Operations On Algebraic Expressions
Ex 6E

Q1

Answer :

(c) $(-6a + 17b)$

$$\begin{array}{r} 6a + 4b - c + 3 \\ + 2b - 3c + 4 \\ -7a + 11b + 2c - 1 \\ -5a + 2c - 6 \\ \hline -6a + 17b + 0c + 0 \end{array}$$

Q2

Answer :

(d) $(3p^2 + 5q - 9r^3 + 7)$

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

Q3

Answer :

(d) $x^2 + 2x - 15$

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

Q4

Answer :

(b) $(6x^2 + 7x - 3)$

$(2x+3)(3x-1)$
$\Rightarrow (2x)(3x-1)+(3)(3x-1)$
$\Rightarrow 6x^2 - 2x + 9x - 3$
$\Rightarrow 6x^2 + 7x - 3$

Q5

Answer :

(c) $(x^2 + 8x + 16)$

$(x+4)(x+4)$
$\Rightarrow (x+4)^2 \qquad \left(\text{according to the formula } (a+b)^2 = a^2+2ab+b^2\right)$
$\Rightarrow (x^2)+2(x)(4)+(4)^2$
$\Rightarrow x^2+8x+16$

Q6

Answer :

(d) $(x^2 - 12x + 36)$

$(x-6)(x-6)$
$\Rightarrow (x-6)^2 \qquad \left(\text{according to the formula } (a-b)^2 = a^2-2ab+b^2\right)$
$\Rightarrow (x^2)-2(x)(6)+(6)^2$
$\Rightarrow x^2-12x+36$

Q7

Answer :

(b) $(4x^2 - 25)$

$(2x+5)(2x-5)$
$\Rightarrow (2x)^2-(5)^2 \qquad \left(\text{according to the formula } (a+b)(a-b) = a^2-b^2\right)$
$\Rightarrow 4x^2 - 25$

Q8

Answer :

(c) $-4ab^2$

$8a^2b^3 \div (-2ab)$
$\Rightarrow \left(\frac{8}{-2}\right)\left(a^{2-1}\right)\left(b^{3-1}\right)$
$\Rightarrow -4ab^2$

Q9

Answer :

(b) $(2x + 1)$

$$
\begin{array}{r|l}
x+1 \;\overline{)\; 2x^2+3x+1} & \boldsymbol{2x+1} \\
\underline{\;2x^2+2x\;} & \\
\quad +1x+1 & \\
\quad \underline{+1x+1} & \\
\quad\quad \times &
\end{array}
$$

Q10

Answer :

(a) $(x - 2)$

$$
\begin{array}{r|l}
x-2 & x^2-4x+4 \quad (x-2 \\
& x^2-2x \\
& \overline{-\quad +} \\
& \overline{\quad -2x+4} \\
& \quad -2x+4 \\
& \quad \overline{+\quad -} \\
& \quad \overline{\quad \times}
\end{array}
$$

Q11

Answer :

(c) $(a^4 - 1)$

$(i)\ (a+1)(a-1)(a^2+1)$

$\Rightarrow \left((a)^2 - (1)^2\right)(a^2+1) \qquad \left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow (a^2-1)(a^2+1)$

$\Rightarrow (a^2)^2 - \left(1^2\right)^2 \qquad \left[\text{according to the formula } a^2 - b^2 = (a+b)(a-b)\right]$

$\Rightarrow a^4 - 1$

Q12

Answer :

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

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

$\Rightarrow$ *According to the formula* $(a+b)(a-b) = (a)^2 - (b)^2$:

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

Q13

Answer :

(c) 23

$\left(x + \frac{1}{x}\right) = 5$

$\Rightarrow$ *Squaring both the sides* :

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

$\Rightarrow \left(x^2 + \frac{1}{x^2} + 2(x)\left(\frac{1}{x}\right)\right) = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) + 2 = 25$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 25 - 2$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 23$

Q14

Answer :

(b) 38

$\left(x - \frac{1}{x}\right) = 6$

$\Rightarrow$ *Squaring both the sides* :

$\Rightarrow \left(x - \frac{1}{x}\right)^2 = (6)^2$

$\Rightarrow \left(x^2 + \frac{1}{x^2} - 2(x)\left(\frac{1}{x}\right)\right) = 36$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) - 2 = 36$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 36 + 2$

$\Rightarrow \left(x^2 + \frac{1}{x^2}\right) = 38$

Q15

Answer :

(c) 6400

$(82)^2 - (18)^2$ [using the identity $(a-b)(a+b)=a^2-b^2$]
$= (82 + 18)(82 - 18)$
$= (100)(64)$
$= 6400$

Q16

Answer :

(a) 39991

$(197) \times (203)$ [using the identity $(a+b)(a-b) = a^2 - b^2$]
$\Rightarrow (200 - 3)(200 + 3)$
$\Rightarrow (200)^2 - (3)^2$
$\Rightarrow 40000 - 9$
$\Rightarrow 39991$

Q17

Answer :

(b) 116

$(a + b) = 12$
$\Rightarrow$ *Squaring both the sides* :
$\Rightarrow (a + b)^2 = (12)^2$
$\Rightarrow \left(a^2 + b^2 + 2ab\right) = 144$
$\Rightarrow \left(a^2 + b^2\right) = 144 - 2ab$
$\Rightarrow \left(a^2 + b^2\right) = 144 - 2(14)$
$\Rightarrow \left(a^2 + b^2\right) = 144 - 28$
$\Rightarrow \left(a^2 + b^2\right) = 116$

Q18

Answer :

(a) 67

$(a - b) = 7$
$\Rightarrow$ Squaring both the sides :
$\Rightarrow (a - b)^2 = (7)^2$
$\Rightarrow \left(a^2 + b^2 - 2ab\right) = 49$
$\Rightarrow \left(a^2 + b^2\right) = 49 + 2ab$
$\Rightarrow \left(a^2 + b^2\right) = 49 + 2(9)$
$\Rightarrow \left(a^2 + b^2\right) = 49 + 18$
$\Rightarrow \left(a^2 + b^2\right) = 67$

Q19 **Answer :**

(c) 625

$\left(4x^2 + 20x + 25\right)$
$\Rightarrow (2x)^2 + 2(2x)(5) + (5)^2$
$\Rightarrow (2x + 5)^2$
$\Rightarrow (2(10) + 5)^2$
$\Rightarrow (20 + 5)^2$
$\Rightarrow (25)^2$
$\Rightarrow 625$