad 0.000\ 672$$

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(Total for question = 2 marks)

(Q09 1MA1/1H, Nov 2020)

Q27.

(a) Write 1.63×10^{-3} as an ordinary number.

.....
(1)

(b) Write 438 000 in standard form.

.....
(1)

(c) Work out $(4 \times 10^3) \times (6 \times 10^{-5})$
Give your answer in standard form.

.....
(2)

(Total for question = 4 marks)

(Q26 1MA1/1F, June 2022)

Q28.

(a) Write 468 000 in standard form.

(b) Write 5.037×10^{-4} as an ordinary number.

.....
(1)

.....
(1)

(Total for question = 2 marks)

(Q01 1MA1/3H, Nov 2023)

Q29.

(a) (i) Write 5.3×10^4 as an ordinary number.

.....
(1)

(ii) Write 7.4×10^{-5} as an ordinary number.

.....
(1)

(b) Calculate the value of $9.7 \times 10^6 + 2.45 \times 10^7$
Give your answer in standard form.

.....
(2)

(Total for question = 4 marks)

(Q23 1MA1/3F, June 2024)

Q30.

$$1.25 \times 10^{-12} = k \times (4 \times 10^{-20})$$

Work out the value of k .

Give your answer in standard form.

$k = \dots\dots\dots$

(Total for question = 2 marks)

(Q08 1MA1/2H, Nov 2024)

Q31.

(a) Write 3.402×10^5 as an ordinary number.

$\dots\dots\dots$
(1)

(b) Write 0.8026 in standard form.

$\dots\dots\dots$
(1)

(Total for question = 2 marks)

(Q02 1MA1/3H, Nov 2024)

Q32.

In May 2019, the distance between Earth and Mars was 3.9×10^7 km.

In May 2019, a signal was sent from Earth to Mars.

Assuming that the signal sent from Earth to Mars travelled at a speed of 3×10^5 km per second,

(a) how long did the signal take to get to Mars?

..... seconds

(2)

The speed of the signal sent from Earth to Mars in May 2019 was actually less than 3×10^5 km per second.

(b) How will this affect your answer to part (a)?

.....
.....
.....

(1)

(Total for question = 3 marks)

Q33.

In 2016 the population of the UK was 6.5×10^7

Laura wants to calculate an estimate for the population of the UK in 2020
She assumes that the population increases by 0.6% each year.

(a) Using Laura's assumption, calculate an estimate for the population of the UK in 2020

.....
(2)

Kieran also assumes that the population of the UK increases by 0.6% each year.

He says that it will take over 80 years for the population to increase by 50% because $\frac{50}{0.6} = 83.\dot{3}$

Kieran's method is wrong.

(b) Explain what is wrong with his method.

.....
.....
(1)

Assuming that the population of the UK increases by 0.6% each year,

(c) show that the population of the UK each year forms a geometric progression.

(2)

(Total for question = 5 marks)

Q34.

(a) Write the number 0.000 086 23 in standard form.

.....
(1)

$$\frac{3.2 \times 10^3 + 5.1 \times 10^{-2}}{4.3 \times 10^{-4}}$$

(b) Work out

Give your answer in standard form, correct to 3 significant figures.

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.....
(2)

(Total for question = 3 marks)

(Q07 1MA1/2H, Nov 2018)

Q35.

(a) Write 4.5×10^5 as an ordinary number.

.....
(1)

(b) Write 0.007 in standard form.

.....
(1)

(c) Work out $4.2 \times 10^3 + 5.3 \times 10^2$
Give your answer in standard form.

.....
(2)

(Total for question = 4 marks)

(Q23 1MA1/3F, Nov 2021)

Q36.

The table shows some information about eight planets.

Planet	Distance from Earth (km)	Mass (kg)
Earth	0	5.97×10^{24}
Jupiter	6.29×10^8	1.898×10^{27}
Mars	7.83×10^7	6.42×10^{23}
Mercury	9.17×10^7	3.302×10^{23}
Neptune	4.35×10^9	1.024×10^{26}
Saturn	1.28×10^9	5.68×10^{26}
Uranus	2.72×10^9	8.683×10^{25}
Venus	4.14×10^7	4.869×10^{24}

(a) Write down the name of the planet with the greatest mass.

.....
(1)

(b) Find the difference between the mass of Venus and the mass of Mercury.

..... kg
(1)

Nishat says that Neptune is over a hundred times further away from Earth than Venus is.

(c) Is Nishat right?

You must show how you get your answer.

(2)

(Total for question = 4 marks)

Q37.

Write the following numbers in order of size.
Start with the smallest number.

0.045×10^3

4.5×10^{-3}

450

0.45×10^{-1}

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(Total for question = 2 marks)

(Q10 1MA1/3H/M2, Specimen papers)

Q38.

$$T = \sqrt{\frac{w}{d^3}}$$

$$w = 5.6 \times 10^{-5}$$

$$d = 1.4 \times 10^{-4}$$

(a) Work out the value of T .

Give your answer in standard form correct to 3 significant figures.

$T = \dots\dots\dots$

(2)

w is increased by 10%
 d is increased by 5%

Lottie says,

"The value of T will increase because both w and d are increased."

(b) Lottie is wrong.

Explain why.

.....
.....

(2)

(Total for question = 4 marks)

Q39.

(a) Write 7.97×10^{-6} as an ordinary number.

(b) Work out the value of $(2.52 \times 10^5) \div (4 \times 10^{-3})$
Give your answer in standard form.

.....
(1)

.....
(2)

(Total for question = 3 marks)

(Q08 1MA1/1H, June 2017)

Q40.

Write the number 47 805 000 in standard form.

.....
(Total for question = 1 mark)

(Q11 1MA1/2H/M2, Specimen papers)

Q41.

(a) Write 340 000 000 in standard form.

.....

(1)

(b) Work out $(1.67 \times 10^{-7}) \div (9.11 \times 10^{-3})$

Give your answer as an ordinary number correct to 3 significant figures.

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.....

(2)

(Total for question = 3 marks)

(Q26 1MA1/3F/M1, Specimen papers)