Algebra Properties of Equality for Real Numbers A.REI.1

Reflexive Property of Equality
For every number a, $a = a$.

Symmetric Property of Equality
If $a = b$, then $b = a$.

Transitive Property of Equality
If $a = b$, and $b = c$, then $a = c$.

Addition & Subtraction Properties of Equality
If $a = b$, then $a \pm c = b \pm c$.

Multiplication & Division Properties of Equality
If $a = b$, then $a \bullet c = b \bullet c$, and $a/c = b/c$.

Distributive Property of Equality
$a(b + c) = ab + ac$.

Substitution Property of Equality
If $a = b$, then a may be replaced by b in an equation.
This includes COMBINING LIKE TERMS.

Examples: Tell which property justifies each conclusion.

1. Given: $6x + 2 = 12$
   Conclusion: $6x = 10$

   Subtraction PoE for ℝ

2. Given: $45 = x$
   Conclusion: $x = 45$

   Symmetric PoE for ℝ

3. Given: $3x - 7x = 20$
   Conclusion: $-4x = 20$

   Substitution PoE for ℝ

4. Given: $4(q - x) = r$
   Conclusion: $4q - 4x = r$

   Distributive PoE for ℝ

5. If $a = r$ and $r = 60°$,
   then $a = 60°$.

   Transitive PoE for ℝ

6. If $2x + 3x = 10$,
   then $5x = 10$

   Substitution PoE for ℝ

Geometry Gap Analysis

Name_____

1. Complete the proof
   Given: $6(6x + 6) - 5 = 1 + 6x$
   Prove: $x = -1$

Statement	Reason
1. $6(6x + 6) - 5 = 1 + 6x$	1. Given
2. $36x + 36 - 5 = 1 + 6x$	2. Distributive PoE for $\mathbb{R}$
3. $36x + 31 = 1 + 6x$	3. Substitution PoE for $\mathbb{R}$
4. $30x + 31 = 1$	4. Subtraction PoE for $\mathbb{R}$
5. $30x = -30$	5. Subtraction PoE for $\mathbb{R}$
6. $x = -1$	6. Div'n PoE for $\mathbb{R}$

Solving Linear Equations & Evaluating Expressions A.REI.3

7. $DO = 4x + 8$
    $OG = 20$

    a. If $DO = OG$, find the value of x.

    $4x+8 = 20$

    $4x = 12$

    $x = 3$

    b. Find DO.

    $DO = 4x + 8$
    $= 4(3) + 8$
    $= 12 + 8$
    $DO = 20$

8. $DO = 3x + 4$
    $OG = 20$
    $DG = 5x + 18$

    a. If $DO + OG = DG$, find the value of x.

    $(3x+4) + (20) = 5x + 18$
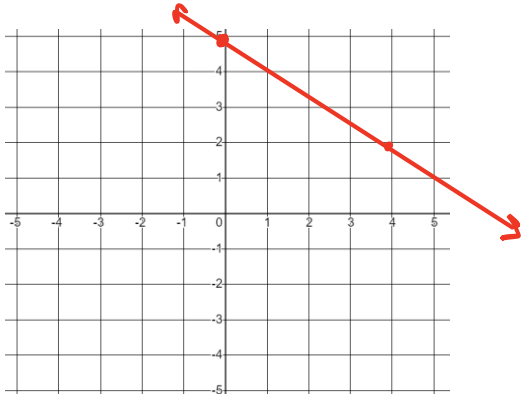
    $3x + 24 = 5x + 18$

    $6 = 2x$

    $3 = x$

    b. Find DO

    $DO = 3x + 4$
    $= 3(3) + 4$
    $= 9 + 4$
    $DO = 13$

Notes   Name_____

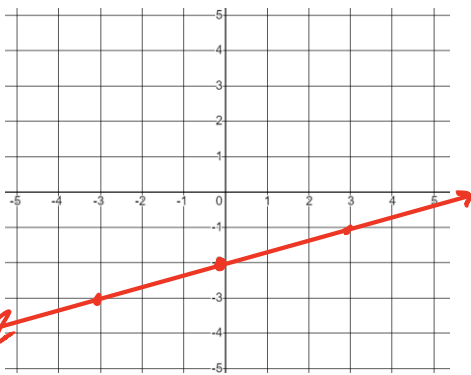# Graphing Lines A.CED.1, A.CED.2

Graph each line. i.v.

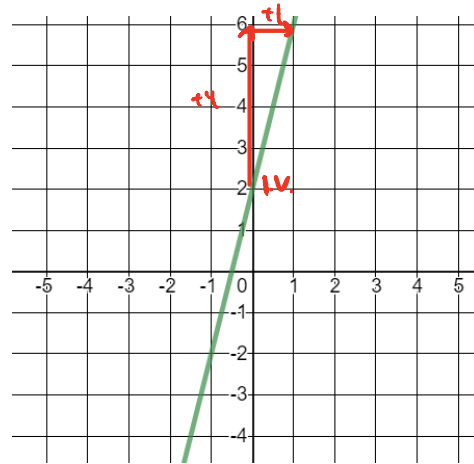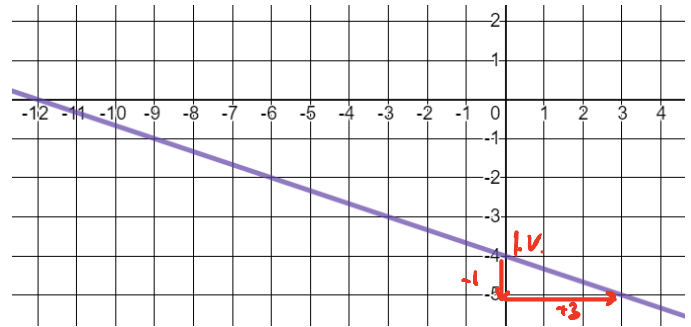9. $y = -\frac{3}{4}x + 5$

10. $y = \frac{1}{3}x - 2$ i.v.

Given the graph, write the equation.

11. ____ $y = 4x + 2$ ____

12. ____ $y = -\frac{1}{3}x - 4$ ____

13. George has 5 used Q-tips to sell and 10 used tissues to sell. He needs to sell these items to purchase a $30 cat hat.

a. Write an equation, with x = price per Q-tip and y = price per tissue, that George could use represent all the prices he charges per item to make enough money to buy a cat hat.
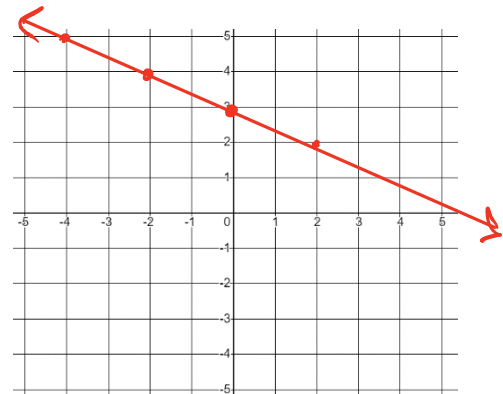
$5x + 10y = 30$

$10y = -5x + 30$

$y = \frac{-5}{10}x + \frac{30}{10}$
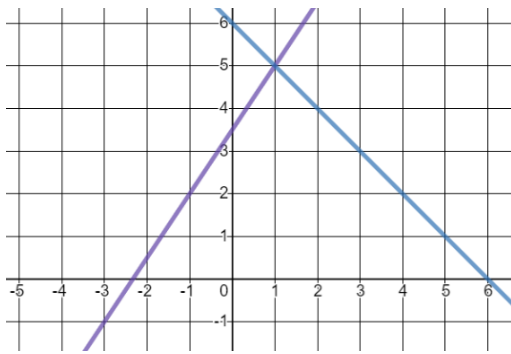
$y = -\frac{1}{2}x + 3$

b. Graph the equation you made in *part a*
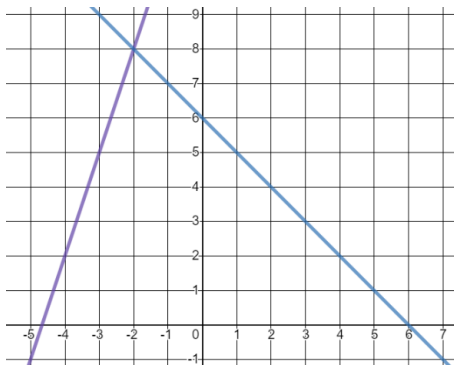
Systems of Equations A.REI.5 A.REI.6

Find the solution to the system of equations graphed.

14. Solution = _____$(1, 5)$_____

$$3x - 2y = -7$$
$$y = -x + 6$$

15. Solution = _____$(-2, 8)$_____

$$y = 3x + 14$$
$$y = -x + 6$$

Solve each system of equations.

16. Solution = _____$(2, 1)$_____

$$-2x - 3y = -7$$
$$y = 6x - 11$$

① $-2x - 3(6x - 11) = -7$

$-2x - 18x + 33 = -7$

$-20x + 33 = -7$

$-20x = -40$

$x = 2$

② $y = 6x - 11$

$y = 6(2) - 11$

$y = 12 - 11$

$y = 1$

17. Solution = _____$(6, -6)$_____

$$-4x - 2y = -12$$
$$+ \quad 4x + 8y = -24$$

① $6y = -36$

$y = -6$

② $4x + 8y = -24$

$4x + 8(-6) = -24$

$4x - 48 = -24$

$4x = 24$

$x = 6$

Super George fell from the top of a building into the ocean.

18. While witnessing a gerbil rob a cockroach, Super George decides to rescue the gerbil in distress. Super George flies for x feet until he becomes too tired to flap his arms. He walks the remaining y feet. The sum of two distances is 12 feet. The difference of the flying distance and walking distance is 4.

a. Make a system of equations to represent this situation.

① $x + y = 12$ ③ $(8) + y = 12$

$+ \quad x - y = 4$ $y = 4$

② $2x = 16$

$x = 8$

b. Find the value of the two distances.

Super George flew for 8 feet and walked for 4 feet.

Factoring F.IF.8

Factor each expression.

19. $x^2 + 8x + 7$

$(x+7)(x+1)$

20. $5x^2 - 45$

$= 5(x^2 - 9)$

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

21. $2x^2 + 2x - 4$

$= 2(x^2 + x - 2)$

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

Solve each equation by factoring.

22. $x^2 - x - 6 = 0$

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

$\begin{array}{c|c} x-3=0 & x+2=0 \\ x=3 & x=-2 \end{array}$

23. $x^2 + 5x - 35 = 3x$

$x^2 + 2x - 35 = 0$

$(x+7)(x-5) = 0$

$\begin{array}{c|c} x+7=0 & x-5=0 \\ x=-7 & x=5 \end{array}$

Projectile Vomit.

24. The height in feet of George's projectile vomit is modeled by the equation $H(t) = -t^2 + 10t + 5$, where t stands for the number of seconds after George ate his toe jam.

a. At what time(s) is the vomit 14 feet high?

$14 = -t^2 + 10t + 5$

$t^2 - 10t + 9 = 0$

$(t-9)(t-1) = 0$

$\begin{array}{c|c} t-9=0 & t-1=0 \\ t=9 & t=1 \end{array}$