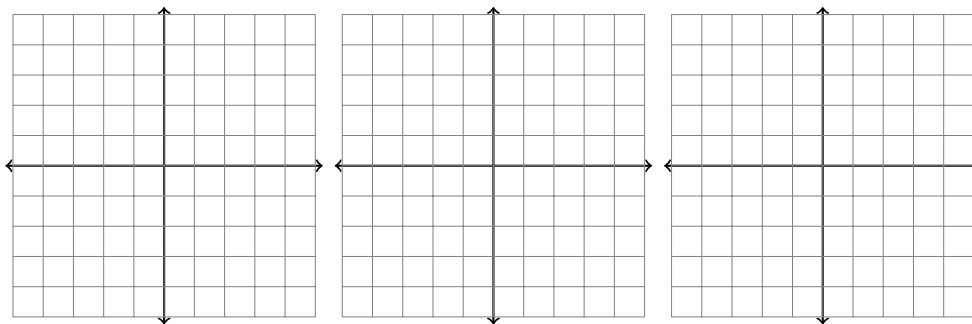


- (1) **(Word problem)** Four brothers have 45 dollars. If the money of the first is increased by 2 dollars and the money of the second is decreased by 2 dollars, and the money of the third is doubled, and the money of the fourth is halved, then all of them will have the same amount of money. How much does each have?
- (2) **(Logic)** On an island of knights (always tell the truth) and knaves (always lie)...
- (a) you meet two inhabitants: Sue and Zippy. Sue says that Zippy is a knave. Zippy says, "I and Sue are knights." Who is a knight and who is a knave?
  - (b) you meet Ned and Zed. Ned says: "Zed is a knave." Bea says: "Zed and I are different types." Determine who is a knight and who is a knave.
- (3) **(Probability)** Imagine that from the regular card deck of 52 cards (4 suits, 13 cards per suit),
- (a) you randomly choose 5 cards. What is the probability that all five cards are hearts?
  - (b) two cards are drawn at random without replacement. What is the probability that both cards are face cards (J, Q, or K)?
- (4) **(Counting)** In how many ways can one arrange 5 books on a shelf?
- (5) **(Algebra)** Solve the following equation:
- $$6x^2 - (3x + 2)(2x - 2) - 4(x + 1) = 0$$
- (6) **(Absolute Value)** Solve the following equations:
- $$|5x + 1| = 46 \quad \text{and} \quad |4x - 3| = 8$$
- (7) **(System of Equations)** Solve the system
- $$\begin{aligned} 2x + 3y &= 11 \\ x - 2y &= -1 \end{aligned}$$

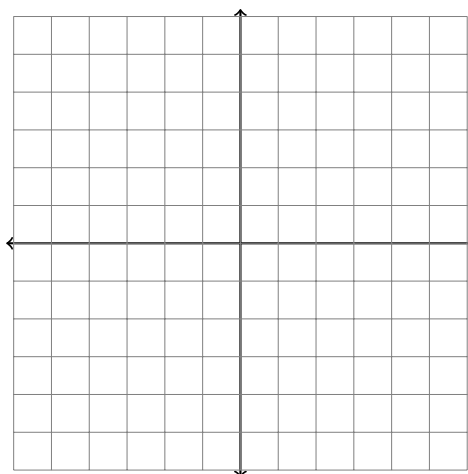
(8) **(Graphing)** Draw the graphs of the following functions:

- (a)  $y = 2x - 1$
- (b)  $y = |x| - 2$
- (c)  $y = |2x - 4|$



(9) **(Coordinate Geometry)** Point  $P$  has coordinates  $(-2, 5)$ . Find the coordinates of obtained by:

- (a) reflecting  $P$  across the  $y$ -axis,
- (b) rotating  $P$  by 90 degrees counterclockwise about the origin,
- (c) reflecting  $P$  across the line  $y = x$ .



(10) **(Inclusion/Exclusion)** I In a class of 30 students, 14 take Biology, 12 take Chemistry, 10 take Physics, 5 take both Biology and Chemistry, 4 take both Biology and Physics, 3 take both Chemistry and Physics, and 2 take all three. How many students take none of these three sciences?