Calculations with Standard Form

'Do Now' Tracker

Solving Equations	1	2	3	4
Laws of Indices	1	2	3	4
Times Tables	1	2	3	4
Calculate Cleverly	1	2	3	4

→ **9.6** Straight Line Graphs → **9.7** Calculations with Standard Form → **9.8** Volume and Surface Area →

1. Solve:

$5x + 2 = 2x + 14$

2. Simplify:

$10^4 \times 10^{-8}$

1

3.

×				
6			42	
	27			0
	18		14	
		64		

4. Calculate cleverly:

$2.8 \times 13 + 7.2 \times 13$

1. Solve:

$5x + 2 = 22 + x$

2. Simplify:

1000×10^8

2

3.

×	7		1	
	49			
9		81		
			1	
20				400

4. Calculate cleverly:

$3.6 \times 57 + 5.7 \times 64$

1. Solve:

$2 - 3x = 2x - 18$

2. Simplify:

0.01×10^{11}

3

3.

×	0.5	0.25	1.5	
1				
2				
			9	
4				10

4. Cleverly, find the mean

$4300, 4300, 4298, 4306$

1. Solve:

$2 - 3x = 20 - 9x$

2. Simplify:

$10^{-4} \times 10^{7} \times 0.001$

4

3.

×				
11	132			
12		6		
15			-15	
20				4

4. Cleverly, find the mean

$2.5, 2.6, 2.8, 4.1$

Task 1: Converting To and From Standard Form

*Jo has answered these questions **correctly**.*

a. Convert 31 000 000 to standard form.

$31\,000\,000 = 3.1 \times 10\,000\,000$

$= 3.1 \times 10^{7}$

b. Write 2.6×10^{-5} as an ordinary number.

$2.6 \times 10^{-5} = 2.6 \times 0.00001$

$= 0.000026$

Read the examples then answer the following.

1. Jo's friend says the answer is 31×10^{6}. Explain why Jo's friend is incorrect.

2. What if Jo were asked to convert 310 000 000?

3. What number would be 3.1×10^{-4} when written in standard form?

Task 2: Fill in the gaps

Ordinary Number	Standard Form
64000	
64	
0.64	
0.000064	
0.000046	

Ordinary Number	Standard Form
	0.0000461
	4610000
	7.52×10^{4}
	7.52×10^{-4}
	7.502×10^{-4}

Task 3: Explain why each number is not in standard form

65×10^{3}	
6.5×3^{10}	
$6.5 \times 10^{3.8}$	
0.65×10^{3}	
$6.5 + 10^{3}$	

Task 4: Converting and Adding in Standard Form

Question	Calculation	Answer	…in S. Form
$3\times10^4+2\times10^3$	$30000+2000$	32000	3.2×10^4
$5.4\times10^3-6\times10^2$			
	$500+6000$		
$9\times10^{-4}+4\times10^{-3}$			
	$0.03-0.024$		
		0.00087	
			2.8×10^3
$3\times10^3+2\times10^5$			
$3\times10^{43}+2\times10^{45}$			

Task 5: Adding in Standard Form Without Converting

*Toby has answered this question **correctly**.*

Calculate $3\times10^{43}+2\times10^{45}$, leaving your answer in standard form.

Toby

$$3\times10^{43}+2\times10^{45}$$
$$=3\times10^{43}+200\times10^{43}$$
$$=203\times10^{43}$$
$$=2.03\times100\times10^{43}$$
$$=2.03\times10^{45}$$

Toby's Friend

$$3\times10^{43}+2\times10^{45}$$
$$=\_\_\_\_\_\times10^{45}+2\times10^{45}$$
$$=$$

Read the examples then answer the following.

1. Why did Toby not leave his final answer as 203×10^{43}?

2. Explain why 2×10^{45} is equal to 200×10^{43}.

3. What if the question was to calculate $3\times10^{43}+2\times10^{46}$

4. Toby's friend uses a slightly different method for the same question. Complete her answer. Which method do you prefer? Why?

Task 6: Adding and Subtracting in Standard Form

$3\times10^{43}+2\times10^{45}$	
$3\times10^{45}+2\times10^{43}$	
$3\times10^{46}+2\times10^{43}$	
$3\times10^{46}-2\times10^{43}$	
$3.9\times10^{46}+2\times10^{43}$	
$3.9\times10^{44}+2\times10^{43}$	
$3.9\times10^{-44}+2\times10^{-43}$	
$3.9\times10^{-44}+9.2\times10^{-43}$	
$3.9\times10^{-44}+9.7\times10^{-43}$	
$3.9\times10^{-45}+9.7\times10^{-43}$	
$3.9\times10^{-45}+9.97\times10^{-43}$	

$6\times10^{19}+4\times10^{21}$	
$6\times10^{21}+2\times10^{19}$	
$6\times10^{21}+2\times10^{18}$	
$6\times10^{21}-2\times10^{18}$	
$6\times10^{21}+2.1\times10^{18}$	
$6\times10^{17}+2.1\times10^{18}$	
$6\times10^{-17}+2.1\times10^{-18}$	
$6.3\times10^{-17}+2.1\times10^{-18}$	
$6.3\times10^{-17}+8.1\times10^{-18}$	
$6.3\times10^{-16}+8.1\times10^{-18}$	
$6.03\times10^{-16}-8.1\times10^{-18}$	

+	7×10^{8}	4×10^{9}	6.2×10^{8}
2×10^{8}	9×10^{8}		
8×10^{7}			
3.9×10^{8}			

−	7×10^{8}	4×10^{9}	6.2×10^{8}
2×10^{8}	5×10^{8}		
8×10^{7}			
3.9×10^{8}			

+	6×10^{14}		
	9×10^{14}		8.7×10^{14}
		2.09×10^{15}	
		2.15×10^{15}	7.2×10^{14}

−			
4×10^{-4}	1.6×10^{-3}		
	1.95×10^{-3}	6.5×10^{-4}	
		5.2×10^{-4}	6.4×10^{-4}

Task 7: Adding and Subtracting in Standard Form – Completion Tables

A	B	$A+B$	$A-B$
4×10^{17}	7×10^{16}		
	7×10^{16}	4×10^{17}	
	7×10^{16}		4×10^{17}
9.4×10^{17}	7×10^{16}		
	7×10^{16}	9.4×10^{17}	
	7×10^{16}		9.4×10^{17}
5.4×10^{17}	4.6×10^{16}		
	4.6×10^{16}	5.4×10^{17}	
	4.6×10^{16}		5.4×10^{17}
4.6×10^{16}		5.4×10^{16}	
		5.4×10^{16}	4.6×10^{16}

a	b	$a+b$	$a-b$	$a\times b$	$a\div b$
6×10^{17}	2×10^{17}				
	2×10^{17}	6×10^{17}			
	2×10^{17}		6×10^{17}		
	2×10^{17}			6×10^{34}	
	2×10^{17}				6
6×10^{18}	2×10^{17}				
4×10^{-13}	5×10^{-14}				
	5×10^{-14}	4×10^{-13}			
	5×10^{-14}		4×10^{-13}		
	5×10^{-14}			4×10^{-26}	
	5×10^{-14}				4
4×10^{-12}	5×10^{-14}				

Task 8: Standard Form Calculations

A	A^2	$5A$	25% of A	$\frac{2}{5}$ of A	A^{-1}
4×10^4					
	4×10^4				
		4×10^4			
			4×10^4		
				4×10^4	
					4×10^4

Task 9: Standard Form Sequences

Find the next three terms of each arithmetic sequence:

a) $2\times10^3, 6\times10^3$

b) $2\times10^3, 2\times10^4$

c) $2\times10^3, 2.4\times10^3$

d) $2\times10^3, 3\times10^4$

e) $2\times10^3, 1.8\times10^4$

f) $2\times10^3, 1.8\times10^3$

g) $2\times10^3, 2\times10^5$

h) $2\times10^3, 2\times10^2$

i) $2\times10^{-2}, 6\times10^{-2}$

j) $2\times10^{-3}, 1.2\times10^{-2}$

Ext: Find the nth term of each sequence

Task 10: Solving Equations with Standard Form

1) $x + 3\times10^6 = 5\times10^6$ — $x =$

2) $0.7x + 3.3\times10^6 = 5.4\times10^6$ — $x =$

3) $1.3x - 3.7\times10^{-3} = 5.4\times10^{-3}$ — $x =$

4) $(2.3\times10^3)x = 9.2\times10^{-5}$ — $x =$

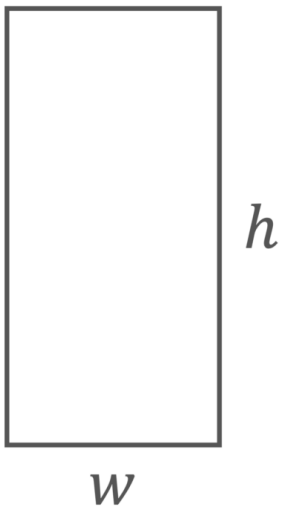
5) $(6.1\times10^{11})x = 1.92\times10^6 - (3.5\times10^{11})x$ — $x =$

6) $3\times10^{-2} + 5x = 3x + 8\times10^{-2}$ — $x =$

Task 11: Standard Form with Area and Perimeter **By @jshmtn**

Fill in the gaps, giving all answers in standard form.

	w	h	Area	Perimeter
1)	3×10^6	4×10^6		
2)	9×10^5	1.2×10^6		
3)		3×10^4	2.4×10^8	
4)	3×10^5			6.6×10^6
5)		3×10^4	6×10^7	
6)			6×10^{12}	1×10^7



Task 12: Standard Form Optimisation

1) Using the digits from 1 to 9 at most once each, fill in the gaps to give the largest possible answer: $\square \times 10^{\square} + \square \times 10^{\square}$	2) Using the digits from 1 to 9 at most once each, fill in the gaps to give the largest possible answer: $\square \times 10^{\square} - \square \times 10^{\square}$
3) Using the digits from 1 to 9 at most once each, fill in the gaps to give an answer as close as possible to 40 000: $\square \times 10^{\square} + \square \times 10^{\square}$	4) Using the digits from 1 to 9 at most once each, fill in the gaps to give an answer as close as possible to 40 000: $\square \times 10^{\square} - \square \times 10^{\square}$
5) Using the digits from 1 to 9 at most once each, fill in the gaps to give an answer as close as possible to 40 000: $\square.\square \times 10^{\square} + \square \times 10^{\square}$	6) Using the digits from 1 to 9 at most once each, fill in the gaps to give an answer as close as possible to 40 000: $\square.\square \times 10^{\square} - \square \times 10^{\square}$