① $x^2+13x-30=0$

$\boxed{(x+15)(x-2)=0}$

Solutions $\boxed{x=-15 \quad x=2}$

30 Subtract

1, 30

2, 15

3, 10

5, 6

② $x^2-5x-24=0$

$\boxed{(x-8)(x+3)=0}$

Solutions $\boxed{x=8 \quad x=-3}$

24 Subtract

1, 24

2, 12

3, 8

4, 6

③ $x^2+5x-36$

$\boxed{(x+9)(x-4)=0}$

Solutions

$\boxed{x=-9 \quad x=4}$

36 Subtract

1, 36

2, 18

3, 12

4, 9

6, 6

④ $x^2+15x+56$

$\boxed{(x+7)(x+8)=0}$

$\boxed{x=-7 \quad x=-8}$

56 Add

1, 56

2, 28

4, 14

7, 8

(5) $x^2+15x+54=0$

$\boxed{(x+6)(x+9)}$

Solutions $\boxed{\begin{array}{l} x=-6 \\ x=-9 \end{array}}$

54 Add

1, 54

2, 27

3, 18

6, 9

---

(6) $x^2-8x-20=0$

$\boxed{(x-10)(x+2)=0}$

Solutions $\boxed{\begin{array}{l} x=10 \\ x=-2 \end{array}}$

20 Subtract

1, 20

2, 10

4, 5

---

(7) $x^2+4x-32=0$

$\boxed{(x+8)(x-4)=0}$

Solutions $\boxed{\begin{array}{l} x=-8 \\ x=4 \end{array}}$

32 subtract

1, 32

2, 16

4, 8

---

(8) $x^2-x-20=0$

$\boxed{(x-5)(x+4)=0}$

Solutions

$\boxed{x=5 \quad x=-4}$

20 Subtract

1, 20

2, 10

4, 5

(9) $x^2+11x+30=0$

$\boxed{(x+5)(x+6)=0}$

solutions $\boxed{x=-5 \quad x=-6}$

30 Add

1, 30
2, 15
3, 10
5, 6

---

(10) $x^2+14x+49=0$ PST

$\sqrt{x^2}$ $\sqrt{49}$

x & 7

$2(x \cdot 7)=14$

$\boxed{(x+7)(x+7)=0}$

Solutions

$\boxed{x=-7 \quad x=-7}$

---

(11) $x^2+10x+16=0$ not PST

16 Add

1, 16
2, 8
4, 4

$\boxed{(x+2)(x+8)=0}$

solutions

$\boxed{x=-2 \quad x=-8}$

---

(12) $x^2+3x+2=0$

3 Add

1, 3

$\boxed{(x+1)(x+2)=0}$

solutions $\boxed{x=-1 \text{ or } x=-2}$

(13) $x^2+15x+44=0$

44 Add

1, 44
2, 22
4, 11

$\boxed{(x+11)(x+4)=0}$

solutions

$\boxed{x=-11 \quad x=-4}$

---

(15) $x^2+6x+5=0$

5 Add

1, 5

$\boxed{(x+1)(x+5)=0}$

Solutions

$\boxed{x=-1 \quad x=-5}$

---

(16) $2x^2+20x+32=0$ GCF "2"

$2(x^2+10x+16)=0$ not PST

16 Add

1, 16
2, 8
4, 4

$\boxed{2(x+8)(x+2)=0}$

solution $\boxed{x=-8 \quad x=-2}$

---

(18) $3x^2-15x+18=0$ GCF "3"

$3(x^2-5x+6)$

6 Add

1, 6
2, 3

$\boxed{3(x-2)(x-3)=0}$

solutions

$\boxed{x=2 \quad x=3}$

(19) $2x^2+8x-24=0$ GCF "2"

$2(x^2+4x-12)$ 12 subtract

1, 12

2, 6

3, 4

$\boxed{2(x+6)(x-2)=0}$

solutions

$\boxed{x=-6 \quad x=2}$

---

(20) $2x^2+16x-32$ GCF "2"

$2(x^2+8x-16)=0$ 16 subtract

1, 16

2, 8

4, 4

cannot be factored further

$D=16^2-4(2)(-32)$

$=256+256=512$

$$\boxed{x=\frac{-16\pm\sqrt{512}}{4}=\frac{-16\pm16\sqrt{2}}{4}=-4\pm4\sqrt{2}}$$

(21) $3x^2+7x+2=0$

$3x^2+1x+6x+2=0$

$x(3x+1)+2(3x+1)=0$

$\boxed{(3x+1)(x+2)=0}$

OR

$3x^2+6x+1x+2=0$

$3x(x+2)+1(x+2)=0$

$\boxed{(x+2)(3x+1)=0}$

$AC=6x^2$ Add

1, 6

2, 3

Solutions

$3x+1=0$ $\quad$ $x+2=0$

$3x=-1$ $\quad$ $x=-2$

$x=-\frac{1}{3}$

---

(22) $2x^2+5x+3=0$

$2x^2+2x+3x+3=0$

$2x(x+1)+3(x+1)=0$

$\boxed{(x+1)(2x+3)=0}$

OR

$2x^2+3x+2x+3=0$

$x(2x+3)+1(2x+3)=0$

$\boxed{(2x+3)(x+1)=0}$

$AC=6x^2$ Add

1, 6

2, 3

Solutions

$2x+3=0$ $\quad$ $x+1=0$

$2x=-3$ $\quad$ $x=-1$

$x=-\frac{3}{2}$

(23) $3x^2-16x+5=0$

$AC = 15x^2$ Add

1, 15

3, 5

$3x^2-15x-1x+5=0$

$3x(x-5)-1(x-5)=0$

$\boxed{(x-5)(3x-1)=0}$

OR

$3x^2-1x-15x+5=0$

$x(3x-1)-5(3x-1)=0$

$\boxed{(3x-1)(x-5)=0}$

Solutions

$3x-1=0$ $\quad$ $x-5=0$

$3x=1$ $\quad$ $x=5$

$x=1/3$

---

(24) $7x^2-9x+2=0$

$AC = 14x^2$ Add

1, 14

2, 7

$7x^2-7x-2x+2=0$

$7x(x-1)-2(x-1)=0$

$\boxed{(x-1)(7x-2)=0}$

OR

$7x^2-2x-7x+2=0$

$x(7x-2)-1(7x-2)=0$

$\boxed{(7x-2)(x-1)=0}$

Solutions

$x-1=0$ $\quad$ $7x-2=0$

$x=1$ $\quad$ $7x=2$

$x=2/7$

(25) $6x^2+5x+1=0$

$AC = 6x^2$ Add

1, 6

2, 3

$6x^2+2x+3x+1=0$

$2x(3x+1)+1(3x+1)=0$

$\boxed{(3x+1)(2x+1)=0}$

or

$6x^2+3x+2x+1=0$

$3x(2x+1)+1(2x+1)=0$

$\boxed{(2x+1)(3x+1)=0}$

Solutions

$3x+1=0$ $\quad$ $2x+1=0$

$3x=-1$ $\quad$ $2x=-1$

$x=\frac{-1}{3}$ $\quad$ $x=\frac{-1}{2}$

---

(26) $8x^2-9x+1=0$

$AC = 8x^2$ Add

1, 8

2, 4

$8x^2-8x-1x+1=0$

$8x(x-1)-1(x-1)=0$

$\boxed{(x-1)(8x-1)=0}$

or

$8x^2-1x-8x+1=0$

$x(8x-1)-1(8x-1)=0$

$\boxed{(8x-1)(x-1)=0}$

Solutions

$8x-1=0$ $\quad$ $x-1=0$

$8x=1$ $\quad$ $x=1$

$x=\frac{1}{8}$

(27) $10x^2 + 17x + 3 = 0$

$AC = 30x^2$ Add

1, 30

2, 15

3, 10

5, 6

$10x^2 + 15x + 2x + 3 = 0$

$5x(2x+3) + 1(2x+3) = 0$

$\boxed{(2x+3)(5x+1) = 0}$

OR

$10x^2 + 2x + 15x + 3 = 0$

$2x(5x+1) + 3(5x+1) = 0$

$\boxed{(5x+1)(2x+3) = 0}$

Solutions

$5x+1=0$ $2x+3=0$

$5x=-1$ $2x=-3$

$x=\frac{-1}{5}$ $x=\frac{-3}{2}$

---

(28) $9x^2 - 9x + 2$

$18x^2$ Add

1, 18

2, 9

3, 6

$9x^2 - 6x - 3x + 2 = 0$

$3x(3x-2) - 1(3x-2) = 0$

$\boxed{(3x-2)(3x-1) = 0}$

OR

$9x^2 - 3x - 6x + 2 = 0$

$3x(3x-1) - 2(3x-1) = 0$

$\boxed{(3x-1)(3x-2) = 0}$

Solutions

$3x-1=0$ $3x-2=0$

$3x=1$ $3x=2$

$x=\frac{1}{3}$ $x=\frac{2}{3}$

(29) $5x^2+11x+6=0$ AC $30x^2$ A+b

$5x^2+5x+6x+6=0$

$5x(x+1)+6(x+1)=0$

$\boxed{(x+1)(5x+6)=0}$

1, 30
2, 15
3, 10
5, 6

OR

$5x^2+6x+5x+6=0$

$x(5x+6)+1(5x+6)=0$

$\boxed{(5x+6)(x+1)=0}$

Solutions

$5x+6=0$ $x+1=0$

$5x=-6$

$x=\frac{-6}{5}$ $x=-1$

---

(30) $3x^2+2x-1=0$ AC $=-3x^2$ Subtract

$3x^2+3x-1x-1=0$

$3x(x+1)-1(x+1)=0$

$\boxed{(x+1)(3x-1)=0}$

1, 3

Solutions

$3x-1=0$ $x+1=0$

$3x=1$ $x=-1$

$x=1/3$

OR

$3x^2-1x+3x-1=0$

$x(3x-1)+1(3x-1)=0$

$\boxed{(3x-1)(x+1)=0}$

(31) $5x^2 - 4x - 1 = 0$

$AC = -5x^2$ subtract

1, 5

$5x^2 - 5x + 1x - 1 = 0$

$5x(x-1) + 1(x-1) = 0$

$(x-1)(5x+1) = 0$

OR

$5x^2 + 1x - 5x - 1 = 0$

$x(5x+1) - 1(5x+1) = 0$

$(5x+1)(x-1) = 0$

Solutions

$5x+1=0 \quad x-1=0$

$5x=-1 \quad x=1$

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

---

(32) $2x^2 + 5x - 3 = 0$

$AC = -6x^2$ subtract

6, 1

2, 3

$2x^2 + 6x - 1x - 3 = 0$

$2x(x+3) - 1(x+3) = 0$

$\boxed{(x+3)(2x-1) = 0}$

OR

$2x^2 - 1x + 6x - 3 = 0$

$x(2x-1) + 3(2x-1) = 0$

$\boxed{(2x-1)(x+3) = 0}$

Solutions

$x+3=0 \quad 2x-1=0$

$x=-3 \quad 2x=1$

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

(33) $7x^2-13x-2=0$

AC $\underline{-14x^2}$

subtract (1, 14)

21 7

$7x^2-14x+1x-2=0$

$7x(x-2)+1(x-2)=0$

$(x-2)(7x+1)=0$

Solutions

$x-2=0$ $7x+1=0$

$x=2$ $7x=-1$

$x=\frac{-1}{7}$

$7x^2+1x-14x-2=0$

$x(7x+1)-2(7x+1)=0$

$(7x+1)(x-2)=0$

---

(34) $3x^2+14x-5=0$

AC $=\underline{-15x^2}$ subtract

(1, 15)

3, 5

$3x^2+15x-1x-5=0$

$3x(x+5)-1(x+5)=0$

$(x+5)(3x-1)=0$

$3x^2-1x+15x-5$

$x(3x-1)+5(3x-1)=0$

$(3x-1)(x+5)=0$

Solutions

$x+5=0$

$x=-5$

$3x-1=0$

$3x=1$

$x=\frac{1}{3}$

(35) $4x^2 - 11x + 7 = 0$

$4x^2 - 4x - 7x + 7 = 0$

$4x(x-1) - 7(x-1) = 0$

$(x-1)(4x-7) = 0$

or $4x^2 - 7x - 4x + 7 = 0$

$x(4x-7) - 1(4x-7) = 0$

$(4x-7)(x-1) = 0$

AC $28x^2$ ~~Add~~

1, 28

2, 14

4, 7

Solutions

$4x - 7 = 0$

$4x = 7$

$x = \frac{7}{4}$

$x - 1 = 0$

$x = 1$