Chapter : 6. OPERATIONS ON ALGEBRAIC EXPRESSIONS

Exercise : 6A

Question: 1

Add:

Solution:

To add the expressions, we have to arrange the given expression in the form of rows and then add the expression column wise, so we have;

$$\begin{array}{r} 8ab \\ -5ab \\ 3ab \\ -ab \\ \hline 5ab \end{array}$$

Question: 2

Add:

Solution:

To add the expressions, we have to arrange the given expression in the form of rows and then add the expression column wise, so we have;

$$\begin{array}{r} 7x \\ -3x \\ 5x \\ -x \\ -2x \\ \hline 6x \end{array}$$

Question: 3

Add:

Solution:

To add the expressions, we have to arrange the given expression in the form of rows and then add the expression column wise, so we have;

$$\begin{array}{l} 3a - 4b + 4c \\ 2a + 3b - 8c \\ \ \ a - 6b + \ c \\ \hline 6a - 7b - 3c \end{array}$$

Question: 4

Add:

Solution:

To add the expressions, we have to arrange the given expression in the form of rows and then add the expression column wise, so we have;

$$\begin{array}{l} 5x - 8y + 2z \\ -2x - 4y + 3z \\ -x + 6y - z \\ 3x - 3y - 2z \\ \hline 5x - 9y + 2z \end{array}$$

Question: 5

Add:

Solution:

To add the expressions, we have to arrange the given expression in the form of rows and then add the expression column wise, so we have;

$$\begin{array}{l} 6ax - 2by + 3cz \\ -11ax + 6by - cz \\ -2ax - 3by + 10cz \\ \hline -7ax + by + 12cz \end{array}$$

Question: 6

Add:

Solution:

Let's arrange the data in a table in the form of descending power of x,

We will get rows and columns; add the data column wise;

	$2x^3$	$-9x^2$	0	+ 8
	0	$3x^2$	$-6x$	− 5
+	$7x^3$	0	$-10x$	+ 1
	$-4x^3$	$-5x^2$	$+2x$	+ 3
Total →	$5x^3$	$-11x^2$	$-14x$	+ 7

So, the answer after adding all the expressions will be;

$5x^3 - 11x^2 - 14x + 7$

Question: 7

Add:

Solution:

To add the expressions, we have to arrange the given expression in the form of rows and then add the expression column wise, so we have;

$$\begin{array}{l} 6p + 4q - r + 3 \\ -5p + 0 + 2r - 6 \\ -7p + 11q + 2r - 1 \\ 0 + 2q - 3r + 4 \\ \hline -6p + 17q + 0 + 0 \end{array}$$

So, the answer is;

$-6p + 17q$

Question: 8

Add:

Solution:

By arrange the given expression in descending powers of x it will be easier To add the expressions,s,

So, we have;

$$\begin{array}{l} 4x^2 + 4y^2 - 7xy - 3 \\ x^2 + 6y^2 - 8xy + 5 \\ 2x^2 - 5y^2 - 2xy + 6 \\ \hline 7x^2 + 5y^2 - 17xy + 8 \end{array}$$

Question: 9

Subtract:

Solution:

We have to subtract $3a^2b$ from $-5a^2b$.

According to the rule when both the expressions have negative sign so we add both the expression and put negative sign only.

So, by arranging the data in rows and columns form we have;

```
  - 5a²b
   3a²b
-______
  - 8a²b
```

Question: 10

Subtract:

Solution:

According to the rule of subtraction two negative becomes positive and the result will have negative sign.

So, To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise,

Therefore, we have;

```
   6pq
 - 8pq
+_____
  14pq
```

Question: 11

Subtract:

Solution:

According to the rule of subtraction two negative becomes positive and the result will have negative sign.

To subtract the expression, we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;

```
 - 8abc
 - 2abc
+______
  - 6abc
```

Question: 12

Subtract:

Solution:

According to the rule of subtraction two negative becomes positive and the result will have negative sign.

To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;

```
 - 11p
 - 16p
+_____
  5p
```

Question: 13

Subtract:

Solution:

According to the rule of subtraction two negative becomes positive and the result will have negative sign.

To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;

$3a - 4b - c + 6$
$2a - 5b + 2c - 9$
$- \quad + \quad - \quad +$

$a + b - 3c + 15$

~~Question: 14~~

~~Subtract:~~

~~Solution:~~

~~According to the rule of subtraction two negative becomes positive and the result will have negative sign.~~

~~To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;~~

$P - 2q - 5r - 8$
$- 6p + q + 3r + 8$
$+ \quad - \quad - \quad +$

$7p - 3q - 8r - 16$

~~Question: 15~~

~~Subtract:~~

~~Solution:~~

~~According to the rule of subtraction two negative becomes positive and the result will have negative sign.~~

~~To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;~~

$3x^3 - x^2 + 2x - 4$
$x^3 + 3x^2 - 5x + 4$
$- \quad - \quad + \quad -$

$2x^3 - 4x^2 + 7x - 8$

~~Question: 16~~

~~Subtract:~~

~~Solution:~~

~~According to the rule of subtraction two negative becomes positive and the result will have negative sign.~~

~~To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;~~

$4y^4 - 2y^3 - 6y^2 - y + 5$
$5y^4 - 3y^3 + 2y^2 + y - 1$
$- \quad + \quad - \quad - \quad +$

$- 4y^4 + y^3 - 8y^2 - 2y + 6$

~~Question: 17~~

~~Subtract:~~

~~Solution:~~

~~According to the rule of subtraction two negative becomes positive and the result will have negative sign.~~

~~To subtract the expression,we have to arrange the given expression in the form of rows and then subtract the expression column wise, so we have;~~

$3p^2 - 4q^2 - 5r^2 - 6$

$4p^2 + 5q^2 - 6r^2 + 7$

\-   \-   +   \-

$-p^2 - 9q^2 + r^3 - 13$

Question: 18

What must be subt

Solution:

Let's suppose the required number be x,

So we have;

$(3a^2 - 6ab - 3b^2 - 1) - x = 4a^2 - 7a - 4b^2 + 1$

$(3a^2 - 6ab - 3b^2 - 1) - (4a^2 - 7a - 4b^2 + 1) = x$

So,

To get the required number we have to subtract $4a^2 - 7a - 4b^2 + 1$ from $3a^2 - 6ab - 3b^2 - 1$

$3a^2 - 6ab - 3b^2 - 1$

$4a^2 - 7a - 4b^2 + 1$

\-   +   +   \-

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

So, the required number is $-a^2 + ab + b^2 - 2$

Question: 19

The two adjacent

Solution:

We know that;

Two adjacent sides of a rectangle are l and b;

$l = 5x^2 - 3y^2$

$b = x^2 + 2xy$

Perimeter of rectangle = (2l+2b)

Which is;

$2(5x^2 - 3y^2) + 2(x^2 + 2xy)$

$= (10x^2 - 6y^2) + (2x^2 + 4xy)$

$10x^2 - 6y^2$

$2x^2 + 0 + 4xy$

$12x^2 - 6y^2 + 4xy$

Question: 20

The perimeter of

Solution:

Perimeter of the triangle = $6p^2 - 4p + 9$

Two sides are;

Side one = $p^2 - 2p + 1$ and

Side two = $3p^2 - 5p + 3$

Let's take third side be = x

As we know perimeter of a triangle = sum of all the sides

So, we have

$6p^2 – 4p + 9 = \{(p^2 – 2p + 1) + (3p^2 – 5p + 3) + (x)\}$

$6p^2 – 4p + 9 = p^2 – 2p + 1 + 3p^2 – 5p + 3 + x$

$6p^2 – 4p + 9 - p^2 + 2p – 1 - 3p^2 + 5p - 3 = x$

Let's make the pairs;

$(6p^2 – p^2 – 3p^2) + (-4p + 2p + 5p) + (9 – 1 – 3) = x$

$2p^2 + 3p + 5 = x$

The required side is $2p^2 + 3p + 5$.

Exercise : 6B

Question: 1

Find each of the

Solution:

To find the product of the given expression we have to Horizontal method;

Horizontal method is the method where each term of one expression is multiplied with each term of other expression.

So, by using horizontal method,

We have;

$= (5x + 7) \times (3x + 4)$

$= 5x (3x + 4) + 7 (3x + 4)$

$= 15x^2 + 20x + 21x + 28$

$= 15x^2 41x + 28$

Question: 2

Find each of the

Solution:

By using horizontal method,

We have;

$= (4x + 9) \times (x - 6)$

$= 4x(x – 6) + 9(x - 6)$

$= 4x^2 – 24x + 9x – 54$

$= 4x^2 – 15x – 54$

Question: 3

Find each of the

Solution:

By using horizontal method,

We have;

$= (2x + 5) \times (4x - 3)$

$= 2x (4x – 3) + 5 (4x – 3)$

$= 8x^2 – 6x + 20x – 15$

$= 8x^2 + 14x - 15$

Question: 4

Find each of the

Solution:

By using horizontal method,

We have;

$= (3y - 8) \times (5y - 1)$

$= 3y(5y - 1) - 8(5y - 1)$

$= 15y^2 - 3y - 40y + 8$

$= 15y^2 - 43y + 8$

Question: 5

Find each of the

Solution:

By using horizontal method,

We have;

$= (7x + 2y) \times (x + 4y)$

$= 7x(x + 4y) + 2y(x + 4y)$

$= 7x^2 + 28xy + 2xy + 8y^2$

$= 7x^2 + 30xy + 8y^2$

Question: 6

Find each of the

Solution:

By using horizontal method,

We have;

$= (9x + 5y) \times (4x + 3y)$

$= 9x(4x + 3y) + 5y(4x + 3y)$

$= 36x^2 + 27xy + 20xy + 15y^2$

$= 36x^2 + 47xy + 15y^2$

Question: 7

Find each of the

Solution:

By using horizontal method,

We have;

$= (3m - 4n) \times (2m - 3n)$

$= 3m(2m - 3n) - 4n(2m - 3n)$

$= 6m^2 - 9mn - 8mn + 12n^2$

$= 6m^2 - 17mn + 12n^2$

Question: 8

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^2 – a^2) \times (x – a)$

$= x^2(x – a) – a^2(x – a)$

$= x^3 – ax^2 – a^2x + a^3$

Question: 9

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^2 – y^2) \times (x + 2y)$

$= x^2 (x + 2y) – y^2(x + 2y)$

$= x^3 + 2x^2y – xy^2 – 2y^3$

Question: 10

Find each of the

Solution:

By using horizontal method,

We have;

$= (3p^2 + q^2) \times (2p^2 – 3q^2)$

$= 3p^2(2p^2 – 3q^2) + q^2(2p^2 – 3q^2)$

$= 6p^4 – 9p^2q^2 + 2p^2q^2 – 3q^4$

$= 6p^4 – 7p^2q^2 – 3q^4$

Question: 11

Find each of the

Solution:

By using horizontal method,

We have;

$= (2x^2 – 5y^2) \times (x^2 + 3y^2)$

$= 2x^2(x^2 + 3y^2) – 5y^2(x^2 + 3y^2)$

$= 2x^4 + 6x^2y^2 – 5x^2y^2 – 15y^4$

$= 2x^4 + x^2y^2 – 15y^4$

Question: 12

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^3 - y^3) \times (x^2 + y^2)$

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

$= x^5 + x^3y^2 - x^2y^3 - y^5$

Question: 13

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^4 + y^4) \times (x^2 - y^2)$

$= x^4(x^2 - y^2) + y^4(x^2 - y^2)$

$= x^6 - x^4y^2 + x^2y^4 - y^6$

Question: 14

Find each of the

Solution:

By using horizontal method,

We have;

$$= \left(x^4 + \frac{1}{x^4}\right) \times \left(x + \frac{1}{x}\right)$$

$$= x^4\left(x + \frac{1}{x}\right) + \frac{1}{x^4}\left(x + \frac{1}{x}\right)$$

$$= x^5 + x^3 + \frac{1}{x^3} + \frac{1}{x^5}$$

Question: 15

Find each of the

Solution:

By using horizontal method,

We have;

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

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

$= 2x^3 - 6x^2 + 14x + 3x^2 - 9x + 21$

By arranging the expression in the form of descending powers of x,

We get;

$= 2x^3 - 6x^2 + 3x^2 + 14x - 9x + 21$

$= 2x^3 - 3x^2 + 5x + 21$

Question: 16

Find each of the

Solution:

By using horizontal method,

We have;

$= (3x^2 + 5x – 9) \times (3x – 5)$

$= 3x(3x^2 + 5x – 9) – 5(3x^2 + 5x – 9)$

$= 9x^3 + 15x^2 – 27x – 15x^2 – 25x + 45$

By arranging the expression in the form of descending powers of x,

We get;

$= 9x^3 + 15x^2 – 15x^2 – 27x – 25x + 45$

$= 9x^3 – 52x + 45$

Question: 17

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^2 – xy + y^2) \times (x + y)$

$= x(x^2 – xy + y^2) + y(x^2 – xy + y^2)$

$= x^3 – x^2y + xy^2 + x^2y – xy^2 + y^3$

By arranging the expression in the form of descending powers of x,

We get;

$= (x^3 + y^3)$

Question: 18

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^2 + xy + y^2) \times (x – y)$

$= x(x^2 + xy + y^2) – y(x^2 + xy + y^2)$

$= x^3 + x^2y + xy^2 – x^2y – xy^2 – y^3$

By arranging the expression in the form of descending powers of x,

We get;

$= (x^3 – y^3)$

Question: 19

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^3 – 2x^2 + 5) \times (4x – 1)$

$= 4x(x^3 – 2x^2 + 5) – 1(x^3 – 2x^2 + 5)$

$= 4x^4 – 8x^3 + 20x – 1x^3 + 2x^2 – 5$

By arranging the expression in the form of descending powers of x, We get;

$= 4x^4 – 8x^3 – x^3 + 2x^2 + 20x – 5$

$= 4x^4 – 9x^3 + 2x^2 + 20x – 5$

Question: 20

Find each of the

Solution:

By using horizontal method,

We have;

$= (9x^2 – x + 15) \times (x^2 – 3)$

$= x^2(9x^2 – x +15) – 3(9x^2 – x + 15)$

$= 9x^4 – x^3 + 15x^2 – 27x^2 + 3x – 45$

$= 9x^4 – x^3 – 12x^2 + 3x – 45$

Question: 21

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^2 – 5x + 8) \times (x^2 + 2)$

$= x^2(x^2 – 5x + 8) + 2(x^2 – 5x + 8)$

$= x^4 – 5x^3 + 8x^2 + 2x^2 – 10x + 16$

$= x^4 – 5x^3 + 10x^2 – 10x +16$

Question: 22

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^3 – 5x^2 + 3x + 1) \times (x^2 – 3)$

$= x^2(x^3 – 5x^2 + 3x + 1) – 3(x^3 – 5x^2 + 3x +1)$

$= x^5 – 5x^4 + 3x^3 + x^2 – 3x^3 + 15x^2 – 9x – 3$

By arranging the expression in the form of descending powers of x,

We get;

$= x^5 – 5x^4 + 3x^3 – 3x^3 + x^2 + 15x^2 – 9x – 3$

$= x^5 – 5x^4 +16x^2 – 9x – 3$

Question: 23

Find each of the

Solution:

By using horizontal method,

We have;

$= (3x + 2y - 4) \times (x - y + 2)$

$= x(3x + 2y - 4) - y(3x + 2y - 4) + 2(3x + 2y - 4)$

$= 3x^2 + 2xy - 4x - 3xy - 2y^2 + 4y + 6x + 4y - 8$

By arranging the expression in the form of descending powers of x,

We get;

$= 3x^2 - 4x + 6x + 2xy - 3xy - 2y^2 + 4y + 4y - 8$

$= 3x^2 + 2x - xy - 2y^2 + 8y - 8$

Question: 24

Find each of the

Solution:

By using horizontal method,

We have;

$= (x^2 - 5x + 8) \times (x^2 + 2x - 3)$

$= x^2(x^2 - 5x + 8) + 2x(x^2 - 5x + 8) - 3(x^2 - 5x + 8)$

$= x^4 - 5x^3 + 8x^2 + 2x^3 - 10x^2 + 16x - 3x^2 + 15x - 24$

By arranging the expression in the form of descending powers of x,

We get;

$= x^4 - 3x^3 - 5x^2 + 31x - 24$

Question: 25

Find each of the

Solution:

By using horizontal method,

We have;

$(2x^2 + 3x - 7) \times (3x^2 - 5x + 4)$

$= 2x^2(3x^2 - 5x + 4) + 3x(3x^2 - 5x + 4) - 7(3x^2 - 5x + 4)$

$= 6x^4 - 10x^3 + 8x^2 + 9x^3 - 15x^2 + 12x - 21x^2 + 35x - 28$

Now, putting equal power terms together, we get,

$= 6x^4 - 10x^3 + 9x^3 + 8x^2 - 15x^2 - 21x^2 + 35x + 12x - 28$

$= 6x^4 - x^3 - 28x^2 + 47x - 28$

Question: 26

Find each o

Solution:

By using horizontal method,

We have;

$(9x^2 - x + 15) \times (x^2 - x - 1)$

$= 9x^2(x^2 - x - 1) - x\,(x^2 - x - 1) + 15(x^2 - x - 1)$

$= 9x^4 - 9x^3 - 9x^2 - x^3 + x^2 + x + 15x^2 - 15x - 15$

Putting equal power terms together, we get,

$= 9x^4 - 9x^3 - x^3 - 9x^2 + x^2 + 15x^2 - 15x + x - 15$

$= 9x^4 - 10x^3 + 7x^2 - 14x - 15$

Exercise : 6C

Question: 1

Divide:

Solution:

(i) By dividing $24x^2y^3$ by $3xy$

We get;

$$= \frac{24x^2y^3}{3xy}$$

$= 8xy^2$

(ii) By dividing $36xyz^2$ by by $-9xz$

We get;

$$= \frac{36xyz^2}{-9xz}$$

$= -4yz$

(iii) By dividing $-72x^2y^2z$ by $-12xyz$

We get;

$$= \frac{-72x^2y^2z}{-12xyz}$$

$= 6xy$

(iv) By dividing $-56mnp^2$ by $7mnp$

We get;

$$= \frac{-56mnp^2}{7mnp}$$

$= -8p$

Question: 2

Divide:

Solution:

(i) By dividing $5m^3 - 30m^2 + 45m$ by $5m$

We get;

$$= \frac{5m^3 - 30m^2 + 45m}{5m}$$

$$= \frac{5m^3}{5m} - \frac{30m^2}{5m} + \frac{45m}{5m}$$

$= m^2 - 6m + 9$

(ii) By dividing $8x^2y^2 - 6xy^2 + 10x^2y^3$ by $2xy$

We get;

$$= \frac{8x^2y^2 - 6xy^2 + 10x^2y^3}{2xy}$$

$$= \frac{8x^2y^2}{2xy} - \frac{6xy^2}{2xy} + \frac{10x^2y^3}{2xy}$$

$= 4xy - 3y + 5xy^2$

(iii) If we divide $9x^2y - 6xy + 12xy^2$ by $-3xy$

We get;

$$= \frac{9x^2y - 6xy + 12xy^2}{-3xy}$$

$$= \frac{9x^2y}{-3xy} - \frac{6xy}{-3xy} + \frac{12xy^2}{-3xy}$$

$= -3x + 2 - 4y$

(iv) If we divide $12x^4 + 8x^3 - 6x^2$ by $-2x^2$

We get;

$$= \frac{12x^4 + 8x^3 - 6x^2}{-2x^2}$$

$$= \frac{12x^4}{-2x^2} + \frac{8x^3}{-2x^2} - \frac{6x^2}{-2x^2}$$

$= -6x^2 - 4x + 3$

Question: 3

Write the quotien

Solution:

If we divide $x^2 - 4x + 4$ by $x - 2$;

$$x - 2 \overline{\big)\, x^2 - 4x + 4\,}\quad \text{quotient: } x - 2$$

$x^2 - 2x$

$-\quad +$

$-2x + 4$

$-2x + 4$

$+\quad -$

$\times$

So, we get;

Quotient = $x - 2$ and remainder = 0

Question: 4

Write the quotien

Solution:

If we divide $(x^2 - 4)$ by $(x + 2)$;

$$x + 2 \overline{\big)\, x^2 - 4\,}\quad \text{quotient: } x - 2$$

$x^2 + 2x$

$-\quad -$

$-2x - 4$

$-2x - 4$

$+\quad +$

$\times$

So, we get;

Quotient = x – 2 and remainder = 0

Question: 5

Write the quotien

Solution:

If we divide (x^2 + 12x + 35) by (x + 7)

$$\begin{array}{r|l} & x+5 \\ \hline x+7 & x^2+12x+35 \\ & x^2+7x \\ & -\quad - \\ \hline & 5x+35 \\ & 5x+35 \\ & -\quad - \\ \hline & \times \\ \hline \end{array}$$

So, we get;

Quotient = (x + 5) and remainder = 0

Question: 6

Write the quotien

Solution:

If we divide ($15x^2$ + x – 6) by (3x + 2)

$$\begin{array}{r|l} & 5x-3 \\ \hline 3x+2 & 15x^2+x-6 \\ & 15x^2+10x \\ & -\quad - \\ \hline & -9x-6 \\ & -9x-6 \\ \hline & +\quad + \\ \hline & \times \\ \hline \end{array}$$

We get;

Quotient = (5x – 3) and remainder = 0

Question: 7

Write the quotien

Solution:

If we divide ($14x^2$ – 53x + 45) by (7x – 9)

So we get;

$$\begin{array}{r|l} & 2x-5 \\ \hline 7x-9 & 14x^2-53x+45 \\ & 14x^2-18x \\ & -\quad + \\ \hline & -35x+45 \\ & -35x+45 \\ & +\quad - \\ \hline & \times \\ \hline \end{array}$$

Quotient = 2x - 5 and remainder = 0

Question: 8

Write the quotien

Solution:

By dividing the given expressions we get;

$$
\begin{array}{r|l}
 & 3x - 8 \\
2x - 5 & 6x^2 - 31x + 47 \\
 & 6x^2 - 15x \\
 & - \quad + \\
\hline
 & -16x + 47 \\
 & -16x + 40 \\
 & + \quad - \\
\hline
 & 7 \\
\hline
\end{array}
$$

Quotient = (3x – 8) and remainder = 7

Question: 9

Write the quotien

Solution:

By dividing the given expressions we get;

$$
\begin{array}{r|l}
 & x^2 - x - 1 \\
2x + 3 & 2x^3 + x^2 - 5x - 2 \\
 & 2x^3 + 3x^2 \\
 & - \quad - \\
\hline
 & -2x^2 - 5x \\
 & -2x^2 - 3x \\
 & + \quad + \\
\hline
 & -2x - 2 \\
 & -2x - 3 \\
 & + \quad + \\
\hline
 & +1 \\
\hline
\end{array}
$$

Quotient = (x^2 – x – 1) and remainder = 1

Question: 10

Write the quotien

Solution:

By dividing the given expressions we get;

$$
\begin{array}{r|l}
 & x^2 - x + 1 \\
x + 1 & x^3 + 1 \\
 & x^3 + x^2 \\
 & - \quad - \\
\hline
 & -x^2 + 1 \\
 & -x^2 - x \\
 & + \quad + \\
\hline
 & +x + 1 \\
 & x + 1 \\
 & - \quad - \\
\hline
 & \times \\
\hline
\end{array}
$$

Quotient = (x^2 – x + 1) and remainder = 0

Question: 11

Write the quotien

Solution:

By dividing the given expressions we get;

$$
\begin{array}{r l}
 & x^2 - 3x + 4 \\
x^2 + x + 1 \,\big) & x^4 - 2x^3 + 2x^2 + x + 4 \\
 & x^4 + x^3 + x^2 \\
 & - \quad - \quad - \\ \hline
 & -3x^3 + x^2 + x \\
 & -3x^3 - 3x^2 - 3x \\
 & + \quad + \quad + \\ \hline
 & 4x^2 + 4x + 4 \\
 & 4x^2 + 4x + 4 \\
 & - \quad - \quad - \\ \hline
 & \times \\ \hline
\end{array}
$$

Quotient = $x^2 - 3x + 4$ and remainder = 0

Question: 12

Write the quotien

Solution:

By dividing the given expressions we get;

$$
\begin{array}{r l}
 & x - 1 \\
x^2 - 5x + 6 \,\big) & x^3 - 6x^2 + 11x - 6 \\
 & x^3 - 5x^2 + 6x \\
 & - \quad + \quad - \\ \hline
 & -x^2 + 5x - 6 \\
 & -x^2 + 5x - 6 \\
 & + \quad - \quad + \\ \hline
 & \times \\ \hline
\end{array}
$$

Quotient = $(x - 1)$ and remainder = 0

Question: 13

Write the quotien

Solution:

By dividing the given expressions we get;

$$
\begin{array}{r l}
 & 5x + 3 \\
x^2 - 3x + 4 \,\big) & 5x^3 - 12x^2 + 12x + 13 \\
 & 5x^3 - 15x^2 + 20x \\
 & - \quad + \quad - \\ \hline
 & 3x^2 - 8x + 13 \\
 & 3x^2 - 9x + 12 \\
 & - \quad + \quad - \\ \hline
 & x + 1 \\ \hline
\end{array}
$$

Quotient = $(5x + 3)$ and remainder = $(x + 1)$

Question: 14

Write the quotien

Solution:

By dividing the given expressions we get;

$$\begin{array}{r|l} & x - 1 \\ 2x^2 - 3x + 5 & 2x^3 - 5x^2 + 8x - 5 \\ & 2x^3 - 3x^2 + 5x \\ & - \quad + \quad - \\ \hline & -2x^2 + 3x - 5 \\ & -2x^2 + 3x - 5 \\ & + \quad - \quad + \\ \hline & \times \\ \hline \end{array}$$

Quotient = (x – 1) and remainder = 0

Question: 15

Write the quotien

Solution:

If we divide $(8x^4 + 10x^3 - 5x^2 - 4x + 1)$ by $(2x^2 - 3x + 5)$

We get,

$$\begin{array}{r|l} & 4x^2 + 11x + 4 \\ 2x^2 - 3x + 5 & 8x^4 + 10x^3 - 5x^2 - 4x + 1 \\ & 8x^4 - 12x^3 + 20x^2 \\ & - \quad + \quad - \\ \hline & 22x^2 - 25x^2 - 4x \\ & 22x^3 - 33x^2 + 55x \\ & - \quad + \quad - \\ \hline & 8x^2 - 59x + 1 \\ & 8x^2 - 12x + 20 \\ & - \quad + \quad - \\ \hline & -47x - 19 \\ \hline \end{array}$$

So,

We get the quotient $4x^2 + 11x + 4$

And the remainder $- 47x - 19$

Exercise : 6D

Question: 1

Find each of the

Solution:

(i) As we have $(x + 6)(x+6)$

$(x + 6)(x + 6) = (x + 6)^2$

By using the formula;

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

We get,

$(x + 6)^2 = x^2 + (6)^2 + 2\times (x) \times (6)$

$= x^2 + 36 + 12x$

By arranging the expression in the form of descending powers of x we get;

$= x^2 + 12x + 36$

(ii) Given;

$(4x + 5y)(4x + 5y)$

By using the formula;

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

We get,

$(4x + 5y)(4x + 5y) = (4x + 5y)^2$

$(4x + 5y)^2 = (4x)^2 + (5y)^2 + 2 \times (4x) \times (5y)$

$= 16x^2 + 25y^2 + 40xy$

(iii) Given,

$(7a + 9b)(7a + 9b)$

By using the formula;

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

We get,

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

$(7a + 9b)^2 = (7a)^2 + (9b)^2 + 2 \times (7a) \times (9b)$

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

(iv) $\left(\frac{2}{3}x + \frac{4}{5}y\right)\left(\frac{2}{3}x + \frac{4}{5}y\right)$

By using the formula $(a + b)^2$

We get;

$$= \left(\frac{2}{3}x + \frac{4}{5}y\right)\left(\frac{2}{3}x + \frac{4}{5}y\right) = \left(\frac{2}{3}x + \frac{4}{5}y\right)^2$$

$$= \left(\frac{2}{3}x\right)^2 + \left(\frac{4}{5}y\right)^2 + 2 \times \left(\frac{2}{3}x\right) \times \left(\frac{4}{5}y\right)$$

$$= \frac{4}{9}x^2 + \frac{16}{25}y^2 + \frac{16}{15}xy$$

(v) $(x^2 + 7)(x^2 + 7)$

By using the formula $(a + b)^2$

We get;

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

$= (x^2)^2 + (7)^2 + 2 \times (x^2) \times (7)$

$= x^4 + 49 + 14x^2$

(vi) $\left(\frac{5}{2}a^2 + 2\right)\left(\frac{5}{2}a^2 + 2\right)$

By using the formula $(a + b)^2$

We get;

$$\left(\frac{5}{2}a^2 + 2\right)\left(\frac{5}{2}a^2 + 2\right)$$

$= \left(\frac{5}{2}a^2 + 2\right)^2$

$= \frac{5}{2}a^2 + 2^2 + 2 \times \frac{5}{2}a^2 \times 2$

$= \frac{25}{36}a^4 + 4 + \frac{10}{3}a^2$

Question: 2

Find each of the

Solution:

(i) Given,

(x – 4)(x – 4)

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$= (x - 4)^2$

$= (x)^2 - 2 \times (x) \times 4 + (4)^2$

$= x^2 - 8x + 16$

(ii) Given,

(2x – 3y)(2x – 3y)

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$= (2x - 3y)^2$

$= (2x)^2 - 2 \times (2x) \times (3y) + (3y)^2$

$= 4x^2 - 12xy + 9y^2$

(iii) $\left(\frac{3}{4}x - \frac{5}{6}y\right)\left(\frac{3}{4}x - \frac{5}{6}y\right)$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$\left(\frac{3}{4}x - \frac{5}{6}y\right)\left(\frac{3}{4}x - \frac{5}{6}y\right)$

$= \left(\frac{3}{4}x - \frac{5}{6}y\right)^2$

$= \left(\frac{3}{4}x\right)^2 - 2 \times \frac{3}{4}x \times \frac{5}{6}y + \left(\frac{5}{6}y\right)^2$

$= \frac{9}{16}x^2 - \frac{15}{12}xy + \frac{25}{36}y^2$

(iv) $\left(x - \frac{3}{x}\right)\left(x - \frac{3}{x}\right)$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$\left(x - \frac{3}{x}\right)\left(x - \frac{3}{x}\right)$

$= \left(x - \frac{3}{x}\right)^2$

$= (x)^2 - 2 \times x \times \frac{3}{x} + \left(\frac{3}{x}\right)^2$

$= x^2 - 6 + \frac{9}{x^2}$

(v) $\left(\frac{1}{3}x^2 - 9\right)\left(\frac{1}{3}x^2 - 9\right)$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$\left(\frac{1}{3}x^2 - 9\right)\left(\frac{1}{3}x^2 - 9\right) = \left(\frac{1}{3}x^2 - 9\right)^2$

$= \left(\frac{1}{3}x^2\right)^2 - 2 \times \frac{1}{3}x^2 \times 9 + (9)^2$

$= \frac{1}{9}x^4 - 6x^2 + 81$

(vi) $\left(\frac{1}{2}y^2 - \frac{1}{3}y\right)\left(\frac{1}{2}y^2 - \frac{1}{3}y\right)$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$\left(\frac{1}{2}y^2 - \frac{1}{3}y\right)\left(\frac{1}{2}y^2 - \frac{1}{3}y\right)$

$= \left(\frac{1}{2}y^2 - \frac{1}{3}y\right)^2$

$= \left(\frac{1}{2}y^2\right)^2 - 2 \times \frac{1}{2}y^2 \times \frac{1}{3}y + \left(\frac{1}{3}y\right)^2$

$= \frac{1}{4}y^4 - \frac{1}{3}y^3 + \frac{1}{9}y^2$

Question: 3

Expand:

Solution:

(i) Given,

$(8a + 3b)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get;

$= (8a)^2 + (3b)^2 + 2 \times 8a \times 3b$

$= 64a^2 + 9b^2 + 48ab$

(ii) $(7x + 2y)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get;

$= (7x)^2 + (2y)^2 + 2 \times (7x) \times (2y)$

$= 49x^2 + 4y^2 + 28xy$

(iii) $(5x + 11)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get;

$= (5x)^2 + (11)^2 + 2\times(5x)\times 11$

$= 25x^2 + 121 + 110x$

(iv) $\left(\frac{a}{2} + \frac{2}{a}\right)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get;

$\left(\frac{a}{2} + \frac{2}{a}\right)^2$

$= \left(\frac{a}{2}\right)^2 + \left(\frac{2}{a}\right)^2 + 2 \times \frac{a}{2} \times \frac{2}{a}$

$= \frac{a^2}{4} + \frac{4}{a^2} + 2$

(v) $\left(\frac{3x}{4} + \frac{2y}{9}\right)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get;

$\left(\frac{3x}{4} + \frac{2y}{9}\right)^2 = \left(\frac{3x}{4}\right)^2 + \left(\frac{2y}{9}\right)^2 + 2 \times \frac{3x}{4} \times \frac{2y}{9}$

$= \frac{9x^2}{16} + \frac{4y^2}{81} + \frac{1}{3}xy$

(vi) $(9x - 10)^2$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$(9x - 10)^2$

$= (9x)^2 - 2 \times (9x) \times 10 + (10)^2$

$= 81x^2 - 180x + 100$

(vii) $(x^2y - yz^2)^2$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$= (x^2y - yz^2)^2$

$= (x^2y)^2 - 2 \times (x^2y) \times yz^2 + (yz^2)^2$

$= x^4y^2 - 2x^2y^2z^2 + y^2z^4$

(viii) $\left(\frac{x}{y} - \frac{y}{x}\right)^2$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$\left(\frac{x}{y} - \frac{y}{x}\right)^2 = \left(\frac{x}{y}\right)^2 - 2 \times \frac{x}{y} \times \frac{y}{x} + \left(\frac{y}{x}\right)^2 = \frac{x^2}{y^2} - 2 + \frac{y^2}{x^2}$

(ix) $\left(3m - \frac{4}{5}n\right)^2$

By using the formula $(a - b)^2 = a^2 - 2ab + b^2$

We get;

$$= (3m)^2 - 2 \times 3m \times \frac{4}{5}n + \left(\frac{4}{5}n\right)^2$$

$$= 9m - \frac{24}{5}mn + \frac{16}{25}n^2$$

Question: 4

Find each of the

Solution:

(i) Given,

$(x + 3)(x - 3)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= x(x + 3) - 3(x + 3)$

$= x^2 + 3x - 3x - 9$

$= x^2 - 9$

(ii) Given,

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

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= 2x(2x + 5) - 5(2x + 5)$

$= 4x^2 + 10x - 10x - 25$

$= 4x^2 - 25$

(iii) Given,

$(8 + x)(8 - x)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= 8(8 + x) - x(8 + x)$

$= 64 + 8x - 8x - x^2$

$= 64 - x^2$

(iv) Given,

$(7x + 11y)(7x - 11y)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= 7x(7x + 11y) - 11y(7x + 11y)$

$= 49x^2 + 77xy - 77xy - 121y^2$

$= 49x^2 - 121y^2$

(v) Given,

$\left(5x^2 + \frac{3}{4}y^2\right)\left(5x^2 - \frac{3}{4}y^2\right)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$\left(5x^2 + \frac{3}{4}y^2\right)\left(5x^2 - \frac{3}{4}y^2\right)$

$= 25x^4 - \frac{9}{16}y^4$

(vi) $\left(\frac{4x}{5} - \frac{5y}{3}\right)\left(\frac{4x}{5} + \frac{5y}{3}\right)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= \frac{16x^2}{25} - \frac{25y^2}{9}$

(vii) $\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= x^2 - \frac{1}{x^2}$

(viii) $\left(\frac{1}{x} + \frac{1}{y}\right)\left(\frac{1}{x} - \frac{1}{y}\right)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= \frac{1}{x^2} - \frac{1}{y^2}$

(ix) $\left(2a + \frac{3}{b}\right)\left(2a - \frac{3}{b}\right)$

By using the formula $(a + b)(a - b) = a^2 - b^2$

We get;

$= 4a^2 - \frac{9}{b^2}$

Question: 5

Using the formula

Solution:

(i) Given,

$(54)^2$

If we break the given number we get;

$(50 + 4)^2$

Now we can use the $(a + b)^2 = a^2 + b^2 + 2ab$

So,

$= (50 + 4)^2 = (50)^2 + (4)^2 + 2 \times 50 \times 4$

$= 2500 + 16 + 400$

= 2916

(ii) $(82)^2$

We can also write it as;

$(80 + 2)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get,

$= (80 + 2)^2 = (80)^2 + (2)^2 + 2 \times 80 \times 2$

= 6400 + 4 + 320

= 6724

(iii) $(103)^2$

We can also write it as;

$(100 + 3)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get,

$(100 + 3)^2 = (100)^2 + (3)^2 + 2 \times 100 \times 3$

= 10000 + 9 + 600

= 10609

(iv) $(704)^2$

We can also write it as;

$(700 + 4)^2$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

We get,

$= (700 + 4)^2 = (700)^2 + (4)^2 + 2 \times 700 \times 4$

= 490000 + 16 + 5600

= 495616

Question: 6

Using the formula

Solution:

(i) Given,

$(69)^2$

We can also write it as;

$(70 – 1)^2$

Now,

By using the formula $(a - b)^2 = a^2 – 2ab + b^2$

We get,

$= (70 – 1)^2 = (70)^2 – 2 \times 70 \times 1 + (1)^2$

= 4900 – 140 + 1

= 4761

(ii) Given = $(78)^2$

We can also write it as;

$(80 – 2)^2$

Now,

By using the formula $(a - b)^2 = a^2 – 2ab + b^2$

We get,

$(80 – 2)^2 = (80)^2 – 2 \times 80 \times 2 + (2)^2$

$= 6400 – 320 + 4$

$= 6084$

(iii) $(197)^2$

We can also write it as;

$(200 – 3)^2$

Now,

By using the formula $(a - b)^2 = a^2 – 2ab + b^2$

We get,

$(200 – 3)^2 = (200)^2 – 2 \times 200 \times 3 + (3)^2$

$= 40000 – 1200 + 9$

$= 38809$

(iv) $(999)^2$

We can also write it as;

$(1000 – 1)^2$

Now,

By using the formula $(a - b)^2 = a^2 – 2ab + b^2$

We get,

$(1000 - 1)^2 = (1000)^2 – 2 \times 1000 \times 1 + (1)^2$

$= 1000000 – 2000 + 1$

$= 998001$

Question: 7

Find the value of

Solution:

(i) Given,

$(82)^2 – (18)^2$

By using $(a – b)(a + b) = a^2 – b^2$

$= (82 – 18)(82 + 18)$

$= (64)(100)$

$= 6400$

(ii) $(128)^2 – (72)^2$

By using $(a – b)(a + b) = a^2 – b^2$

= (128 – 72)(128 + 72)

= (56)(200)

=11200

(iii) 197 × 203

By converting the given number into the form of formula we get,

= (200 – 3)(200 + 3)

= $(200)^2 – (3)^2$

= 40000 – 9

= 39991

(iv) Given,

$$\frac{198 \times 198 - 102 \times 102}{96}$$

By using the formula $(a – b)(a + b) = a^2 – b^2$

We get;

$$= \frac{(198)^2 - (102)^2}{96}$$

$$= \frac{(198 - 102)(198 + 102)}{96}$$

$= \frac{(96)(300)}{96} = 300$

(v) (14.7 × 15.3)

By using $(a – b)(a + b) = a^2 – b^2$

We get;

= (15 – 0.3)(15 + 0.3)

= $(15)^2 – (0.3)^2$

= 225 – 0.09

= 224.91

(vi) $(8.63)^2 – (1.37)^2$

By using $(a – b)(a + b) = a^2 – b^2$

We get;

= (8.63 – 1.37)(8.63 + 1.37)

= (7.26)(10)

= 72.6

Question: 8

Find the value of

Solution:

Given,

$(9x^2 + 24x + 16)$

x = 12

So, we can also write it as;

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

→ By the formula $(a + b)^2$ we get,

$= (3x + 4)^2$

$= [3 (12) + 4]^2$

$= [36 + 4]^2$

$= [40]^2 = 1600$

Hence the value of the expression is 1600 when x =12.

Question: 9

Find the value of

Solution:

Given,

$(64x^2 + 81y^2 + 144xy)$

X = 11

$Y = \frac{4}{3}$

By using the formula $(a + b)^2$ we get;

$= (8x)^2 + (9y)^2 + 2(8x)(9y)$

$= (8x + 9y)^2$

$= [8(11) + 9\left(\frac{4}{3}\right)]^2$

$= (88 + 12)^2$

$= (100)^2 = 10000$

Hence the value of the expression is 10000.

Question: 10

Find the value of

Solution:

Given,

$(36x^2 + 25y^2 - 60xy)$

$X = \frac{2}{3}$

$Y = \frac{1}{5}$

With the help of the formula $(a - b)^2$ we get;

$= (6x)^2 + (5y)^2 - 2(6x)(5y)$

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

$= \left(6\left(\frac{2}{3}\right) - 5\left(\frac{1}{5}\right)\right)^2$

$= (4 - 1)^2$

$= (3)^2 = 9$

Question: 11

If

We know that,

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

$= \left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = x^2 + \frac{1}{x^2} + 2$

$= x + \frac{1}{x} = 4$ given

So, by putting the values , we get,

$= 4^2 = x^2 + \frac{1}{x^2} + 2$

$= x^2 + \frac{1}{x^2} = 16 - 2 = 14$

(ii) $\left(x^4 + \frac{1}{x^4}\right)$

We know that,

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

$= \left(x^2 + \frac{1}{x^2}\right)^2 = x^4 + \frac{1}{x^4} + 2 \times x^2 \times \frac{1}{x^2} = x^4 + \frac{1}{x^4} + 2$

$= x^2 + \frac{1}{x^2} = 14$ (previously calculated)

So, by putting the values , we get,

$= 14^2 = x^4 + \frac{1}{x^4} + 2$

$= x^2 + \frac{1}{x^2} = 196 - 2 = 194$

Question: 12

If $\left(x^2 + \frac{1}{x^2}\right)$

We know that,

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

$= \left(x - \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} - 2 \times x \times \frac{1}{x} = x^2 + \frac{1}{x^2} - 2$

$= x - \frac{1}{x} = 5$ given

So, by putting the values, we get,

$= 5^2 = x^2 + \frac{1}{x^2} - 2$

$= x^2 + \frac{1}{x^2} = 25 + 2 = 27$

(ii) $\left(x^4 + \frac{1}{x^4}\right)$

We know that,

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

$= \left(x^2 + \frac{1}{x^2}\right)^2 = x^4 + \frac{1}{x^4} + 2 \times x^2 \times \frac{1}{x^2} = x^4 + \frac{1}{x^4} + 2$

$= x^2 + \frac{1}{x^2} = 27$ (previously calculated)

So, by putting the values, we get,

$= 27^2 = x^4 + \frac{1}{x^4} + 2$

$= x^2 + \frac{1}{x^2} = 729 - 2 = 727$

Question: 13

Find the continue

Solution:

(i) $(x + 1)(x - 1)(x^2 + 1)$

We know that, from formula,

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

$(x + 1)(x - 1)(x^2 + 1) = (x^2 - 1)(x^2 + 1)$

$= (x^2)^2 - 1 = x^4 - 1$

(ii) $(x - 3)(x + 3)(x^2 + 9)$

We know that, from formula,

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

$(x - 3)(x + 3)(x^2 + 9)$

$= (x^2 - 9)(x^2 + 9)$

$= (x^2)^2 - 9^2 = x^4 - 81$

(iii) $(3x - 2y)(3x + 2y)(9x^2 + 4y^2)$

We know that, from formula,

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

$(3x - 2y)(3x + 2y)(9x^2 + 4y^2)$

$= (9x^2 - 4y^2)(9x^2 + 4y^2)$

$= 81x^4 - 16y^4$

(iv) $(2p + 3)(2p - 3)(4p^2 + 9)$

We know that, from formula,

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

$(2p + 3)(2p - 3)(4p^2 + 9)$

$= (4p^2 - 9)(4p^2 + 9)$

$= (4p^2)^2 - 9^2 = 16p^4 - 81$

Question: 14

If x + y = 12 and

Solution:

Given,

$x + y = 12$

Let's square the both sides,

We get;

$= (x + y)^2 = (12)^2$

$= x^2 + y^2 + 2xy = 144$

$= x^2 + y^2 = 144 - 2xy$

Also given,

xy = 14

$= x^2 + y^2 = 144 - 2(14)$

$= x^2 + y^2 = 144 - 28$

$= x^2 + y^2 = 116$

So, the value of $(x^2 + y^2)$ is 116.

Question: 15

If x – y =

Solution:

x – y = 7 (given)

By squaring both the sides we get;

$= (x - y)^2 = (7)^2$

$= x^2 + y^2 - 2xy = 49$

$= x^2 + y^2 = 49 + 2xy$

Also given,

xy = 9

$= x^2 + y^2 = 49 + 2(9)$

$= x^2 + y^2 = 49 + 18$

$= x^2 + y^2 = 67$

So, the value of $x^2 + y^2$ is 67.

Exercise : 6E

Question: 1

The sum of

Solution:

```
6a + 4b – c  +  3
    + 2b – 3c + 4
-7a+ 11b +2c – 1
-5a         + 2c – 6
------------------
- 6a + 17 b
------------------
```

Question: 2

$(3q + 7p^2$

Solution:

$$\left(3q + 7p^2 - 2r^3 + 4\right) - \left(4p^2 - 2q + 7r^3 - 3\right) = ?$$

After solving the bracket,

we get,

$= 3q + 7p^2 - 2r^3 + 4 - 4p^2 + 2q - 7r^3 + 3 = 7p^2 - 4p^2 + 3q + 2q - 2r^3 - 7r^3 + 3 + 4$

$= 3p^2 + 5q - 9r^3 + 7$

Question: 3

$(x + 5)(x - 3) =$

Solution:

After solving the equation,

we get,

$(x + 5)(x - 3) = x(x - 3) + 5(x - 3)$

$= x^2 - 3x + 5x - 15$

$= x^2 + 2x - 15$

Question: 4

$(2x + 3)(3x - 1)$

Solution:

After solving the equations,

we get,

$(2x + 3)(3x - 1) = 2x(3x - 1) + 3(3x - 1)$

$= 6x^2 - 2x + 9x - 3$

$= 6x^2 + 7x - 3$

Question: 5

$(x + 4)(x + 4) =$

Solution:

We know that,

$(x + 4)(x + 4) = (x + 4)^2$

From formula, $(a + b)^2 = a^2 + b^2 + 2ab$

$(x + 4)^2 = x^2 + 4^2 + 2 \times x \times 4$

$= x^2 + 8x + 16$

Question: 6

$(x - 6)(x - 6) =$

Solution: $(x - 6)(x - 6)$By component wise multiplication$= x(x - 6) - 6(x - 6)$(**from above we can see that,** $x.x = x^2$, $x.(-6) = -6x$, $-6.x = -6x$, and $-6.-6 = +36$)$= x^2 - 6x - 6x + 36$$= x^2 - 12x + 36$**Note: Multiplication of signs is given by-(+) × (+) = +(+) × (-) = -(-)×(+)= -(-) × (-) = +**

Question: 7

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

Solution:

We know that,

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

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

$= 4x^2 - 25$

Question: 8

$8a^2b$

Solution:

If we divide $8a^2b^3$ by (-2ab)we get;

$= \left(\frac{8}{-2}\right)(a^{2-1})(b^{3-1})$

$= -4ab^2$

Question: 9

$(2x^2 +$

Solution:

By dividing $(2x^2 + 3x + 1)$ by $(x + 1)$

We get;

$$
\begin{array}{r l}
 & 2x + 1 \\
x + 1 \,\big) & 2x^2 + 3x + 1 \\
 & 2x^2 + 2x \\
 & - \quad - \\
\hline
 & +1x + 1 \\
 & +1x + 1 \\
 & - \quad - \\
\hline
 & \times \\
\hline
\end{array}
$$

Question: 10

$(x^2 -$

Solution:

By dividing $(x^2 - 4x + 4)$ by $(x - 2)$

We get;

$$
\begin{array}{r l}
 & x - 2 \\
x - 2 \,\big) & x^2 - 4x + 4 \\
 & x^2 - 2x \\
 & - \quad + \\
\hline
 & -2x + 4 \\
 & -2x + 4 \\
 & + \quad - \\
\hline
 & \times \\
\hline
\end{array}
$$

Question: 11

$(a + 1)(a -$

Solution:

We know that,

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

$(a + 1)(a - 1)(a^2 + 1) = (a^2 - 1)(a^2 + 1)$

Again applying the formula,

$(a^2 - 1)(a^2 + 1) = (a^2)^2 - (1^2)^2 = a^4 - 1$

Question: 12

Solution:

We know that,

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

$$\left(\frac{1}{x}+\frac{1}{y}\right)\left(\frac{1}{x}-\frac{1}{y}\right)=\left(\frac{1}{x}\right)^2-\left(\frac{1}{y}\right)^2=\frac{1}{x^2}-\frac{1}{y^2}$$

Question: 13

If $\left(x+\frac{1}{x}\right)^2 = x^2+\frac{1}{x^2}+2 \times x \times \frac{1}{x} = x^2+\frac{1}{x^2}+2$

$\left(x+\frac{1}{x}\right)^2 = x^2+\frac{1}{x^2}+2$ ………………….(i)

And $x+\frac{1}{x}=5$, given,

Putting value of $x+\frac{1}{x}$ in equation (i), we get,

$(5)^2 = x^2+\frac{1}{x^2}+2$

$x^2+\frac{1}{x^2} = 25 - 2 = 23.$

Question: 14

If

$\left(x-\frac{1}{x}\right)^2 = x^2+\frac{1}{x^2}-2$ ………………….(i)

And $x-\frac{1}{x}=6$, given,

Putting value of $x-\frac{1}{x}$ in equation (i), we get,

$(6)^2 = x^2+\frac{1}{x^2}-2$

$x^2+\frac{1}{x^2} = 36+2 = 38.$

Question: 15

$(82)^2$

Solution:

$(82)^2 - (18)^2$

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

$= (82 - 18)(82 + 18)$

$= (64)(100)$

$= 6400$

Question: 16

(197×203)

Solution:

We can write following problem such as,

$(197 \times 203) = (200 - 3)(200 + 3)$

From the formula, $(a + b)(a - b) = a^2 - b^2$

We get,

$(200 - 3)(200 + 3) = 200^2 - 3^2 = 40000 - 9 = 39991.$

Question: 17

If $(a + b) = 12$ a

Solution:

From the formula,

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

We get,

$= a + b = 12$ and $ab = 14$

By putting values, we get,

$12^2 = a^2 + b^2 + 2 \times 14$

$= a^2 + b^2 = 144 - 28 = 116.$

Question: 18

If (a - b) = 7 an

Solution:

From the formula,

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

We get,

$= a - b = 7$ and $ab = 9$

By putting values, we get,

$7^2 = a^2 + b^2 - 2 \times 9$

$= a^2 + b^2 = 49 + 18 = 67$

Question: 19

If x = 10, then f

Solution:

$(4x^2 + 20x + 25)$

By using $(a + b)^2 = a^2 + b^2 + 2ab$,

We get;

$= (2x)^2 + (5)^2 + 2(2x)(5)$

$= (2x + 5)^2$

$= (2(10) + 5)^2$

$= (20 + 5)^2$

$= (25)^2$

$= 625$