

1:05 | Indices

Exercise 1:05

1 Write in index form.

a $a \times a \times a$

b $2 \times 2 \times 2 \times 2$

c $n \times n \times n \times n \times n$

d $10 \times 10 \times 10$

2 Simplify, giving your answers in index form.

a $2^4 \times 2^5$

b $a^3 \times a^2$

c $m \times m^4$

d $10^6 \times 10^2$

e $a^{10} \div a^2$

f $y^4 \div y^3$

g $b^3 \div b$

h $10^5 \div 10^2$

i $(m^3)^4$

j $(a^2)^3$

k $(x^4)^2$

l $(10^5)^2$

m $a^0 \times 3$

n $b^0 + c^0$

o $6y^0$

p $e^6 \div e^6$

q $6a^2 \times 5$

r $6m^3 \div 3$

s $6a \times 5a$

t $(4x^4)^2$

3 Simplify.

a $6a^4 \times 5ab^3$

b $7a^2b^2 \times 8a^3b$

c $4a^2b^3 \times 6a^2b^4$

d $10a^7 \times a^3b^3$

e $(7x^3)^2$

f $(2m^2)^4$

g $(x^2y^3)^3$

h $(5xy^2)^4$

i $30a^5 \div 5a^3$

j $100x^4 \div 20x$

k $36a^3b^4 \div 12a^2b^4$

l $8y^7z^2 \div y^7z^2$

4 Rewrite without a negative index.

a 4^{-1}

b 10^{-1}

c x^{-1}

d $2a^{-1}$

e 5^{-2}

f 2^{-3}

g m^{-3}

h $5x^{-2}$

5 Rewrite each of the following with a negative index.

a $\frac{1}{3}$

b $\frac{1}{8}$

c $\frac{1}{a}$

d $\frac{3}{x}$

e $\frac{1}{2^4}$

f $\frac{1}{10^6}$

g $\frac{1}{y^4}$

h $\frac{5}{n^3}$

6 Find the value of the following.

a $9^{\frac{1}{2}}$

b $36^{\frac{1}{2}}$

c $8^{\frac{1}{3}}$

d $27^{\frac{1}{3}}$

7 Rewrite, using fractional indices.

a \sqrt{a}

b $\sqrt[3]{y}$

c $5\sqrt{m}$

d $\sqrt{16x}$

8 Simplify these expressions.

a $x^4 \times x^{-2}$

b $5m^3 \div m^{-2}$

c $4n^{-2} \times 3n^3$

d $6y^4 \times 3y^{\frac{1}{2}}$

e $12x^{\frac{3}{2}} \div 6x^{\frac{1}{2}}$

f $(27x^6)^{\frac{1}{3}}$

g $\frac{5a^4 \times 4a^5}{10a^8}$

h $\frac{6m^4 \times (2m)^3}{3m^2 \times 8m^5}$

i $\left[\frac{9x^3 \times (2x^3)^3}{6x^6 \div 3x^{-2}} \right]^{\frac{1}{2}}$

9 Write these numbers in scientific (or standard) notation.

a 148 000 000

b 68 000

c 0.000 15

d 0.000 001 65

10 Write these as basic numerals.

a 6.2×10^4

b 1.15×10^6

c 7.4×10^{-3}

d 6.91×10^{-5}

Answers:

- | | | | | | | | |
|------------------------|---------------------|------------------------|-------------------------|-----------------------|---------------------|----------------------|----------------------|
| 1 a a^3 | b 2^4 | c n^5 | d 10^3 | | | | |
| 2 a 2^9 | b a^5 | c m^5 | d 10^8 | e a^8 | f y | g b^2 | h 10^3 |
| i m^{12} | j a^6 | k x^8 | l 10^{10} | m 3 | n 2 | o 6 | p e^0 or 1 |
| q $30a^2$ | r $2m^3$ | s $30a^2$ | t $16x^8$ or 4^2x^8 | | | | |
| 3 a $30a^5b^3$ | b $56a^5b^3$ | c $24a^4b^7$ | d $10a^{10}b^3$ | e $49x^6$ | f $16m^8$ | g x^6y^9 | h $625x^4y^8$ |
| i $6a^2$ | j $5x^3$ | k $3a$ | l 8 | | | | |
| 4 a $\frac{1}{4}$ | b $\frac{1}{10}$ | c $\frac{1}{x}$ | d $\frac{2}{a}$ | e $\frac{1}{25}$ | f $\frac{1}{8}$ | g $\frac{1}{m^3}$ | h $\frac{5}{x^2}$ |
| 5 a 3^{-1} | b 8^{-1} | c a^{-1} | d $3x^{-1}$ | e 2^{-4} | f 10^{-6} | g y^{-4} | h $5n^{-3}$ |
| 6 a 3 | b 6 | c 2 | d 3 | 7 a $a^{\frac{1}{2}}$ | b $y^{\frac{1}{3}}$ | c $5m^{\frac{1}{2}}$ | d $4x^{\frac{1}{2}}$ |
| 8 a x^2 | b $5m^5$ | c $12n$ | d $18y^{\frac{9}{2}}$ | e $2x$ | f $3x^2$ | g $2a$ | h 2 |
| 9 a 1.48×10^8 | b 6.8×10^4 | c 1.5×10^{-4} | d 1.65×10^{-6} | | | i $6x^2$ | |
| o a 62 000 | b 1 150 000 | c 0.0074 | d 0.000 069 1 | | | | |