Review 1 Solutions

1. Solve. Simplify your answer as much as possible.

$-21 = -\frac{3}{7}w$ $49 = w$

$78 - u = 168$ $-90 = u$

$3y - 8 = -20$ $y = -4$

$-2 = \dfrac{3x - 23}{4}$ $5 = x$

$23 + 18y = -21 + 14y$ $y = -11$

$-5u - 18 = -2(u - 6)$ $u = -10$

$\dfrac{w}{3} + 4 = \dfrac{w}{2}$ $24 = w$

$-\dfrac{3}{2} = -\dfrac{2}{7}u - \dfrac{9}{5}$ $-\frac{21}{20} = u$

$9 = \dfrac{9y + 5}{8} + \dfrac{y - 6}{2}$ $y = 7$

$\dfrac{w - 4}{5} - \dfrac{w + 1}{3} = 1$ $w = -16$

$3(w - 2) - 5w = -2(w + 3)$ all Real numbers

$5(2 - v) + 7v = 2(v + 1)$ no solution

2. Solve for L. $4LW = V$ $L = \dfrac{V}{4W}$

   Solve for B. $A = 4B + C$ $\dfrac{A - C}{4} = B$

   Solve for x. $y = (x - 8)m$ $\dfrac{y}{m} + 8 = x$

3. A house was increased in value by 34% since it was purchased. The current value is \$335,000. What was the value when it was purchased?

   $1.34x = 335,000$ $x = 250,000$ so it was original purchased for \$250,000.

4. A TV has a listed price of \$503.98 before tax. If sales tax is 7.5%, find the total cost of the TV with sales tax included.

   $1.075(503.98) = 541.79$ The price with tax is \$541.79.

5. The perimeter of a rectangle is 132 feet. If the length is represented by $5y$ and the width by $4y + 3$, find the length and width in feet.

   $L = 5y$ $W = 4y + 3$ $P = 2W + 2L$ and $P = 132$ so $132 = 2(5y) + 2(4y + 3)$, so by solving this, $y = 7$. This means $L = 5 \cdot 7 = 35$ and $W = 4 \cdot 7 + 3 = 31$.

6. Solve the inequality. Graph your solution and write it in interval notation.

   $-4u + 37 \leq 13$ $8w - 40 > -3(4 - 5w)$ $-12 \leq 4x + 4 < 16$

   Remember when solving inequalities, if you multiply or divide by a negative number this will change the sign of the inequality.

   $u \geq 6$ $[6, \infty)$ $-4 > w$ $(-\infty, -4)$ $-4 \leq x < 3$ $[-4, 3)$

7. Solve the following absolute value equations or inequalities. For the inequalities, graph your solutions and write your solutions in interval notation.

   Remember when solving equations with absolute values, after you isolate the absolute value, you need to keep in mind that you can have a positive and negative version of the other side. For example, on the first problem, $6v - 3 = 9$ but also $6v - 3 = -9$.

   $|6v - 3| = 9$ $v = 2, -1$

   $|4u + 2| - 35 = -5$ $u = 7, -8$

   $|5v - 9| = |5v + 4|$ $v = \frac{1}{2}$

When solving the inequalities, you can treat them as if they are equalities ($=$ in place of $<$ or $>$), and then place your solutions on a number line and test which parts of the number line work in the original inequality. For example, on the second problem below, when you solve with an $=$ sign, you get $x = -4$ and $x = 8$. When you place these on a number line, it breaks the number line into 3 parts, $(-\infty, -4)$, $(-4, 8)$, and $(8, \infty)$. You can pick one point from each of these intervals and test them into the original inequality. When you do this, you see that any numbers in the intervals $(-\infty, -4)$ or $(8, \infty)$ work in the original inequality, but the other interval does not work.

$|4x + 4| \leq 8$ $\qquad$ $|u - 2| > 6$

$[-3, 1]$ $\qquad$ $(-\infty, -4) \cup (8, \infty)$

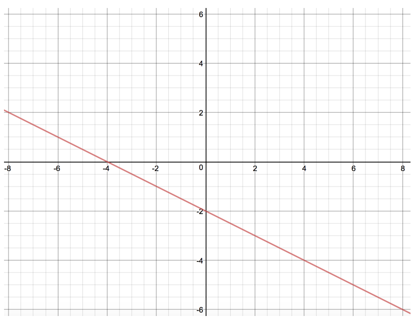
8. Find the x-intercept and y-intercept for the following, and then use them to graph the functions.

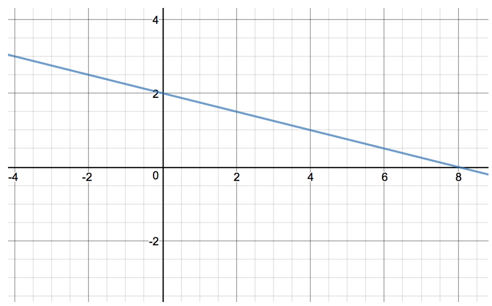
$2x + 4y = -8$

x-intercept: $(-4, 0)$ y-intercept: $(0, -2)$

$y = -\frac{1}{4}x + 2$

x-intercept: $(8, 0)$ y-intercept: $(0, 2)$





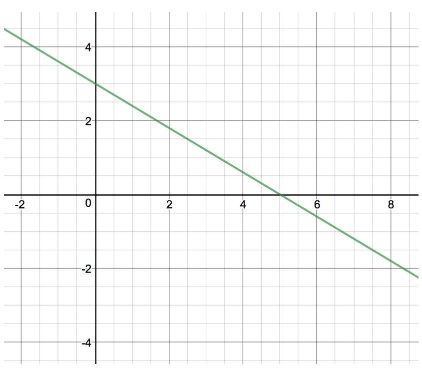
9. Find the slope and y-intercept, then graph.

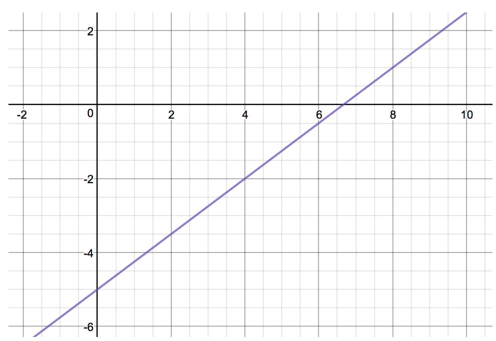
$-3x - 5y = -15$

slope: $m = -\frac{3}{5}$ y-intercept: $b = 3$

$-3x + 4y = -20$

slope: $m = \frac{3}{4}$ y-intercept: $b = -5$





10. Find an equation for the line described. You can leave your answer in point-slope form or slope-intercept form.

Line passing through the points $(-9, -6)$ and $(-4, 5)$. $y - 5 = \frac{11}{5}(x + 4)$ or $y + 6 = \frac{11}{5}(x + 9)$ or $y = \frac{11}{5}x + \frac{69}{5}$

Line passing through $(-8, 2)$ with a slope of $-\frac{5}{4}$. $y - 2 = -\frac{5}{4}(x + 8)$

Line passing through $(9, 6)$ and parallel to the line $y = \frac{3}{2}x$. $y - 6 = \frac{3}{2}(x - 9)$

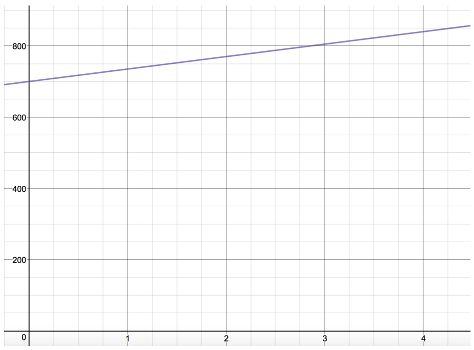
Line passing through the origin and perpendicular to the line $y = \frac{3}{2}$. Since this is $y =$ a constant, this is a horizontal line. So the line perpendicular to it must be a vertical line, and since it must go through the origin, it is $x = 0$.

11. Owners of a recreation area are filling a small pond with water at a rate of 35 liters per minute. There are 700 liters in the pond when they begin.

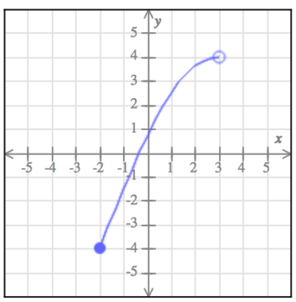
    Let W represent the amount of water in the pond (in liters), and let T represent the number of minutes the water has been added.

    Write an equation relating W to T, and the graph your equation.

    $W = 35T + 700$



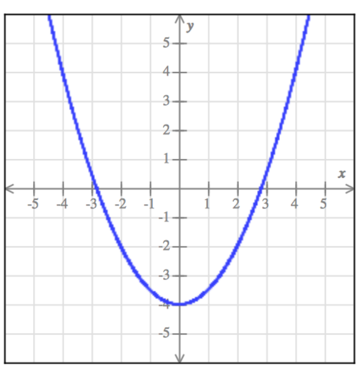
12. The entire graph of the function h is shown in the figure below. Write the domain and range of h using interval notation.



    Domain: $[-2, 3)$ Range: $[-4, 4)$

13. The graph of a function f is shown below.

    Find $f(2)$ and find one value of x for which $f(x) = -3$.



    $f(2) = -2$ notice when $x = 2$, $y = -2$.

    $f(x) = -3$ when $x = -1.5$ or $x = 1.5$ notice when $x = 1.5, -1.5$, $y = -3$.

14. Find the domain of the function, and write your solution in interval notation.

    $g(x) = \sqrt{x-4}$ $\quad$ $f(x) = \sqrt{-x+9}$ $\quad$ $h(x) = \sqrt{2x-3}$

    $x - 4 \geq 0$ so $x \geq 4$ $[4, \infty)$ $\quad$ $-x + 9 \geq 0$ $9 \geq x$ $(-\infty, 9]$ $\quad$ $2x - 3 \geq 0$ $x \geq \frac{3}{2}$ $[\frac{3}{2}, \infty)$

15. Solve the following system of equations.

$y = 3x - 4$	$6x + 9y = -3$	$7x - 2y = -9$
$4x + 3y = 27$	$6x + 5y = 9$	$4x - 5y = -9$

You can use direct substitution on the first set. You can subtract the second set. For the third set, one method would be to multiply the first equation by 5 and the second equation by -2 and then add the two equations.

$x = 3 \quad y = 5 \quad (3, 5)$	$x = 4 \quad y = -3 \quad (4, -3)$	$x = -1 \quad y = 1 \quad (-1, 1)$

16. A jet travels 1464 miles against the wind in 2 hours, and it travels 1704 miles with the wind in the same amount of time. What is the rate of the jet in still air, and what is the rate of the wind?

Remember, distance=rate $\cdot$ time, so $D = R \cdot T$. Since you are asked to find the rate, you can solve for R, giving $R = \frac{D}{T}$.

If you let x represent the jet's rate in still air, and y represent the wind's rate, then when the jet is flying against the wind, the jet's rate is reduced by the wind's rate. so **against the wind:** $x - y = \frac{1464}{2} = 732$ **so** $x - y = 732$.

When the jet is flying with the wind, the jet's rate is increased by the wind's rate, so **with the wind:** $x + y = \frac{1704}{2} = 852$ **so** $x + y = 852$.

Now you can add the two equations and solve for x, and then sub back in to find y. This gives the jet's rate to be 792 miles per hour, and the wind is 60 miles per hour.

17. Hong bought a desktop computer and a laptop. Before financing charges, the laptop cost \$400 less than the desktop. He paid for the computers using two different financing plans. For the desktop, the interest rate was 7.5% per year, and for the laptop, it was 8% per year. The total finance charge for one year was \$371. How much did each computer cost before finance charges?

If L is the price of the laptop, and D is the price of the desktop, the fact that the laptop is 400 less than the desktop gives $L = D - 400$. Then using the interest rates and the total finance charge (interest charge), we get $0.075D + 0.08L = 371$. Now you can sub the first equation into the second and solve. The desktop is \$2600 and the laptop is \$2200.

18. Simplify as much as possible. Leave your answers with only positive exponents.

$2y^5v^5 \cdot 4v^4 \cdot 6y$	$(-7ab^3)^2$	$\left(\dfrac{-4a}{b^3}\right)^3$	$(-x^3z^4)^2(2x^2y^3z)$	$\dfrac{6u^4v^2}{18uv^2}$	$(-9)^{-2}$
$48v^9y^6$	$49a^2b^6$	$-\dfrac{64a^3}{b^9}$	$2x^8y^3z^9$	$3u^3$	$\frac{1}{81}$

$\left(\dfrac{4m^4}{3m^7n^2}\right)^2$	$4v^{-4}$	$(-3w^4x^{-2})^3$	$\dfrac{36x^{-4}y^3z^{-2}}{6y^{-5}z^6}$	$\left(\dfrac{2x^{-3}u}{z^{-2}}\right)^3(x^2z^{-1})$
$\dfrac{16}{9m^6n^4}$	$\dfrac{4}{v^4}$	$-\dfrac{27w^{12}}{x^6}$	$\dfrac{6y^8}{x^4z^8}$	$\dfrac{8u^3z^5}{x^7}$

19. Factor.

$2w^3 + 5w^2 + 14w + 35$ $\quad$ $ux - 7x - 3u + 21$ $\quad$ $y^2 - 10y + 16$ $\quad$ $y^2 - 14y + 49$ $\quad$ $w^2 - 36$

$(2w{+}5)(w^2{+}7)$ $\quad$ $(u{-}7)(x{-}3)$ $\quad$ $(y{-}8)(y{-}2)$ $\quad$ $(y{-}7)(y{-}7)$ $\quad$ $(w{+}6)(w{-}6)$

$4y^2 - 28y + 48$ $\quad$ $3y^2 - 4y - 7$ $\quad$ $3y^2 - 4y - 20$ $\quad$ $27w^3 - 48w$ $\quad$ $32u^2 - 2u^2v^4$

$4(y{-}3)(y{-}4)$ $\quad$ $(3y{-}7)(y{+}1)$ $\quad$ $(3y{-}10)(y{+}2)$ $\quad$ $3w(3w{+}4)(3w{-}4)$ $\quad$ $2u^2(4{+}v^2)(2{+}v)(2{-}v)$

20. Solve.

$3y^2 - 18y = 0$ $\quad$ $u^2 - 10u + 21 = 0$ $\quad$ $5w^2 = -17w - 6$

$3y(y - 6) = 0 \;\; y = 0, 6$ $\quad$ $(u - 7)(u - 3) = 0 \;\; u = 7, 3$ $\quad$ $(5w + 2)(w + 3) = 0 \;\; w = -\frac{2}{5}, -3$