

Index Notation, Square and Cube Numbers - Worksheet

Skill

Group A - Square and cube numbers

Find the value of:

1) 2^2

2) 3^2

3) 2^3

4) 3^3

5) 5^2

6) 8^2

7) 10^3

8) $2^2 \times 2^2$

9) 4^3

10) 3×2^3

11) $3^2 \times 2^3$

12) $\frac{3^3}{3^2}$

Group B - Simplifying expressions involving indices

Simplify fully the expression using index notation:

1) 2×2

2) $3 \times 3 \times 3 \times 3$

3) $4 \times 4 \times 4 \times 4 \times 4$

4) $2^3 \times 2^5$

5) $3 \times 3^3 \times 3^2 \times 3^4$

6) $4^3 \times 4^4 \times 4 \times 4^{-2}$

7) $2x^2 \times 4x \times 3x^4$

8) $12x^5 \div 4x^3$

9) $\frac{21x^8}{3x}$

10) $20x^{10} \div 5x^5$

11) $(4x^3)^3$

12) $(8x^3y^4)^2$

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Group C - Index Notation

Simplify fully the expression using index notation:

1) $3x \times 3x \times 3x$

2) $3x^{-1} \times 3x^{-1} \times 3x^{-1}$

3) $3x \times 3x \times 3x^{-2}$

4) $\frac{10x^8}{20x^{10}}$

5) $\frac{20x^8}{10x^{10}}$

6) $\frac{100x^{10}}{200x^8}$

7) $\left(64x^{\frac{1}{2}}\right)^{\frac{1}{2}}$

8) $\frac{3ax^6y^4}{xy}$

9) $2x^{\frac{2}{3}} \times 3x^{\frac{1}{2}}$

10) $x^{\frac{1}{2}} \times x^{\frac{1}{2}}$

11) $x^{\frac{2}{3}} \times x^{\frac{2}{3}}$

12) $(144x^2)^{\frac{1}{2}}$

Index Notation, Square and Cube Numbers - Worksheet

Applied

- 1) (a) The length of a side of a square is 10cm .
What is the area of the square?

(b) The length of one edge of a cube is 4cm .
What is the volume of the cube?

- 2) (a) Lyra says “6 squared is 12”.
Why is Lyra incorrect?

(b) Ahmed says “the cube root of -8 is 2”.
Why is Ahmed incorrect?

- 3) (a) Between which integer values does the square root of 45 lie?

(b) Find the value of $x^{-1} \times x^1$.

- 4) (a) $c^a \times c^b = c^{10}$ where a and b are different positive integers. List the possible values of a and b .

(b) What is 1 to the power of 100?

Index Notation, Square and Cube Numbers - Exam Questions

1) (a) Find the value of $\sqrt{81}$

.....
(1)

(b) Find the value of $\sqrt{225}$

.....
(1)

(c) Find the value of 13^2

.....
(1)

(d) Find the value of x^0

.....
(1)
(4 marks)

2) (a) Simplify
 $4x^2 \times x \times 2x^7$

.....
(2)

(b) Simplify $\frac{35x^{12}}{7x^5}$

.....
(2)

(c) Simplify $(3x^3)^3$

.....
(2)
(6marks)

3) (a) Simplify $\frac{x^5 \times 20x^6}{4x^8}$

.....
(2)

(b) Simplify
 $10x^{\frac{1}{4}} \times \frac{1}{2}x^{\frac{1}{5}}$

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

Index Notation, Square and Cube Numbers - Exam Questions

4) (a) $8 = 2^n$

Find the value of n .

.....
(1)

(b)
$$\frac{a^k \times a^{2k}}{\sqrt{a}} = a^n$$

Find the value of n in
terms of k .

.....
(4)
(5 marks)

Index Notation, Square and Cube Numbers - Answers

	Question	Answer
Group A	Skill questions	
	Find the value of:	
	1) 2^2	1) 4
	2) 3^2	2) 9
	3) 2^3	3) 8
	4) 3^3	4) 27
	5) 5^2	5) 25
	6) 8^2	6) 64
	7) 10^3	7) 1000
	8) $2^2 \times 2^2$	8) 16
	9) 4^3	9) 64
	10) 3×2^3	10) 24
	11) $3^2 \times 2^3$	11) 72
	12) $\frac{3^3}{3^2}$	12) 3
Group B	Simplify fully the expression using index notation:	
	1) 2×2	1) 2^2
	2) $3 \times 3 \times 3 \times 3$	2) 3^4
	3) $4 \times 4 \times 4 \times 4 \times 4$	3) 4^5
	4) $2^3 \times 2^5$	4) 2^8
	5) $3 \times 3^3 \times 3^2 \times 3^4$	5) 3^{10}
	6) $4^3 \times 4^4 \times 4 \times 4^{-2}$	6) 4^6
	7) $2x^2 \times 4x \times 3x^4$	7) $24x^7$
	8) $12x^5 \div 4x^3$	8) $3x^2$

Index Notation, Square and Cube Numbers - Answers

	Question	Answer
Group B	9) $\frac{21x^8}{3x}$ 10) $20x^{10} \div 5x^5$ 11) $(4x^3)^3$ 12) $(8x^3y^4)^2$	9) $7x^7$ 10) $4x^5$ 11) $64x^9$ 12) $64x^6y^8$
Group C	Simplify fully the expression using index notation: 1) $3x \times 3x \times 3x$ 2) $3x^{-1} \times 3x^{-1} \times 3x^{-1}$ 3) $3x \times 3x \times 3x^{-2}$ 4) $\frac{10x^8}{20x^{10}}$ 5) $\frac{20x^8}{10x^{10}}$ 6) $\frac{100x^{10}}{200x^8}$ 7) $\left(64x^{\frac{1}{2}}\right)^{\frac{1}{2}}$ 8) $\frac{3ax^6y^4}{xy}$ 9) $2x^{\frac{2}{3}} \times 3x^{\frac{1}{2}}$ 10) $x^{\frac{1}{2}} \times x^{\frac{1}{2}}$ 11) $x^{\frac{2}{3}} \times x^{\frac{2}{3}}$ 12) $(144x^2)^{\frac{1}{2}}$	1) $27x^3$ 2) $27x^{-3}$ 3) 27 4) $\frac{1}{2}x^{-2}$ 5) $2x^{-2}$ 6) $\frac{1}{2}x^2$ 7) $4x^{\frac{1}{4}}$ 8) $3ax^5y^3$ 9) $6x^{\frac{7}{6}}$ 10) x 11) $x^{\frac{4}{3}}$ 12) $12x$

Index Notation, Square and Cube Numbers - Answers

	Question	Answer
	Applied Questions	
1)	(a) The length of a side of a square is 10cm . What is the area of the square?	(a) 100cm^2
	(b) The length of one edge of a cube is 4cm . What is the volume of the cube?	(b) 64cm^3
2)	(a) Lyra says “6 squared is 12”. Why is Lyra incorrect?	(a) 6 squared is 36. Lyra did 2×6 .
	(b) Ahmed says “the cube root of – 8 is 2”. Why is Ahmed incorrect?	(b) The cube root is – 2. Ahmed has not considered the negative.
3)	(a) Between which integer values does the square root of 45 lie?	(a) Between 6 and 7
	(b) Find the value of $x^{-1} \times x^1$.	(b) 1
4)	(a) $c^a \times c^b = c^{10}$ where a and b are different positive integers. List the possible values of a and b .	(a) 9, 1 8, 2 7, 3 6, 4
	(b) What is 1 to the power of 100?	(b) 1

Index Notation, Square and Cube Numbers - Mark Scheme

	Question	Answer	
1) (a)	Find the value of $\sqrt{81}$	(a) 9	(1)
(b)	Find the value of $\sqrt{225}$	(b) 15	(1)
(c)	Find the value of 13^2	(c) 169	(1)
(d)	Find the value of x^0	(d) 1	(1)
2) (a)	Simplify $4x^2 \times x \times 2x^7$	(a) $8x^{10}$ One mark for correct coefficient One mark for x with correct index number	(2)
(b)	Simplify $\frac{35x^{12}}{7x^5}$	(b) $5x^7$ One mark for correct coefficient One mark for x with correct index number	(2)
(c)	Simplify $(3x^3)^3$	(c) $27x^9$ One mark for correct coefficient One mark for x with correct index number	(2)
3) (a)	Simplify $\frac{x^5 \times 20x^6}{4x^8}$	(a) $5x^3$ One mark for correct coefficient One mark for x with correct index number	(2)
(b)	Simplify $10x^{\frac{1}{4}} \times \frac{1}{2}x^{\frac{1}{5}}$	(b) $5x^{\frac{9}{20}}$ One mark for correct coefficient One mark for x with correct index number	(2)

Index Notation, Square and Cube Numbers - Mark Scheme

	Question	Answer
4)	(a) $8 = 2^n$ Find the value of n.	(a) 3 (1)
	(b) $\frac{a^k \times a^{2k}}{\sqrt{a}} = a^n$ Find the value of n in terms of k.	(b) Simplifying numerator correctly to a^{3k} (1) Can be seen anywhere Writing denominator in index for : $a^{\frac{1}{2}}$ (1) Can be seen anywhere Attempt to simplify to a single expression (1) $n = 3k - \frac{1}{2}$ Condone $a^{3k - \frac{1}{2}}$ given as final answer (1) Allow indices simplified to a single form e.g $n = \frac{6k-1}{2}$

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