cuemath
THE MATH EXPERT

Get better at Math. Get better at everything.

Come experience the Cuemath methodology and ensure your child stays ahead at math this summer.

Adaptive Platform | **Interactive Visual Simulations** | **Personalized Attention**

For Grades 1 - 10

LIVE online classes by trained and certified experts.

Get the Cuemath advantage

Book a FREE trial class

Chapter 9: Algebraic Expressions and Identities

Exercise 9.1 (Page 140 of Grade 8 NCERT)

Q1. Identify the terms, their coefficients for each of the following expressions.

(i) $5xyz^2 - 3zy$

(ii) $1 + x + x^2$

(iii) $4x^2y^2 - 4x^2y^2z^2 + z^2$

(iv) $3 - pq + qr - rp$

(v) $\frac{x}{2} + \frac{y}{2} - xy$

(vi) $0.3a - 0.6ab + 0.5b$

Difficulty level: Easy

Known:
Expressions

Unknown:
Terms and their coefficients

Reasoning:
The numerical factor of a term is called its numerical coefficient or simply coefficient.

Solution:
The terms and the respective coefficients of the given expressions are as follows.

-	Terms	Coefficients
(i)	$5xyz^2$ $-3zy$	5 -3
(ii)	1 x x^2	1 1 1
(iii)	$4x^2y^2$ $-4x^2y^2z^2$ z^2	4 -4 1

(iv)	3 $-pq$ qr $-rp$	3 -1 1 -1
(v)	$\frac{x}{2}$ $\frac{y}{2}$ $-xy$	$\frac{1}{2}$ $\frac{1}{2}$ -1
(vi)	$0.3a$ $-0.6ab$ $0.5b$	0.3 -0.6 0.5

Q2. Classify the following polynomials as monomials, binomials, trinomials. Which
polynomials do not fit in any of these three categories?

$x + y$, 1000, $x + x^2 + x^3 + x^4$, $7 + y + 5x$, $2y - 3y^2$, $2y - 3y^2 + 4y^3$, $5x - 4y + 3xy$, $4z - 15z^2$, $ab + bc + cd + da$, pqr, $p^2q + pq^2$, $2p + 2q$

Difficulty level: Easy

Known:
Expression

Unknown:
The degree of the expression.

Reasoning:

1. Expression that contains only one term is called a **monomial.**
2. Expression that contains two terms is called a **binomial.**
3. Expression containing three terms is a **trinomial** and so on.
4. An expression containing, one or more terms with non-zero coefficient (with variables having non-negative integers as exponents) is called a polynomial.
5. A polynomial may contain any number of terms, one or more than one.

Solution:
The given expressions are classified as

Monomials: 1000, pqr

Binomials: $x + y$, $2y - 3y^2$, $4z - 15z^2$, $p^2q + pq^2$, $2p + 2q$

Trinomials: $7+y+5x,\ 2y-3y^2+4y^3,\ 5x-4y+3xy$
Polynomials that do not fit in any of these categories are

$x+x^2+x^3+x^4,\ ab+bc+cd+da$

Q3. Add the following.

(i) $ab\ -\ bc, bc\ -\ ca, ca\ -\ ab$
(ii) $a\ -\ b\ +\ ab, b\ -\ c\ +\ bc\ ,\ c\ -\ a\ +\ ac$
(iii) $2p^2q^2-\ 3pq+\ 4,\ 5\ +7pq\ -3p^2q^2$
(iv) $l^2+m^2, m^2+n^2,\ n^2+l^2,\ 2lm+2mn+2nl$

Difficulty level: Medium

Known:
Expressions

Unknown:
Addition

Reasoning:
Addition will take place between like terms.

Solution:
The given expressions written in separate rows, with like terms one below the other and then the addition of these expressions are as follows.

(i)

$$\begin{array}{rr} & ab-bc \\ + & \quad bc-ca \\ \hline & 0 \end{array}$$

Thus, the sum of the given expressions is 0.

(ii)

$$\begin{array}{rrrr} & a & -b & +ab \\ + & & b & -c+bc \\ + & -a & & +c \quad +ac \\ \hline & & ab+ & bc \quad +ac \end{array}$$

Thus, the sum of the given expressions is $ab+bc+ac$.

(iii)

$$\begin{array}{r} 2p^2q^2 - 3pq + 4 \\ +\ -3p^2q^2 + 7pq + 5 \\ \hline -p^2q^2 + 4pq + 9 \end{array}$$

Thus, the sum of the given expressions is $-p^2q^2 + 4pq + 9$.

(iv)

$$\begin{array}{r} l^2 + m^2 \\ +\quad + m^2 + n^2 \\ +\ l^2 \quad + n^2 \\ +\quad\quad 2lm + 2mn + 2nl \\ \hline 2l^2 + 2m^2 + 2n^2 + 2lm + 2mn + 2nl \end{array}$$

Thus, the sum of the given expressions is $2(l^2 + m^2 + n^2 + lm + mn + nl)$.

Q4. (a) Subtract $4a - 7ab + 3b + 12$ from $12a - 9ab + 5b - 3$

(b) Subtract $3xy + 5yz - 7zx$ from $5xy - 2yz - 2zx + 10xyz$

(c) Subtract $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from

$18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q$

Difficulty level: Medium

Known:
Expressions

Unknown:
Subtraction

Reasoning:
Subtraction will take place between like terms.

Solution:
The given expressions in separate rows, with like terms one below the other and then the subtraction of these expressions is as follows.

(a)

$$\begin{array}{r} 12a \quad -9ab \quad +5b \quad -3 \\ 4a \quad -7ab \quad +3b \quad +12 \\ \hline (-) \quad (+) \quad (-) \quad (-) \\ \hline 8a - 2ab \quad +2b - 15 \end{array}$$

(b)

$$\begin{array}{r} 5xy - 2yz - 2zx + 10xyz \\ 3xy + 5yz - 7zx \\ (-)\quad (-)\quad (+) \\ \hline 2xy - 7yz + 5zx + 10xyz \end{array}$$

(c)

$$\begin{array}{r} 18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q \\ -10 - 8p + 7p - 3pq + 5pq^2 + 4p^2q \\ (+)\ (+)\ (-)\ (+)\ (-)\ (-) \\ \hline 28 + 5p - 18q + 8pq - 7pq^2 + p^2q \end{array}$$

Chapter 9: Algebraic Expressions and Identities

Exercise 9.2 (Page 143 of Grade 8 NCERT)

Q1. Find the product of the following pairs of monomials.

$(i)\ 4, 7p \quad (ii)\ -4p, 7p \quad (iii)\ -4p, 7pq \quad (iv)\ 4p^3, -3p \quad (v)\ 4p, 0$

Difficulty level: Easy

Known:
Pairs of monomials

Unknown:
Product

Reasoning:

i) By using the distributive law, we can carry out the multiplication term by term.
ii) In multiplication of polynomials with polynomials, we should always look for like terms, if any, and combine them.

Solution:
The product will be as follows.

$(i)\ 4 \times 7p = 4 \times 7 \times p = 28p$

$(ii)\ -4p \times 7p = -4 \times p \times 7 \times p = (-4 \times 7) \times (p \times p) = -28p^2$

$(iii)\ -4p \times 7pq = -4 \times p \times 7 \times p \times q = (-4 \times 7) \times (p \times p \times q) = -28p^2q$

$(iv)\ 4p^3 \times -3p = 4 \times (-3) \times p \times p \times p \times p = -12p^4$

$(v)\ 4p \times 0 = 4 \times p \times 0 = 0$

Q2. Find the areas of rectangles with the following pairs of monomials as their lengths and breadths respectively.
$(p, q); (10m, 5n); (20x^2, 5y^2); (4x, 3x^2); (3mn, 4np)$

Difficulty level: Easy

Known:
Lengths and breadths of rectangles

Unknown:
Areas of rectangles

Reasoning:

Area of a rectangle = length × breadth

Solution:

We know that,

Area of rectangle = Length × *Breadth*

Area of 1^{st} rectangle $= p \times q = pq$

Area of 2^{nd} rectangle $= 10m \times 5n = 10 \times 5 \times m \times n = 50\,mn$

Area of 3^{rd} rectangle $= 20x^2 \times 5y^2 = 20 \times 5 \times x^2 \times y^2 = 100\,x^2y^2$

Area of 4^{th} rectangle $= 4x \times 3x^2 = 4 \times 3 \times x \times x^2 = 12x^3$

Area of 5^{th} rectangle $= 3mn \times 4np = 3 \times 4 \times m \times n \times n \times p = 12mn^2p$

Q3. Complete the table of products.

First monomial → / Second monomial ↓	$2x$	$-5y$	$3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$	$4x^2$	⋯	⋯	⋯	⋯	⋯
$-5y$	⋯	⋯	$-15x^2y$	⋯	⋯	⋯
$3x^2$	⋯	⋯	⋯	⋯	⋯	⋯
$-4xy$	⋯	⋯	⋯	⋯	⋯	⋯
$7x^2y$	⋯	⋯	⋯	⋯	⋯	⋯
$-9x^2y^2$	⋯	⋯	⋯	⋯	⋯	⋯

Difficulty level: Easy

Known:

Expressions

Unknown:

Product

Solution:

The table can be completed as follows.

First monomial → / Second monomial ↓	$2x$	$-5y$	$3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$	$4x^2$	$-10xy$	$6x^3$	$-8x^2y$	$14x^3y$	$-18x^3y^2$
$-5y$	$-10xy$	$25y^2$	$-15x^2y$	$20xy^2$	$-35x^2y^2$	$45x^2y^3$
$3x^2$	$6x^3$	$-15x^2y$	$9x^4$	$-12x^3y$	$21x^4y$	$-27x^4y^2$
$-4xy$	$-8x^2y$	$20xy^2$	$-12x^3y$	$16x^2y^2$	$-28x^3y^2$	$36x^3y^3$
$7x^2y$	$14x^3y$	$-35x^2y^2$	$21x^4y$	$-28x^3y^2$	$49x^4y^2$	$-63x^4y^3$
$-9x^2y^2$	$-18x^3y^2$	$45x^2y^3$	$-27x^4y^2$	$36x^3y^3$	$-63x^4y^3$	$81x^4y^4$

Q4. Obtain the volume of rectangular boxes with the following length, breadth and height respectively.

$(i)\ 5a, 3a^2, 7a^4\ \ (ii)\ 2p,\ 4q,\ 8r\ \ (iii)\ xy,\ 2x^2y,\ 2xy^2\ \ (iv)\ a,\ 2b,\ 3c$

Difficulty level: Easy

Known:
Length, breadth and height respectively of rectangular boxes

Unknown:
Volume of rectangular boxes

Reasoning:
volume of a rectangular box = length × breadth × height

Solution:
We know that,

$$\text{Volume} = \text{Length} \times \text{Breadth} \times \text{Height}$$

(i) $\text{Volume} = 5a \times 3a^2 \times 7a^4 = 5 \times 3 \times 7 \times a \times a^2 \times a^4 = 105\,a^7$

(ii) $\text{Volume} = 2p \times 4q \times 8r = 2 \times 4 \times 8 \times p \times q \times r = 64\,pqr$

(iii) $\text{Volume} = xy \times 2x^2y \times 2xy^2 = 2 \times 2 \times xy \times x^2y \times xy^2 = 4x^4y^4$

(iv) $\text{Volume} = a \times 2b \times 3c = 2 \times 3 \times a \times b \times c = 6abc$

Q5. Obtain the product of

$(i)\ xy,\ yz,\ zx\ \ (ii)\ a,\ -a^2,\ a^3\ \ (iii)\ 2,\ 4y,\ 8y^2,\ 16y^3$

$(iv)\ a,\ 2b,\ 3c,\ 6abc\ \ (v)\ m,\ -mn,\ mnp$

Difficulty level: Easy

Known:
Expressions

Unknown:
Product

Reasoning:
By using the distributive law, we can carry out the multiplication term by term.

Solution:

$(i)\ xy \times yz \times zx = x^2y^2z^2$

$(ii)\ a \times (-a^2) \times a^3 = -a^6$

$(iii)\ 2 \times 4y \times 8y^2 \times 16y^3 = 2 \times 4 \times 8 \times 16 \times y \times y^2 \times y^3 = 1024\,y^6$

$(iv)\ a \times 2b \times 3c \times 6abc = 2 \times 3 \times 6 \times a \times b \times c \times abc = 36a^2b^2c^2$

$(v)\ m \times (-mn) \times mnp = -m^3n^2p$

Chapter 9: Algebraic Expressions and Identities

Exercise 9.3 (Page 146 of Grade 8 NCERT)

Q1. Carry out the multiplication of the expressions in each of the following pairs.

$(i)\ 4p,\ q + r\ \ (ii)\ ab,\ a - b\ \ (iii)\ a + b,\ 7a^2b^2$
$(iv)\ a^2 - 9,\ 4a\ \ (v)\ pq + qr + rp,\ 0$

Difficulty level: Medium

Known:
Expressions

Unknown:
Product

Reasoning:

i) By using the distributive law, we can carry out the multiplication term by term.
ii) In multiplication of polynomials with polynomials, we should always look for like terms, if any, and combine them.

Solution:

$$(i)\ (4p) \times (q + r) = (4p \times q) + (4p \times r) = 4pq + 4pr$$
$$(ii)\ (ab) \times (a - b) = (ab \times a) + [ab \times (-b)] = a^2b - ab^2$$
$$(iii)\ (a + b) \times (7a^2\ b^2) = (a \times 7a^2b^2) + (b \times 7a^2b^2) = 7a^3b^2 + 7a^2b^3$$
$$(iv)\ (a^2 - 9) \times (4a) = (a^2 \times 4a) + [(-9) \times (4a)] = 4a^3 - 36a$$
$$(v)\ (pq + qr + rp) \times 0 = (pq \times 0) + (qr \times 0) + (rp \times 0) = 0$$

Q2. Complete the table

---	First expression	Second Expression	Product
(i)	a	$b+c+d$	---
(ii)	$x+y-5$	$5xy$	---
(iii)	p	$6p^2-7p+5$	---
(iv)	$4p^2q^2$	p^2-q^2	---
(v)	$a+b+c$	abc	---

Difficulty level: Medium

Known:
Expressions

Unknown:
Product

Solution:
The table can be completed as follows.

---	First expression	Second Expression	Product
(i)	a	$b+c+d$	$ab+ac+ad$
(ii)	$x+y-5$	$5xy$	$5x^2y+5xy^2-25xy$
(iii)	p	$6p^2-7p+5$	$6p^3-7p^2+5p$
(iv)	$4p^2q^2$	p^2-q^2	$4p^4q^2-4p^2q^4$
(v)	$a+b+c$	abc	$a^2bc+ab^2c+abc^2$

Q3. Find the product.

(i) $\left(a^2\right) \times \left(2a^{22}\right) \times \left(4a^{26}\right)$

(ii) $\left(\frac{2}{3}xy\right)\times\left(\frac{-9}{10}x^2y^2\right)$

(iii) $\left(-\frac{10}{3}pq^3\right)\times\left(\frac{6}{5}p^3q\right)$

(iv) $x \times x^2 \times x^3 \times x^4$

Difficulty level: Medium

Known:
Expressions

Unknown:
Simplification

Solution:

(i) $\left(a^2\right) \times \left(2a^{22}\right) \times \left(4a^{26}\right) = 2 \times 4 \times a^2 \times a^{22} \times a^{26} = 8a^{50}$

(ii) $\left(\frac{2}{3}xy\right)\times\left(\frac{-9}{10}x^2y^2\right)=\left(\frac{\cancel{2}}{3}\right)\times\left(\frac{-9}{10^{\cancel{5}}}\right)\times x\times y\times x^2\times y^2=\frac{-3}{5}x^3y^3$

(iii) $\left(\frac{-10}{3}pq^3\right)\times\left(\frac{6}{5}p^3q\right)=\left(\frac{-10^{\cancel{2}}}{3}\right)\times\left(\frac{6}{\cancel{5}}\right)\times pq^3\times p^3q=-4p^4q^4$

(iv) $x \times x^2 \times x^3 \times x^4 = x^{10}$

Q4.

a) Simplify $3x(4x-5)+3$ and find its values for $(i)\ x = 3,\ (ii)\ x=\frac{1}{2}$.

b) $a(a^2+a+1)+5$ and find its values for $(i)\ a = 0,\ (ii)\ a = 1,\ (iii)\ a = -1$

Difficulty level: Medium

Known:
Expression with their corresponding values.

Unknown:
Simplification and its result with their corresponding values

Solution:

$(a)\ 3x\ (4x-5)+3 = 12x^2-15x+3$

(i) For $x=3$,

$$=12x^2-15x+3$$
$$=12(3)^2-15(3)+3$$
$$=108-45+3$$
$$=66$$

(ii) For $x=\frac{1}{2}$,

$$=12x^2-15x+3$$
$$=12\left(\frac{1}{2}\right)^2-15\left(\frac{1}{2}\right)+3$$
$$=\cancel{12}^{3}\times\frac{1}{\cancel{4}}-\frac{15}{2}+3$$
$$=3-\frac{15}{2}+3$$
$$=6-\frac{15}{2}$$
$$=\frac{12-15}{2}$$
$$=\frac{-3}{2}$$

(b) $a\left(a^2+a+1\right)+5=a^3+a^2+a+5$

(i) For $a=0,\ a^3+a^2+a+5=0+0+0+5=5$

(ii) For $a=1,\ a^3+a^2+a+5=(1)^3+(1)^2+1+5$
$=1+1+1+5=8$

(iii) For $a=-1,\ a^3+a^2+a+5=(-1)^3+(-1)^2+(-1)+5$
$=-1+1-1+5=4$

Q5. (a) Add: $p(p-q),\ q(q-r)$ and $r(r-p)$
(b) Add: $2x\ (z-x-y)$ *and* $2y(z-y-x)$
(c) Subtract: $3l\ (l-4m+5n)$ from $4l(10n-3m+2l)$
(d) Subtract: $3a(a+b+c)-2b(a-b+c)$ from $4c\ (-a+b+c)$

Difficulty level: Medium

Known:
Expressions

Unknown:
Simplification

Reasoning:
Addition and Subtraction takes place between like terms.

Solution:
(a) First expression = $p(p-q)=p^2-pq$
Second expression = $q(q-r)=q^2-qr$
Third expression = $r(r-p)=r^2-pr$

Adding the three expressions, we obtain

$$\begin{array}{r} p^2-pq \\ +\quad q^2-qr \\ +\quad r^2-pq \\ \hline p^2-pq+q^2-qr+r^2-pq \end{array}$$

Therefore, the sum of the given expressions is $p^2+q^2+r^2-pq-qr-rp.$

(b) First expression = $2x(z-x-y)=2xz-2x^2-2xy$

Second expression = $2y(z-y-x)=2yz-2y^2-2yx$

Adding the two expressions, we obtain

$$\begin{array}{r} 2xz-2x^2-2xy \\ +\quad -2xy+2yz-2y^2 \\ \hline 2xz-2x^2-4xy+2yz-2y^2 \end{array}$$

Therefore, the sum of the given expressions is $-2x^2-2y^2-4xy+2yz+2zx$.

(c) $3l(l-4m+5n)=3l^2-12lm+15ln$

$4l(10n-3m+2l)=40ln\ -12lm+8l^2$

Subtracting these expressions, we obtain

$$\begin{array}{r} 40ln-12lm+8l^2 \\ 15l-12lm+3l^2 \\ \hline (-)\quad (+)\quad (-) \\ +25ln\qquad +5l^2 \end{array}$$

Therefore, the result is $5l^2\ +\ 25ln$.

(d) $3a(a+b+c)-2b(a-b+c)$

$=3a^2\ +3ab+3ac-2ba+2b^2-2bc$

$=3a^2\ +2b^2+ab\ +3ac-2bc$

$4c(-a+b+c)=-4ac+4bc+4c^2$

Subtracting these expressions, we obtain

$$\begin{array}{r} -4ac+4bc+4c^2 \\ 3ac-2bc\qquad +3a^2+2b^2+ab \\ \hline (-)\quad (+)\qquad (-)\quad (-)\ (-) \\ -7ac+6bc+4c^2-3a^2-2b^2-ab \end{array}$$

Therefore, the result is $-3a^2-2b^2+4c^2-ab\ +6bc-7ac$.

Chapter 9: Algebraic Expressions and Identities

Exercise 9.4 (Page 148 of Grade 8 NCERT)

Q1. Multiply the binomials.

(i) $(2x+5)$ and $(4x-3)$

(ii) $(y-8)$ and $(3y-4)$

(iii) $(2.5l - 0.5m)$ and $(2.5l + 0.5m)$

(iv) $(a+3b)$ *and* $(x+5)$

(v) $(2pq+3q^2)$ and $(3pq-2q^2)$

(vi) $\left(\frac{3}{4}a^2+3b^2\right)$ and $4\left(a^2-\frac{2}{3}b^2\right)$

Difficulty level: Medium

Known:
Expressions

Unknown:
Multiplication

Reasoning:

i) By using the distributive law, we can carry out the multiplication term by term.

ii) In multiplication of polynomials with polynomials, we should always look for like terms, if any, and combine them.

Solution:

(i)

$$(2x+5)\times(4x-3) = 2x\times(4x-3) + 5\times(4x-3)$$
$$= 8x^2 - 6x + 20x - 15$$
$$= 8x^2 + 14x - 15 \text{ (By adding like terms)}$$

(ii)

$$(y-8)\times(3y-4) = y\times(3y-4) - 8\times(3y-4)$$
$$= 3y^2 - 4y - 24y + 32$$
$$= 3y^2 - 28y + 32 \text{ (By adding like terms)}$$

(iii)

$$(2.5l-0.5m)\times(2.5l+0.5m)=2.5l\times(2.5l+0.5m)-0.5m(2.5l+0.5m)$$
$$=6.25l^2+1.25lm-1.25lm-0.25m^2$$
$$=6.25l^2-0.25m^2$$

(iv)

$$(a+3b)\times(x+5)=a\times(x+5)+3b\times(x+5)$$
$$=ax+5a+3bx+15b$$

(v)

$$(2pq+3q^2)\times(3pq-2q^2)=2pq\times(3pq-2q^2)+3q^2\times(3pq-2q^2)$$
$$=6p^2q^2-4pq^3+9pq^3-6q^4$$
$$=6p^2q^2+5pq^3-6q^4$$

(vi)

$$\left(\frac{3}{4}a^2+3b^2\right)\times\left[4\left(a^2-\frac{2}{3}b^2\right)\right]=\left(\frac{3}{4}a^2+3b^2\right)\times\left(4a^2-\frac{8}{3}b^2\right)$$
$$=\frac{3}{4}a^2\times\left(4a^2-\frac{8}{3}b^2\right)+3b^2\times\left(4a^2-\frac{8}{3}b^2\right)$$
$$=\left(\frac{3}{\cancel{4}}a^2\times\cancel{4}a^2\right)-\left(\frac{\cancel{3}}{\cancel{4}}a^2\times\frac{\cancel{8}^{2}}{\cancel{3}}b^2\right)+\left(3b^2\times4a^2\right)-\left(\cancel{3}b^2\times\frac{8}{\cancel{3}}b^2\right)$$
$$=3a^4-2b^2a^2+12b^2a^2-8b^4$$
$$=3a^4+10a^2b^2-8b^4$$

Q2. Find the product.

(i) $(5-2x)(3+x)$

(ii) $(x+7y)(7x-y)$

(iii) $(a^2+b)(a+b^2)$

(iv) $(p^2-q^2)(2p+q)$

Difficulty level: Medium

Known:
Expressions

Unknown:
Simplification

Reasoning:

i) By using the distributive law, we can carry out the multiplication term by term.
ii) In multiplication of polynomials with polynomials, we should always look for like terms, if any, and combine them.

Solution:

(i)

$$\begin{aligned}(5-2x)(3+x) &= 5(3+x)-2x(3+x)\\ &= 15+5x-6x-2x^2\\ &= 15-x-2x^2\end{aligned}$$

(ii)

$$\begin{aligned}(x+7y)(7x-y) &= x(7x-y)+7y(7x-y)\\ &= 7x^2-xy+49xy-7y^2\\ &= 7x^2+48xy-7y^2\end{aligned}$$

(iii)

$$\begin{aligned}(a^2+b)(a+b^2) &= a^2(a+b^2)+b(a+b^2)\\ &= a^3+a^2b^2+ab+b^3\end{aligned}$$

(iv)

$$\begin{aligned}(p^2-q^2)(2p+q) &= p^2(2p+q)-q^2(2p+q)\\ &= 2p^3+p^2q-2pq^2-q^3\end{aligned}$$

Q3. Simplify.

(i) $(x^2-5)(x+5)+25$

(ii) $(a^2+5)(b^3+3)+5$

(iii) $(t+s^2)(t^2-s)$

(iv) $(a+b)(c-d)+(a-b)(c+d)+2(ac+bd)$

(v) $(x+y)(2x+y)+(x+2y)(x-y)$

(vi) $(x+y)(x^2-xy+y^2)$

(vii) $(1.5x-4y)(1.5x+4y+3)-4.5x+12y$

(viii) $(a+b+c)(a+b-c)$

Difficulty level: Medium

Known:

Expressions

Unknown:
Simplification

Solution:
(i)

$$\begin{aligned}\left(x^2-5\right)\left(x+5\right)+25 &= x^2\left(x+5\right)-5\left(x+5\right)+25\\ &= x^3+5x^2-5x-25+25\\ &= x^3+5x^2-5x\end{aligned}$$

(ii)

$$\begin{aligned}\left(a^2+5\right)\left(b^3+3\right)+5 &= a^2\left(b^3+3\right)+5\left(b^3+3\right)+5\\ &= a^2b^3+3a^2+5b^3+15+5\\ &= a^2b^3+3a^2+5b^3+20\end{aligned}$$

(iii)

$$\begin{aligned}\left(t+s^2\right)\left(t^2-s\right) &= t\left(t^2-s\right)+s^2\left(t^2-s\right)\\ &= t^3-st+s^2t^2-s^3\end{aligned}$$

(iv)

$$\begin{aligned}&\left(a+b\right)\left(c-d\right)+\left(a-b\right)\left(c+d\right)+2\left(ac+bd\right)\\ &= a\left(c-d\right)+b\left(c-d\right)+a\left(c+d\right)-b\left(c+d\right)+2\left(ac+bd\right)\\ &= ac-ad+bc-bd+ac+ad-bc-bd+2ac+2bd\\ &= \left(ac+ac+2ac\right)+\left(ad-ad\right)+\left(bc-bc\right)+\left(2bd-bd-bd\right)\\ &= 4ac\end{aligned}$$

(v)

$$\begin{aligned}&\left(x+y\right)\left(2x+y\right)+\left(x+2y\right)\left(x-y\right)\\ &= x\left(2x+y\right)+y\left(2x+y\right)+x\left(x-y\right)+2y\left(x-y\right)\\ &= 2x^2+xy+2xy+y^2+x^2-xy+2xy-2y^2\\ &= \left(2x^2+x^2\right)+\left(y^2-2y^2\right)+\left(xy+2xy-xy+2xy\right)\\ &= 3x^2-y^2+4xy\end{aligned}$$

(vi)

$$\begin{aligned}&\left(x+y\right)\left(x^2-xy+y^2\right)\\ &= x\left(x^2-xy+y^2\right)+y\left(x^2-xy+y^2\right)\\ &= x^3-x^2y+xy^2+x^2y-xy^2+y^3\\ &= x^3+y^3+\left(xy^2-xy^2\right)+\left(x^2y-x^2y\right)\\ &= x^3+y^3\end{aligned}$$

(vii)

$$(1.5x-4y)(1.5x+4y+3)-4.5x+12y$$
$$=1.5x(1.5x+4y+3)-4y(1.5x+4y+3)-4.5x+12y$$
$$=2.25\,x^2+6xy+4.5x-6xy-16y^2-12y-4.5x+12y$$
$$=2.25\,x^2+(6xy-6xy)+(4.5x-4.5x)-16y^2+(12y-12y)$$
$$=2.25x^2-16y^2$$

(viii)

$$(a+b+c)(a+b-c)$$
$$=a(a+b-c)+b(a+b-c)+c(a+b-c)$$
$$=a^2+ab-ac+ab+b^2-bc+ca+bc-c^2$$
$$=a^2+b^2-c^2+(ab+ab)+(bc-bc)+(ca-ca)$$
$$=a^2+b^2-c^2+2ab$$

Chapter 9: Algebraic Expressions and Identities

Exercise 9.5 (Page 151 of Grade 8 NCERT)

Q1. Use a suitable identity to get each of the following products.

(i) $(x+3)(x+3)$

(ii) $(2y+5)(2y+5)$

(iii) $(2a-7)(2a-7)$

(iv) $\left(3a-\frac{1}{2}\right)\left(3a-\frac{1}{2}\right)$

(v) $(1.1\,\text{m}-0.4)(1.1\,\text{m}+0.4)$

(vi) $(a^2+b^2)(-a^2+b^2)$

(vii) $(6x-7)(6x+7)$

(viii) $(-a+c)(-a+c)$

(ix) $\left(\frac{x}{2}+\frac{3y}{4}\right)\left(\frac{x}{2}+\frac{3y}{4}\right)$

(x) $(7a-9b)(7a-9b)$

Difficulty level: Medium

Known:
Expressions

Unknown:
Simplification

Reasoning:

i) By using the distributive law, we can carry out the multiplication term by term.
ii) In multiplication of polynomials with polynomials, we should always look for like terms, if any, and combine them.

Solution:
The products will be as follows.

(i)

$$(x+3)(x+3)=(x+3)^2$$
$$=(x)^2+2(x)(3)+(3)^2 \qquad \left[(a+b)^2=a^2+2ab+b^2\right]$$
$$=x^2+6x+9$$

(ii)

$$(2y+5)(2y+5)=(2y+5)^2$$
$$=(2y)^2+2(2y)(5)+(5)^2 \qquad \left[(a+b)^2=a^2+2ab+b^2\right]$$
$$=4y^2+20y+25$$

(iii)

$$(2a-7)(2a-7)=(2a-7)^2$$
$$=(2a)^2-2(2a)(7)+(7)^2 \qquad \left[(a-b)^2=a^2-2ab+b^2\right]$$
$$=4a^2-28a+49$$

(iv)

$$\left(3a-\frac{1}{2}\right)\left(3a-\frac{1}{2}\right)=\left(3a-\frac{1}{2}\right)^2$$
$$=(3a)^2-\cancel{2}(3a)\left(\frac{1}{\cancel{2}}\right)+\left(\frac{1}{2}\right)^2 \qquad \left[(a-b)^2=a^2-2ab+b^2\right]$$
$$=9a^2-3a+\frac{1}{4}$$

(v)

$$(1.1\,\mathrm{m}-0.4)(1.1\,\mathrm{m}+0.4)=(1.1\,\mathrm{m})^2-(0.4)^2 \qquad \left[(a+b)(a-b)=a^2-b^2\right]$$
$$=1.21\,\mathrm{m}^2-0.16$$

(vi)

$$(a^2+b^2)(-a^2+b^2)=(b^2+a^2)(b^2-a^2)$$
$$=(b^2)^2-(a^2)^2 \qquad \left[(a+b)(a-b)=a^2-b^2\right]$$
$$=b^4-a^4$$

(vii)

$$(6x-7)(6x+7)=(6x)^2-(7)^2 \qquad \left[(a+b)(a-b)=a^2-b^2\right]$$
$$=36x^2-49$$

(viii)

$$(-a+c)(-a+c)=(-a+c)^2$$
$$=(-a)^2+2(-a)(c)+(c)^2 \qquad \left[(a+b)^2=a^2+2ab+b^2\right]$$
$$=a^2-2ac+c^2$$

(ix)

$$\left(\frac{x}{2}+\frac{3y}{4}\right)\left(\frac{x}{2}+\frac{3y}{4}\right)=\left(\frac{x}{2}+\frac{3y}{4}\right)^2$$

$$=\left(\frac{x}{2}\right)^2+2\left(\frac{x}{2}\right)\left(\frac{3y}{4}\right)+\left(\frac{3y}{4}\right)^2 \qquad \left[(a+b)^2=a^2+2ab+b^2\right]$$

$$=\frac{x^2}{4}+\frac{3xy}{4}+\frac{9y^2}{16}$$

(x)

$$(7a-9b)(7a-9b)=(7a-9b)^2$$

$$=(7a)^2-2(7a)(9b)+(9b)^2 \qquad \left[(a-b)^2=a^2-2ab+b^2\right]$$

$$=49a^2-126ab+81b^2$$

Q2. Use the identity $(x+a)(x+b)=x^2+(a+b)x+ab$ to find the following products.

(i) $(x+3)(x+7)$

(ii) $(4x+5)(4x+1)$

(iii) $(4x-5)(4x-1)$

(iv) $(4x+5)(4x-1)$

(v) $(2x+5y)(2x+3y)$

(vi) $(2a^2+9)(2a^2+5)$

(vii) $(xyz-4)(xyz-2)$

Difficulty level: Easy

Known:

$(x+a)(x+b)=x^2+(a+b)x+ab$

Unknown:

Simplification

Solution:

The products will be as follows.

(i)

$$(x+3)(x+7)=x^2+(3+7)x+(3)(7)$$

$$=x^2+10x+21$$

(ii)

$$(4x+5)(4x+1)=(4x)^2+(5+1)(4x)+(5)(1)$$
$$=16x^2+24x+5$$

(iii)

$$(4x-5)(4x-1)=(4x)^2+[(-5)+(-1)](4x)+(-5)(-1)$$
$$=16x^2-24x+5$$

(iv)

$$(4x+5)(4x-1)=(4x)^2+[(+5)+(-1)](4x)+(+5)(-1)$$
$$=16x^2+16x-5$$

(v)

$$(2x+5y)(2x+3y)=(2x)^2+(5y+3y)(2x)+(5y)(3y)$$
$$=4x^2+16xy+15y^2$$

(vi)

$$(2a^2+9)(2a^2+5)=(2a^2)^2+(9+5)(2a^2)+(9)(5)$$
$$=4a^4+28a^2+45$$

(vii)

$$(xyz-4)(xyz-2)=(xyz)^2+[(-4)+(-2)](xyz)+(-4)(-2)$$
$$=x^2y^2z^2-6xyz+8$$

Q3. Find the following squares by using the identities.

(i) $(b-7)^2$

(ii) $(xy+3z)^2$

(iii) $(6x^2-5y)^2$

(iv) $\left(\frac{2}{3}m+\frac{3}{2}n\right)^2$

(v) $(0.4p-0.5q)^2$

(vi) $(2xy+5y)^2$

Difficulty level: Medium

Known:

Expressions

Unknown:
Simplification

Reasoning:

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$(a+b)(a-b) = a^2 - b^2$$

Solution:

(i)

$$(b-7)^2 = (b)^2 - 2(b)(7) + (7)^2 \qquad \left[(a-b)^2 = a^2 - 2ab + b^2\right]$$
$$= b^2 - 14b + 49$$

(ii)

$$(xy+3z)^2 = (xy)^2 + 2(xy)(3z) + (3z)^2 \qquad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$$
$$= x^2y^2 + 6xyz + 9z^2$$

(iii)

$$(6x^2 - 5y)^2 = (6x^2)^2 - 2(6x^2)(5y) + (5y)^2 \qquad \left[(a-b)^2 = a^2 - 2ab + b^2\right]$$
$$= 36x^4 - 60x^2y + 25y^2$$

(iv)

$$\left(\frac{2}{3}m + \frac{3}{2}n\right)^2 = \left(\frac{2}{3}m\right)^2 + 2\left(\frac{\cancel{2}}{\cancel{3}}m\right)\left(\frac{\cancel{3}}{\cancel{2}}n\right) + \left(\frac{3}{2}n\right)^2 \qquad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$$
$$= \frac{4}{9}m^2 + 2mn + \frac{9}{4}n^2$$

(v)

$$(0.4p - 0.5q)^2 = (0.4p)^2 - 2(0.4p)(0.5q) + (0.5q)^2 \qquad \left[(a-b)^2 = a^2 - 2ab + b^2\right]$$
$$= 0.16p^2 - 0.4pq + 0.25q^2$$

(vi)

$$(2xy+5y)^2 = (2xy)^2 + 2(2xy)(5y) + (5y)^2 \qquad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$$
$$= 4x^2y^2 + 20xy^2 + 25y^2$$

Q4. Simplify.

(i) $\left(a^2-b^2\right)^2$

(ii) $(2x+5)^2-(2x-5)^2$

(iii) $(7m-8n)^2+(7m+8n)^2$

(iv) $(4m+5n)^2+(5m+4n)^2$

(v) $(2.5p-1.5q)^2-(1.5p-2.5q)^2$

(vi) $(ab+bc)^2-2ab^2c$

(vii) $\left(m^2-n^2m\right)^2+2m^3n^2$

Difficulty level: Medium

Known:
Expressions

Unknown:
Simplification

Reasoning:

$(a+b)^2=a^2+2ab+b^2$

$(a-b)^2=a^2-2ab+b^2$

$(a+b)(a-b)=a^2-b^2$

Solution:

$(i)\ \left(a^2-b^2\right)^2$

$=\left(a^2\right)^2-2\left(a^2\right)\left(b^2\right)+\left(b^2\right)^2 \qquad \left[(a-b)^2=a^2-2ab+b^2\right]$

$=a^4-2a^2b^2+b^4$

$(ii)\ (2x+5)^2-(2x-5)^2$

$=(2x)^2+2(2x)(5)+(5)^2-\left[(2x)^2-2(2x)(5)+(5)^2\right]$

$\left[(a-b)^2=a^2-2ab+b^2\right]$

$\left[(a+b)^2=a^2+2ab+b^2\right]$

$=4x^2+20x+25-\left[4x^2-20x+25\right]$

$=4x^2+20x+25-4x^2+20x-25$

$=40x$

$(iii)\ (7m - 8n)^2 + (7m + 8n)^2$

$= (7m)^2 - 2(7m)(8n) + (8n)^2 + (7m)^2 + 2(7m)(8n) + (8n)^2$

$\left[(a - b)^2 = a^2 - 2ab + b^2 \text{ and } (a + b)^2 = a^2 + 2ab + b^2\right]$

$= 49m^2 - 112mn + 64n^2 + 49m^2 + 112mn + 64n^2$

$= 98m^2 + 128n^2$

$(iv)\ (4m + 5n)^2 + (5m + 4n)^2$

$= (4m)^2 + 2(4m)(5n) + (5n)^2 + (5m)^2 + 2(5m)(4n) + (4n)^2 \quad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$

$= 16m^2 + 40mn + 25n^2 + 25m^2 + 40mn + 16n^2$

$= 41m^2 + 80mn + 41n^2$

$(v)\ (2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

$= (2.5p)^2 - 2(2.5p)(1.5q) + (1.5q)^2 - \left[(1.5p)^2 - 2(1.5p)(2.5q) + (2.5q)^2\right]$

$\left[(a - b)^2 = a^2 - 2ab + b^2\right]$

$= 6.25p^2 - 7.5pq + 2.25q^2 - \left[2.25p^2 - 7.5pq + 6.25q^2\right]$

$= 6.25p^2 - 7.5pq + 2.25q^2 - 2.25p^2 + 7.5pq - 6.25q^2]$

$= 4p^2 - 4q^2$

$(vi)\ (ab + bc)^2 - 2ab^2c$

$= (ab)^2 + 2(ab)(bc) + (bc)^2 - 2ab^2c \left[(a + b)^2 = a^2 + 2ab + b^2\right]$

$= a^2b^2 + 2ab^2c + b^2c^2 - 2ab^2c$

$= a^2b^2 + b^2c^2$

$(vii)\ (m^2 - n^2m)^2 + 2m^3n^2$

$= (m^2)^2 - 2(m^2)(n^2m) + (n^2m)^2 + 2m^3n^2 \left[(a - b)^2 = a^2 - 2ab + b^2\right]$

$= m^4 - 2m^3n^2 + n^4m^2 + 2m^3n^2$

$= m^4 + n^4m^2$

Q5. Show that

(i) $(3x+7)^2 - 84x = (3x-7)^2$

(ii) $(9p-5q)^2 + 180pq = (9p+5q)^2$

(iii) $\left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn = \frac{16}{9}m^2 + \frac{9}{16}n^2$

(iv) $(4pq+3q)^2 - (4pq-3q)^2 = 48pq^2$

(v) $(a-b)(a+b) + (b-c)(b+c) + (c-a)(c+a) = 0$

Difficulty level: Hard

Known:
LHS and RHS expression

Unknown:
Verification of LHS = RHS

Solution:

(i) $L.H.S = (3x+7)^2 - 84x$

$= (3x)^2 + 2(3x)(7) + (7)^2 - 84x$

$= 9x^2 + 42x + 49 - 84x$

$= 9x^2 - 42x + 49$

$R.H.S = (3x-7)^2$

$= (3x)^2 - 2(3x)(7) + (7)^2$

$= 9x^2 - 42x + 49$

$L.H.S = R.H.S$

(ii) $L.H.S = (9p-5q)^2 + 180pq$

$= (9p)^2 - 2(9p)(5q) + (5q)^2 + 180pq$

$= 81p^2 - 90pq + 25q^2 + 180pq$

$= 81p^2 + 90pq + 25q^2$

$R.H.S = (9p+5q)^2$

$= (9p)^2 + 2(9p)(5q) + (5q)^2$

$= 81p^2 + 90pq + 25q^2$

$L.H.S = R.H.S$

(iii) $L.H.S = \left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn$

$= \left(\frac{4}{3}m\right)^2 - 2\left(\frac{\cancel{4}}{\cancel{3}}m\right)\left(\frac{\cancel{3}}{\cancel{4}}n\right) + \left(\frac{3}{4}n\right)^2 + 2mn$

$= \frac{16}{9}m^2 - \cancel{2mn} + \frac{9}{16}n^2 + \cancel{2mn}$

$= \frac{16}{9}m^2 + \frac{9}{16}n^2$

$L.H.S = R.H.S$

(iv) $L.H.S = (4pq + 3q)^2 - (4pq - 3q)^2$

$= (4pq)^2 + 2(4pq)(3q) + (3q)^2 - \left[(4pq)^2 - 2(4pq)(3q) + (3q)^2\right]$

$= 16p^2q^2 + 24pq^2 + 9q^2 - \left[16p^2q^2 - 24pq^2 + 9q^2\right]$

$= \cancel{16p^2q^2} + 24pq^2 + \cancel{9q^2} - \cancel{16p^2q^2} + 24pq^2 - \cancel{9q^2}$

$= 48pq^2$

$L.H.S = R.H.S$

(v) $L.H.S = (a-b)(a+b) + (b-c)(b+c) + (c-a)(c+a)$

$= (a^2 - b^2) + (b^2 - c^2) + (c^2 - a^2)$

$= \cancel{a^2} - \cancel{b^2} + \cancel{b^2} - \cancel{c^2} + \cancel{c^2} - \cancel{a^2}$

$= 0$

$L.H.S = R.H.S.$

Q6.Using identities, evaluate.

(i) 71^2

(ii) 99^2

(iii) 102^2

(iv) 998^2

(v) $(5.2)^2$

(vi) 297×303

(vii) 78×82

(viii) 8.9^2

(ix) 1.05×9.5

Difficulty level: Hard

Known:
Expressions

Unknown:
Values of the expressions

Reasoning:

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$(a+b)(a-b) = a^2 - b^2$$

Solution:

$(\text{i})\quad 71^2 = (70+1)^2$

$= (70)^2 + 2(70)(1) + (1)^2 \qquad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$

$= 4900 + 140 + 1$

$= 5041$

$(\text{ii})\quad 99^2 = (100-1)^2$

$= (100)^2 - 2(100)(1) + (1)^2 \qquad \left[(a-b)^2 = a^2 - 2ab + b^2\right]$

$= 10000 - 200 + 1$

$= 9801$

$(\text{iii})\quad 102^2 = (100+2)^2$

$= (100)^2 + 2(100)(2) + (2)^2 \qquad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$

$= 10000 + 400 + 4$

$= 10404$

$(\text{iv})\quad 998^2 = (1000-2)^2$

$= (1000)^2 - 2(1000)(2) + (2)^2 \qquad \left[(a-b)^2 = a^2 - 2ab + b^2\right]$

$= 1000000 - 4000 + 4$

$= 996004$

(v) $(5.2)^2 = (5.0+0.2)^2$

$= (5.0)^2 + 2(5.0)(0.2) + (0.2)^2$ $\quad \left[(a+b)^2 = a^2 + 2ab + b^2\right]$

$= 25 + 2 + 0.04$

$= 27.04$

(vi) $297 \times 303 = (300-3) \times (300+3)$

$= (300)^2 - (3)^2$ $\quad \left[(a+b)(a-b) = a^2 - b^2\right]$

$= 90000 - 9$

$= 89991$

(vii) $78 \times 82 = (80-2)(80+2)$

$= (80)^2 - (2)^2$ $\quad \left[(a+b)(a-b) = a^2 - b^2\right]$

$= 6400 - 4$

$= 6396$

(viii) $8.9^2 = (9.0-0.1)^2$

$= (9.0)^2 - 2(9.0)(0.1) + (0.1)^2$ $\quad \left[(a-b)^2 = a^2 - 2ab + b^2\right]$

$= 81 - 1.8 + 0.01$

$= 79.21$

(ix) $1.05 \times 9.5 = 1.05 \times 0.95 \times 10$

$= (1+0.05)(1-0.05) \times 10$

$= \left[(1)^2 - (0.05)^2\right] \times 10$

$= [1 - 0.0025] \times 10 \left[(a+b)(a-b) = a^2 - b^2\right]$

$= 0.9975 \times 10$

$= 9.975$

Q 7. Using $a^2 - b^2 = (a+b)(a-b)$, find

(i) $51^2 - 49^2$

(ii) $(1.02)^2 - (0.98)^2$

(iii) $153^2 - 147^2$

(iv) $12.1^2 - 7.9^2$

Difficulty level: Medium

Known:

$a^2 - b^2 = (a + b)(a - b)$,

Unknown:

Results of the given expression with their corresponding values

Solution:

$$(\text{i}) \quad 51^2 - 49^2 = (51+49)(51-49)$$
$$= (100)(2) = 200$$

$$(\text{ii}) \quad (1.02)^2 - (0.98)^2 = (1.02+0.98)(1.02-0.98)$$
$$= (2)(0.04)$$
$$= 0.08$$

$$(\text{iii}) \quad 153^2 - 147^2 = (153+147)(153-147)$$
$$= (300)(6)$$
$$= 1800$$

$$(\text{iv}) \quad 12.1^2 - 7.9^2 = (12.1+7.9)(12.1-7.9)$$
$$= (20.0)(4.2)$$
$$= 84$$

Q8. Using $(x+a)(x+b) = x^2 + (a+b)x + ab$, find

$(\text{i}) \quad 103 \times 104$

$(\text{ii}) \quad 5.1 \times 5.2$

$(\text{iii}) \quad 103 \times 98$

$(\text{iv}) \quad 9.7 \times 9.8$

Difficulty level: Medium

Known:

$(x+a)(x+b) = x^2 + (a+b)x + ab$

Unknown:

Results of the given expression with their corresponding values

Solution:

(i) $103 \times 104 = (100+3)(100+4)$

$= (100)^2 + (3+4)(100) + (3)(4)$

$= 10000 + 700 + 12$

$= 10712$

(ii) $5.1 \times 5.2 = (5+0.1)(5+0.2)$

$= (5)^2 + (0.1+0.2)(5) + (0.1)(0.2)$

$= 25 + 1.5 + 0.02$

$= 26.52$

(iii) $103 \times 98 = (100+3)(100-2)$

$= (100)^2 + [3+(-2)](100) + (3)(-2)$

$= 10000 + 100 - 6$

$= 10094$

(iv) $9.7 \times 9.8 = (10-0.3)(10-0.2)$

$= (10)^2 + [(-0.3)+(-0.2)](10) + (-0.3)(-0.2)$

$= 100 + (-0.5)10 + 0.06$

$= 100 - 5 + 0.06$

$= 95 + 0.06$

$= 95.06$

cuemath
THE MATH EXPERT

When you learn math in an interesting way, you never forget.

25 Million
Math classes & counting

100K+
Students learning Math the right way

20+ Countries
Present across USA, UK, Singapore, India, UAE & more.

Why choose Cuemath?

"Cuemath is a valuable addition to our family. We love solving puzzle cards. My daughter is now visualizing maths and solving problems effectively!"

- Gary Schwartz

"Cuemath is great because my son has a one-on-one interaction with the teacher. The instructor has developed his confidence and I can see progress in his work. One-on-one interaction is perfect and a great bonus."

- Kirk Riley

"I appreciate the effort that miss Nitya puts in to help my daughter understand the best methods and to explain why she got a problem incorrect. She is extremely patient and generous with Miranda."

- Barbara Cabrera

Get the Cuemath advantage

Book a FREE trial class