1) $\begin{cases} -3x+2y=-21 \\ -x-y=-2 \end{cases}$ Plug in $(5,-3)$
$x \quad y$

$-3(5)+2(-3) \stackrel{?}{=} -21$

$-15+-6=-21$ TRUE

$-(5)-(-3) \stackrel{?}{=} -2$

$-5+3=-2$ TRUE. It's a solution

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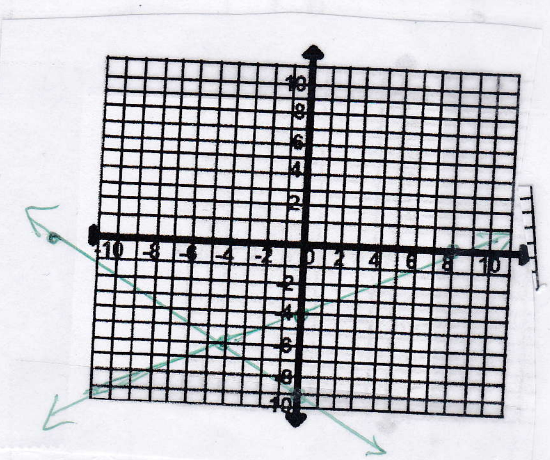
2) $\begin{cases} 3x+4y=-36 \\ -2x+4y=-16 \end{cases}$ Use the cover-up method to find the x and y intercepts. The solution is the spot where they intersect

$3x=-36$
$x=-12,\ (-12,0)$
$4y=-36$
$y=-9,\ (0,-9)$
$-2x=-16$
$x=8,\ (8,0)$
$4y=-16$
$y=-4\ (0,-4)$

They meet at the point $(-4,-6)$



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

substitute $y=x+5$ into 1st equation

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

$4x+5=-3$
$-5\quad -5$

$\frac{4x}{4}=\frac{-8}{4}$ $\quad x=-2$

Plug $x=-2$ into $y=x+5$

$y=-2+5=3$

solution $(-2,3)$

(4) $\begin{cases} 4x-4y=-16 \\ x-2y=-12 \end{cases}$

Solve for x in 2^{nd} equation:

$$\begin{array}{r} x-2y=-12 \\ +2y \quad +2y \\ \hline x=2y-12 \end{array}$$

Plug $x=2y-12$ into 1^{st} equation

$4(2y-12)-4y=-16$

$8y-48-4y=-16$

$$\begin{array}{r} 4y-48=-16 \\ +48 \quad +48 \\ \hline \frac{\cancel{4}y}{\cancel{4}}=\frac{32}{4} \end{array}$$

$, y=8 \Rightarrow$ Plug $y=8$ into $x=2y-12$:

$x=2(8)-12$

$x=16-12=4$

Solution: $(4,8)$

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(5) $\begin{cases} 3x-6y=12 \\ +2x+6y=-12 \end{cases}$ Add the 2 equations to eliminate the y

$5x=0$

$x=0$ Plug $x=0$ into either equation:

$3(0)-6y=12$

$0-6y=12$

$\frac{-6y}{-6}=\frac{12}{-6}$ $y=-2$

Solution: $(0,-2)$

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(6) $\begin{cases} 3x-2y=15 \\ -(x-2y=5) \end{cases}$ subtract the 2^{nd} equation from 1^{st} to eliminate y

$\frac{2x}{2}=\frac{10}{2}$

$x=5$. Plug $x=5$ into either equation

$3(5)-2y=15$

$$\begin{array}{r} 15-2y=15 \\ -15 \qquad -15 \\ \hline -2y=0 \end{array}$$

$y=0$

Solution

$(5,0)$

⑦ $\begin{cases} 2x - 5y = -7 \\ 5x - 3y = 11 \end{cases}$

Multiply top by 5
Multiply bottom by 2

$$= \begin{cases} 10x - 25y = -35 \\ -(10x - 6y = 22) \end{cases}$$

Now subtract to eliminate the x

$$-19y = -57$$

$$\frac{-19y}{-19} = \frac{-57}{-19}$$

$y = 3 \Longrightarrow$ Plug $y=3$ into $2x - 5y = -7$

$$2x - 5(3) = -7$$

$$2x - 15 = -7$$

$$+15 \quad +15$$

$$2x = 8, \ x = 4$$

Solution:
(4, 3)

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⑧ Plug (8, 5) into $y > x + 7$
x y

$$5 > 8 + 7$$

$5 > 15$ False, NOT A SOLUTION

---

⑨ Plug (5, 6) into $y < 5x + 8$
x y

$$6 < 5(5) + 8$$

$6 < 33$ TRUE, It's a solution

---

⑩ $-8x + 2y > -6$

$$+8x \qquad + 8x$$

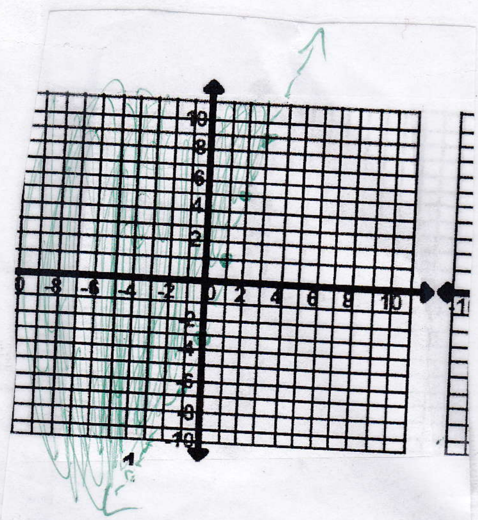
$$\frac{2y}{2} > \frac{8x}{2} - \frac{6}{2}$$

$$y > \frac{4}{1}x - 3$$

y-intercept: (0, −3)

Slope: $\frac{\text{up } 4}{\text{right } 1}$

Use a dotted line,
Shade above



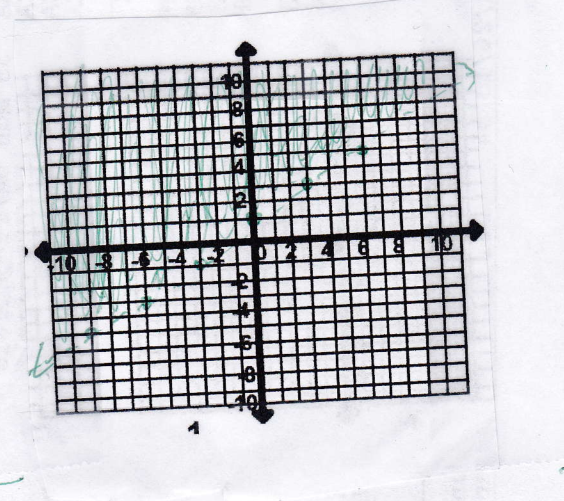
(11) $0 > 9 + 6x - 9y$ Solve for y

$+9y \qquad +9y$

$\frac{9y}{9} > \frac{9}{9} + \frac{6x}{9}$ Dotted line, shade above

$y > 1 + \frac{2x}{3}$

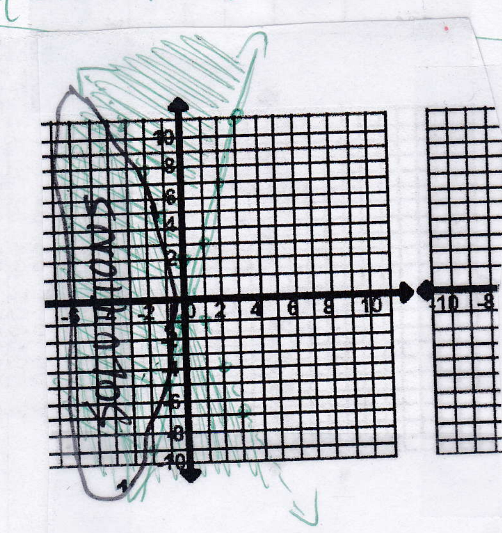
slope $= \frac{2}{3}$, y-int: $(0,1)$



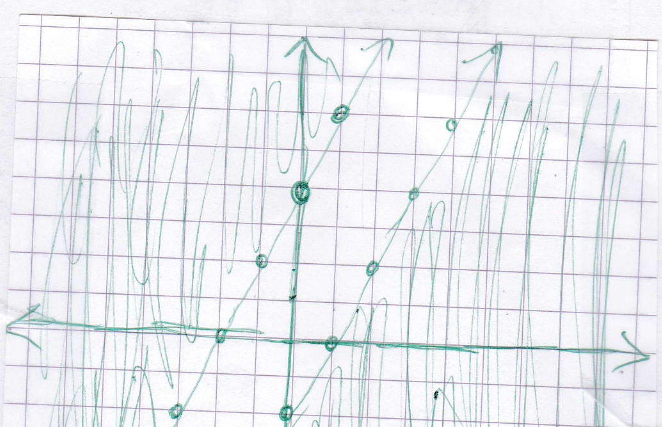
(12) $\begin{cases} y \geq 4x \\ y < x + 2 \end{cases}$ Plug in $(\underset{x}{2},\underset{y}{7})$ into both equations

$7 \geq 4(2)$, $7 \not\geq 8$ False, 7 is not greater than or equal to 8. Not a solution

(13) $\begin{cases} y < -\frac{3}{1}x + 2 \\ \text{dotted, below} \\ y \geq \frac{4}{1}x - 1 \\ \text{SOLID, above} \end{cases}$ y-int: $(0,2)$ slope: $-\frac{3}{1}$ y-int: $(0,-1)$ slope $= \frac{4}{1}$



(14) $\begin{cases} y \geq 2x + 4 \\ \text{SOLID Above} \\ y \leq 2x - 2 \\ \text{SOLID, below} \end{cases}$ slope $= \frac{2}{1}$, y-int: $(0,4)$ slope $= \frac{2}{1}$, y-int: $(0,-2)$



The lines are parallel. The shading doesn't overlap. There is no solution to the system

15) $2^{-3} = \frac{1}{2^3} = \frac{1}{2\cdot 2\cdot 2}$
$= \boxed{\frac{1}{8}}$

16) $(-4)^0 = 1$

Any number raised to the zero power is 1

17) $a^{-2}b^0$ for $a=-3$ and $b=-3$

$= (-3)^{-2}(-3)^0$

$= \frac{1}{(-3)^2} \cdot 1$

$= \frac{1}{(-3)(-3)} = \boxed{\frac{1}{9}}$

18) $a^0 b^{-2}$ for $a=2$, $b=-2$

$= 2^0(-2)^{-2} = 1 \cdot \frac{1}{(-2)^2}$

$= \frac{1}{(-2)(-2)} = \boxed{\frac{1}{4}}$

19) $\frac{9x^0y^{-8}}{z^{-8}} = \frac{9(1)\cdot y^{-8}}{z^{-8}}$

$= \frac{9z^8}{y^8}$

Flip the variables & remove the negative signs.

20) $m^3 \cdot y^6 \cdot m^2$

$= m^{3+2}y^6 = \boxed{m^5y^6}$

21) $(x^5)^{-8} \cdot x^4$

$= x^{-40} \cdot x^4 = x^{-40+4}$

$= x^{-36}$

$= \boxed{\frac{1}{x^{36}}}$

23) $\frac{y^6z^{12}}{(yz)^3} = \frac{y^6z^{12}}{y^3z^3}$

$= y^{6-3}z^{12-3}$

$= \boxed{y^3z^9}$

22) $(m^2n^{-3})^2(-1\cdot m^{-3}n^3)^3$ Multiply the exponents

$= (m^4n^{-6})(-1^3\cdot m^{-9}\cdot n^9)$ Add the exponents now

$= m^{4-9}n^{-6+9}\cdot -1^3 = m^{-5}n^3\cdot -1 = \boxed{\frac{-1n^3}{m^5}}$

24) $\left(\frac{2m^8}{m^2n^4}\right)^4 = \frac{2^4(m^8)^4}{(m^2)^4(n^4)^4} = \frac{16m^{32}}{m^8n^{16}} = \boxed{\frac{16m^{24}}{n^{16}}}$

Multiply the exponents

subtract $32-8=24$

(25) $\left(\frac{2}{4}\right)^{-3} = \left(\frac{1}{2}\right)^{-3}$

$= \frac{1}{\left(\frac{1}{2}\right)^3} = \frac{1}{\frac{1^3}{2^3}} = \frac{1}{\frac{1}{8}}$

Multiply by the reciprocal or use a calculator $= 1 \cdot \frac{8}{1} = \boxed{8}$

(26) $-12x^5 + 2x^4 - 5x^3 + 3x^2 - 8x - 6$

The leading coefficient is -12

(27) $8x$ is $8x^1$. It is a linear (deg = 1) monomial (# terms = 1)

(28) $-10m + 2m^4 - 13m - 20m^4$

$= 2m^4 - 20m^4 - 10m - 13m = \boxed{-18m^4 - 23m}$

(29) $(5c^5 - c) + (c^5 + 7c - 2)$

$= 5c^5 + 1c^5 - 1c + 7c - 2 = \boxed{6c^5 + 6c - 2}$

(30) $(8b^4 - b^3) - (b^4 + 4b^3 - 4)$

$= 7b^4 - 1b^3 - 4b^3 - (-4)$

$= \boxed{7b^4 - 5b^3 + 4}$

(31) $4x(-5x^3y^3 - 3y^3)$

$= \boxed{-20x^4y^3 - 12xy^3}$

(32) $(n-5)(n-1)$

$= n^2 - 1n - 5n + 5 = \boxed{n^2 - 6n + 5}$

(33)

$$\begin{array}{r} x^3 - 5x + 2 \\ 5x - 3 \\ \hline -3x^3 + 15x - 6 \\ +5x^4 - 25x^2 + 10x \quad 0 \end{array}$$

$$\boxed{5x^4 - 3x^3 - 25x^2 + 25x - 6}$$

(34) $(p-8)^2$

$= (p-8)(p-8)$

$= p^2 - 8p - 8p + 64$

$= p^2 - 16p + 64$

(35) $(r+7)(r-7) = r^2 - 7r + 7r - 49$

$= \boxed{r^2 - 49}$

(36) $70 = 7 \cdot 10 = \boxed{7 \cdot 2 \cdot 5}$

(37) $48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$ GCF = 24

$72 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

(38) $2m^5 = 2 \cdot m \cdot m \cdot m \cdot m \cdot m$, GCF $= 2m^4$

$32m^4 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot m \cdot m \cdot m \cdot m$

(39) $5(x-2) - 9x(x-2)$

$= (x-2)(5-9x)$

(40) $15x^3 - 6x^2 - 25x + 10$

$= 3x^2(5x-2) + -5(5x-2)$

$= (5x-2)(3x^2-5)$

(41) $4x^3 - 16x^2 + 12 - 3x$

$4x^2(x-4) + 3(4-x)$

$= 4x^2(x-4) + 3(-1)(-4+x)$

$= (4x^2+3)(x-4)$

42) $a^2 + 14a + 48$

Find 2 #'s that multiply to 48 and add to 14:

6 and 8

$(a+6)(a+8)$

43) There is no problem #43.

44) Factor $\underbrace{2x^2 + 7\cancel{x} + 6}_{ax^2 + bx + c}$

Mutiply $2 \cdot 6 = 12$

Find factors of 12 that add to 7. They are 3 and 4

Write $\left(x + \frac{a}{3}\right)\left(x + \frac{a}{4}\right)$ where $a = 2$ because it's $2x^2$

$= \left(x + \frac{2}{3}\right)\left(x + \frac{2}{4}\right)$ Reduce $\frac{2}{4} = \frac{1}{2}$

$= \left(x + \frac{2}{3}\right)\left(x + \frac{1}{2}\right)$ Make the denominators into coefficients

$= (3x+2)(2x+1)$

45) Is $81 - 49n^4$ a difference of 2 squares?

Yes it's a difference of 2 squares because 81 is a perfect square $(81 = 9^2)$ and because $49n^4$ is a perfect square $(49n^4 = (7n^2)^2)$. It's a difference because of the subtraction sign.

$81 - 49n^4 = (9 + 7n^2)(9 - 7n^2)$ because the Difference of Two Squares rule states that $a^2 - b^2 = (a+b)(a-b)$. In this case, $a = 9$ and $b = 7n^2$.