



Integers, Powers and Roots (H)

Intervention Booklet

Laws of Indices

Things to remember:

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

$$(a^m)^n = a^{mn}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

Questions:

1. (a) Simplify $m^5 \div m^3$

.....
(1)

(b) Simplify $5x^4y^3 \times x^2y$

.....
(2)

(Total for Question is 3 marks)

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

5^{-1}

0.5

-5

5^0

.....
(Total for Question is 2 marks)

3. Write down the value of $125^{\frac{2}{3}}$

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

4. (a) Write down the value of 10^{-1}

.....
(1)

(b) Find the value of $27^{\frac{2}{3}}$

.....
(2)

(Total for Question is 3 marks)

5. (a) Find the value of 5°

.....
(1)

(b) Find the value of $27^{1/3}$

.....
(1)

(c) Find the value of 2^{-3}

.....
(1)

(Total for Question is 3 marks)

6. (a) Write down the value of $27^{1/3}$

.....
(1)

(b) Find the value of $25^{-1/2}$

.....
(2)

(Total for Question is 3 marks)

7. (a) Write down the value of $64^{1/2}$

.....
(1)

(b) Find the value of $\left(\frac{8}{125}\right)^{-2/3}$

.....
(2)

(Total for question = 3 marks)

8. (a) Write down the value of 6^0

.....
(1)

(b) Work out $64^{2/3}$

.....
(2)

(Total for question = 3 marks)

Standard Form

Things to remember:

- $a \times 10^b$



$1 \leq a < 10$

1. A floppy disk can store 1 440 000 bytes of data.
(a) Write the number 1 440 000 in standard form.

.....
(1)

A hard disk can store 2.4×10^9 bytes of data.

- (b) Calculate the number of floppy disks needed to store the 2.4×10^9 bytes of data.

.....
(3)
(Total 4 marks)

2. A nanosecond is 0.000 000 001 second.
(a) Write the number 0.000 000 001 in standard form.

.....
(1)

A computer does a calculation in 5 nanoseconds.

- (b) How many of these calculations can the computer do in 1 second?
Give your answer in standard form.

.....
(2)
(Total 3 marks)

3. (a) (i) Write 40 000 000 in standard form.
(ii) Write 3×10^{-5} as an ordinary number.

.....
.....
(2)

- (b) Work out the value of
 $3 \times 10^{-5} \times 40\,000\,000$
Give your answer in standard form.

.....
(2)
(Total 4 marks)

4. Work out $(3.2 \times 10^5) \times (4.5 \times 10^4)$
Give your answer in standard form correct to 2 significant figures.

.....
(Total 2 marks)

5. (a) Write the number 40 000 000 in standard form.

.....
(1)

- (b) Write 1.4×10^{-5} as an ordinary number.

.....
(1)

- (c) Work out
 $(5 \times 10^4) \times (6 \times 10^9)$
Give your answer in standard form.

.....
(2)
(Total 4 marks)

6. Write in standard form

- (a) 456 000

.....
(1)

- (b) 0.00034

.....
(1)

- (c) 16×10^7

.....
(1)
(Total 3 marks)

7. (a) Write 5.7×10^{-4} as an ordinary number.

.....
(1)

- (b) Work out the value of $(7 \times 10^4) \times (3 \times 10^5)$
Give your answer in standard form.

.....
(2)
(Total 3 marks)

8. (a) Write 30 000 000 in standard form.

 (1)
- (b) Write 2×10^{-3} as an ordinary number.

 (1)
- (Total 2 marks)**

9. (a) (i) Write 7900 in standard form.

- (ii) Write 0.00035 in standard form.

- (2)**

- (b) Work out $\frac{4 \times 10^3}{8 \times 10^{-5}}$
 Give your answer in standard form.

- (2)**
- (Total 4 marks)**

10. Work out

$$\frac{2 \times 2.2 \times 10^{12} \times 1.5 \times 10^{12}}{2.2 \times 10^{12} - 1.5 \times 10^{12}}$$
 Give your answer in standard form correct to 3 significant figures.

- (Total 3 marks)**
11. (a) Write 6.4×10^4 as an ordinary number.

- (b) Write 0.0039 in standard form.

- (c) Write 0.25×10^7 in standard form.

- (1)**
- (Total 3 marks)**

Surds

Things to remember:

- $\sqrt{\quad}$ means square root;
- To simplify surds, find all its factors;
- To rationalise the denominator, find an equivalent fraction where the denominator is rational.

Questions:

1. Work out

$$\frac{(5 + \sqrt{3})(5 - \sqrt{3})}{\sqrt{22}}$$

Give your answer in its simplest form.

.....
(Total 3 marks)

2. (a) Rationalise the denominator of $\frac{1}{\sqrt{3}}$

.....
(1)

(b) Expand $(2 + \sqrt{3})(1 + \sqrt{3})$
Give your answer in the form $a + b\sqrt{5}$ where a and b are integers.

.....
(2)
(Total 3 marks)

3. (a) Rationalise the denominator of $\frac{1}{\sqrt{7}}$

.....
(2)

(b) (i) Expand and simplify $(\sqrt{3} + \sqrt{15})^2$
Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

.....

(ii) All measurements on the triangle are in centimetres.
 ABC is a right-angled triangle.
 k is a positive integer.

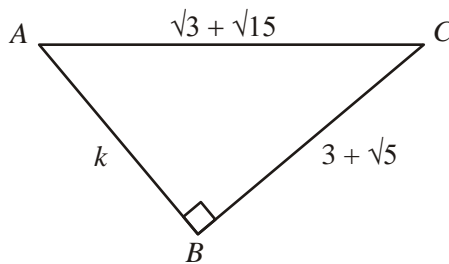


Diagram **NOT**
accurately drawn

Find the value of k .

$k =$

(5)
(Total 7 marks)

4. Expand and simplify $(\sqrt{3} - \sqrt{2})(\sqrt{3} - \sqrt{2})$

.....
(Total 2 marks)

5. (a) Write down the value of $49^{1/2}$

.....
(1)

(b) Write $\sqrt{45}$ in the form $k\sqrt{5}$, where k is an integer.

.....
(1)
(Total 2 marks)

6. Write $\frac{\sqrt{18} + 10}{\sqrt{2}}$ in the form $a + b\sqrt{2}$ where a and b are integers.

$a =$

$b =$

(Total 2 marks)

7. Expand and simplify $(2 + \sqrt{3})(7 - \sqrt{3})$
Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

.....
(Total 3 marks)

8. Rationalise the denominator of $\frac{(4 + \sqrt{2})(4 - \sqrt{2})}{\sqrt{7}}$
Give your answer in its simplest form.

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

9. Show that $\frac{(4 - \sqrt{3})(4 + \sqrt{3})}{\sqrt{13}}$ simplifies to $\sqrt{13}$

(Total for question = 2 marks)