

2.1.99 Independent transfer: Foundation then Higher

Name: _____ Class: _____ Date: _____

KEY WORDS identity • root

<!-- Session 2 independent transfer -->

Objective

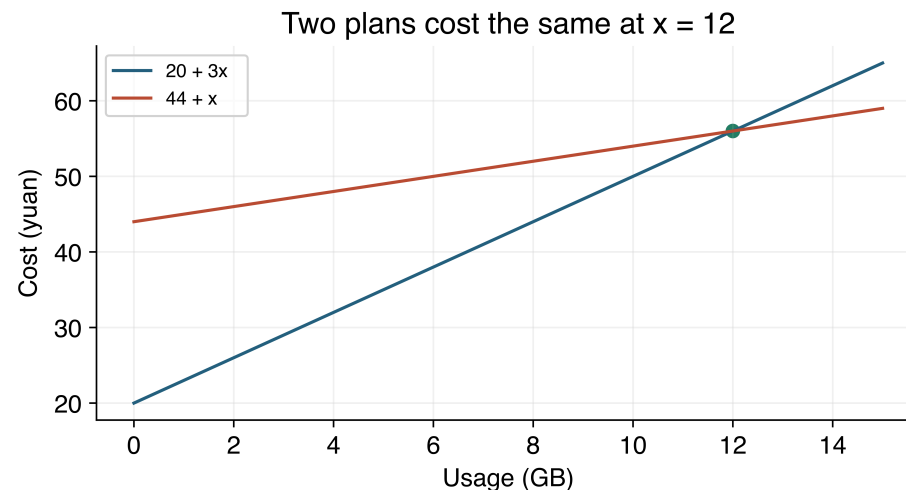
Apply this topic to unfamiliar Foundation and Higher problems; keep the two scopes distinct. Original questions and local marking guidance.

1 Key knowledge and worked examples

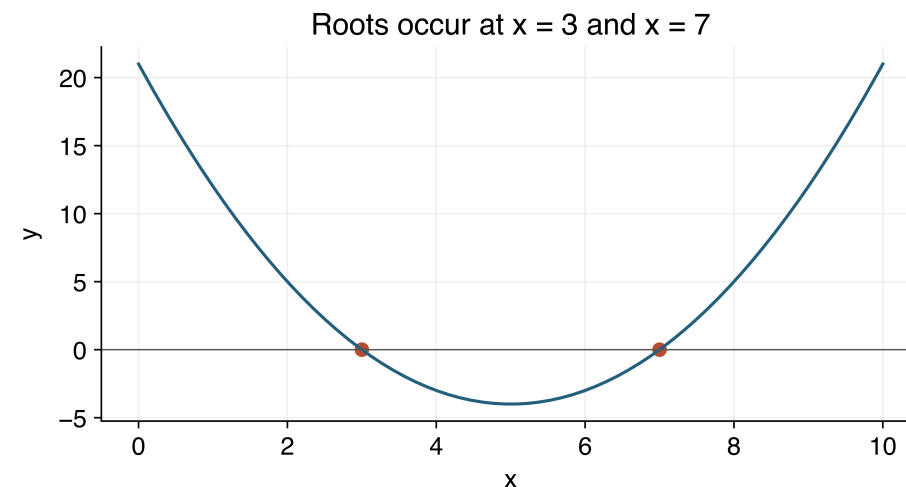
Translate fixed and variable costs into an equation with defined units. Elimination combines whole equations. In a rational equation, exclude zero denominators before cancelling factors. For a quadratic inequality, locate roots and test the intervals between them; completing the square locates its vertex.

$20 + 3x = 44 + x$ gives $2x = 24$ and $x = 12$. Both plans then cost 56. In $A = \pi r^2$, divide by π and take the positive square root to obtain $r = \sqrt{(A/\pi)}$, because r is a length.

$x^2 - 10x + 21 = (x-3)(x-7)$. Hence the equation $x^2 - 10x + 21 = 0$ has roots 3 and 7. Check each root by substitution and mark both intercepts on the graph.



Prerequisite example; use the transfer task's own data.



Prerequisite example; use the transfer task's own data.

2 Practice

2.1 Foundation: A taxi charges a fixed 8 CNY plus 3 CNY per kilometre. Form a cost equation. A trip costs 35 CNY; find its distance and check. Then solve the simultaneous equations $2x + y = 11$, $x - y = 1$.

3 Exam-style questions

3.1 Higher: Solve $(x^2 - 9)/(x - 3) = x^2 - 5$ on its original real domain. Then solve $x^2 - 4x - 5 \leq 0$ completely. State the turning point and roots of $y = x^2 - 4x - 5$.

Solutions

2.1 For distance d in kilometres and cost C in CNY, $C = 8 + 3d$. Rearranging gives $d = (C - 8)/3 = (35 - 8)/3 = 9$ km. Substitution gives $8 + 3(9) = 35$ CNY. Adding the simultaneous equations gives $3x = 12$, so $x=4$ and $y=3$. Both equations check: $2(4) + 3 = 11$, $4 - 3 = 1$. The cost intercept represents the charge at zero distance, not the distance for zero cost.

3.1 The equation excludes $x=3$. Cancellation gives $x + 3 = x^2 - 5$, hence $x^2 - x - 8 = 0$ and $x = (1 \pm \sqrt{33})/2$. Neither is 3, so both remain. For the separate inequality, $(x - 5)(x + 1) \leq 0$ gives $-1 \leq x \leq 5$, including both zero endpoints. Completing the square gives $y = (x - 2)^2 - 9$; its turning point is $(2, -9)$, a minimum, with roots -1 and 5. Do not confuse the two different quadratics.

Local guidance: select and explain the relationship; calculate every requested result; check units, scope, conditions and completeness. These are authored classroom criteria.