

Algebra — Practice Set I

Linear Equations and Linear Functions: Easy to Medium

6 Questions | Full Solutions | Mistake-Pattern Analysis

Question 1 [EASY]

If $3x + 7 = 22$, what is the value of x ?

- A) 3
- B) 5
- C) 7
- D) 15

Algebraic: Subtract 7 from both sides to get $3x = 15$, then divide by 3. $x = 5$.

Desmos: Type " $3x+7=22$ " into the graph line and read the solution Desmos returns, or graph $y = 3x+7$ and $y = 22$ and find the intersection.

Faster path: Algebraic. This is a two-step equation; opening a graph for it costs more time than it saves.

Mistake: **Overcomplication**: the student graphs or re-checks a problem that was already solved correctly in one line, losing pace, not accuracy.

Question 2 [EASY]

If $x/3 + 5 = 11$, what is the value of x ?

- A) 8
- B) 18
- C) 33
- D) 48

Algebraic: Subtract 5 to get $x/3 = 6$, then multiply both sides by 3. $x = 18$.

Desmos: Graph $y = x/3+5$ and $y = 11$, find the intersection x -value.

Faster path: Algebraic, two clean steps.

Mistake: **Concept gap**: student multiplies by 3 before subtracting 5, getting $3(11) - 5 = 28$, an operation-order error.

Question 3 [MEDIUM]

If $6 - x = 2x - 9$, what is the value of x ?

- A) 5
- B) 1
- C) -5
- D) 15

Algebraic: Add x to both sides: $6 = 3x - 9$, then $15 = 3x$, so $x = 5$.

Desmos: Graph $y = 6-x$ and $y = 2x-9$, find the intersection.

Faster path: Algebraic, a single rearrangement.

Mistake: **Wording trap**: student treats " $6 - x$ " as " $x - 6$ " when rearranging, flipping the sign of x and arriving at $x = -5$.

Question 4 [EASY]

If $f(x) = 3x - 2$, what is the value of $f(4)$?

- A) 8
- B) 10
- C) 12
- D) 14

Algebraic: Substitute $x = 4$: $f(4) = 3(4) - 2 = 10$.

Desmos: Type $y = 3x - 2$, trace to $x = 4$, read the y-value.

Faster path: Algebraic, direct substitution is faster than tracing a graph for one point.

Mistake: **Concept gap**: student adds 2 instead of subtracting, treating -2 as $+2$ inside the substitution.

Question 5 [MEDIUM]

A tank starts with 500 liters of water and drains at a constant rate of 20 liters per minute. After how many minutes is the tank empty?

- A) 20
- B) 25
- C) 30
- D) 480

Algebraic: $V(t) = 500 - 20t$. The tank is empty when $V(t) = 0$, so $500 = 20t$, giving $t = 25$.

Desmos: Graph $y = 500 - 20x$, find where it crosses the x-axis.

Faster path: Algebraic, setting the expression equal to zero is a one-line solve.

Mistake: **Concept gap**: student divides 500 by 20 incorrectly or confuses "empty" with "started," choosing a distractor like 20.

Question 6 [MEDIUM]

A line passes through the points (1, 4) and (3, 10). What is the slope of the line?

- A) 2
- B) 3
- C) 6
- D) $1/3$

Algebraic: Slope = $(10 - 4)/(3 - 1) = 6/2 = 3$.

Desmos: Plot both points, let Desmos display the slope between them.

Faster path: Algebraic, the slope formula is faster than plotting two points for one number.

Mistake: **Wording trap**: student computes the slope upside down, as the change in x over the change in y, getting $1/3$.