

Name:

Date:

Marks:

7. Standard Form

Learning Objectives

Checklist Candidates should be able to:

- ☐ Use the standard form $A \times 10^n$ where n is a positive or negative integer, and $1 \leq A < 10$.
- ☐ Convert numbers into and out of standard form.
- ☐ Calculate with values in standard form.

No	Question	Reference
1	Evaluate $8 \times 10^9 - 9 \times 10^8$. Give your answer in standard form.	..... [2]
2	$p = 2.7 \times 10^{11}$ $q = 9 \times 10^{12}$ Evaluate $p + q$. Give your answer in standard form.	..... [1]
3	$P = 6 \times 10^{10}$ $Q = 5 \times 10^9$ Evaluate $P - Q$. Give your answer in standard form.	..... [1]
4	Giving your answer in standard form, evaluate $5.5 \times 10^7 - 2.1 \times 10^6$.	..... [2]
5	$s = 1.3 \times 10^7$ $t = 8 \times 10^8$ Evaluate $t - s$. Give your answer in standard form.	..... [2]
6	The mass of the Earth is 5.972×10^{24} kg. The mass of the Moon is 7.3×10^{22} kg. Find the total mass, in kg, of the Earth and the Moon. Give your answer in standard form.	..... kg [2]

No	Question	Reference
7	$p = 6 \times 10^8$ $q = 4 \times 10^7$ Evaluate $p - q$. Give your answer in standard form.	..... [1]
8	$p = 4 \times 10^5$ $q = 7 \times 10^6$ Evaluate $p + q$. Give your answer in standard form.	..... [1]
9	$p = 8 \times 10^5$ $q = 7 \times 10^3$ Evaluate $p - q$. Give your answer in standard form.	..... [2]
10	$p = 2.4 \times 10^2$ $q = 6 \times 10^3$ Evaluate $p + q$. Give your answer in standard form.	..... [1]
11	Giving your answer in standard form, evaluate $6 \times 10^{-4} + 8 \times 10^{-5}$ [1]

No	Question	Reference
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- 12 Tom estimated the population of five countries in 2020.
The table below shows these estimates.

Country	Population
Australia	2.35×10^7
Brazil	1.95×10^9
China	1.4×10^9
Japan	1.36×10^8
United Kingdom	6.9×10^7

- (a) Which country did he estimate would have a population about 20 times that of the United Kingdom?

..... [1]

- (b) How many more people did he estimate would be in Japan than in Australia?
Give your answer in standard form.

..... [2]

- 13 The Earth is 1.5×10^8 kilometres from the Sun.

- (a) Mercury is 5.81×10^7 kilometres from the Sun.

How much nearer is the Sun to Mercury than to the Earth?
Give your answer in standard form.

..... km [2]

- (b) A terametre is 10^{12} metres.

Find the distance of the Earth from the Sun in terametres.

..... terametres [2]

- 14 The population of a country is 3.2×10^6 .
There are 8×10^5 children.

Find the number of adults.
Give your answer in standard form.

..... [1]

No	Question	Reference
15	$p = 2.7 \times 10^{11}$ $q = 9 \times 10^{12}$ Evaluate $p \div q$. Give your answer in standard form.	..... [2]
16	$P = 6 \times 10^{10}$ $Q = 5 \times 10^9$ Evaluate PQ . Give your answer in standard form.	..... [1]
17	$N = 4 \times 10^5$ Giving your answers in standard form, find (a) N^2 , (b) $\frac{1}{N}$.	..... [2] [2]
18	$p = 8 \times 10^{-6}$ $q = 2 \times 10^{11}$ Evaluate the following, giving your answers in standard form. (a) $p \times q$ (b) $p \div q$ (c) $\sqrt[3]{p}$ [1] [1] [1]

No	Question	Reference
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19 The table below shows the approximate population of some countries in 2016 and their land areas.

Country	Population	Land area in km ²
Brazil	2.1×10^8	8.5×10^6
Greenland	5.6×10^4	2.2×10^6
Hong Kong	7.4×10^6	1.1×10^3
India		3.3×10^6
Nigeria	1.9×10^8	9.2×10^5

(i) The population of India was approximately 130 000 000.

In the table above complete the row for India.
Write the number in standard form.

..... [1]

(ii) Calculate the **total** land area of India and Nigeria.
Give your answer in standard form.

..... km² [2]

(iii) Which country in the table has the smallest population per km²?

..... [1]

20 $N = 2 \times 10^8$

Giving your answers in standard form, find the value of

(i) $N \times 700$,

..... [1]

(ii) $\frac{1}{N}$.

..... [2]

No	Question	Reference
21	$p = 5 \times 10^9$ $q = 9 \times 10^{-16}$ Expressing each answer in standard form, find (i) $p \times q$, [1] (ii) \sqrt{q} [1]	
22	$s = 1.3 \times 10^7$ $t = 8 \times 10^8$ Evaluate t^2 . Give your answer in standard form. [1]	
23	Expressing your answer in standard form, evaluate $(4 \times 10^{-5}) \times (6 \times 10^{-4})$ [2]	
24	$p = 6 \times 10^8$ $q = 4 \times 10^7$ Evaluate $p \times q$. Give your answer in standard form. [1]	
24	$p = 4 \times 10^5$ $q = 7 \times 10^6$ Evaluate p^2 . Give your answer in standard form. [1]	
25	Giving your answer in standard form, evaluate $(6 \times 10^7) \times (5 \times 10^{-3})$ [1]	

No	Question	Reference
26	$p = 8 \times 10^5$ $q = 7 \times 10^3$ Evaluate pq . Give your answer in standard form.	<p>..... [1]</p>
27	One molecule of water is made up of two atoms of hydrogen and one atom of oxygen. The mass of one atom of hydrogen is 1.67×10^{-24} g. The mass of one atom of oxygen is 2.66×10^{-23} g. Calculate the mass of one molecule of water. Give your answer in standard form.	<p>..... g [2]</p>
28	Calculate $(3 \times 10^5) \div (6 \times 10^{-2})$, giving your answer in standard form.	<p>..... [1]</p>
29	Find $(5 \times 10^8) \times (2.4 \times 10^{-3})$. Give your answer in standard form.	<p>..... [1]</p>
30	$p = 2.4 \times 10^2$ $q = 6 \times 10^3$ Evaluate $2p \div q$. Giving your answers in standard form, find	<p>..... [2]</p>

No	Question	Reference
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- 31 The table shows information about the annual coffee production of some countries in 2010.

Country	Number of bags per year
Brazil	
Vietnam	1.85×10^7
Colombia	9.2×10^6
Indonesia	8.5×10^6

- (a) In 2010, Brazil produced 48 million bags of coffee.

Complete the table with the coffee production for Brazil, using standard form. [1]

- (b) How many more bags of coffee were produced in Vietnam than in Colombia?

..... g [2]

- (c) The mass of a bag of coffee is 60 kg.

Work out the number of kilograms of coffee produced in Indonesia.
Give your answer in standard form.

..... kg [1]

- 32 Expressing your answer in standard form, find $(5 \times 10^8) \times (4 \times 10^7)$.

..... [1]

- 33 A swarm of locusts contains 40 billion locusts.
A billion is a thousand million.

- (a) Write down, in standard form, the number of locusts in this swarm.

..... [1]

- (b) Each locust eats 2 grams of food every day.

Find the amount of food eaten by this swarm in one week.
Give your answer in **kilograms** using standard form.

..... kg [2]

No	Question	Reference
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- 34 The table below shows the populations of some countries in 2010.

Country	Population
Senegal	1.4×10^7
South Korea	4.8×10^7

Calculate the difference in population between South Korea and Senegal.
Give your answer in standard form.

..... [1]

- 35 A large tank contained 2.3×10^6 litres of oil.
During a 4 week period, 1.2×10^5 litres were used.

(a) Calculate how many litres of oil remain in the tank after the 4 weeks.
Give your answer in standard form.

..... [1]

(b) Giving your answer in standard form, calculate the average number of litres used each week.

..... [1]

- 36 Calculate $(7 \times 10^{-3}) \times (3 \times 10^9)$, giving your answer in standard form.

..... [1]

- 37 (a) Vicky's fingernail grows one nanometre in one second.
One nanometre is 1×10^{-9} metres.
Vicky calculates how much her fingernail grows in one hour.
Find this length, in standard form, giving your answer

(i) in metres,

..... m [1]

(ii) in millimetres.

..... mm [1]

- (b) It is given that $2 \times 10^3(d + 3 \times 10^2) = 8 \times 10^6$.

Find d .

$d =$ [2]

No	Question	Reference
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- 38 The table shows the amount of rice grown in some countries in 2002.

	China	Brazil	India	Vietnam
Amount (tonnes)	1.2×10^8	7.6×10^6	8.0×10^7	2.1×10^7

Calculate the difference in the amount of rice grown in Brazil and Vietnam.
Give your answer in standard form.

..... tonnes [1]

- 39 Some data about two planets, Earth and Mars, is shown in the table.

Planet	Average temperature (°C)	Mass (tonnes)	Volume (km ³)
Earth	15	5.98×10^{21}	1.08×10^{12}
Mars	-63	6.58×10^{20}	162 000 million

- (a) Write down the volume of Mars in standard form.

..... km³ [1]

- (b) Calculate the difference in mass between Earth and Mars.
Give your answer in standard form.

.....tonnes [2]

- 40 Evaluate $(6.3 \times 10^6) \div (9 \times 10^2)$, giving your answer in standard form.

..... [2]

- 41 It is given that $m = 2.1 \times 10^7$ and $n = 3 \times 10^4$.
Expressing your answers in standard form, find

- (a) $m \div n$,

..... [1]

- (b) $n^2 + m$.

..... [2]

No	Question	Reference
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- 42 It is given that $p = 4 \times 10^5$ and $q = 8 \times 10^6$.
Expressing your answers in standard form, find

(i) $\frac{p}{q}$,

..... [1]

(ii) $\sqrt[3]{q}$.

..... [1]

- 43 The distance from the Earth to the Sun is e kilometres, where $e = 1.5 \times 10^8$.
The distance from the Sun to Mercury is m kilometres, where $m = 6 \times 10^7$.



The diagram shows when the Earth, the Sun and Mercury are in a straight line, with the Sun between the Earth and Mercury.
Find the distance from the Earth to Mercury.
Give your answer in standard form.

..... km [2]

- 44 $p = 3.2 \times 10^{11}$ and $q = 8 \times 10^{-4}$.
Expressing your answers in standard form, evaluate

(a) q^2 ,

..... [1]

(b) $p \div q$.

..... [1]

No	Question	Reference
45	Giving your answer in standard form, evaluate $\frac{2.4 \times 10^{-8}}{4 \times 10^{-3}}$.	..... [2]
46	Giving your answer in standard form, evaluate $\frac{1.5 \times 10^5}{5 \times 10^{-5}}$.	..... [2]
47	Giving your answer in standard form, evaluate $\frac{3 \times 10^{-5}}{5 \times 10^6}$.	..... [2]
48	Giving your answer in standard form, evaluate $\frac{4.2 \times 10^{-2}}{3 \times 10^4}$.	..... [2]

Nos	Answers	Nos	Answers
1	2.3×10^{-4}	23	2.4×10^{16}
2	9.27×10^{12}	24	1.6×10^{11}
3	5.5×10^{10}	25	3.0×10^5
4	5.29×10^7	26	5.6×10^9
5	7.87×10^8	27	2.99×10^{-23}
6	6.045×10^{24}	28	5.0×10^6
7	5.6×10^8	29	1.2×10^6
8	7.4×10^6	30	8.0×10^{-2}
9	7.93×10^5	31 (a)	4.8×10^7
10	6.24×10^3	(b)	9.3×10^6
11	6.80×10^{-4}	(c)	5.1×10^8
12 (a)	China	32	2.0×10^{16}
(b)	1.125×10^8	33 (a)	4.0×10^{10}
13 (a)	9.19×10^7	(b)	5.6×10^8
(b)	0.15 terameters	34	3.4×10^7
14	2.4×10^6	35 (a)	2.18×10^6
15	3.0×10^{-2}	(b)	3.0×10^4
16	3.0×10^{20}	36	2.1×10^7
17 (a)	1.6×10^{11}	37 (a) (i)	3.6×10^{-6}
(b)	2.5×10^{-6}	(ii)	3.6×10^{-3}
18 (a)	1.6×10^6	(b)	3700
(b)	4×10^{-17}	38	1.34×10^7
(c)	2×10^{-2}	39 (a)	1.62×10^{11}
19 (i)	1.3×10^8	(b)	5.322×10^{21}
(ii)	4.22×10^6	40	7×10^3
(iii)	Greenland	41 (a)	7×10^2
20 (i)	1.4×10^{11}	(b)	9.21×10^8
(ii)	5×10^{-9}	42 (i)	5×10^{-2}
21 (i)	4.5×10^{-6}	(ii)	2×10^2
(ii)	3×10^{-8}	43	2.1×10^8
22	6.4×10^{17}		

Nos	Answers	Nos	Answers
44 (a)	6.4×10^{-7}	46	3×10^9
(b)	4×10^{14}	47	6×10^{-12}
45	6×10^{-6}	48	1.4×10^{-6}