Exercise 7.8

Resolve each of the following quadratic trinomials into factors:

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

Sol: here we need to find two numbers p and q such that $p+q=5$, $p\times q = 2\times 3=6$

$\therefore \quad p=3, q=2$

$\Rightarrow \quad 2x^2+(3+2)x+3$

$\Rightarrow \quad 2x^2+3x+2x+3$

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

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

here we need to find p and q, such that

$p+q=-3$, $p\times q = 2\times -2 = -4$

$\therefore \quad p=-4, q=1$

$2x^2-3x-2 = 2x^2-(4-1)x-2$

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

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

(3) $3x^2+10x+3$

we need to find two factors p and q

such that $p+q=10$, $p\times q = 3\times 3 = 9$

$\Rightarrow \quad 3x^2+9x+x+3$

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

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Q4 $7x-6-2x^2$

$= -(2x^2-7x+6)$

here we have to find two factors p and q

such that $p+q=-7$, $p\times q = 6\times 2 = 12$

$\therefore p=-3, p=-4$

Therefore $= -\{2x^2-3x-4x+6\}$

$= -\{x(2x-3)-2(2x-3)\}$

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

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

Q5 $7x^2-19x-6$

here, we need to find two factors p and q

such that $p+q=-19$, $p\times q = 7\times -6 = -42$, $\therefore p=-21$

$q=2$

$7x^2-19x-6 = 7x^2-21x+2x-6$

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

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

Q6 $28-31x-5x^2$

$= -[5x^2+31x-28]$ here $p+q=31$

$p\times q = 5\times -28 = -140$

$=$

$\therefore p=35, q=-4$

$= -[5x^2+35x-4x-28]$

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$= -[5x(x+7) - 4(x+7)]$

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

$= (-x-7)(5x-4)$

Q7 $3 + 23y - 8y^2$

$= -(8y^2 - 23y - 3)$ here $p+q = -23$

$p \times q = 8 \times -3 = -24$

$= -[8y^2 - 24y + y - 3]$ $\therefore p = -24, q = 1$

$= -[8y(y-3) + 1(y-3)]$

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

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

Q8 $11x^2 - 54x + 63$

here we need to find two factors p and q

such that $p+q = -54$, $p \times q = 11 \times 63 = 693$

$\therefore$ ~~$p = -63$~~, $p = -21, q = -33$

$\therefore 11x^2 - 54x + 63 = 11x^2 - 21x - 33x + 63$

$= x(11x-21) - 3(11x-21)$

$= (11x-21)(x-3)$

Q9 $7x - 6x^2 + 20$

$= -(6x^2 - 7x - 20)$ here $p+q = -7$, $p \times q = 6 \times -20 = -120$

$= -(6x^2 - 15x + 8x - 20)$ $\therefore p = -15, q = 8$

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$= \cancel{\{\{6}$

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

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

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

Q.10 $3x^2+22x+35$

here we need to find factors p and q such that $p+q=22$, $p\times q = 3\times 35 = 105$

$\therefore p=15,\ q=7$

Therefore, $3x^2+22x+35 = 3x^2+15x+7x+35$

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

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

Q11 $12x^2-17xy+6y^2$

here, we need to find two factors p and q such that $p+q=-17$, $p\times q = 12\times 6 = 72$

$\therefore p=-9,\ q=-8$

$\Rightarrow 12x^2-9xy-8xy+6y^2$

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

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

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(12) $6x^2 - 5xy - 6y^2$

Sol: here we need to find factors p and q such that $p+q=-5$, $p \times q = 6 \times -6 = -36$, $p=-9$, $q=4$

$$\Rightarrow 6x^2 - 5xy - 6y^2 = 6x^2 - 9xy + 4xy - 6y^2$$
$$= 3x(2x-3y) + 2y(2x-3y)$$
$$= (2x-3y)(3x+2y)$$

(13) $6x^2 - 13xy + 2y^2 =$

we need to find two factors p and q such that $p+q=-13$, $p \times q = 6 \times 2 = 12$

$\therefore p=-12$, $q=-1$

Therefore $6x^2 - 13xy + 2y^2 = 6x^2 - 12xy - xy + 2y^2$
$$= 6x(x-2y) - y(x-2y)$$
$$= (x-2y)(6x-y)$$

(14) $14x^2 + 11xy - 15y^2$

here we need to find p and q such that

$p+q=11$, $p \times q = 14 \times -15 = -210$

$\therefore p = 21$, $q = -10$

$$14x^2 + 11xy - 15y^2 = 14x^2 + 21xy - 10xy - 15y^2$$
$$= 7x(2x+3y) - 5y(2x+3y)$$
$$= (2x+3y)(7x-5y)$$

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Q.15 $6a^2+17ab-3b^2$

$\Rightarrow$ here we need to find p and q such that $p+q=17$, $p\times q = 6\times -3 = -18$, $p=18, q=-1$

$\therefore 6a^2+17ab-3b^2 = 6a^2+18ab-ab-3b^2$

$= 6a(a+3b)-b(a+3b)$

$= (a+3b)(6a-b)$

Q16 $3[a^2+12abc-15b^2c^2] = 3[a^2+4abc-5b^2c^2]$

Sol: here we need to find two factors p and q such that $p+q = 4$, $p\times q = 12\times -5 = -60, -1$, $p=10$, $q=-6$

$= 3[12a^2+10abc-6abc-5b^2c^2]$

$= 3[2a(6a+5abc)-bc(6a+5abc)]$

$= 3(2a-bc)(6a+5abc)$

Q17 $15x^2-16xyz-15y^2z^2$

here we need to find p and q such that $p+q=-16$, $p\times q = 15\times -15 = -225$

$\therefore p=-25$, $q=9$

$= 15x^2-25xyz+9xyz-15y^2z^2$

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

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

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Q.18 $(x-2y)^2 - 5(x-2y) + 6$

Sol: let $x - 2y = a$

$$a^2 - 5a + 6$$

$$\Rightarrow a^2 - 3a - 2a + 6$$

$$\Rightarrow a(a-3) - 2(a-3)$$

$$= (a-3)(a-2)$$

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

Q.19 $(2a-b)^2 + 2(2a-b) - 8$

Sol: let $2a-b = x$

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

$$= x^2 + 4x - 2x - 8$$

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

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

$$= (2a-b+4)(2a-b-2)$$

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