# Homework Answer

## 5A Expanding expressions

1.

| | | | |
|---|---|---|---|
| -3x(2 - 5x) $\Rightarrow 15x^2 - 6x$ | 5x(4x - 3) $\Rightarrow 20x^2 - 15x$ | ½(8x + 6) $\Rightarrow 4x + 3$ | $-^3/_5$(15x - 10) $\Rightarrow -9x + 6$ |
| (2/7)(14x + 7) $\Rightarrow 4x + 2$ | -4x(3 - 2x) $\Rightarrow 8x^2 - 12x$ | (7/3)(9x - 6) $\Rightarrow 21x - 14$ | ¼(4x - 12) $\Rightarrow x - 3$ |
| (2/5)(10x - 15) $\Rightarrow 4x - 6$ | $(-^1/_3$ x)(6x + 9) $\Rightarrow -2x^2 - 3x$ | -2x(-2x + 1) $\Rightarrow 4x^2 - 2x$ | 3x(2x - 5) $\Rightarrow 6x^2 - 15x$ |

2.

| | | | |
|---|---|---|---|
| (x + 4)(x + 6) $\Rightarrow x^2 + 10x + 24$ | (x - 2)(x + 7) $\Rightarrow x^2 + 5x - 14$ | (x + 5)(x - 6) $\Rightarrow x^2 - x - 30$ | (x - 10)(x - 1) $\Rightarrow x^2 - 11x + 10$ |
| (x + 2)(x - 1) $\Rightarrow x^2 + x - 2$ | (2 - 3x)(x + 1) $\Rightarrow -3x^2 - x + 2$ | (x - 5)(x - 3) $\Rightarrow x^2 - 8x + 15$ | (3 - x)(x - 2) $\Rightarrow -x^2 + 5x - 6$ |
| (x + 2)(x - 8) $\Rightarrow x^2 - 6x - 16$ | (-x + 2)(-3x - 1) $\Rightarrow 3x^2 - 5x - 2$ | (x - 8)(-x + 1) $\Rightarrow -x^2 + 9x - 8$ | (-x - 1)(x + 3) $\Rightarrow -x^2 - 4x - 3$ |

3.

| | | | |
|---|---|---|---|
| (x - 3)² $\Rightarrow x^2 - 6x + 9$ | (x + 6)² $\Rightarrow x^2 + 12x + 36$ | (2x - 1)² $\Rightarrow 4x^2 - 4x + 1$ | (2 + x)² $\Rightarrow x^2 + 4x + 4$ |
| (x - 8)² $\Rightarrow x^2 - 16x + 64$ | (5 + x)² $\Rightarrow x^2 + 10x + 25$ | (7 + x)² $\Rightarrow x^2 + 14x + 49$ | (10 - x)² $\Rightarrow x^2 - 20x + 100$ |
| (-x + 3)² $\Rightarrow x^2 - 6x + 9$ | (2x - 1)² $\Rightarrow 4x^2 - 4x + 1$ | (-2x + 1)² $\Rightarrow 4x^2 - 4x + 1$ | (-x + 6)² $\Rightarrow x^2 - 12x + 36$ |

4.

| | | |
|---|---|---|
| (x + 2)(x - 2) $\Rightarrow x^2 - 4$ | (x + 10)(x - 10) $\Rightarrow x^2 - 100$ | (x - 3)(x + 3) $\Rightarrow x^2 - 9$ |
| (4x + 1)(4x - 1) $\Rightarrow 16x^2 - 1$ | (5x + 2)(5x - 2) $\Rightarrow 25x^2 - 4$ | (3x + 4)(3x - 4) $\Rightarrow 9x^2 - 16$ |
| (x + 11)(x - 11) $\Rightarrow x^2 - 121$ | (2x - 5)(2x + 5) $\Rightarrow 4x^2 - 25$ | (6x - 1)(6x + 1) $\Rightarrow 36x^2 - 1$ |

5. Find the missing number.

| | |
|---|---|
| 5 | 7 |
| 3 | 3 |
| 7 | 5 |
| 5 | 7 |

**5B Factorising expressions**

1.

| | | |
|---|---|---|
| $x^2 + 5x + 6 \Rightarrow (x+2)(x+3)$ | $x^2 + 7x + 10 \Rightarrow (x+5)(x+2)$ | $x^2 + 12x + 36 \Rightarrow (x+6)^2$ |
| $x^2 + 2x - 15 \Rightarrow (x+5)(x-3)$ | $x^2 - 5x - 24 \Rightarrow (x-8)(x+3)$ | $x^2 - 6x + 8 \Rightarrow (x-2)(x-4)$ |
| $x^2 + x - 20 \Rightarrow (x+5)(x-4)$ | $x^2 + 2x - 8 \Rightarrow (x+4)(x-2)$ | $x^2 - x - 12 \Rightarrow (x-4)(x+3)$ |
| $x^2 + 8x - 20 \Rightarrow (x+10)(x-2)$ | $x^2 + 4x - 12 \Rightarrow (x+6)(x-2)$ | $x^2 + 2x - 24 \Rightarrow (x+6)(x-4)$ |
| $x^2 + 11x + 24 \Rightarrow (x+8)(x+3)$ | $x^2 - 12x + 36 \Rightarrow (x-6)^2$ | $x^2 + 10x + 25 \Rightarrow (x+5)^2$ |

2.

| | | |
|---|---|---|
| $-2x^2 - 14x - 20 \rightarrow -2(x+5)(x+2)$ | $-3x^2 - 6x - 3 \rightarrow -3(x+1)^2$ | $-4x^2 - 12x - 8 \rightarrow -4(x+1)(x+2)$ |
| $-x^2 + 3x + 4 \rightarrow -(x-4)(x+1)$ | $-2x^2 + 6x + 8 \rightarrow -2(x-4)(x+1)$ | $4x^2 + 16x + 16 \rightarrow 4(x+2)^2$ |
| $6x^2 + 24x + 18 \rightarrow 6(x+1)(x+3)$ | $-10x^2 - 50x - 60 \rightarrow -10(x+2)(x+3)$ | $3x^2 + 12x + 12 \rightarrow 3(x+2)^2$ |
| $6x^2 - 12x - 18 \rightarrow 6(x-3)(x+1)$ | $2x^2 - 10x - 12 \rightarrow 2(x-6)(x+1)$ | $8x^2 + 32x + 24 \rightarrow 8(x+1)(x+3)$ |

## 5C Factorising expressions with two or four terms

1.

| | | | |
|---|---|---|---|
| 6x - 9x² → $3x(2-3x)$ | 10x² + 50x → $10x(x+5)$ | 4x² - 8x → $4x(x-2)$ | 7x² - 14x → $7x(x-2)$ |
| 12x² + 3x → $3x(4x+1)$ | 3x² - 9x → $3x(x-3)$ | 15x² + 60x → $15x(x+4)$ | 2x² - 18x → $2x(x-9)$ |
| 9x³ + 3x² → $3x^2(3x+1)$ | 8a²b - 4ab → $4ab(2a-1)$ | 5m²n - 15mn → $5mn(m-3)$ | 16x - 24x² → $8x(2-3x)$ |

2.

| | | | |
|---|---|---|---|
| $x^2-4 \to (x-2)(x+2)$ | $9-x^2 \to (3-x)(3+x)$ | $25-x^2 \to (5-x)(5+x)$ | $36x^2-81 \to (6x-9)(6x+9)$ |
| $81-16a^2 \to (9-4a)(9+4a)$ | $16x^2-25y^2 \to (4x-5y)(4x+5y)$ | $49y^2-64 \to (7y-8)(7y+8)$ | $100-4x^2 \to (10-2x)(10+2x)$ |
| $121-121d^2 \to 121(1-d)(1+d)$ | $9m^2-4n^2 \to (3m-2n)(3m+2n)$ | $1-x^2 \to (1-x)(1+x)$ | $49a^2-49b^2 \to 49(a-b)(a+b)$ |

3.

| | | | |
|---|---|---|---|
| $8x^2-72 \to 8(x^2-9) \to 8(x-3)(x+3)$ | $6a^2-54 \to 6(a^2-9) \to 6(a-3)(a+3)$ | $12m^2-48 \to 12(m^2-4) \to 12(m-2)(m+2)$ | $10x^2-90 \to 10(x^2-9) \to 10(x-3)(x+3)$ |
| $9z^2-81 \to 9(z^2-9) \to 9(z-3)(z+3)$ | $7p^2-63 \to 7(p^2-9) \to 7(p-3)(p+3)$ | $4x^2-36y^2 \to 4(x^2-9y^2) \to 4(x-3y)(x+3y)$ | $15c^2-60d^2 \to 15(c^2-4d^2) \to 15(c-2d)(c+2d)$ |
| $3k^2-27k^2t^0 \to 3k^2(1-9t^0)$ | $6b^2-24q^2 \to 6(b^2-4q^2) \to 6(b-2q)(b+2q)$ | $25a^2-225 \to 25(a^2-9) \to 25(a-3)(a+3)$ | $2r^2-8s^2 \to 2(r^2-4s^2) \to 2(r-2s)(r+2s)$ |

4.

| | | |
|---|---|---|
| $(x-3)^2-16 \to (x-7)(x+1)$ | $(x+5)^2-25 \to x(x+10)$ | $(2x-1)^2-4 \to (2x-3)(2x+1)$ |
| $(m+2)^2-9 \to (m-1)(m+5)$ | $100-(x+10)^2 \to -x(x+20)$ | $(3y-1)^2-49 \to (3y-8)(3y+6)$ |
| $1-(x-1)^2 \to (2-x)\,x$ | $(x+4)^2-36 \to (x-2)(x+10)$ | $(x-7)^2-64 \to (x-15)(x+1)$ |
| $81-(2a+1)^2 \to (8-2a)(10+2a)$ | $(x+2)^2-49 \to (x-5)(x+9)$ | $(x-8)^2-25 \to (x-13)(x-3)$ |
| $144-(x-10)^2 \to (22-x)(x+2)$ | $(2z+3)^2-9 \to 4z\,(z+3)$ | $(p-1)^2-100 \to (p-11)(p+9)$ |

5.

| | | |
|---|---|---|
| $x+5y+2x+10y \to 3(x+5y)$ | $ab+3a+2b+6 \to (b+3)(a+2)$ | $mx-nx+my-ny \to (x+y)(m-n)$ |
| $12x+3xz+8y+2yz \to (4+z)(3x+2y)$ | $pq-4p+2q-8 \to (q-4)(p+2)$ | $8rs-12s+4rt-6t \to 2(2r-3)(2s+t)^\star$ |
| $4a^2+6ab+8ac+12bc \to 2(2a+3b)(a+2c)^\star$ | $ax+bx+ay+by \to (a+b)(x+y)$ | $10+2x+25y+5xy \to (x+5)(2+5y)$ |

**5D Factorising by completing the square**

1.

| | | | |
|---|---|---|---|
| $x^2 + 4x \to (x+2)^2 - 4$ | $x^2 - 12x \to (x-6)^2 - 36$ | $x^2 + 14x \to (x+7)^2 - 49$ | $y^2 + 10y \to (y+5)^2 - 25$ |
| $m^2 - 2m \to (m-1)^2 - 1$ | $t^2 + 20t \to (t+10)^2 - 100$ | $z^2 - 6z \to (z-3)^2 - 9$ | $x^2 + 18x \to (x+9)^2 - 81$ |
| $p^2 - 10p \to (p-5)^2 - 25$ | $a^2 + 22a \to (a+11)^2 - 121$ | $u^2 - 16u \to (u-8)^2 - 64$ | $w^2 + 2w \to (w+1)^2 - 1$ |
| $x^2 + 12x \to (x+6)^2 - 36$ | $k^2 - 8k \to (k-4)^2 - 16$ | $r^2 + 24r \to (r+12)^2 - 144$ | $x^2 - 18x \to (x-9)^2 - 81$ |

2. Factorise each of the following by first completing the square.

| | | |
|---|---|---|
| $(x-1)^2 - 4$ | $(x+2)^2 - 16$ | $(x+5)^2 - 24$ |
| $(x-6)^2 - 19$ | $(x+1)^2 + 4$ | $(x-3)^2 - 1$ |
| $(x+7)^2 - 19$ | $(x-4)^2 - 25$ | $(x+11)^2 - 111$ |
| $(x-8)^2 - 16$ | $(x-5)^2 - 24$ | $(x-10)^2 - 95$ |

3. Factorise each of the following by first looking for a common factor and then completing the square.

| | | |
|---|---|---|
| $2(x+1)^2 - 6$ | $4(x-2)^2 - 12$ | $5(x+1)^2 - 10$ |
| $6(x-2)^2 - 18$ | $3(x-1)^2 + 6$ | $9(x+1)^2 - 18$ |
| $12(x+2)^2 - 60$ | $7(x-2)^2 - 21$ | $2(x+2)^2 - 6$ |
| $3(r+5)^2 - 48$ | $4(x-3)^2 - 52$ | $5(x+3)^2 - 50$ |
| $6(x-3)^2 - 12$ | $8(x+4)^2 - 32$ | $7(x-3)^2 - 64$ |

**5E Solving quadratic equations using factorisation**

1.

| | | | |
|---|---|---|---|
| $x^2 - 9 = 0 \Rightarrow x = \pm 3$ | $x^2 - 1 = 0 \Rightarrow x = \pm 1$ | $5x^2 - 80 = 0 \Rightarrow x = \pm 4$ | $2x^2 - 4 = 0 \Rightarrow x = \pm\sqrt{2}$ |
| $16x^2 - 25 = 0 \Rightarrow x = \pm\frac{5}{4}$ | $49x^2 - 49 = 0 \Rightarrow x = \pm 1$ | $25x^2 - 100 = 0 \Rightarrow x = \pm 2$ | $8x^2 = 72 \Rightarrow x^2 = 9 \implies x = \pm 3$ |
| $10x^2 - 40 = 0 \Rightarrow x = \pm 2$ | $12x^2 - 36 = 0 \Rightarrow x = \pm\sqrt{3}$ | $x^2 = 49 \Rightarrow x = \pm 7$ | $3x^2 = 27 \Rightarrow x = \pm 3$ |
| $5x^2 = 45 \Rightarrow x = \pm 3$ | $\frac{1}{4}x^2 - 1 = 0 \Rightarrow x^2 = 4 \implies x = \pm 2$ | $4x^2 - 1 = 0 \Rightarrow x = \pm\frac{1}{2}$ | $x^2 = 16 \Rightarrow x = \pm 4$ |
| $9x^2 = 81 \Rightarrow x = \pm 3$ | $x^2 - \frac{4}{9} = 0 \Rightarrow x = \pm\frac{2}{3}$ | $\frac{1}{2}x^2 = 8 \Rightarrow x^2 = 16 \implies x = \pm 4$ | $x^2 = \frac{1}{16} \Rightarrow x = \pm\frac{1}{4}$ |

2.

| | | |
|---|---|---|
| $x^2 - 5x + 6 = 0 \Rightarrow x = 2, 3$ | $x^2 + x - 2 = 0 \Rightarrow x = -2, 1$ | $x^2 - 12x + 32 = 0 \Rightarrow x = 4, 8$ |
| $x^2 + 3x + 2 = 0 \Rightarrow x = -1, -2$ | $x^2 + 2x - 15 = 0 \Rightarrow x = -5, 3$ | $x^2 - 9x + 18 = 0 \Rightarrow x = 3, 6$ |
| $2x^2 - x - 15 = 0 \Rightarrow x = \frac{1 \pm 11}{4} \implies 3, -\frac{5}{2}$ | $3x^2 - 7x + 2 = 0 \Rightarrow x = \frac{1}{3}, 2$ | $x^2 + 4x + 4 = 0 \Rightarrow x = -2$ (double root) |
| $x^2 - x - 20 = 0 \Rightarrow x = 5, -4$ | $4x^2 - 12x + 8 = 0 \Rightarrow x = 1, 2$ | $x^2 + 7x + 12 = 0 \Rightarrow x = -3, -4$ |
| $x^2 + 9x + 20 = 0 \Rightarrow x = -5, -4$ | $2x^2 + 5x - 3 = 0 \Rightarrow x = \frac{-5 \pm 7}{4} \implies \frac{1}{2}, -3$ | $3x^2 - 4x - 4 = 0 \Rightarrow x = \frac{4 \pm 8}{6} \implies 2, -\frac{4}{3}$ |
| $x^2 - 6x = 0 \Rightarrow x = 0, 6$ | $x^2 + 2x = 0 \Rightarrow x = 0, -2$ | $x^2 - 1 = 0 \Rightarrow x = \pm 1$ |

3.

| | | |
|---|---|---|
| $2x^2 + 3x - 5 = 0 \Rightarrow x = 1, -\frac{5}{2}$ | $3x^2 - x - 4 = 0 \Rightarrow x = 1, -\frac{4}{3}$ | $6x^2 - x - 2 = 0 \Rightarrow x = \frac{2}{3}, -\frac{1}{2}$ |
| $7x^2 + 13x + 6 = 0 \Rightarrow x = -\frac{6}{7}, -1$ | $10x^2 - 7x - 12 = 0 \Rightarrow x = \frac{3}{2}, -\frac{4}{5}$ | $4x^2 + 12x + 9 = 0 \Rightarrow x = -\frac{3}{2}$ (double) |
| $6x^2 + 5x - 6 = 0 \Rightarrow x = \frac{2}{3}, -\frac{3}{2}$ | $3x^2 + 14x + 8 = 0 \Rightarrow x = -\frac{2}{3}, -4$ | $8x^2 - 2x - 1 = 0 \Rightarrow x = \frac{1}{2}, -\frac{1}{4}$ |
| $12x^2 - 13x + 3 = 0 \Rightarrow x = \frac{3}{4}, \frac{1}{3}$ | $5x^2 + 2x - 7 = 0 \Rightarrow x = 1, -\frac{7}{5}$ | $9x^2 + 6x - 8 = 0 \Rightarrow x = \frac{2}{3}, -\frac{4}{3}$ |

1.

      a.  $h = 4 \pm \sqrt{13} = 0.39$ and $7.61$

      b.  $7.61 - 0.39 = 7.22$h

2.

  a.

    1. **Plan X:**

      $C_X(20) = 0.05 \times (20)^2 + 2 \times 20 + 10 = 0.05 \times 400 + 40 + 10 = 20 + 40 + 10 = 70$ dollars.
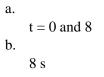
    2. **Plan Y:**

      $C_Y(20) = 0.07 \times (20)^2 + 1.5 \times 20 + 12 = 0.07 \times 400 + 30 + 12 = 28 + 30 + 12 = 70$ dollars.

    They both cost **70 dollars** at 20 GB.

  b.

    d = 5 and 20

3.

  a.

    t = 0 and 8

  b.

    8 s

4.

  a.

    n = 0 and 30

**5G Solving quadratic equations by completing the square**

1. Solve by first completing the square.

| | | |
|---|---|---|
| $x = -3$  <br><br> $x = 1$ | $x = 2 - \sqrt{5}$  <br><br> $x = 2 + \sqrt{5}$ | $x = 1 - 2\sqrt{2}$  <br><br> $x = 1 + 2\sqrt{2}$ |
| $x = -5$  <br><br> $x = 1$ | $x = 3 - \sqrt{2}$  <br><br> $x = 3 + \sqrt{2}$ | $x = -5 - \sqrt{33}$  <br><br> $x = \sqrt{33} - 5$ |
| $x = 6 - \sqrt{6}$  <br><br> $x = 6 + \sqrt{6}$ | $x = -4 - \sqrt{6}$  <br><br> $x = \sqrt{6} - 4$ | $x = 3 - \sqrt{11}$  <br><br> $x = 3 + \sqrt{11}$ |
| $x = \dfrac{5}{2} - \dfrac{\sqrt{33}}{2}$  <br><br> $x = \dfrac{5}{2} + \dfrac{\sqrt{33}}{2}$ | $x = \dfrac{7}{2} - \dfrac{\sqrt{29}}{2}$  <br><br> $x = \dfrac{7}{2} + \dfrac{\sqrt{29}}{2}$ | $x = -\dfrac{11}{2} - \dfrac{\sqrt{137}}{2}$  <br><br> $x = \dfrac{\sqrt{137}}{2} - \dfrac{11}{2}$ |
| $x = -2$  <br><br> $x = 1$ | $x = -\dfrac{13}{2} - \dfrac{\sqrt{181}}{2}$  <br><br> $x = \dfrac{\sqrt{181}}{2} - \dfrac{13}{2}$ | $x = -\dfrac{9}{2} - \dfrac{\sqrt{65}}{2}$  <br><br> $x = \dfrac{\sqrt{65}}{2} - \dfrac{9}{2}$ |

2.

| Equation | Equation | Equation |
|---|---|---|
| 1) $2x^2+12x-6=0$ | 2) $3x^2-12x+3=0$ | 3) $4x^2+32x+20=0$ |
| $x^2 + 6x - 3 = 0$ | $x^2 - 4x + 1 = 0$ | $x^2 + 8x + 5 = 0$ |
| Solutions: | Solutions: | Solutions: |
| $x = -3 \pm 2\sqrt{3}$ | $x = 2 \pm \sqrt{3}$ | $x = -4 \pm \sqrt{11}$ |
| 4) $6x^2-12x-18=0$ | 5) $5x^2+50x-10=0$ | 6) $-4x^2+16x-4=0$ |
| $x^2 - 2x - 3 = 0$ | $x^2 + 10x - 2 = 0$ | $x^2 - 4x + 1 = 0$ |
| Solutions: | Solutions: | Solutions: |
| $x = 3,\ -1$ | $x = -5 \pm 3\sqrt{3}$ | $x = 2 \pm \sqrt{3}$ |
| 7) $7x^2+14x-14=0$ | 8) $8x^2-32x-72=0$ | 9) $9x^2+9x-72=0$ |
| $x^2 + 2x - 2 = 0$ | $x^2 - 4x - 9 = 0$ | $x^2 + x - 8 = 0$ |
| Solutions: | Solutions: | Solutions: |
| $x = -1 \pm \sqrt{3}$ | $x = 2 \pm \sqrt{13}$ | $x = \frac{-1 \pm \sqrt{33}}{2}$ |
| 10) $10x^2-10x-10=0$ | 11) $12x^2+36x+12=0$ | 12) $-6x^2+18x-12=0$ |
| $x^2 - x - 1 = 0$ | $x^2 + 3x + 1 = 0$ | $x^2 - 3x + 2 = 0$ |
| Solutions: | Solutions: | Solutions: |
| $x = \frac{1 \pm \sqrt{5}}{2}$ | $x = \frac{-3 \pm \sqrt{5}}{2}$ | $x = 1,\ 2$ |
| 13) $4x^2-8x-12=0$ | 14) $2x^2+8x+4=0$ | 15) $3x^2+15x+6=0$ |
| $x^2 - 2x - 3 = 0$ | $x^2 + 4x + 2 = 0$ | $x^2 + 5x + 2 = 0$ |
| Solutions: | Solutions: | Solutions: |
| $x = 3,\ -1$ | $x = -2 \pm \sqrt{2}$ | $x = \frac{-5 \pm \sqrt{17}}{2}$ |

**5H Solving quadratic equations using the quadratic**

1.

$x^2 + 7x + 2 = 0$
$x = \frac{-7 \pm \sqrt{49-8}}{2} \implies \frac{-7 \pm \sqrt{41}}{2}$

$x^2 + 6x - 5 = 0$
$x = \frac{-6 \pm \sqrt{36+20}}{2} \implies -3 \pm \sqrt{14}$

$2x^2 + 5x + 1 = 0$
$x = \frac{-5 \pm \sqrt{25-8}}{4} \implies \frac{-5 \pm \sqrt{17}}{4}$

$2x^2 + 7x - 1 = 0$
$x = \frac{-7 \pm \sqrt{49+4}}{4} \implies \frac{-7 \pm \sqrt{57}}{4}$

$3x^2 + 4x - 1 = 0$
$x = \frac{-4 \pm \sqrt{16+12}}{6} \implies \frac{-4 \pm 2\sqrt{7}}{6}$

$3x^2 - 7x + 1 = 0$
$x = \frac{7 \pm \sqrt{49-12}}{6} \implies \frac{7 \pm \sqrt{37}}{6}$

$4x^2 + 5x - 3 = 0$
$x = \frac{-5 \pm \sqrt{25+48}}{8} \implies \frac{-5 \pm \sqrt{73}}{8}$

$5x^2 + 7x + 1 = 0$
$x = \frac{-7 \pm \sqrt{49-20}}{10} \implies \frac{-7 \pm \sqrt{29}}{10}$

$5x^2 - x - 1 = 0$
$x = \frac{1 \pm \sqrt{1+20}}{10} \implies \frac{1 \pm \sqrt{21}}{10}$

$6x^2 + x - 4 = 0$
$x = \frac{-1 \pm \sqrt{1+96}}{12} \implies \frac{-1 \pm \sqrt{97}}{12}$

$6x^2 + 17x + 1 = 0$
$x = \frac{-17 \pm \sqrt{289-24}}{12} \implies \frac{-17 \pm \sqrt{265}}{12}$

$7x^2 + 9x - 1 = 0$
$x = \frac{-9 \pm \sqrt{81+28}}{14} \implies \frac{-9 \pm \sqrt{109}}{14}$

$8x^2 + 17x + 1 = 0$
$x = \frac{-17 \pm \sqrt{289-32}}{16} \implies \frac{-17 \pm \sqrt{257}}{16}$

$9x^2 - 4x - 1 = 0$
$x = \frac{4 \pm \sqrt{16+36}}{18} = \frac{4 \pm 2\sqrt{13}}{18} \implies \frac{2 \pm \sqrt{13}}{9}$

$10x^2 + 7x - 1 = 0$
$x = \frac{-7 \pm \sqrt{49+40}}{20} \implies \frac{-7 \pm \sqrt{89}}{20}$

2.

1. No real solutions ($\Delta < 0$)

$$9 - 8k < 0 \implies 9 < 8k \implies k > \tfrac{9}{8}.$$

2. Exactly 1 real solution ($\Delta = 0$)

$$9 - 8k = 0 \implies k = \tfrac{9}{8}.$$

3. 2 distinct real solutions ($\Delta > 0$)

$$9 - 8k > 0 \implies k < \tfrac{9}{8}.$$

3.

- No real solutions if $\Delta < 0 \implies 16 - 12k < 0 \implies k > \tfrac{4}{3}.$
- Exactly one real solution (double root) if $\Delta = 0 \implies 16 - 12k = 0 \implies k = \tfrac{4}{3}.$
- Two distinct real solutions if $\Delta > 0 \implies 16 - 12k > 0 \implies k < \tfrac{4}{3}.$

4.

1. No real solutions ($\Delta < 0$)

$$k^2 - 16 < 0 \implies k^2 < 16 \implies -4 < k < 4.$$

2. Exactly one real solution (double root) ($\Delta = 0$)

$$k^2 - 16 = 0 \implies k^2 = 16 \implies k = \pm 4.$$

3. Two distinct real solutions ($\Delta > 0$)

$$k^2 - 16 > 0 \implies k^2 > 16 \implies k < -4 \quad \text{or} \quad k > 4.$$