Standard form — Scientific Notation.

A number in standard form will be in the form $a \times 10^n$, where $1 \leq a < 10$, and n is an integer

a is the number which is a value greater than or equal to 1 and less than 10

n is the number of times the decimal point moves.

Eg 1)   1234 write in standard form

1 2 3 4.

move the decimal point to get a number between 1 and 10

$a \times 10^n$

1.234×10^3

Eg 2)   245,000

2.45×10^5

$a \times 10^n$

Eg 3) Numbers less than 1

0.05 → move decimal to the right. the power will be negative.

Ans = 5×10^{-2}

Eg 4)   0.008

8×10^{-3}

CIW Pg 131 Q1→ 8

T&T3 5.9

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PROJECT MATHS
Text & Tests
Leaving 3 Certificate

Section 5.9 Working with numbers in standard form

Example 1

Express each of these in standard form:

(i) $2.76 \times 10^3 - 5.9 \times 10^2$

(ii) $\dfrac{(6 \times 10^3) \times (4.5 \times 10^4)}{1.2 \times 10^4}$

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Calculator [SHIFT] [log] $10^{\square}$

1. Write each of the following as a decimal number:
   - (i) 6×10^2
   - (ii) 4.5×10^2
   - (iii) 6.8×10^3
   - (iv) 5.1×10^4
   - (v) 6.7×10^4
   - (vi) 5.16×10^2
   - (vii) 7.05×10^3
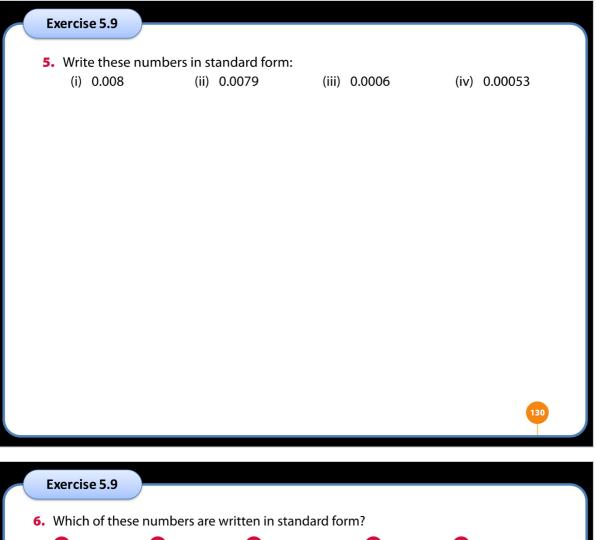   - (viii) 1.86×10^4

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2. Write each of these numbers in standard form:
   - (i) 400
   - (ii) 580
   - (iii) 6200
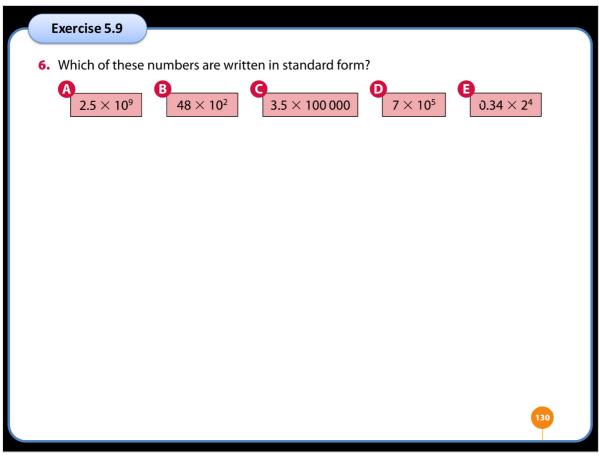   - (iv) 5700
   - (v) 60 000
   - (vi) 76 000
   - (vii) 92 000
   - (viii) 720 000

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3. Change these numbers to decimal form:
    (i) 2.5×10^{-1} (ii) 6×10^{-2} (iii) 4.8×10^{-3} (iv) 9.2×10^{-4}

4. Write these numbers in standard form:
    (i) 0.04   (ii) 0.062   (iii) 0.007   (iv) 0.0065

5. Write these numbers in standard form:

(i) 0.008   (ii) 0.0079   (iii) 0.0006   (iv) 0.00053

6. Which of these numbers are written in standard form?

A 2.5×10^9 **B** 48×10^2 **C** $3.5 \times 100\,000$ **D** 7×10^5 **E** 0.34×2^4

7. Work these out and express your answers as decimal numbers:

(i) $3.8 \times 10^2 + 1.7 \times 10^3$

(ii) $1.76 \times 10 + 6.43 \times 10^2$

(iii) $8.4 \times 10^3 - 1.7 \times 10^2$

(iv) $6.64 \times 10^2 - 9.4 \times 10$

8. Evaluate each of the following and give your answers in standard form:

(i) $(3.6 \times 10^2) \times (1.5 \times 10^3)$

(ii) $(4.6 \times 10^2) \times (3.7 \times 10^{-1})$

(iii) $(3.64 \times 10^{-2}) \times (9 \times 10^4)$

(iv) $(1.8 \times 10^{-4}) \times (8 \times 10^5)$

9. Write each of these in the form $a \times 10^n$, where $1 \leqslant a < 10$, $n \in Z$:

(i) $\dfrac{8.4 \times 10^5}{1.2 \times 10^2}$

(ii) $\dfrac{9 \times 10^4}{1.5 \times 10^2}$

(iii) $\dfrac{4.48 \times 10^3}{8 \times 10^{-1}}$

10. Write these in standard form:

(i) $\dfrac{1.4 \times 10^3 + 5.6 \times 10^2}{7 \times 10^{-1}}$

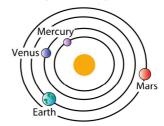(ii) $\dfrac{(6.4 \times 10^2) + (8.2 \times 10^4)}{1.033 \times 10^2}$

11. Work out each of these without using a calculator.
Give your answer in standard form.

(i) $(5.4 \times 10^5) \times (3 \times 10^2)$

(ii) $\dfrac{4 \times 10^3}{8 \times 10^5}$

(iii) $\dfrac{4 \times 10^5}{5 \times 10^8}$

(iv) $\dfrac{1.6 \times 10^9}{8 \times 10^7}$

(v) $\dfrac{8 \times 10^4}{1.6 \times 10^5}$

(vi) $\dfrac{4.8 \times 10^{-2}}{3 \times 10^3}$

12. The Earth's diameter is 1.27×10^4 km and the diameter
of Mars is 6.8×10^3 km.

(i) Which planet has the larger diameter?

(ii) What is the difference between their diameters?

(iii) What is the total if the two diameters are added?
Give your answer in standard form.

13. Express $\dfrac{1.2 \times 10^8 \times 3.6 \times 10^5}{1.8 \times 10^9}$ in standard form.

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14. Calculate the value of $\dfrac{5.1 \times 10^8 + 19 \times 10^7}{1.4 \times 10^{12}}$ and write your answer as a decimal number.

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15. This table shows the organised religions
with most members in the year 2000.
  (i) Write the number of Buddhists
       in decimal form.
 (ii) Which religion had the most members?
(iii) Which religion had the fewest members?
 (iv) The number of members of one religion
       is slightly more than half the number of
       members of another religion.
       Which two religions are they?

Religion	Members
Buddhism	3.4×10^8
Christianity	1.92×10^9
Confucianism	6.37×10^6
Hinduism	7.67×10^8
Islam	1.04×10^9

16. Write each of these as decimal numbers:

(i) $\dfrac{6.8 \times 10^3 - 5.2 \times 10^2}{3.2 \times 10^2}$

(ii) $\dfrac{1.12 \times 10^{-2} \times 9.8 \times 10^5}{1.4 \times 10^2}$

1. (i) 600   (ii) 450   (iii) 6800
   (iv) 51 000   (v) 67 000   (vi) 516
   (vii) 7050   (viii) 18 600

2. (i) 4×10^2 (ii) 5.8×10^2
   (iii) 6.2×10^3 (iv) 5.7×10^3
   (v) 6×10^4 (vi) 7.6×10^4
   (vii) 9.2×10^4 (viii) 7.2×10^5

3. (i) 0.25   (ii) 0.06
   (iii) 0.0048   (iv) 0.00092

4. (i) 4×10^{-2} (ii) 6.2×10^{-2}
   (iii) 7×10^{-3} (iv) 6.5×10^{-3}

5. (i) 8×10^{-3} (ii) 7.9×10^{-3}
   (iii) 6×10^{-4} (iv) 5.3×10^{-4}

6. A, D

7. (i) 2080   (ii) 660.6
   (iii) 8230   (iv) 570

8. (i) 5.4×10^5 (ii) 1.702×10^2
   (iii) 3.276×10^3 (iv) 1.44×10^2

9. (i) 7×10^3 (ii) 6×10^2
   (iii) 5.6×10^3

10. (i) 2.8×10^3 (ii) 8×10^2

11. (i) 1.62×10^8 (ii) 5×10^{-3}
    (iii) 8×10^{-4} (iv) 2×10^1
    (v) 5×10^{-1} (vi) 1.6×10^{-5}

12. (i) Earth   (ii) 5900 km
    (iii) 1.95×10^4

13. 2.4×10^4

14. 0.0005

15. (i) 340,000,000
    (ii) Christianity
    (iii) Confucianism
    (iv) Islam and Christianity

16. (i) 19.625   (ii) 78.4