20/09/2023

Starter

Addition

$$\begin{array}{r} 7\ 1\ 7 \\ +\ 3\ 6\ 6 \\ \hline \end{array}$$

Subtraction

$$\begin{array}{r} 6\ 6\ 4 \\ -\ 1\ 9\ 1 \\ \hline \end{array}$$

Multiplication

×	80	2	Total
90			
4			
		82 × 94 =	

Division

$5 \overline{)\ 1\ 9\ 0}$

Multiples of 4

4 × 1 =
4 × 2 =
4 × 3 =
4 × 4 =
4 × 5 =
4 × 6 =
4 × 7 =
4 × 8 =
4 × 9 =
4 × 10 =

Square numbers

1^2 = × =
= × = 4
= × = 9
= 4 × 4 =
= × = 25
6^2 = × =
= × = 49
= × = 64
= × = 81
= 10 × 10 =

Even numbers

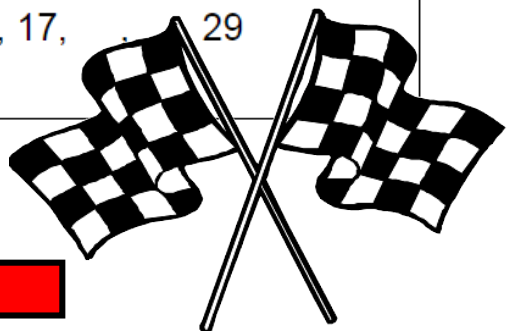
12, , , , 20, 22, 24, 26, 28, 30, 32

Odd numbers

, , , 17, , 21, , , , 29, 31

Prime numbers

5, 7, , , 17, , 29



Time's Up!

20/09/2023

Starter - Answers

Addition

$$\begin{array}{r} 7\ 1\ 7 \\ +\ 3\ 6\ 6 \\ \hline 1\ 0\ 8\ 3 \end{array}$$

Subtraction

$$\begin{array}{r} 6\ 6\ 4 \\ -\ 1\ 9\ 1 \\ \hline 4\ 7\ 3 \end{array}$$

Multiplication

×	80	2	Total
90	7200	180	7380
4	320	8	328
		82 × 94 =	7708

Division

$$5 \overline{)\ 1\ 9\ 0}\ \ 0\ 3\ 8$$

Multiples of 4

4 × 1 = 4
4 × 2 = 8
4 × 3 = 12
4 × 4 = 16
4 × 5 = 20
4 × 6 = 24
4 × 7 = 28
4 × 8 = 32
4 × 9 = 36
4 × 10 = 40

Square numbers

$1^2 = 1 \times 1 = 1$
$2^2 = 2 \times 2 = 4$
$3^2 = 3 \times 3 = 9$
$4^2 = 4 \times 4 = 16$
$5^2 = 5 \times 5 = 25$
$6^2 = 6 \times 6 = 36$
$7^2 = 7 \times 7 = 49$
$8^2 = 8 \times 8 = 64$
$9^2 = 9 \times 9 = 81$
$10^2 = 10 \times 10 = 100$

Even numbers

12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32

Odd numbers

11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31

Prime numbers

5, 7, 11, 13, 17, 19, 23, 29

Laws of Indices

20/09/2023

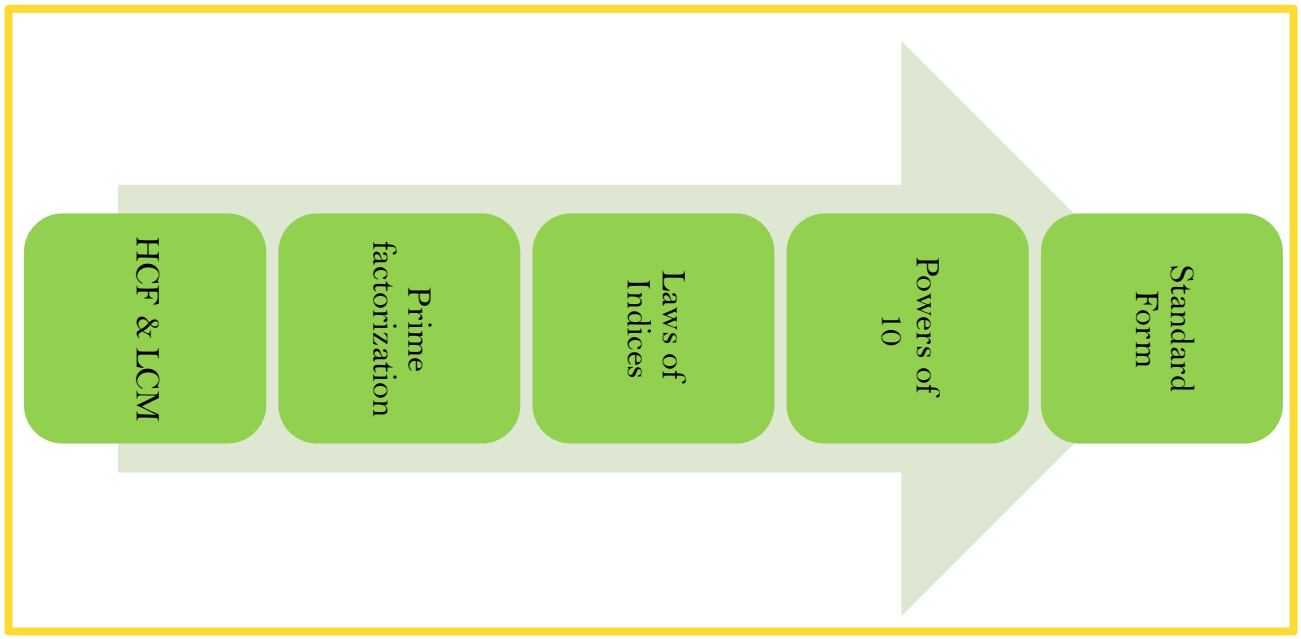
By the end of today's lesson, we will be able to:

✓ Use index laws to simplify and solve different problems

If we are successful, we will be able to answer:

Simplify $(g^4 \times g^2)^3$

Our Learning Journey



De/ci/mal

In/dex no/ta/tion

Prime fac/tor de/com/po/si/tion

Al/ge/bra/ic

In/verse o/pe/ra/tions

Com/mon de/no/mi/na/tor

Con/ver/sion

Ac/ce/ler/a/tion

Mr Taylor (MTA)

Planners out & open?

St. Bede's Catholic School & Byron Sixth Form College

Copy into your books!

Notes

An index (plural: indices) is:

$$b^p$$

when b is a '*base number*' and p is a '*power*'

There are different rules (or Laws) that we have to follow whenever we work with indices.

Copy into your books!

Notes

1) Multiplication Rule

$$x^a \times x^b = x^{a+b}$$

2) Division Rule (sign OR line)

$$\frac{x^a}{x^b} = x^a \div x^b = x^{a-b}$$

3) Brackets Rule (everything inside to the power)

$$(x^a)^b = x^{a\times b}$$

E.g. $(3x^2)^3 = 3^3x^{2\times 3} = 27x^6$

Copy into your books!

Notes

4) 'Zero Power' – anything to the power of zero is equal to one

$$x^0 = 1$$

5) 'One Power' – anything to the power of one is itself

$$x^1 = x$$

Copy into your books!

Model Answers

Simplify

a $x^7 \times x^9 = x^{16}$

b $z^{12} \div z^4 = z^8$

c $(v^4)^2 = v^8$

Work out the missing power.

a $y^2 \times y^{\square} = y^8$ $\square = 6$

b $n^{\square} \div n^3 = n^6$ $\square = 9$

c $(w^{\square})^3 = w^{18}$ $\square = 6$

Trial Practice

Q1. Simplify $y^7 \times y^2$

Q2. Simplify $y^7 \div y^2$

Q3. Simplify $(y^7)^2$

Q4. Simplify $\frac{m^4}{m^6}$

Q5. Simplify fully $2e^3f \times e^2f^6$

Trial by…

Think. Pair. Share.

✓ **Mini Whiteboards**

Multiple Choice

Spot the Mistake!

Practice

★	★★	★★★
A1.↻ Write $(4^5)^4$ as a power of 4.	B1.↻ Write $(2^3)^3$ as a power of 2.	C1.↻ Write $(5^9)^{10}$ as a power of 5.
A2.↻ Simplify: $2^1 \div 2^5$	B2.↻ Simplify: $3^3 \div 3^{-6}$	C2.↻ Simplify: $6^6 \div 6^6$
A3.↻ Simplify: $3^5 \div 3^4$	B3.↻ Simplify: $5^4 \div 5^{-1}$	C3.↻ Write $(64^{-2})^7$ as a power of 4.
A4.↻ Write $(3^2)^1$ as a power of 3.	B4.↻ Simplify: $2^1 \times 2^6$	C4.↻ Simplify: $2^{-7} \div 2^5$
A5.↻ Write $(2^5)^3$ as a power of 2.	B5.↻ Simplify: $5^2 \div 5^1$	C5.↻ Simplify: $256^7 \div 4^{-2}$
A6.↻ Write $(3^5)^1$ as a power of 3.	B6.↻ Simplify: $5^{-5} \times 5^{-2}$	C6.↻ Write $(5^{-1})^{11}$ as a power of 5.

Practice - Answers

★	★★	★★★
A1.↻ 4^{20}	B1.↻ 2^{9}	C1.↻ 5^{90}
A2.↻ 2^{-4}	B2.↻ 3^{9}	C2.↻ 6^{0}
A3.↻ 3^{1}	B3.↻ 5^{5}	C3.↻ 4^{-42}
A4.↻ 3^{2}	B4.↻ 2^{7}	C4.↻ 2^{-12}
A5.↻ 2^{15}	B5.↻ 5^{1}	C5.↻ 4^{30}
A6.↻ 3^{5}	B6.↻ 5^{-7}	C6.↻ 5^{-11}

Practice

1. $4ab \times 2c =$
2. $12x \times 3y =$
3. $4mn \times 3pq =$
4. $4a^2 \times 3a =$
5. $12m^2p \times 2m^3p^2 =$
6. $x^6 \times 3x^2 =$
7. $0.5a^3 \times 6b^2 =$
8. $3m^2p \times 3m^2p =$
9. $5nm \times 5nm =$
10. $4ac \times 2ca =$

1. $\frac{x^3}{x} =$
2. $a^7 \div a^2 =$
3. $\frac{15m^2p}{3m^3} =$
4. $\frac{24x^3y^5}{8x^2y^3} =$
5. $6rst \div 2rs =$
6. $5mp \div 15m^2 =$
7. $\frac{5x^3}{20x^2} =$
8. $\frac{7a^2b^3}{ac} =$
9. $\frac{28m^3n^2}{21m^4} =$
10. $\frac{8abc}{2a^2c^3} =$

Simplify:

1. $(x^3)^2 =$
2. $(6x^2)^2 =$
3. $(x^5)^2 =$
4. $(3^x)^2 =$
5. $(4m^2)^2 =$
6. $(5yz^2)^2 =$
7. $(2bc^3)^5 =$
8. $(3a^4)^3 =$
9. $(2m^3)^4 =$
10. $(\frac{1}{2}x^2)^2 =$

Practice - Answers

1. $8abc$
2. $36xy$
3. $12mnpq$
4. $12a^3$
5. $24m^5p^3$
6. $3x^8$
7. $3a^3b^2$
8. $9m^4p^2$
9. $25n^2m^2$
10. $8a^2c^2$

1. x^2
2. a^5
3. $\frac{5p}{m}$
4. $3xy^2$
5. $3t$
6. $\frac{p}{3m}$
7. $\frac{x}{4}$
8. $\frac{7ab^3}{c}$
9. $\frac{4n^2}{3m}$
10. $\frac{4b}{ac^2}$

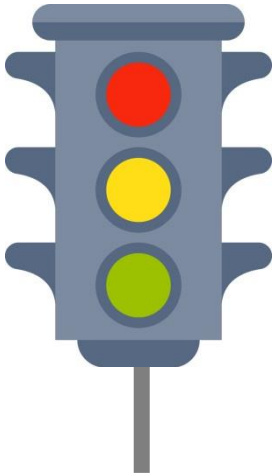
1. x^6
2. $36x^4$
3. x^{10}
4. 3^{2x}
5. $16m^4$
6. $25y^2z^4$
7. $32b^5c^{15}$
8. $27a^{12}$
9. $16m^{12}$
10. $\frac{1}{4}x^4$

Last Lap (Plenary)

60

Simplify $(g^5 \div g^3)^3$

$= (g^{5-3})^3 = g^{2\times3} = g^6$



Red	Method & understanding mistake. I'm not sure where my mistakes were made.
Amber	Calculation & presentation mistake. I know where I went wrong.
Green	Correct! I feel comfortable in this topic. Write: ✓ **Lesson Objective Achieved**