PRISMS

A prism is a kind of **polyhedron**, that is a many faced solid figure.

Each prism consists of two kinds of faces:
the **bases** are the same shape and size, and are parallel to each other,
the **lateral faces** are all parallelograms.

A **right prism** is one in which the lateral faces are perpendicular to the bases.
Any other prism is an **oblique prism**.

The **lateral surface area** is the area of the parallelogram faces. The **total surface area** includes the area of the bases too.

Volume = height * area of the base
Lateral surface area = height * perimeter of the base

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17 March 2006

Shedding Light on Prisms p262

late
2.5/5
3/17

Absent For

	1. Hight (units)	Area of Base (units^2)	Volume of Prism (units^3)	Perimeter Base (units)	lateral Surface Area (units^2)
a	4	3	12	8	32
b	6	4	24	8	48
c	3	4	12	10	30
d	9	6	54	10	90
e	6	6	36	12	72
f	given	given (l×w)	l·w·h $A_B \cdot h$	l+w	$P_B \cdot h$

2. Generlization/Formula:
Volume = hight × area of base
lateral surface area = perimiter of base × hight

Michael,
It is your responsibility to find out what work you missed when you are absent. The work is never going to be requested from you. Also, everyone was told what the absent policy is in the beginning of each semester. It is also in the syllabus and on the website. Again, these are your responsibilities.

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Back on the Form (26)

3/17

1. Need to find volume
$V = H \times Area_{Base}$

Base

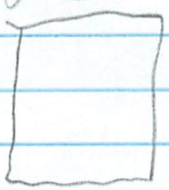
$Area = \frac{1}{2} 1ft(1ft)$
$Area = .5ft^2$

Volume = Hight × Area Base
~~5ft × .5ft²~~
Volume = $2.5ft^3$

2. Barn problem

a) Guess: Least LSA; All will be the same

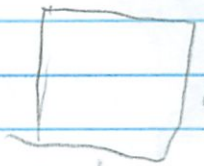
b) Octagon = 8 sides — 300ft premiter
10 ft high wall



300/8 = 37.5ft

Area = 37.5ft × 8 = LSA = $3000 ft^2$

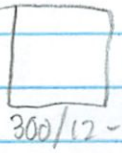
Decagon = 10 side



300/10 = 30ft

Area = 300ft × 10 = 3000 ft^2 LSA

Dodecagon = 12 side



300/12 = 25ft2

Area = 250ft × 12 = 3000 ft^2 LSA

c) Ha, Ha I was right! You always have to same total premiter and hight look at the formula for LSA = Perim × hight

Name _____ Date _____

Rectangular Prisms

(Answer ID # 0867150)

Fill in the missing values for a rectangular prism.

1.	length	12	2.	length	5	3.	length	13.6
	width	1		width	9.85		width	10.69
	height	14		height	1		height	5.81
	surface area	388		surface area	129.4		surface area	573.0178
	volume	168		volume	49.75		volume	844.68104
4.	length	7	5.	length	14	6.	length	1
	width	12		width	2		width	3
	height	13		height	14		height	7
	surface area	662		surface area	504		surface area	62
	volume	1092		volume	392		volume	21
7.	length	6.7	8.	length	13.4	9.	length	11
	width	6.26		width	6.88		width	9
	height	11.51		height	5		height	12
	surface area	382.7232		surface area	387.184		surface area	678
	volume	482.75242		volume	460.96		volume	1188
10.	length	4	11.	length	6.7	12.	length	11.74
	width	10		width	12.39		width	10.72
	height	1		height	3.3		height	~~27~~ 13.5
	surface area	108		surface area	292.02		surface area	~~464.5456~~ 858.12
	volume	40		volume	273.9471		volume	1699.0128
13.	length	4	14.	length	2.1	15.	length	14
	width	5		width	11.79		width	8
	height	10		height	7.17		height	5
	surface area	220		surface area	248.7006		surface area	444
	volume	200		volume	177.5703		volume	560

Units on work page

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Rectangular Prisms

formulas to use: $V = lwh$ $TSA = 2(lw) + 2(lh) + 2(wh)$

1. $TSA = 2(12) + 2(14) + 2(168) = 388 \text{ units}^2$
$V = 12 \times 1 \times 14 = 168 \text{ units}^3$

2. $TSA = 129.4 = 2(5 \times w) + 2(5) + 2(w1)$
$129.4 = 2(5w) + 2(w)$
$129.4 = 10w + 2w$
$\frac{129.4}{12} = \frac{12w}{12}$
$w = 9.95 \text{ units}$
$V = 5 \times 9.95 \times 1 = 49.75 \text{ units}^3$

3. $V = 844.68104 = 13.6(w)5.81$
$\frac{844.68104}{79.016} = \frac{79.016w}{79.016}$
$w = 10.69 \text{ units}$
$TSA = 2(145.384) + 2(79.016) + 2(62.1089)$
$TSA = 573.0178 \text{ units}^2$

4. $V = 1092 = 7 \times 12h$
$\frac{1092}{84} = \frac{84h}{84}$
$h = 13 \text{ units}$
$TSA = 662 \text{ units}^2$ Work on calc

5. $V = 392 = 14 \times 14 \times w$
$\frac{392}{196} = \frac{196w}{196}$
$w = 2 \text{ units}$
$TSA = 504 \text{ units}^2$

6. $TSA = 62 = 2(3L) + 2(2L) + 2(7L)$

$62 = 6L + 4L + 14L$

$\frac{20}{20} = \frac{20L}{20}$

$L = 1 \text{ unit}$

$V = 1 \times 3 \times 7 = 21 \text{ units}^3$

7. $V = 482.75242 = L \times 6.26 \times 11.51$

$\frac{482.75242}{72.0526} = \frac{72.0526L}{72.0526}$

$L = 6.7 \text{ units}$

$TSA = 382.2232 \text{ units}^2$

8. $V = 460.96 = 13.4 \times 6.88 \times h$

$\frac{460.96}{92.192} = \frac{92.192h}{92.192}$

$h = 5 \text{ units}$

$TSA = 387.184 \text{ units}^2$

9. $V = 1188 = 11 \times 9 \times h$

$\frac{1188}{99} = \frac{99h}{99}$

$h = 12 \text{ units}$

$TSA = 678 \text{ units}^2$

10. $TSA = 108 = 2(4w) + 2(1w) + 2(4)$

$108 = 8w + 2w + 8$

$\frac{100}{10} = \frac{10w}{10}$

$w = 10 \text{ units}$

$V = 4 \times 10 \times 1 = 40 \text{ units}^3$

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Prisms Cont

11. $TSA = 292.02 = 2(80.013) + 2(12.39h) + 2(6.7h)$

$292.02 = 166.026 + 24.78h + 13.4h$

$\frac{125.994}{38.18} = \frac{38.18h}{38.18}$

$h = 3.3$ units

$V = 6.7 \times 12.39 \times 3.3 = 273.9429$ units^3

12. $V = 1699.0128 = 11.79 \times 10.72 \times h$

$\frac{1699.0128}{125.8528} = \frac{125.8528h}{125.8528}$ ← division or calc error

~~$h = 7$ units~~ 13.5 units

~~TSA = 1464.5456 units^2~~ 858.1256 units^2

13. $V = 200 = L \times 5 \times 16$

$\frac{200}{50} = \frac{50L}{50}$

$L = 4$ units

$TSA = 220$ units^2

14. $TSA = 248.7006$ units^2

$V = 2.1 \times 11.79 \times 7.17 = 177.52203$ units^3

15. $V = 560 = 14 \times 8 \times h$

$560 = 112h$

$\frac{560}{112} = \frac{112h}{112}$

$h = 5$ units

$TSA = 444$ units^2

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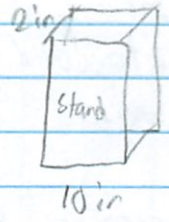
Cereal Boxes (27)

3/23

	Volume	TSA
Mini	20	58
Normal	160	232
Int.	4320	2088
Super	20,000	5,800

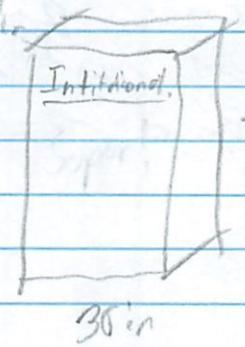
1. 

$V = 2 \times 8 \times 10 = 160 \text{ in}^3$
$TSA = 2(2 \times 8) + 2(8 \times 10) + 2(2 \times 10)$
$TSA = 232 \text{ in}^2$

2a 

$V = 1 \times 4 \times 5 = 20 \text{ in}^3$
$TSA = 58 \text{ in}^2$

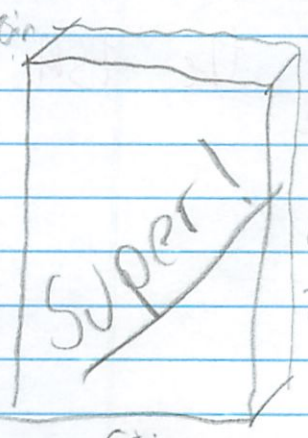
$4 \times 16 \times 20$

b 

$V = 6 \cdot 24 \times 30 =$
4320 in^3
$TSA = 2088$

3. The volume of the standard is 8 times the mini
The volume of the inte is 27 times the standard
the volume of the int is 216 times the mini

When you double the sides, the volume increases 8 times
When you triple the sides, the volume increases 27 sides
When you quadruple the sides, the volume increases 64 times
(4b) → * When you n the sides, the volume increase n^3 times *
4c. This is because when you enlarge all the sides you add space all around x^3 is the volume of all this extra space added to each side

4a 

$5^2 \times V_{Normal}$
$V = 20{,}000 \text{ units}^3$
Check $V = 10 \times 40 \times 50 = 20{,}000$ ✓

7a
7a) $5^2 \times TSA_{normal}$
$TSA = 5800 \text{ units}^2$ TSA = 5800 ✓
Check $TSA = 2(10 \times 40) + 2(40 \times 50) + 2(50 \times 10)$

5. See above w/ #1+2

TSA = Total Surface area

6. The TSA of the standard is 4 times the mini
The TSA of the int. is 9 times the standard
The TSA of the int is 36 times the mini

When you double the sides, the TSA increases 4 times
When you triple the sides, the TSA increases 9 times
When you quadruple the sides, the TSA increases 16 times

7b * When you nth the side, the TSA increases n^2 times *

c I don't know why this works. You add cardboard to the TSA, but not as much as the volume. You add area to the 6 sides

Conclusion

Volume

When multiply all 3 side lengths by the same #, x, the Volume will increase by x^3.

TSA

When you multiply all 3 side lengths by the same #, x, the TSA will increase by x^2

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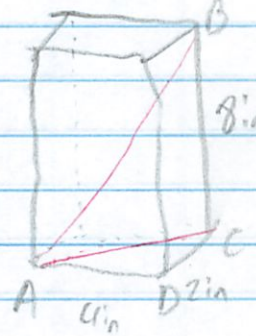
Pythagoras + the Box (25)

3/23

#1.



$\triangle ADC = 4^2 + 2^2 = c^2$

$16 + 4 = 20 = c^2$

$\sqrt{\quad}\qquad\sqrt{\quad}$

$\overline{AC} = 4.4721$ or $\sqrt{20}$

$\triangle ACB = 4.472^2 + 8^2 = c^2$

$84 = c^2$

$\sqrt{\quad}\qquad\sqrt{\quad}$

or $\sqrt{84}$ $9.165\text{in} = \overline{AB}$ or pen

Ne the pen won't fit, Peter, Sorry!

#2 Don't Do

#3 (From above) $\triangle ACB = \sqrt{p^2+q^2} + 8^2$

$\overline{UV} = \sqrt{\sqrt{p^2+q^2}^2 + r^2}$ (forgot that sq. root)

2 cancles out so $\sqrt{p^2+q^2+r^2}$ or Vus

This works because of the pythagoras theorem $c = \sqrt{a^2+b^2}$. You first (in the nested radical) find the lenght of $\overline{AC}$ (from #1) this lenght plus the r lenght (both squared of course ☺ Forgot that) and getting the square root from that gives you the largest diagonal lenght $\overline{UV}$ or the pen from the above box

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27 March 2006

Which holds more?
p267

3/27

1. I guess the short, fat cylinder holds more but they both have the same LSA

Formula
Volume $_{Hight}$ = Area $_{base}$ * hight

Area $_{circle} = \pi r^2$
Circumference of a circle $= 2\pi r$
π like the perimeter

Tall Skinny

Circumference $= 2\pi r$
$\frac{8.5}{2\pi} = \frac{2\pi r}{2\pi}$
$\frac{8.5}{2\pi} = r$ or 1.3528 in

(! make sure you use parentheses for $8.5/(2\pi)$)

Area $= \pi r^2$
$a = \pi 1.3528^2$
$a = 5.7493$ in^2

Volume $= A_{base} \times h$
$V = 5.7493 \times 11$ in
$V = 63.2426$ in^3

Short, Fat Circumference $= 2\pi r$
$\frac{11}{2\pi} = \frac{2\pi r}{2\pi}$
$\frac{11}{2\pi} = r$ or 1.7507 in

$Area = \pi r^2$

$A = \pi 1.7507^2$

$A_{Base} = 9.67887\ in^2$

$Volume = A_{Base}\ h$

$V = 9.67887 \times 8.5$

$V = 81.3954\ in^3$

I was right, the short fat cylinder holds more.

2. LSA - I think both will be the same

$LSA = P_b \times h$

$LSA_{Tall, Skinny} = 8.5 \times 11\ in = 93.5\ in^2$

$LSA_{Short\ Fat} = 11 \times 8.5\ in = 93.5\ in^2$

I was correct again. The LSA stays the same because the same piece of paper was used both times that makes up the LSA.

The volumes are different because the bases were different. This is the same with the boxes we built at the start of the unit. Not all of the faces are part of the given SA in both cases.

In the boxes you noticed, a closer to equal division between l x w x h. Also you want as large of an area that wasn't in paper - the top.

25/25

Name Michael Plasmeier Volume and Lateral Surface Area

1) Find the lateral surface area of a right pentagonal prism which has a regular pentagon with sides 10 as its base. The height of the prism is 15.

2) Find the volume the the prism in question 1.

3) What is the difference between lateral surface area and surface area?

4) Find the lateral surface area of a right octagonal prism which has a regular octagon with sides 12 has its base. The height of the prism is 20.

5) Find the volume of the prism in problem 4.

1. $LSA = P_{Base} \times Hight \rightarrow LSA = (10 \cdot 5) \cdot 15 = LSA = 50 \cdot 15$

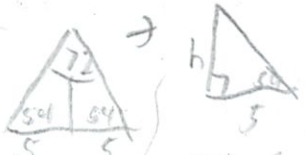
$LSA = 750\ units^2$

2. $Volume = A_{Base} \times Hight \rightarrow V = 172.0477 \times 15 =$

$V = 2580.716\ units^3$

Area

each angle $360/5 = 72°$



$\tan(54) = \frac{h}{5}$

$1.3763 = \frac{h}{5}$

$6.8819 = h$

10

$\text{area } A = \frac{1}{2}bh$

$\frac{1}{2}(10)6.8819$

$OA = 34.4095 \times 5 = 172.0477^2$

3. $SA = LSA + 2A_{Base} = 750 + 2(172.0477) = SA = 1094.0954$

$- TSA = 750^2$

Difference $= 344.0954\ units^2$

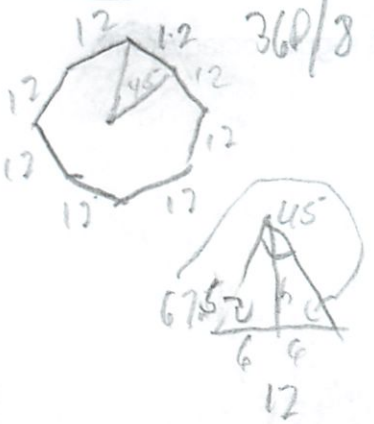
4. See back

5.

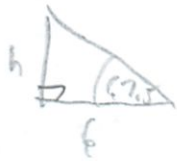
4. $LSA = P_{Base} \times height = (12 \times 8) \times 20 =$ 1920 units^2

5. $Volume = A_{Base} \times height = 695.2935 \times 20 =$ 13905.87012 units^3

A_{Base}



$360/8 = 45°$



$\tan(67.5) = \frac{h}{6}$

$2.414 \times 6 = h$

$14.485 = h$

$Area_{\triangle} = \frac{1}{2}bh$

$A = \frac{1}{2}(12)14.485$

$a = 86.91168 \times 8 =$ 695.2935 u^2

3. The total surface area is the surface area of all of the sides. The lateral surface area is only the sides of the lateral (or side) faces. It does not include the base and the top.

Bee's Unit Test Pratice

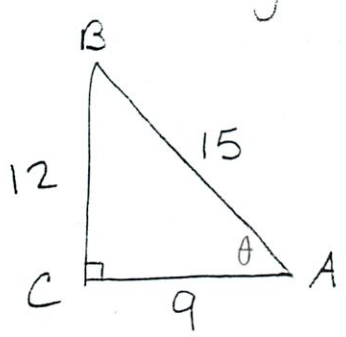
Information to Review

1. Area of Polygons
   a. triangles $\frac{1}{2}bh$
   b. rectangles bh
   c. parallelograms bh
   d. trapezoids $\frac{(b_1+b_2)h}{2}$
2. Trigonometry
   a. finding side lengths Sin, Cos, Tan
   b. finding angle measurements $^{-1}$ Inverse
3. Pythagorean theorem $a^2+b^2=c^2$
4. Volume lbh $A_B \times h$
5. Surface Area / Lateral Surface Area $2(lb)+2(bh)+2(lh)=SA$ $P_B \times h = LSA$
6. Square Roots $\sqrt{\ }$
   + - do first
   x ÷ order doesn't matter

- Don't know: STUDY!

Review Packet for Unit Test

1. Using an Inverse Trigonometry function, find the measurement of angle A.

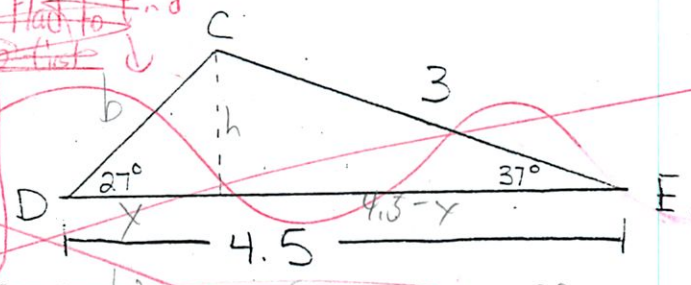


$\tan(\theta) = \frac{12}{9}$

$\tan^{-1}(12/9) = 53.1301$

$53.13° = m\angle A$

2. Find the area of the triangle below.



Help

Shorter side gets x

Had to find b first

$\cos(27) = \frac{x}{b}$

$(\cos(27))b = x$

$x^2 + h^2 = b^2$

$(4.5 - x)^2 + h^2 = 3^2$

$-h^2 \quad -h^2$

Then what → $x^2 = b^2 - h^2$

Wrong Approach

$\sin(37) = \frac{h}{3}$

$.6018(3) = h$

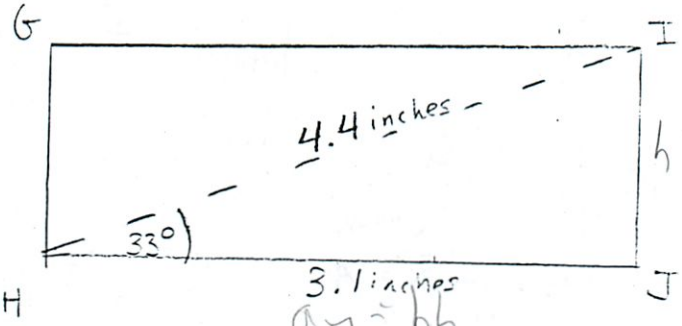
$1.8054 = h$

$a_\Delta = \frac{1}{2}bh$

$a_\Delta = \frac{1}{2}(4.5)1.8054$

$a_\Delta = 4.06225$ units²

3. Find the area of the rectangle below.



$\sin(33) = \frac{h}{4.4in}$

$.5446 \times 4.4in = h$

$2.3964in = h$

$a_{\square} = bh$

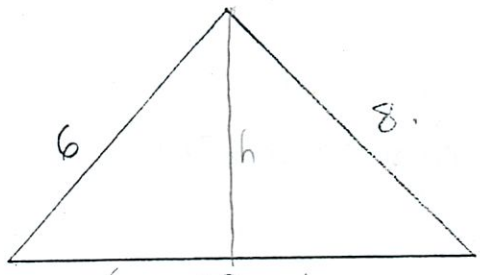
$a_{\square} = 2.3964 \times 3.1$

$a_{\square} = 7.4288 in^2$

~~Same as #2~~ Its not

4. Find the area of the triangle below.

Shorter gets Y



Shorter gets Y

$6feet^2 = y^2 + h^2$ | $8feet^2 = (12-y)^2 + h^2$

$-y^2 \quad -y^2$ | $-(12-y)^2 \quad -(12-y)^2$

Get h^2 on each side

$36ft - y^2 = h^2$ | $64ft - (12-y)^2 = h^2$

h^2 equal each other

$36ft - y^2 = h^2 = 64ft - (12-y)^2$ seperate

$36ft - y^2 = 64ft - (144 - 24y + y^2)$

Reduce

$36ft - y^2 = 64 - 144 + 24y - y^2$

$+y^2 \qquad\qquad\qquad +y^2$

Foil Operation

$(12-y)(12-y)$ $(-x- = +)$

$12 \times 12 + -12y + -12y + +y^2$

$144 - 24y + y^2$

$36 = -80 + 24y$

$+80 \qquad +80$

$116ft = 24y$

$\overline{24} \qquad \overline{24}$

$4.833ft = y$

$36ft - y^2 = h^2$

$36ft - 4.833^2 = h^2$

$36ft - 23.36 = h^2$

$12.638ft = h^2$

find h

$3.555 = h$

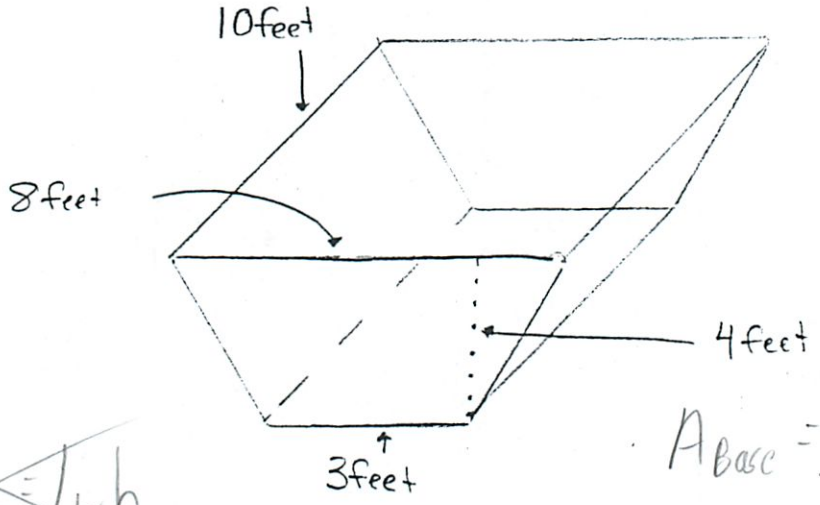
find area

$a_\Delta = \frac{1}{2}bh$

$a_\Delta = \frac{1}{2}(12ft)(3.555ft)$

$a_\Delta = 21.33ft$

5. Rancher Gonzales has another neighbor, farmer Joe, who has a drinking trough for his animals. The trough is in the shape of a trapezoidal prism, as shown below. How much water will the trough hold when it's full?



~~Volume = lwh~~

Volume = $A_{Base}\,h$

$V = 22 \times 10$

Volume = 220 ft³

$A_{Base} = \frac{(B_1 + B_2)h}{2}$

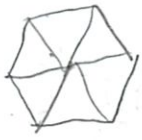
$A_{Base} = \frac{(3+8)4}{2}$

$A_{Base} = \frac{44}{2}$

$A_{Base} = 22\ ft^2$

6. Student Painters Company just got a job to paint a swimming pool. The Company would only have to paint the inside an outside of the pool, not the bottom. Student Painters Company are responsible for the design of the pool. The choices for the shape of the pool are a regular hexagon (6 sides), a regular heptagon (7 sides or a regular octagon (8 sides). No matter what shape the pick, the pool's walls will be 9ft tall, and the perimeter has to be 450 feet. Student Painters Company want a pool that will have the largest lateral surface area (More money for them). Which shape of the pool will give them the largest lateral surface area?

Hexagon = LSA - need to find width of each wall



450ft/6 = 75ft

$LSA_{[W]}$ = width × hight

$LSA_{[W]}$ = 9 × 75ft

$LSA_{[W]}$ = 675ft × 6 sides

$LSA_{⑥}$ = 4050ft²

Octagon

450/8 = 56.25ft

$LSA_{[W]}$ = 9 × 56.25ft

$LSA_{[W]}$ = 506.25ft × 8 sides

$LSA_{⑧}$ = 4050ft²

Every shape gives them the same LSA. That is because the perimeter of the base stays the same and so does the hight. Remember LSA also = P_{Base} × Hight. Because none of these variables change for each shape, the LSA is the same.

A Look over this too

7. Simplify these square roots completely.

also $\sqrt{12} \times \sqrt{13}$ - but not perf $\sqrt{}$

a. $\sqrt{156} = \sqrt{4} \times \sqrt{39}$ $2\sqrt{39}$

b. $\sqrt{51-15}$

$\sqrt{36} \rightarrow 6$

needed help

c. $\sqrt{\frac{2}{64}}$ $\sqrt{\frac{1}{32}}$ $\frac{\sqrt{1}}{\sqrt{32}}$ $\frac{1}{\sqrt{2}\sqrt{16}}$ $\frac{1}{\sqrt{4}\sqrt{8}}$ $\frac{1}{\sqrt{4}\sqrt{2}\sqrt{4}}$ $\frac{1}{4\sqrt{2}}$

That's not equivalent - what was I thinking

Yes it is

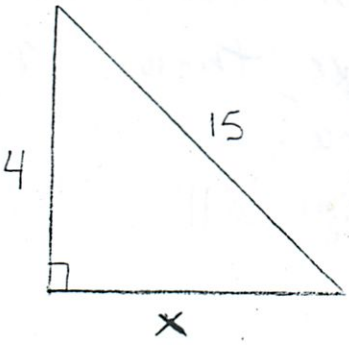
$\frac{1}{4\sqrt{2}}$ $\frac{\sqrt{2}}{\sqrt{64}}$ $\frac{\sqrt{2}}{8}$

d. $\sqrt{10+159}$

$\sqrt{169} \rightarrow 13$

8. Find the missing side lengths.

a.



$a^2 + b^2 = c^2$

$4^2 + x^2 = 15^2$ $x =$

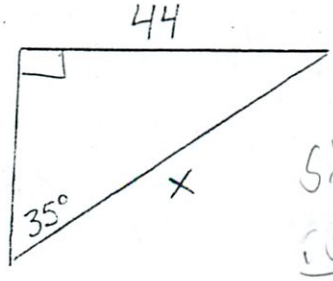
$16 + x^2 = 255$

$-16 \quad -16$

$x^2 = 209$

$x = \sqrt{209}$ or 14.456

b.



$x =$

$\sin(35) = \frac{44}{x}$

$.5735x = \frac{44}{.5735}$

$x = 76.71165$

75/75

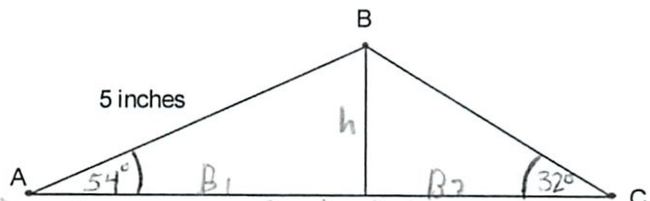
Name Michael Plaomeier
Behl
IAG 2-H
3/31/06

Bee's Unit Test

DIRECTIONS: Show all work that is necessary in order to receive full credit. Pay attention to each question and answer it as best as you can. If you have any questions, please ask me. Be sure to use the correct units in your solutions. Good luck!

Round ans to nearest tenth

1. Find the area of the triangle below.



Sin(54) = h/5   Cos(54) = B1/5   Tan(32) = h/B2

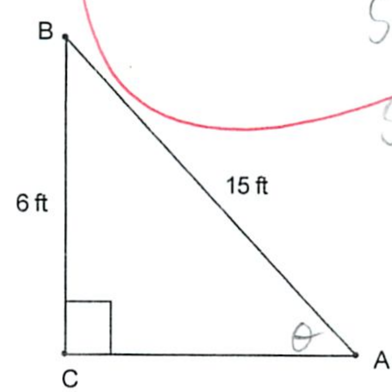
.8090(5) = h   .587785(5) = B1   .6248(B2) = 4.0450

4.0450 = h   2.9389 = B1   B2 = 6.4734

$a_\Delta = \frac{1}{2}bh \rightarrow a_\Delta = \frac{1}{2}(2.9389 + 6.4734)(4.0450)$

$a_\Delta \approx 19.036 \rightarrow$ (19 in²)

2. Using an Inverse Trigonometry function, find the measure of angle A. Round your answer to the nearest tenth.



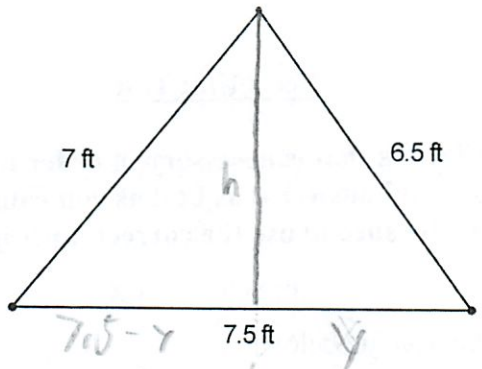
Sin(θA) = 6/15

Sin⁻¹(6/15) = 23.57817

(23.6°)

y goes on the shorter side

3. Find the area of the triangle below.



$a^2+b^2=c^2$

$h^2+(7.5-y)^2=7^2$

$h^2+(7.5-y)^2=49$

$-(7.5-y)^2 \quad -(7.5-y)^2$

$h^2=49-(7.5-y)^2$

$a^2+b^2=c^2$

$h^2+y^2=6.5^2$

$h^2+y^2=42.25$

$-y^2 \quad -y^2$

$h^2=42.25-y^2$

Foil

$-(7.5-y)^2$

$-[(7.5-y)(7.5-y)]$

$-[(7.5\times7.5)+(7.5\times-y)+(-y\times7.5)+(-y\times-y)]$

$-[(56.25)+(-7.5y)+(-7.5y)+(y^2)]$

$-(56.25-15y+y^2)$

$-56.25+15y-y^2$

$-x-=+$

$49-(7.5-y)^2=h^2=42.25-y^2$

$49-56.25+15y-y^2=42.25-y^2$

$+y^2 \qquad +y^2$

$-7.25+15y=42.25$

$+7.25 \qquad +7.25$

$\frac{15y}{15}=\frac{49.5}{15}$

$y=3.3$

$h^2=42.25-y^2$

$h^2=42.25-3.3^2$

$h^2=42.25-10.89$

$h^2=31.36$

$\sqrt{\quad} \qquad \sqrt{\quad}$

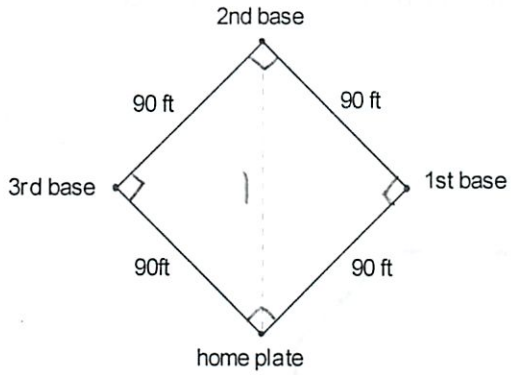
$h=5.6$

$a_\Delta=\frac{1}{2}bh$

$a_\Delta=\frac{1}{2}(7.5)(5.6)$

$a_\Delta=21ft^2$

4. Bases on a baseball field are 90 ft apart from each other. If a catch has the ball at home plate, how far will he/she have to throw the ball to get the player out at 2nd base? Use the diagram below to help you answer this question.



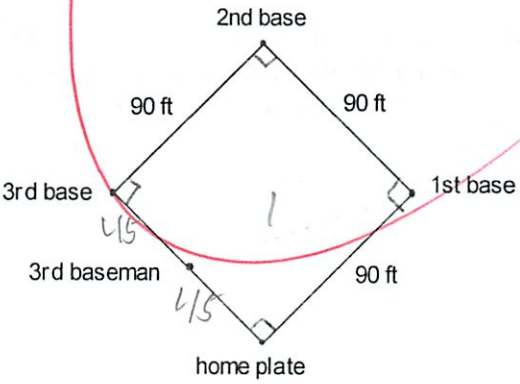
$a^2+b^2=c^2$

$90^2+90^2=l^2$

$8100+8100=l^2$

$16200=l^2$ $\quad l=127.2792 \rightarrow$ (127.3 ft)

5. If the person playing 3rd base fields the ball half way between 3rs base and home plate, how far will he/she have to throw the ball to get a person out at 1st base? Use the diagram below to help you answer this question.



$a^2+b^2=c^2$

$45^2+90^2=l^2$

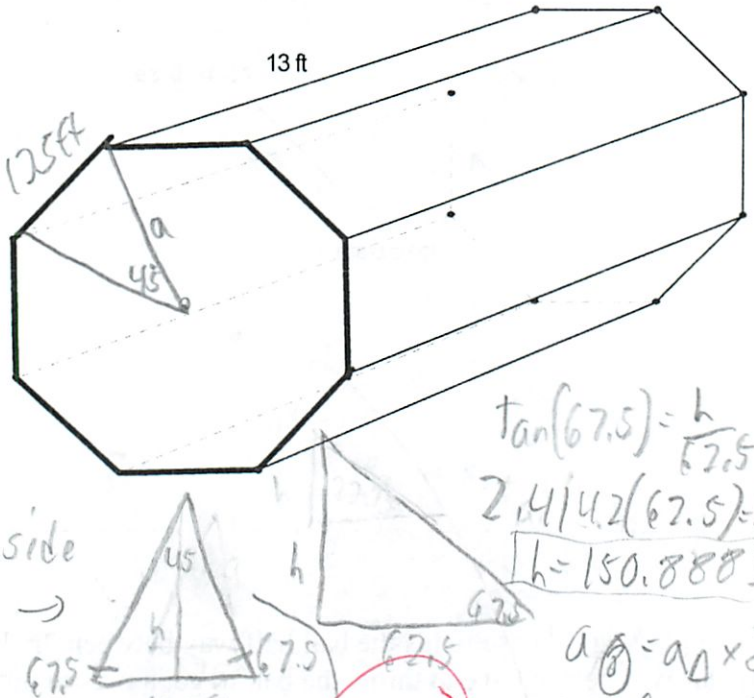
$2025+8100=l^2$

$10125=l^2$

$100.62305 \rightarrow$ (100.6 ft)

6. Good old Rancher Gonzales has another neighbor, farmer Bill, who has a drinking trough for his animals. The trough is in the shape of an octagonal prism, as shown below. How much water will the trough hold when it's full? Use the following information to help you solve this problem: Farmer Bill has 1000 ft of fencing for the perimeter of the octagonal trough.

world - record trough



1000ft/8 = 125ft, side → 360°/8 = 45°

$\tan(67.5) = \frac{h}{62.5}$

$2.4142(62.5) = h$

$h = 150.8883$

$a_\Delta = \frac{1}{2}bh$

$a_\Delta = \frac{1}{2}(125)(150.8883)$

$a_\Delta = 9430.5217$

$a_{⑧} = a_\Delta \times 8$

$a_{⑧} = 9430.5217 \times 8$

$P_{⑧} = 75444.17382$

$V = A_{Base} \times h$

$V = 7444.17382 \times 13$

$V = 980774.2597$

7. Compare the lateral surface area of a regular heptagon (7-sided shape) that has a perimeter of 1350 ft and a height of 8 ft to a regular decagon (10-sided shapes) that has a perimeter of 1200 ft and a height of 9 ft.

980774.3 ft³

$LSA = P_{Base} \times height$

$LSA_{⑦} = 1350ft \times 8ft$

$10800 ft^2$

$LSA_{⑩} = 1200ft \times 9ft$

$10800 ft^2$

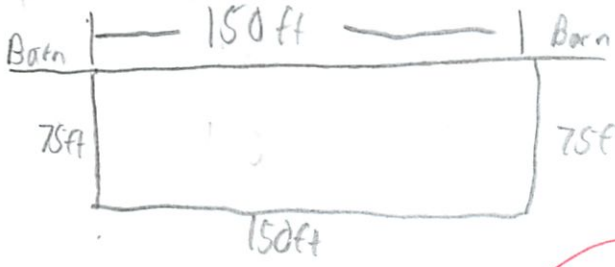
They both have the same LSA.

8. A rancher is building a rectangular corral and is using one wall of his barn as one of the sides. Because the barn wall is quite long, he needs fencing only along the other three sides. He has 300 feet of fencing.

a. The rancher wants the area of the corral to be as large as possible. What should he choose as the dimensions of the corral?

100 × 100 = 10,000
150 × 75 = 11,250
200 × 50 = 10,000
250 × 25 = 6,250

The corral should be 150 × 75 ft.



75 + 150 + 75 = 300 ft ✓

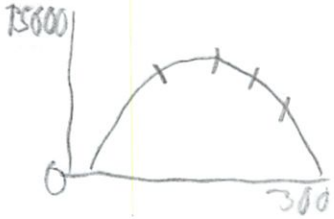
b. Use x to represent the length (in feet) of the side of the corral opposite the wall. Find a formula that expresses the area of the corral in terms of x.

$y = -.5x^2 + 150x$

I found this by entering the wall into L_1 and the area into L_2 on my calc. I then used the Quad Reg function to find this. The r^2 value was 1, so I know I found it perfectly for this data

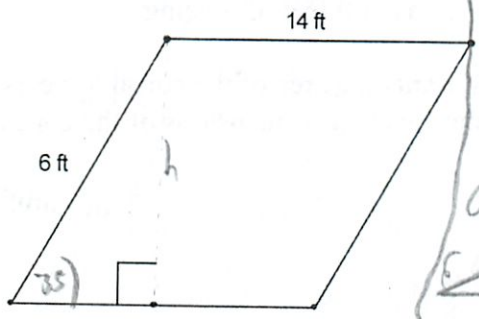
c. Use your answer to part b to justify your answer to part a, and write a summary of your reasoning.

I typed my quadratic "fit line" into Y_1. I then generated a graph and a table the graph looked like this!



Because the 2nd mark was the highest, I know that was (150, 11250) I set TBLStart to 150 and viewed the table. Both before and after 150, the numbers started to go down. Both 149 and 151 were = to 11249.5. I knew I found the "top" of my quadratic "fit line"

9. Find the area of the parallelogram below.



The answer is not $(6 \cdot 14) = 84$ because the angles are not 90°. As you change the angles, the area changes.

← This would have a smaller area

$\sin(35) = \frac{h}{6\text{ ft}}$

$.57357(6\text{ ft}) = h$

$3.441458 = h$

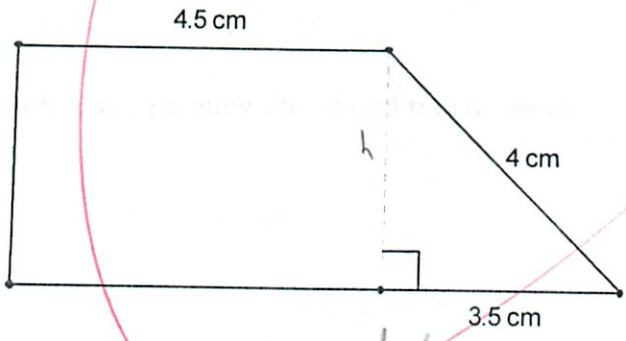
$a_{\square} = bh$

$a_{\square} = 14(3.441458)$

$a_{\square} = 48.18042065$

48.1 ft^2

10. Find the area of the trapezoid below.



$a^2 + b^2 = c^2$

$3.5^2 + h^2 = 4^2$

$12.25 + h^2 = 16$

$-12.25 \quad -12.25$

$h^2 = 3.75$

$h = 1.93649$

$a_{\square} = bh$

$a_{\square} = 4.5 \times 1.93649$

$a_{\square} = 8.7142$

$a_{\triangle} = \frac{1}{2}bh$

$a_{\triangle} = \frac{1}{2}(3.5)1.93649$

$a_{\triangle} = 3.38886$

$a_{\square} = a_{\square} + a_{\triangle}$

$a_{\square} = 8.7142 + 3.38886$

$a_{\square} = 12.103072$

12.1 cm^2

11. Simplify these square roots completely.

a. $\sqrt{289}$ → 17

b. $\sqrt{250+6}$ → $\sqrt{256}$ → 16

c. $\sqrt{\frac{144}{9}}$ → $\frac{\sqrt{144}}{\sqrt{9}}$ → $\frac{12}{3}$ → 4

d. $\sqrt{180}$ → $\sqrt{5} \cdot \sqrt{36}$ → $6\sqrt{5}$

33 pts
36

Name Michael Plasmeier
April 4th, 2006

Bee's Notebook Quiz

Directions: You will have exactly 20 mins to take this quiz. For each problem, just write the correct answer. You do not have to include the work that went along with the problem.

1. What is the formal MLA heading that was required on all of your notebook papers?

Michael Plasmeier
Behl
IAG 2H9
4 April 2006 ← Note the date is done in the Correct MLA format

2. **Nailing Down Area** worksheet - what is the answer to 1e?

4.5 units²

3. **Triangle Notes** - Complete this statement

The height of an obtuse triangle is always Outside it.
(I had is sometimes outside it, is that right?)

4. **What Do You Call the Big Grass Field on an Orbiting Satellite** worksheet - what is the answer to # 3?

10.92m

5. **After Day 21 Shadow** - What is the answer to # 1?

671.28 ft

6. **Quiz on Square Roots and Inverse Trig** - What is the answer to # 6?

$\frac{7}{4}$

7. **Square Root packet, page 17** - what is the answer to the 2nd to last question?
(The problem is in the 2 column, 5th row, 2nd from the last)

$-2\sqrt{3}$

8. **Rectangular Prisms** worksheet - what is the answer to # 12?

Height = 13.5 units

Surface Area = 858.1756 units²

9. **Finding BC** - What is the angle measurement of Angle A?

15°

10. **Review Packet for Bee's unit test** - what is the answer for #5?

220 ft^3

11. **What's the answer Wroth** worksheet - what is the answer for 1b?

8.343289877 cm^2

12. **Pentagon and Hexagon's Max Area** problems - what is the Hexagon's height measurement?

-3

41.29 ft

Math Will Rock Your World

Extra Credit Directions:

- Read through the text the first time. Then read the text a second time.
- As you read, underline interesting phrases and ideas.
- In the margins of the text, write personal comments on those phrases and ideas. For example, "What does the author mean here?" "Interesting thought!" "I feel this way, too."
- Also, write analytical thoughts and ideas. For example, "Does this really prove the thesis idea?" "What is the author saying between the lines?" "Why does the author use this particular example?" "This reminds me of…"
- These thoughts do not have to be complete sentences. You can just jot down words and phrases.
- After you have read the article and understand what the message is behind it, you should begin to think about your paper.

The Reaction Paper

Your paper should contain the following sections. Please address the questions in an essay format, not just answering questions.

a. Summary: You are to *summarize* the article. *Do not merely repeat the text.* Should you feel the need to selectively use quotations from the material, put them in quotes and follow the end of the sentence with a parenthetical citation *(for example:,* Baker pg.5). **Failure to cite your material constitutes *plagiarism* and you will NOT receive ANY credit.**

b. Reaction: You are to give your personal reaction to this material. Your reactions could include any or all of these points:

* Do you agree or disagree with the author's message? Explain
* Why do you think this work was a good/bad choice for you to read?
* What did you find surprising about the reading? What angered or delighted you? Explain.

e. Application: You need to answer the following questions.

* ***How*** does this material relate to your own life experience? Explain.
* How do you use Math outside of Haverford High School? Explain
* Did you learn of new ways math can be used outside of the classroom? Explain

Rubric

- There is no length requirement, just make sure that you answer all of the above questions.
- ALL English rules apply to this paper. (Check spelling and punctuation)
- The paper must be typed.
- Remember to cite any quotes that were used from this article or others.
- 10 extra credit points are possible on this assignment, but the allotment of those points will be determined by an English teacher and Miss Behl.

BusinessWeek online

Close Window

JANUARY 23, 2006

COVER STORY

Math Will Rock Your World

A generation ago, quants turned finance upside down. Now they're mapping out ad campaigns and building new businesses from mountains of personal data

COVER STORY PODCAST

Neal Goldman is a math entrepreneur. He works on Wall Street, where numbers rule. But he's focusing his analytic tools on a different realm altogether: the world of words.

Goldman's startup, Inform Technologies LLC, is a robotic librarian. Every day it combs through thousands of press articles and blog posts in English. It reads them and groups them with related pieces. Inform doesn't do this work alphabetically or by keywords. It uses algorithms to analyze each article by its language and context. It then sends customized news feeds to its users, who also exist in Inform's system as -- you guessed it -- math.

How do you convert written words into math? Goldman says it takes a combination of algebra and geometry. Imagine an object floating in space that has an edge for every known scrap of information. It's called a polytope and it has near-infinite dimensions, almost impossible to conjure up in our earthbound minds. It contains every topic written about in the press. And every article that Inform processes becomes a single line within it. Each line has a series of relationships. A single article on Bordeaux wine, for example, turns up in the polytope near France, agriculture, wine, even alcoholism. In each case, Inform's algorithm calculates the relevance of one article to the next by measuring the angle between the two lines.

By the time you're reading these words, this very article will exist as a line in Goldman's polytope. And that raises a fundamental question: If long articles full of twists and turns can be reduced to a mathematical essence, what's next? Our businesses -- and, yes, ourselves.

The world is moving into a new age of numbers. Partnerships between mathematicians and computer scientists are bulling into whole new domains of business and imposing the efficiencies of math. This has happened before. In past decades, the marriage of higher math and computer modeling transformed science and engineering. Quants turned finance upside down a generation ago. And data miners plucked useful nuggets from vast consumer and business databases. But just look at where the mathematicians are now. They're helping to map out advertising campaigns, they're changing the nature of research in newsrooms and in biology labs, and they're enabling marketers to forge new one-on-one relationships with customers. As this occurs, more of the economy falls into the realm of numbers. Says James R. Schatz, chief of the mathematics research group at the National Security Agency: "There has never been a better time to be a mathematician."

From fledglings like Inform to tech powerhouses such as IBM (IBM), companies are hitching mathematics to business in ways that would have seemed fanciful even a few years ago. In the past decade, a sizable chunk of humanity has moved its work, play, chat, and shopping online. We feed networks gobs of digital data that once would have languished on scraps of paper -- or vanished as forgotten conversations. These slices of our lives now sit in databases, many of them in the public domain. From a business point of view, they're just begging to be analyzed. But even with the most powerful computers and abundant, cheap storage, companies can't sort out their swelling oceans of data, much less build businesses on them, without enlisting skilled mathematicians and

computer scientists.

The rise of mathematics is heating up the job market for luminary quants, especially at the Internet powerhouses where new math grads land with six-figure salaries and rich stock deals. Tom Leighton, an entrepreneur and applied math professor at Massachusetts Institute of Technology, says: "All of my students have standing offers at Yahoo! (**YHOO**) and Google (**GOOG**)." Top mathematicians are becoming a new global elite. It's a force of barely 5,000, by some guesstimates, but every bit as powerful as the armies of Harvard University MBAs who shook up corner suites a generation ago.

Math entrepreneurs, meanwhile, are raking in bonanzas. Fifteen months ago, Neal Goldman of Inform sold his previous math-based startup, a financial analysis company called CapitalIQ, for $225 million to Standard & Poor's (**MHP**) (like *BusinessWeek*, a division of The McGraw-Hill Companies). And last May two brothers, Amit and Balraj Singh, sold Perabit Networks -- a company that developed algorithms for genetic research -- to Juniper Networks (**JNPR**) for $337 million.

In a world teeming with data, we ourselves become the math nerds' most prized specimens. Researchers at Aetna Health Care, Amazon.com (**AMZN**), and many other companies are piecing together mathematical models of customers and employees. Some models predict what music we'll buy, others figure out which worker is best equipped for a particular job. For now, these models are crude, the digital equivalent of stick figures. But over the coming decade, each of us will give birth to far more fleshed out simulations of ourselves. We'll be modeled as workers, shoppers, voters, and patients. Some of the simulations will have our names and credit cards attached, perhaps a few genetic details. In others, our identities will be shielded. Many of these models will be eerily accurate and others laughably off mark. But companies and governments will use them all the same to predict how to sell us things, steer us clear of diseases, and ramp up our productivity. And yes, they'll try to use them to keep us from hijacking airplanes or detonating bombs.

This mathematical modeling of humanity promises to be one of the great undertakings of the 21st century. It will grow in scope to include much of the physical world as mathematicians get their hands on new flows of data, from atmospheric sensors to the feeds from millions of security cameras. It's a parallel world that's taking shape, a laboratory for innovation and discovery composed of numbers, vectors, and algorithms. "We turn the world of content into math, and we turn you into math," says Howard Kaushansky, CEO of Boulder (Colo.)-based Umbria Inc., a company that uses math to analyze marketing trends online.

The Dark Side

This industrial metamorphosis also has a dark side. The power of mathematicians to make sense of personal data and to model the behavior of individuals will inevitably continue to erode privacy. Merchants will be in a position to track many of our most intimate purchases, and employers will be able to rank us not only by productivity, but by wasted minutes. What's more, the rise of math can contribute to a sense that individuals are powerless, a foreboding that mathematics, from our credit rating to our genomic map, spells out our destiny.

Debates over these issues have flared up many times in the past decade. And they are sure to rear up again as the U.S. Congress investigates the Bush Administration's mining of phone and Internet traffic in its effort to sniff out terrorists. But the merger of sophisticated data mining and higher math has tremendous power to conquer mankind's scourges as well. As Jack Einhorn, chief technical officer of Inform, puts it: "The next Jonas Salk will be a mathematician, not a doctor."

The clearest example of math's disruptive power is in advertising. There Google and other search companies built on math are turning an industry that grew on ideas, hunches, and personal relationships into a series of calculations. They can pull it off because, quite simply, they know where their prospective customers are browsing, what they click on, and often, what they buy. Internet companies use this data not only to profile customers but also to pitch for more contracts. Some 18 months ago, 30 blue-chip companies, from Procter & Gamble Co. (**PG**) to Walt Disney Co. (**DIS**), underwent a series of tests promoted by the Interactive Advertising Bureau, an industry group. These studies crunched consumer data to measure the effectiveness of advertising in a host of media. The results came back in hard numbers. They indicated, for example, that Ford Motor Co. (**F**) could have sold an additional $625 million worth of trucks if it had lifted its online ad budget from 2.5% to 6% of the total. Ford responded vigorously: Last August it announced plans to move up to 30% of its $1 billion ad budget into media targeted to individual customers, half of it through online advertising. Such moves are sure to generate even more

data, giving greater clout to the numbers people.

Just ask Imran Khan, the director of search advertising at E-Loan, an online lender. An accountant by training, Khan has turned the advertising operation into an enormous statistical laboratory. Like most others in the industry, he started three years ago by bidding on keywords on the major search engines. Over time, Khan's team has amassed a portfolio of 250,000 key words and phrases. Each time a Web surfer types one of those words in a search engine, an E-Loan ad appears next to the results, and Khan's team pays the price bid for each click. But running search-based ads is hardly a static process. Working with Efficient Frontier Inc., an analytics startup in Silicon Valley, Khan crunches his stash of words, calculating the return on investment for each one and tweaking thousands of bids hour by hour. He spends $15 million a year -- half of E-Loan's ad budget -- and he accumulates massive feedback from customers.

As data mavens gather more information about customers, they gain muscle to demand changes inside companies. Take media. With banks of consumer data continuing to swell, quants on the marketing side will be able to provide editors and program managers with increasingly sophisticated statistical models, telling them which types of TV scenes or articles appeal most to certain demographic groups. As publishers seek to optimize profits and performance, data analysis will grow in importance. The risk: It gives math-based analysts, not to mention advertisers, a growing role in editorial decisions. "It puts a question mark around the classic church-state divide in the media," says Rex Briggs, founder of Marketing Evolution, the San Francisco company that conducted the 30 advertising studies.

Rising flows of data give companies the intelligence to home in on the individual customer. Internet marketers are the natural leaders, but traditional businesses are following suit. Gary W. Loveman, CEO of casino giant Harrah's Entertainment Inc. (**HET**) and a former Harvard B-school professor, has led the company to build individual profiles of millions of Harrah's customers. The models include gamblers' ages, gender, and Zip codes, as well as the amount of time they spent gambling and how much they won or lost. These data enable Harrah's to study gambling through a host of variables and to target individuals with offers, from getaway weekends to gourmet dining, calculated to maximize returns. In the last five years, Harrah's has averaged 22% annual growth, and its stock has nearly tripled.

Pi in the Sky

Math is also positioned to shake up investigations. Whether in law, journalism, or criminal detective work, sleuths have relied for centuries on the human brain to pick through strands of disparate evidence and to find patterns. Sherlock Holmes sometimes looked for them in plumes of pipe smoke. And why not? Even today, no machine could sift through the photos, names, words, geographical coordinates, snippets of video -- that towering mountain of information that computer scientists call "unstructured data."

But some companies are making inroads. Colorado's Umbria has built a system to sift through millions of blogs in real time, looking for market intelligence. Umbria breaks down English messages into the smallest components -- words, phrases, grammar, even emotions -- and turns them into math. Then it analyzes the content, looking for trends. It can give cell-phone companies or fast-food restaurants the latest buzz on an ad campaign or a new sandwich.

Sometimes it uncovers trends researchers weren't even looking for. A recent search for Gatorade (**PEP**), for example, showed that large numbers of young men look to it as a cocktail mixer in hopes that the electrolytes in the sports drink will ease hangovers. In the future, similar insights could uncover countless other patterns. They could help bankers spot entrepreneurs careening toward bankruptcy or point police toward sociopaths planning terrorist acts.

At the Sunnyvale (Calif.) campus of Yahoo, chief researcher Prabhakar Raghavan heads a team of 100 mathematicians and computer scientists. Scribbling on a white board covered with equations, Raghavan describes Yahoo's immense pool of data, featuring the online activity of 200 million registered customers, as Yahoo's most precious resource. There is a whole world of uninvented businesses, he believes. They'll come into being as Yahoo discovers new ways to satisfy the urges, curiosities, and desires of this customer base. The hints of these future businesses float in the oceans of Yahoo's data. Raghavan's mandate is to sift through that data and form new connections among consumers, e-marketers, and advertisers. Better algorithms, he says, "are critical to survival."

As companies continue to receive ever more data about their own processes and their workers, many will use math to boost productivity and shake up the workplace. This doesn't have to be limited to one company. Vast globe-spanning projects can be modeled, then cut into tiny pieces, with each task going to the best-qualified person. Pierre Haren, CEO of Paris-based ILOG, a company that turns customers' raw data into visual displays, foresees virtual assembly lines. "We'll have systems that tap our knowledge by the minute," he says. "Productivity could rise by a factor of 10."

That may sound like more digital pi in the sky. It's actually an extension of mathematical modeling that's been going on for half a century at companies like IBM. Following World War II, researchers at Big Blue constructed a mathematical model of the company's supply chain. It featured raw materials, trucking schedules, and manufacturing plants. Once the company had a working model, it put it through a mathematical analysis called optimization. The results suggested specific improvements, and the rejiggering sped up IBM's operations and cut costs. Decades later, IBM turned optimization into a leg of its services business. Today, IBM consultants are implementing math-based blueprints to upgrade steel mills in China and revamp operations at the U.S. Postal Service.

If you look back at those old supply-chain programs, there's one important element nearly absent: the human being. People were represented by numbers and were largely interchangeable. The mathematicians' systems lacked the data to provide more detail. And even if they had amassed a huge pile of it, the primitive computers of the time would have choked on it.

Now, though, at an IBM research center a half-hour's drive north of New York City, a 40-member team of researchers is scrutinizing people. The team combines data miners, statisticians, and experts in operations research. The current project is to refocus the supply-chain programs on 50,000 of the consultants in IBM's services division. That means that instead of modeling machines, furnaces, and schedules, they're building models of their colleagues.

A leader in this effort is Syrian-born Samer Takriti, who came from the math shop at Enron Corp. Years before the accounting mess brought the company down, Enron pioneered advanced math to create new financial markets. IBM hired Takriti for a second stint in 2000, a year before Enron's collapse. Big Blue named him senior manager of stochastic analysis. That's the science of incorporating random behavior, including the meanderings of humans, into math models.

The first step in modeling IBM's workforce, says Takriti, is to harvest all sorts of data from company records. To date, these professionals are divided into 200 categories. But the math team is hunting for richer personal details. A survey of company e-mail, Takriti says, could highlight communication links between employees and the informal social networks that they create. Workers who e-mail each other a lot are more likely to work well together. Calendar data could show which consultants have more free time. Eventually, by tracking mobile devices, the system will know exactly where the consultants are. And when a contract comes through for, say, a new call center in Manila, IBM's optimization program will cull through its global database and put together the perfect team.

Calculus Ahead

The program will take years to implement. "People are complicated," says Takriti. "If you have a system, they figure out how to game it. Machines never do." This means the researchers will have to factor in a certain amount of human behavior, from lowballing sales targets to "accidentally" deleting a rival's snazzy report. This threatens to make the models fuzzier. Still, if IBM's operation yields fruit, you can bet that Big Blue will be offering similar workforce modeling services to its customers.

Eventually IBM-like programs will reach us. And it doesn't take much imagination to see where that can lead. Managers will operate tools not only to monitor employees' performance but also to follow their movements and drive up productivity. Perhaps, like Internet marketers, they'll even have the tools to link these initiatives to revenue or return on investment. On the other side, consumers will be armed with ever more data, from predictive models of real estate markets to patient mortality charts for comparing different oncologists.

It adds up to an era chock-full of numbers. Outfitting students with the right quantitative skills is a crucial test facing school boards and education ministries worldwide. This is especially true in America. The U.S. has long leaned on foreigners to provide math talent in universities and corporate research labs. Even in the post-September 11 world,

where it is harder for foreigners to get student visas, an estimated half of the 20,000 math grad students now in the U.S. are foreign-born. A similar pattern holds for many other math-based professions, from computer science to engineering.

The challenge facing the U.S. now is twofold. On one hand, the country must breed more top-notch mathematicians at home, especially as foreigners find greater opportunities abroad. This will require revamping education, engaging more girls and ethnic minorities in math, and boosting the number of students who make it through calculus, the gateway for math-based disciplines. "It's critical to the future of our technological society," says Michael Sipser, head of the mathematics department at Massachusetts Institute of Technology. At the same time, school districts must cultivate greater math savvy among the broader population to prepare it for a business world in which numbers will pop up continuously. This may well involve extending the math curriculum to include more applied subjects such as statistics.

Private Lives

One significant challenge to the math revolution is to build new businesses from data without sacrificing privacy. If customers, patients, and workers have reason to fear that the intimate details of their lives are floating around in databases, they'll likely work to lock up their information or move it off network. This could disrupt efforts to use math and data mining to fight disease and to battle terrorism. The goal now is to create systems that share group information while shielding the individual. This way, researchers working with a database of HIV or breast cancer patients, for example, could study them by age, race, income, medication, education, and neighborhood without zeroing in on one person.

Mathematicians are at the heart of the privacy battle -- on both sides. In Microsoft Corp.'s (**MSFT**) laboratories near San Francisco, Cynthia Dwork, a cryptographer, is working on a system to shield individuals while making use of the data. Dwork and her team are encasing each person's records in a camouflage of numbers that she calls "noise." Think of looking at a picture of a crowd. As soon as you zoom in on an individual face, it becomes pixelated. It's a promising approach, but even Dwork admits that mathematically gifted hackers can continue to pry open doors that she and her team slam shut. "As cryptographers, we know the power of the adversary," she says.

Math's other problem? Sometimes it's just not as smart as advertised. As mathematicians expand their domain into the humanities, they're working with new data, much of it untested. "It's very possible for people to misplace faith in numbers," says Craig Silverstein, director of technology at Google. The antidote at Google and elsewhere is to put mathematicians on teams with specialists from other disciplines, including the social sciences.

Just as mathematicians need to grapple with human quirks and mysteries, managers and entrepreneurs must bone up on mathematics. Midcareer managers can delegate much of this work to their staffers. But they still must understand enough about math to question the assumptions behind the numbers. "Now it's easier for people to bamboozle someone by having analysis based on lots of data and graphs," says Paul C. Pfleiderer, a finance professor at the Stanford Graduate School of Business. "We have to train people in business to spot a bogus argument."

And to spot opportunities. As more of the world's information is pooled into mathematics, the realm of numbers becomes an ever larger meeting ground. It's a percolating laboratory full of surprising connections, and a birthplace for new industries. Yes, it's a magnificent time to know math.

Corrections and Clarifications

In "Math will rock your world" (Cover Story, Jan. 23), the name of the company acquired by Juniper Networks in 2005 was spelled incorrectly. The name is Peribit Networks Inc.

By Stephen Baker, with Bremen Leak in New York

How Math Transforms Industries

Mathematicians have long enjoyed celebrity status in Silicon Valley and on Wall Street. Now they're plying their trade throughout the U.S. economy:

»Consulting

IBM: Big Blue is building math profiles of 50,000 consultants so that computers can pick the perfect team for every assignment. Other tools eventually will be able to track their progress, hour by hour, and rate their performance. Workers will eventually labor in virtual assembly lines.

»Food and Beverage

ENOLOGIX: The goal of this California consultancy is to help vintners mimic the chemistry of wines ranked highly by leading critic Robert B. Parker. It employs algorithms to cull a database of 70,000 vintages and run the analyses. Precise studies of customer data provide blueprints for new products.

»Advertising

EFFICIENT FRONTIER: The Silicon Valley startup provides mathematical optimization for online ad campaigns. It calculates response rates and return on investment for every advertisement. Broad shift from hunch-based campaigns to mathematical targeting.

»Police and Intelligence

NATIONAL SECURITY AGENCY: Mathematicians at nation's top techno-spy agency build algorithms to trawl Internet and phone traffic looking for patterns in speech, subject, and frequency that might point to the next attack. Investigators wade through rivers of data in search of would-be terrorists.

»Marketing

UMBRIA: Colorado startup assigns numeric values to picks and pans of products that pop up on blogs. Using vector graphics, it confirmed that raunchy Burger King ads online turned off nearly everyone, except for the target audience of young men. Math-based consultancies scour blogs and podcasts for market intelligence.

»Media

INFORM: This New York startup turns written articles into bits of geometry and organizes them in a virtual library. It can match the articles to readers' math-based profiles. Automatic systems threaten to supplant editors.

ILLUSTRATION BY GARY TAXALI

COVER STORY

How Much Math Do We Need to Know?

Recommendations vary, depending on your profession, your goals, and your stage in life. Some pointers:

»Calculus

This remains the gateway discipline for all of engineering and science, plus finance. B-school grads with strong calculus find far more opportunities.

Career Tip: To sidestep calculus is to slam shut doors to growing realms in the 21st-century job market, including many of the most lucrative.

»Statistics and Probability

Standard in social sciences, they will become core skills for businesspeople and consumers as we grapple with challenges involving large data sets. Winners will know how to use statistics—and how to spot when others are dissembling.

Career Tip: They'll come in handy whether you're building financial models at Goldman Sachs or marketing plans at Ford. (Parents take note: Children who really understand probability won't squander savings on state lotteries.)

»Algebra and Geometry

Key stepping stones to calculus. Mathematicians say that algebra is central to problem solving and that geometry's proofs and theorems prepare for the rigors ahead.

Career Tip: You may associate geometry with floor tiling, but it is one of the hottest fields in math today. Advanced geometry is key to designing search engines, including Google's. But the geometry used at this level comes after calculus.

»Math Tools

Though disdained by many mathematicians, Microsoft Excel is a vital tool for generalists. Those who master it and some add-ins, whether in advertising or law, can produce statistical analysis and reports that their unschooled colleagues can't touch.

Career Tip: Many workers coming out of college and grad school already master Excel. It's midcareer workers who really need the training.

The NSA: Security In numbers

THE JOB OFFERS ARRIVED in plain envelopes. For decades, the mathematicians who accepted them stole off to Washington and the hush-hush National Security Agency, the nation's top techno-spy agency. Through the Cold War, NSA math whizzes matched wits with the Soviets: Each side protected its own secret codes while trying to break the other's.

Math is more important than ever at the NSA. Chances are, the world's growing rivers of data contain terrorist secrets, and it's up to the agency's math teams to find them. But to land the best brains, the NSA must compete with free-spending Web giants such as Google and Yahoo! This is leading the agency to open up its recruiting process. "We have to look at new and innovative ways to find talent," says Cynthia Miller-Wentt, chief of the NSA's recruitment office. The agency is even sponsoring math contests....

BusinessWeek online For the rest of the story on math at the NSA, go to www.businessweek.com/extras

Michael Plasmeier
Bohl
IAG 2H9
4 April 2006

Mid Term Topics

4/4

(formula sheet provided)

- Solving equations (1 and 2 variables)
- factoring
- multiplying expressions
- substution/evaluation
- Slope & intercept
- area
- pythagorean theorem
- trig/inverse trig
- LSA + TSA
- Given situation -
  - write equation
  - solve it
  - graph info
- volume

Mid-Term Review

Name _____
IAG 1 - A
Miss Behl
Feb. 16th, 2006

Solve-It Unit Quiz

Directions: Solve each of these equations for x. Be sure to show all of your work!

Check

1. $5x + 12 = 28 - 3x$

$-12 \quad -12$

$5x = 16 - 3x$

$+3x \quad +3x$

$\frac{8x}{8} = \frac{16}{8}$

$x = 2$ ✓

2. $4x + 9 = 2x + 13$

$-2x \quad -2x$

$2x + 9 = 13$

$-9 \quad -9$

$\frac{2x}{2} = \frac{4}{2}$

$x = 2$ ✓

3. $15 - (x + 5) = 40$

$15 - x - 5 = 40$

$10 - x = 40$

$-10 \quad -10$

$-x = 30$

$x = -30$ ✓

4. $-6(x - 2) = -28$

$-6x + 12 = -28$

$-12 \quad -12$

$\frac{-6x}{-6} = \frac{-40}{-6}$

$x = 6\frac{2}{3}$ ✓

Directions: Multiply these binomials to find an equivalent expression. Be sure to show all of your work! You may use any method.

5. $(x + 5)(x - 7)$

	x	5
x	x^2	$5x$
-7	$-7x$	-35

$x^2 - 2x - 35$

6. $(5x - 2)(2x + 7)$

$(5x \cdot 2x) + (5x \cdot 7) + (-2 \cdot 2x) + (-2 \cdot 7)$

$10x^2 + 35x - 4x - 14$

$10x^2 + 31x - 14$

7. $(x - 9)(x + 9)$

$(x \cdot x) + (x \cdot 9) + (-9 \cdot x) + (-9 \cdot 9)$

$x^2 + 9x - 9x - 81$

$x^2 - 81$

Directions: Factor out the largest common term from these expressions.

8. $11x^2 + 7xy$

$11x \cdot x + 7x \cdot y \rightarrow 11 + 11 + 7y$

$x(11x + 7y)$

9. $24vg - 32vu + 64vq$

$4g - 8v + 16q$

$8v(3g - 4u + 8q)$

10. $25vb + 30vs$

$5b + 6s$

$5v(5b + 6s)$

Directions: Use the distributive property to find an equivalent expression for each of these terms. Simplify them to the lowest possible answer.

11. $-4x(x - 6)$

$-4x^2 + 24x$

Simplify

12. $2x + 5(x + 3) - 7x$

$2x + 5x + 15 - 7x$

15

13. $-6 + 4x - (-x + 3)$

$-6 + 4x + x - 3$

$-9 + 5x$

Directions: Substitute the value for x into these expresses and evaluate them.

14. $x = -3$

$x^2 + 3x - 9 + (5 - x)$

$(-3)^2 + 3(-3) - 9 + (5 - (-3))$

$9 - 9 - 9 + 15$ $5 - (-3) = 2$ Sub, Not x

$-9 + 15$ 2

6 -7

15. $x = 4$

$x(x^2 - 10) + (4 + x^2) - 20$

$4(4^2 - 10) + (4 + 4^2) - 20$

$4(16 - 10) + (4 + 16) - 20$

$4(6) + 20 - 20$

24

Mid-Term Review

Name _____
IAG 1 – A
BEHL
Feb. 14th, 2006

Box, Vertical, and FOIL Review

Directions: Use the box method to multiply these expressions. Simplify your answers.

1. $(x + 3)(x - 2)$

	x	-2
x	x^2	$-2x$
3	$3x$	-6

$x^2 + x - 6$

2. $(3x - 8)(x + 1)$

	x	1
$3x$	$3x^2$	$3x$
-8	$-8x$	-8

$3x^2 - 5x - 8$

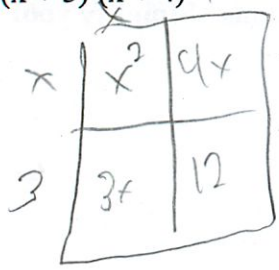
3. $(x + 4)(x + 5)$

	x	$+4$
x	x^2	$4x$
$+5$	$5x$	20

$x^2 + 9x + 20$

Directions: Use the vertical method to multiply these expressions. Simplify your answers.

4. $(x + 3)(x + 4)$



$x^2 + 7x + 12$

5. $(2x - 1)(x + 7)$

$(2x \times x) + (2x + 7) + (-1 \times x)(-1 \times 7)$

$2x^2 + 14x + -1x - 7$

$2x^2 + 13x - 7$

6. $(x + 9)(x + 1)$

$(x \times x) + (x \times 1) + (9 \times x) + (9 \times 1)$

$x^2 + 1x + 9x + 9$

$x^2 + 10x + 9$

Directions: Use Mr. FOIL to multiply these expressions. Simplify your answers.

7. $(x - 1)(x - 5)$

$(x \cdot x) + (x \cdot -5) + (1 \cdot x) + (-1 \cdot -5)$

$x^2 - 5x - 1x + 5$

$x^2 - 6x + 5$

8. $(2x + 3)(x + 2)$

$(2x \cdot x) + (2 \cdot 2) + (3 \cdot x) + (3 \cdot 2)$

$2x^2 + 4x + 3x + 6$

$2x^2 + 7x + 6$

9. $(x - 7)(x + 9)$

$(x \cdot x) + (x \cdot 9) + (-7 \cdot x) + (-7 \cdot +9)$

$x^2 + 9x - 7x - 63$

$x^2 + 2x - 63$

Mid-Term Review

Name _____
IAG 1 – A
Behl
Feb. 6th, 2006

Multiplying Algebraic Expressions Review

Directions: Multiply these expressions by using the box method

1. (x + 9) (x – 6)

$(x \cdot x) + (x \cdot -6) + (9 \cdot x) + (9 \cdot -6)$

$x^2 - 6x + 9x - 54$

$x^2 + 3x - 54$

2. (x – 5) (x – 2)

$(x \cdot x) + (x \cdot -2) + (-5 \cdot x) + (-5 \cdot -2)$

$x^2 - 2x - 5x - 20$

$x^2 - 7x - 20$

3. (2x + 7) (x – 3)

$(2x \cdot x) + (2x \cdot -3) + (7 \cdot x) + (7 \cdot -3)$

$2x^2 - 6x + 7x - 21$

$2x^2 + x - 21$

Directions: Multiply these expressions by ~~using the vertical method~~

4. $(x + 2)(x + 8)$

$(x \cdot x) + (x \cdot 8) + (2 \cdot x) + (2(8))$

$x^2 + 8x + 2x + 16$

$x^2 + 10x + 16$

5. $(x - 7)(x + 11)$

$(x \cdot x) + (x \cdot 11) + (-7 \cdot x) + (-7 \cdot 11)$

$x^2 + 11x - 7x - 77$

$x^2 + 4x - 77$

6. $(2x + 1)(x + 4)$

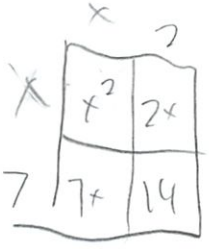
$(2 \cdot x \cdot x) + (2x \cdot 4) + (1 \cdot x) + (1 \cdot 4)$

$2x^2 + 8x + x + 4$

$2x^2 + 9x + 4$

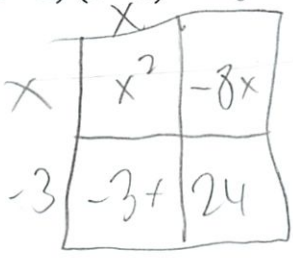
Directions: Multiuply these expressions by using Mr. FOIL.

7. $(x + 2)(x + 7)$



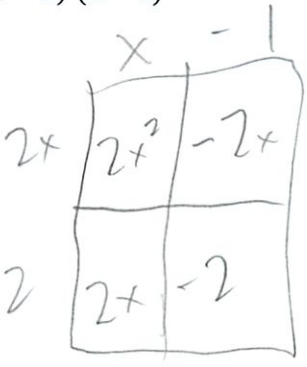
$x^2 + 9x + 14$

8. $(x - 3)(x - 8)$ -8



$x^2 - 11x + 24$

9. $(2x + 2)(x - 1)$



$2x^2 - 2$

Mid-Term Review

Name _____
Period _____
Date _____

Box Method and Distribute Review

Directions: Find an equivalent expression without parentheses for each of the following expressions, using the box method.

1. (x + 9) (x + 4) =

	x	4
x	x^2	4x
9	9x	36

$x^2 + 13x + 36$

2. (x - 7) (x - 3) =

	x	-7
x	x^2	-7x
-3	-3x	21

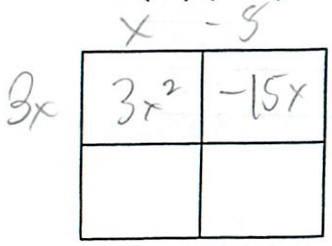
$x^2 - 10x + 21$

3. (x) (x + 8) =

	x	8
x	x^2	8x

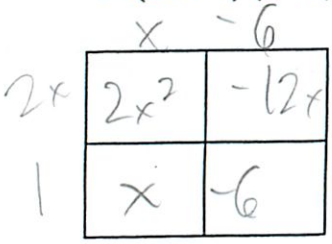
$x^2 + 8x$

4. (3x) (x - 5) =



$3x^2 - 15x$

5. (2x + 1) (x - 6) =



$2x^2 - 13x - 6$

Directions: Use the distributive property to find an equivalent expression for each problem below.

6. 7(x + 6) = $7x + 42$

7. 5(x - 8) = $5x - 40$

8. 2x (x + 4) = $2x^2 + 8x$

9. 3x (3x -5) = $9x^2 - 15x$

10. 4(5x - 7) = $20x - 28$

Directions: For each of the following problems, take out a common factor.

11. $21x + 35 =$ $7(3x+5)$

12. $re + rd =$ $r(e+d)$

13. $2x + 3x =$ $x(2+3)$

14. $18 + 54x =$ $9(2+6x)$

15. $8xy + 10xz =$ $2x(4y+5z)$

Mid Term Review

Name _____
Period _____
Date _____

Slope and Writing an Equation Review

1. In the standard linear equation $y = mx + b$

   a. What does the m represent?

   Slope

   b. What does the b represent?

   y intercept value

2. Given the equation $y = 3x + 4$

   a. What is the slope of this line?

   3 Don't say "x"

   b. What is the y-intercept? +4 (0,4) Point

3. Given the equation $y = x - 3$

   a. What is the slope of this line?

   1

   b. What is the y-intercept? point

   -3 (0,-3)

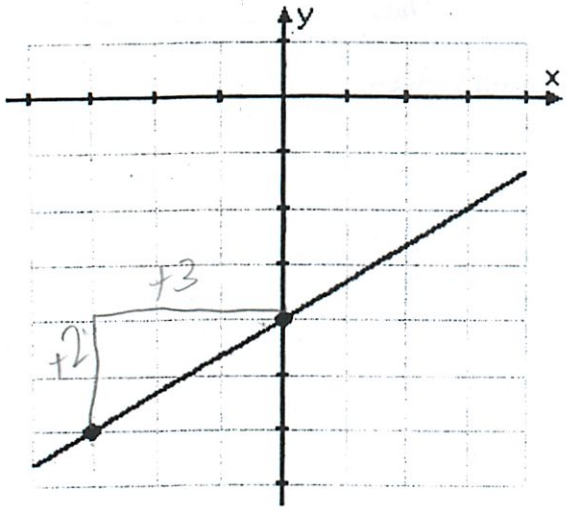
4. Write an equation for the line with the slope of 7 and y-intercept (0, 2)

   $y = 7x + 2$

5. Write an equation for the line with the slope of 0 and y-intercept (0, -3)

   $y = -3$

6. Find the slope of this line. You may use any method you want. Be sure to show all of your work!

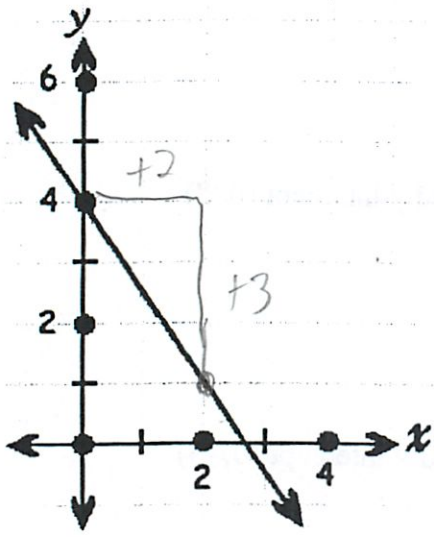


$\frac{\Delta y}{\Delta x}$ $\frac{2}{3}$

$y = mx + b$

$y = \frac{2}{3}x - 4$

7. Find the slope of this line. You can use whichever method you want. Be sure to show all of your work!



$y = mx + b$ $\frac{\Delta y}{\Delta x}$

$y = \frac{3}{2}x + 4$

Name _____
IAG 1 – A
Behl
March 1, 2006

Mid Term Review

Solving 2-variable equation worksheet

Directions: Solve each of these equations for y in terms of x. Be sure to show all of your work. Remember that whatever you do to one side of the equal side you have to do to the other side; you can only add numbers with numbers and variables with variables; and to get rid of a positive you will subtract and to get rid of a negative you will add.

1. $3y = 21x + 15$

$\frac{3y}{3} = \frac{21x}{3} + \frac{15}{3}$

$y = 7x + 5$

15/3

2. $4x + 7 = 2y$

$\frac{4x}{2} + \frac{7}{2} = \frac{2y}{2}$

$2x + 3.5 = y$

3. $6x - 3y = 12$

$-6x \quad -6x$

$\frac{-3y}{-3} = \frac{12 - 6x}{-3}$ transfer

$y = -4 + 2x$

4. $2x + 5 + x = y$

$3x + 5 = y$

Just Simp

5. $3 + 4x + 6 - x = 3y$

$\frac{9}{3} + \frac{3x}{3} = \frac{3y}{3}$

$3 + x = y$

6. $10x + 5y - 25 = 0$

$-5y \quad -5y$

$\frac{10x - 25}{-5} = \frac{-5y}{-5}$

$-2x + 5 = y$

Michael Plasmeier
Bohl
IA6 7HQ
18 April 2006

How many of each kind?

P302 (Central unit problem) 4/18

Cookies

Variables

P = # of dozens of plain cookies
I = # of dozens of iced cookies

Conditions

- Ingredients
  - Dough = 110 lbs
  - Icing = 32 lbs.
- Oven Space (Total # of Cookies)
  = 140 dozens of cookies total
- Prep Time
  = 15 hrs.

Constraints

≤ less than or = to (inequality)

Dough = $1P + .7I \leq 110$ lbs.
Icing = $0P + .4I \leq 32$ lbs.
Oven Space = $P + I \leq 140$
Prep time = $.1P + .15I \leq 15$ hrs

Profit

Plain Cookie = $6 - 4.50 = $1.50
Iced Cookie = $7.5 = $12

* Profit = $1.5P + 2I$ = Profit

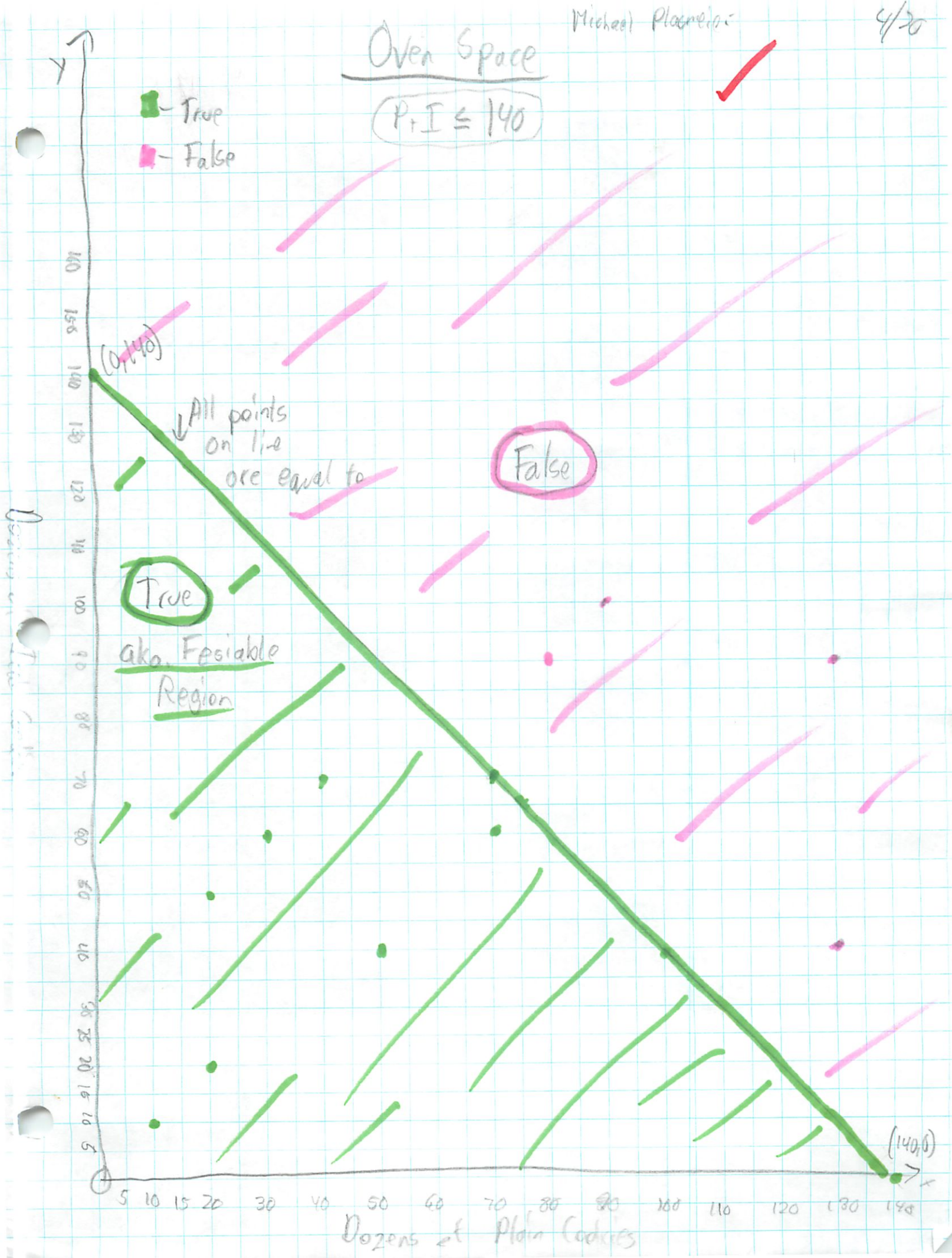
Reality Constraints

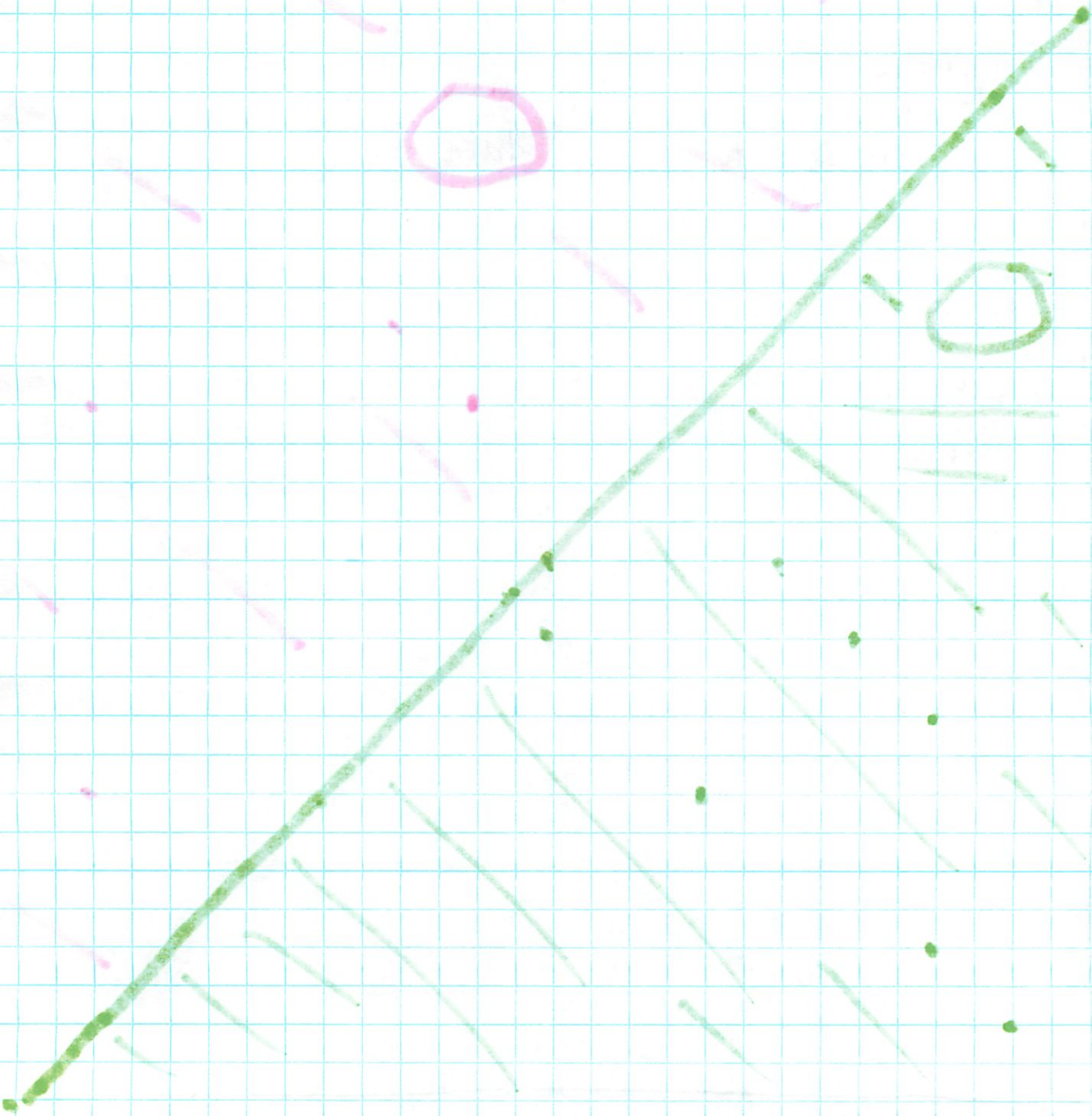
$P \geq 0$
$I \geq 0$

Michael Plagmeier 4/20

Oven Space

$P + I \leq 140$



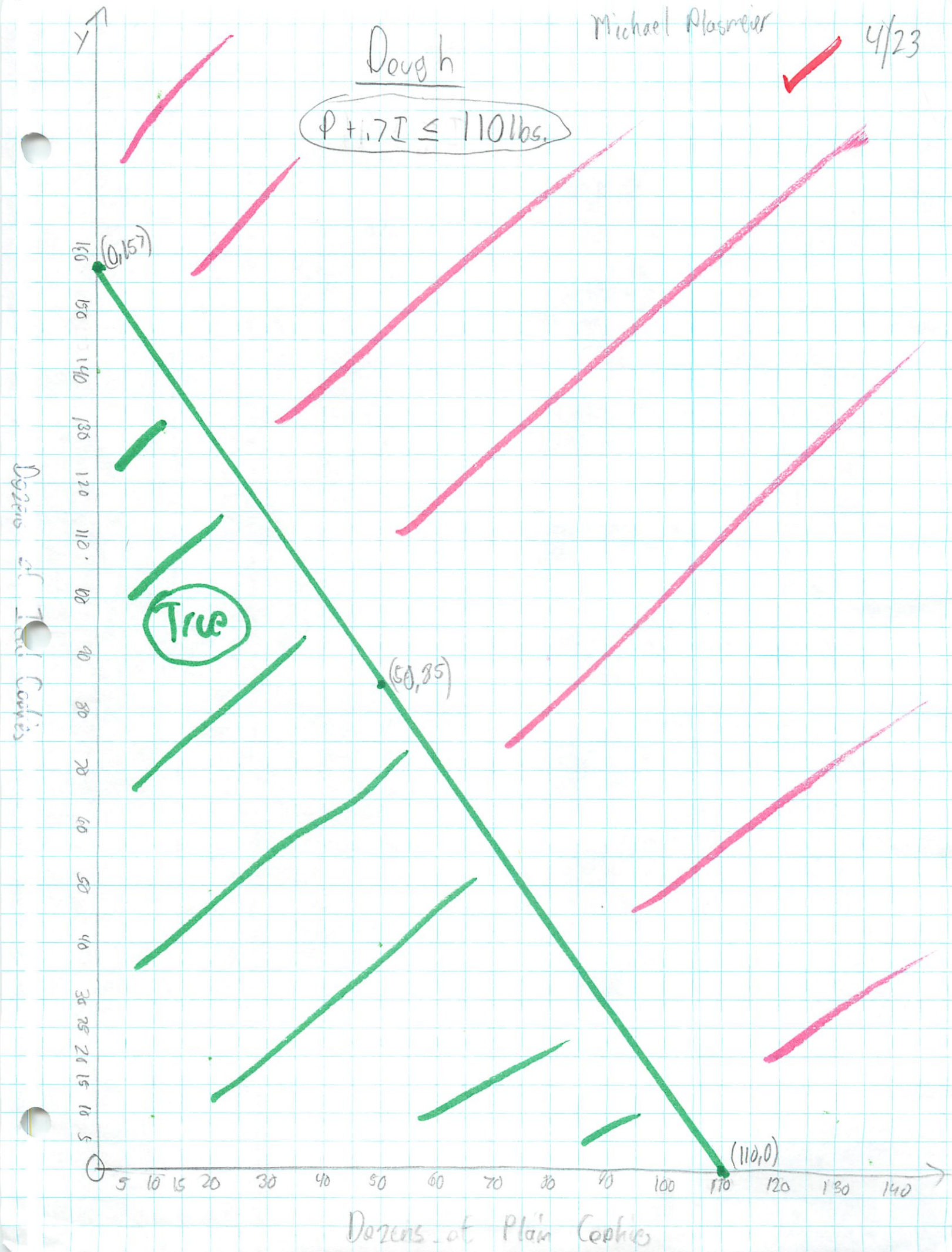


Michael Plasmeier

4/23

Dough

$P + 1.7I \leq 110$ lbs.



Michael Plessmeier 4/23

Icing

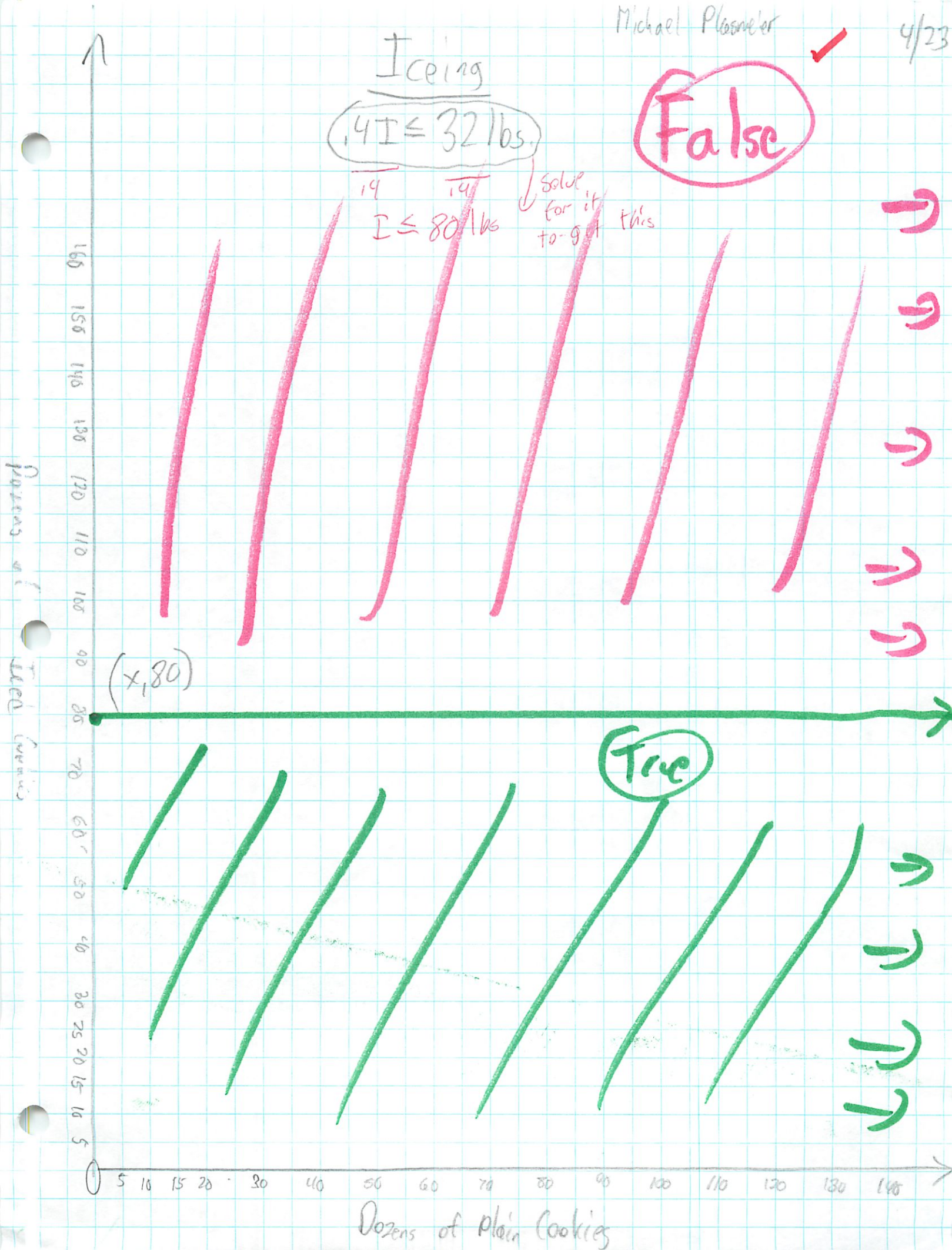
$.4I \leq 32$ lbs.

÷.4 ÷.4

$I \leq 80$ lbs

↓ Solve for it to get this

False ✓



~~20/20~~

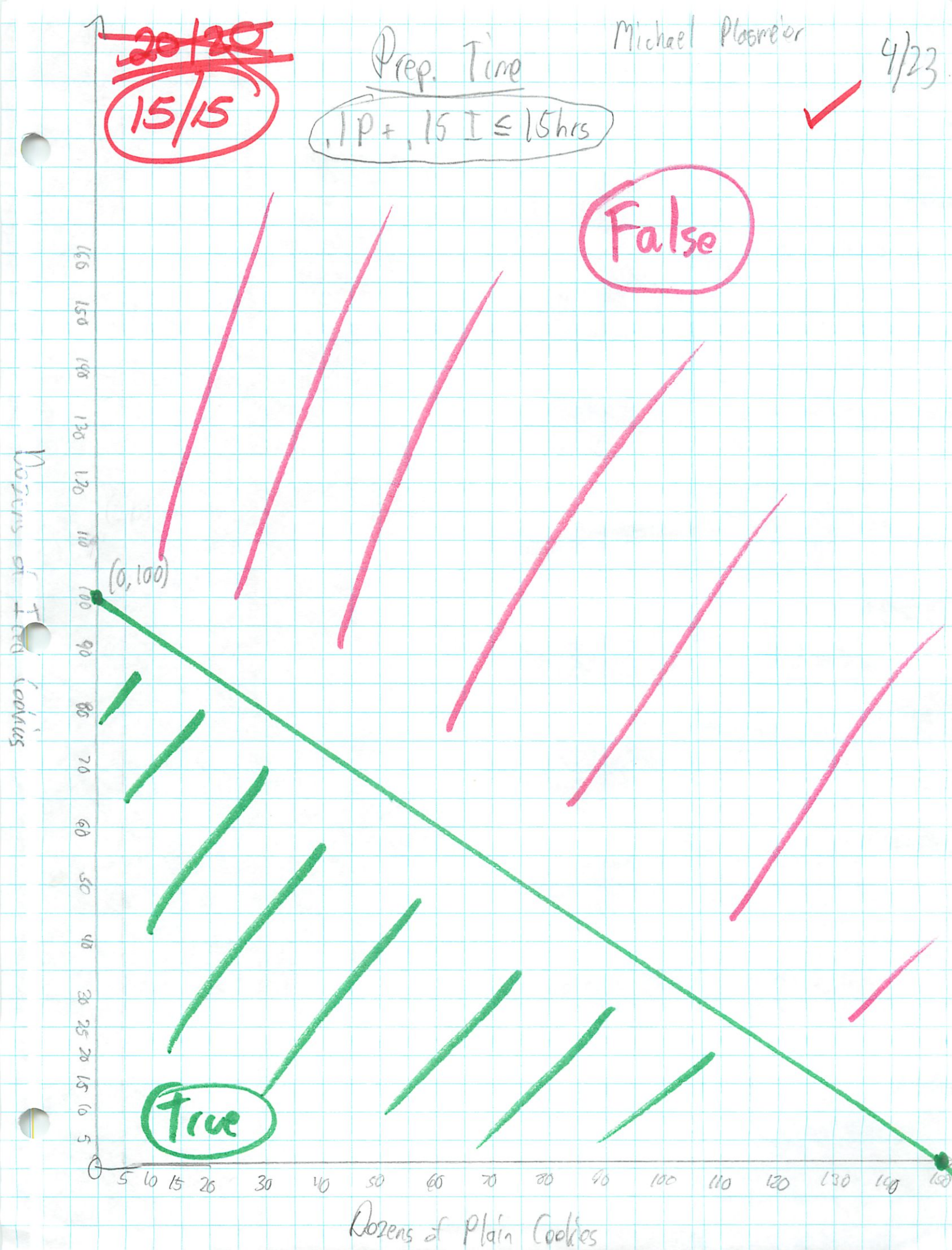
15/15

Michael Ploorde'or

4/23

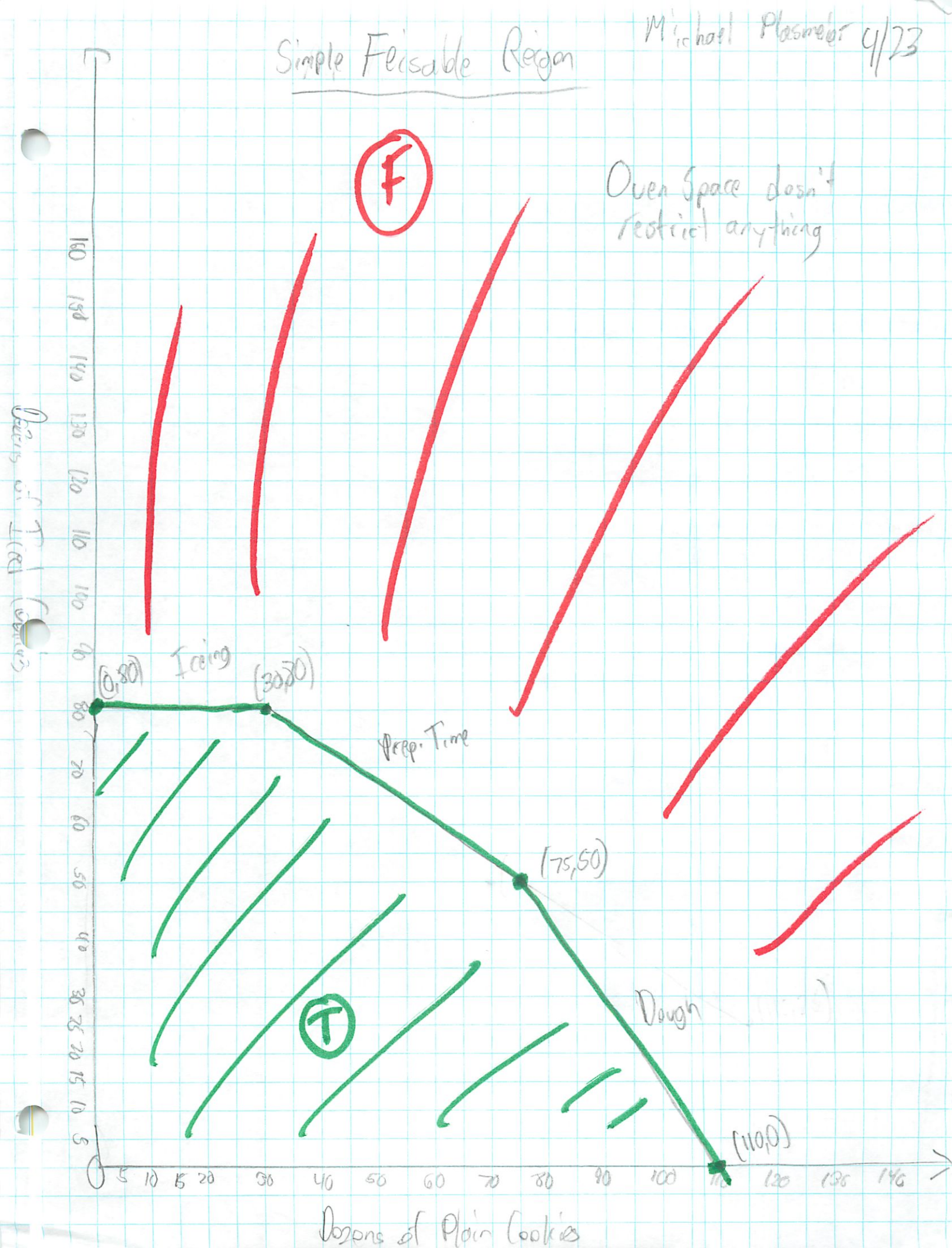
Prep. Time

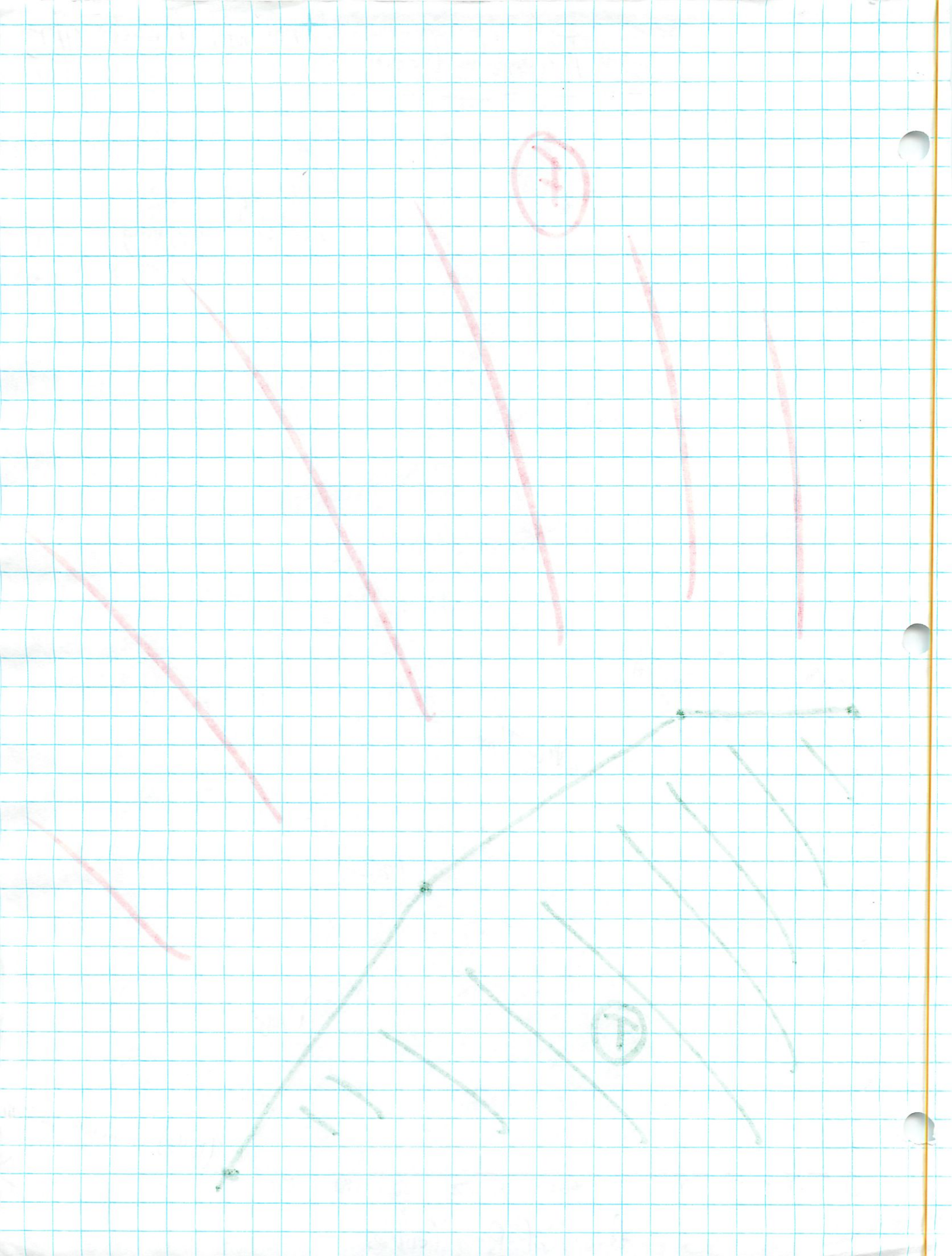
$.1P + .15I \leq 15 hrs$



Simple Feasable Region

Michael Plasmeier 4/23





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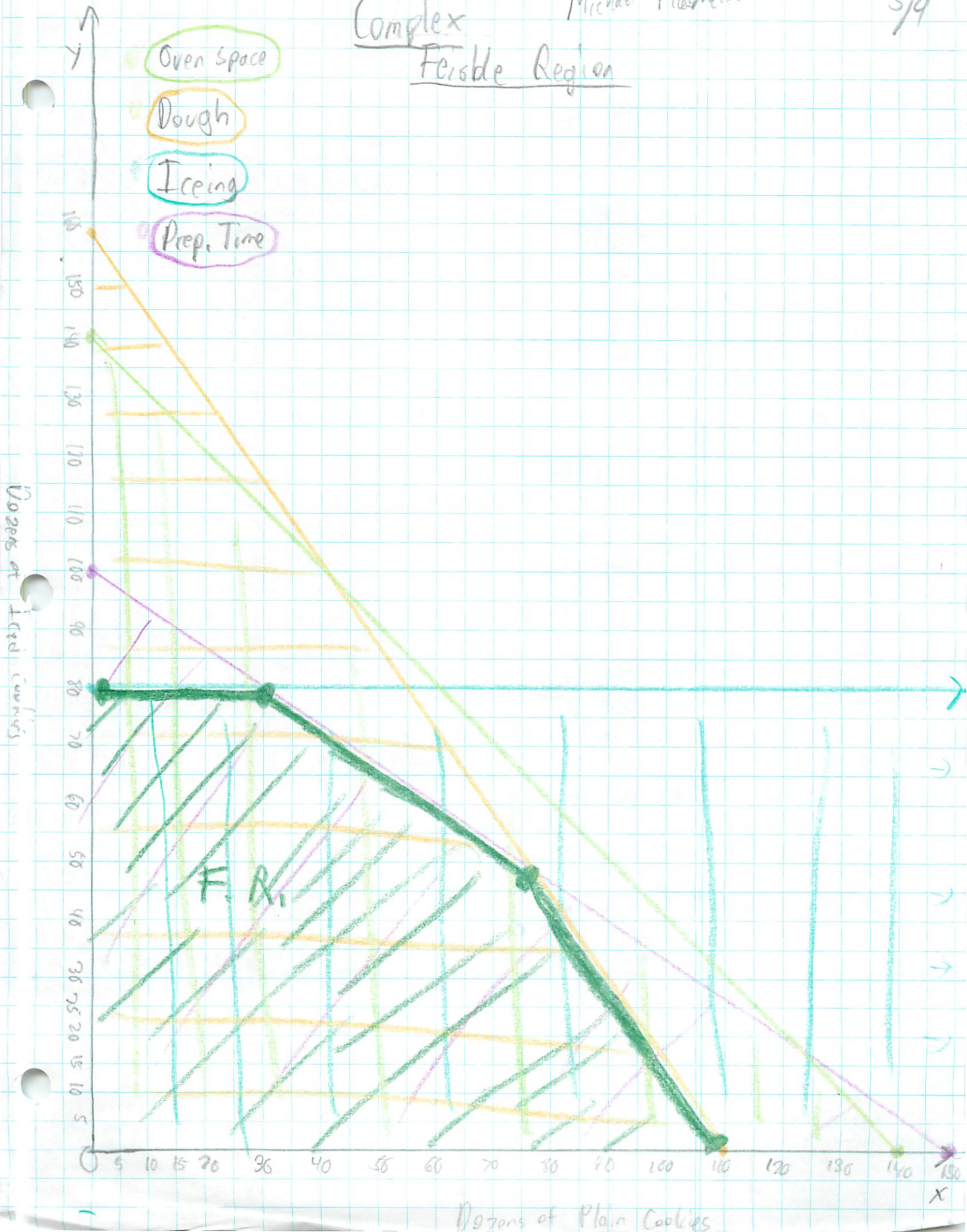
5/4

Complex Feisble Region



Michael Plasmeier
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IAG 9H
4 May 2006

Cookies
Profit

20/20

5/4

Profit = 1.5P + 2I

Plain	Iced	Profit
0	80	$ 160
30	80	$ 205
75	50	$ 212.5
110	0	$ 165
55	65	$ 212.5
57	62	$ 209.5
60	66	$ 210

intercepts

Max Profit

Why similar, but for apart, should be something in the middle.

$.1P + .15I \leq 15$
$-.1P \quad -.1P$
$\frac{.15I}{.15} \leq \frac{15 - .1P}{.15}$

$I = 100 - \frac{2}{3}P$

Michael Plocreior
Bohl
FAC 2+4
18 April 2006

Investigating Inequalities (2)

4/18

1. $4 > 3$

Addition - $4+2 \;?\; 3+2 \to 6 > 5$ ✓
$4+-5 \;?\; 3+-5 \to -1 > -2$ ✓
Subtraction - $4-2 \;?\; 3-2 \to 2 > 1$ ✓
$4--5 \;?\; 3--5 \to 9 > 8$ ✓
Multiplication - $4 \times 2 \;?\; 3 \times 2 \to 8 > 6$ ✓
$4 \times (-5) \;?\; 3 \times (-5) \to -20 < -15$ ✗
Division - $4/2 \;?\; 3/2 \to 2 > 1.5$ ✓
$4/-5 \;?\; 3/-5 \to -.8 < -.6$ ✗

2. $2 < 7$

Addition - $2+4 \;?\; 7+4 \to 6 < 11$ ✓
$2+-7 \;?\; 7+-7 \to -5 < 0$ ✓
Subtraction - $2-4 \;?\; 7-4 \to -2 < 3$ ✓
$2--7 \;?\; 7--7 \to 9 < 14$ ✓
Multiplication - $2 \times 4 \;?\; 7 \times 4 \to 8 < 28$ ✓
$2 \times (-1) \;?\; 7(-4) \to -14 > -28$ ✗
Division - $2/4 \;?\; 7/4 \to .5 < 1.75$ ✓
$2/-7 \;?\; 7/-7 \to -\frac{2}{7} > -1$ ✗

3. You may add or subtract the same number to each side, but you may not multiply or divide each side by the same value in order to return the same result, negitive but you may multiply or divide each side by a positive side, or if you do w/ a negitive number - flip the signs

Iters → over

Hers

You may (Manipulating Inequalites)

1. Add the same # to both sides of the inequality
2. Subtract the same # from both sides of the inequality
3. Multiply both sides of the inequality by the same POSITIVE #
4. Divide both sides of the inequality by the same POSITIVE #
5. Multiply both sides of the inequality by the same Negative # AND REVERSE the direction of the inequality.
6. Divide both sides of the inequality by the same Negative # AND REVERSE the direction of the inequality.

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Bohl
IA62H1
18 April 2006

Part 2: Graphing Inequalities (2)

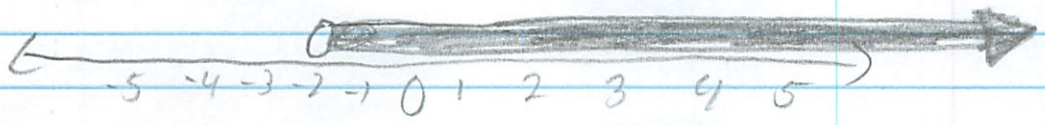
→ Homework 2

4/18

< or > is a strict equality
≤ or ≥ is a non strict equality

● - includes that number $(x \leq 4)$ - not-strict
O - does NOT include that number $(x < 4)$ - strict

4. $x > -2$



5. $x \leq 0$

6. $x > -3$

7. $-1 < x \leq 3$ → $-1 < x \leq 3$

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IAB9 H1
18 April 2006

Inequality Practice

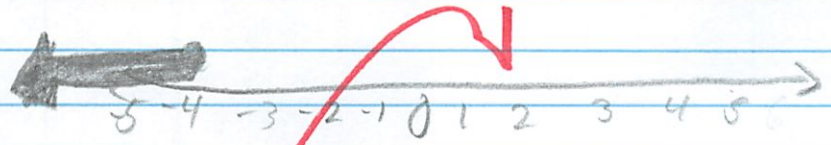
4/18

graphs are not balanced

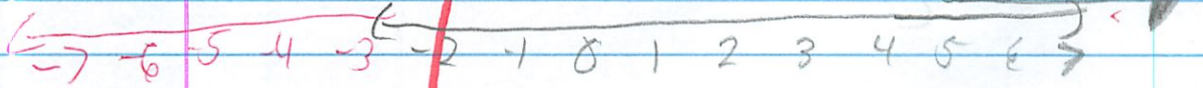
5.5/6

Graph the following inequality:

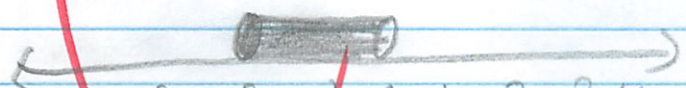
1. $x \leq -4$



2. $x > 5$



3. $-2 \leq x < 0$



4. $x < -1$

5. $x \geq 4$

6. $-3 < x \leq -1$

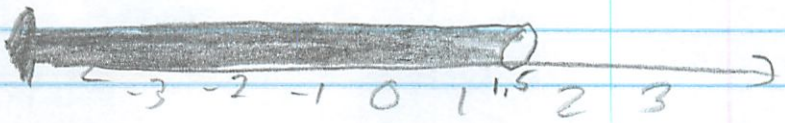
Must be balanced

Michael Plasmeier
Rehl
IAG 7H9
20 April 2006

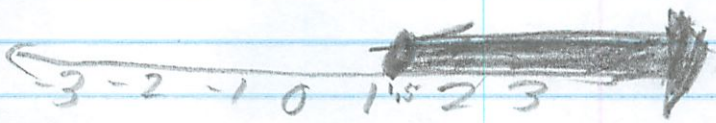
My simpliest Ineaculity
Part 1 p207

4/20

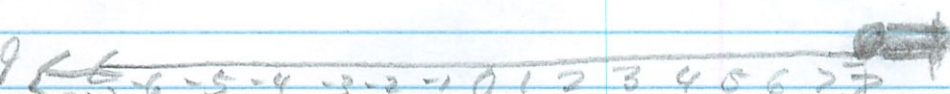
1. a. $2x + 5 < 8$
$-5 \quad -5$
$\frac{2x}{2} < \frac{3}{2}$
$x < \frac{3}{2}$



b. $3x - 2 \geq x + 1$
$-x \quad -x$
$2x - 2 \geq 1$
$+2 \quad +2$
$\frac{2x}{2} \geq \frac{3}{2}$
$x \geq \frac{3}{2}$

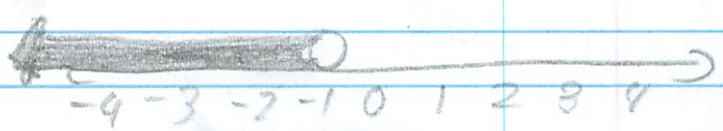


c. $3x + 7 \leq 5x - 9$
$-3x \quad -3x$
$7 \leq 2x - 9$
$+9 \quad +9$
$\frac{16}{2} \leq \frac{2x}{2}$
$8 \leq x$



d. $4 - 2x > 7 + x$
$-x \quad -x$
$4 - 3x > 7$
$-4 \quad -4$
$\frac{-3x}{-3} > \frac{3}{-3}$
$x < -1$

Change direction w/ ÷ division



Name: Michael Rhoneier Date: _____

IAG 2

Cookies

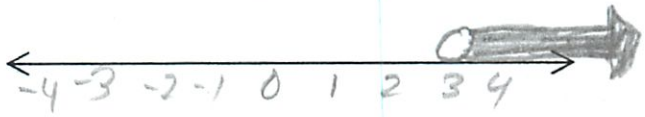
Solving Inequalities

Directions: Solve and graph the solution to each of the following inequalities.

1. $x + 3 > 6$

$-3 \quad -3$

$x > 3$



2. $x - 6 > -8$

$+6 \quad +6$

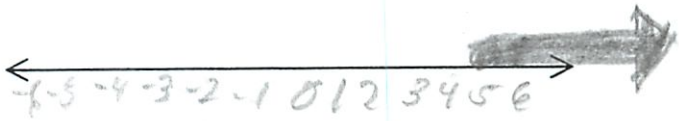
$x > -2$

3. $6 - 2x \leq -4$

$-6 \quad -6$

$\frac{-2x}{-2} \leq \frac{-10}{-2}$ switch

$x \geq 5$



4. $7x - 30 < 19$

$+30 \quad +30$

$\frac{7x}{7} < \frac{49}{7}$

$x < 7$

5. $2x + 3 < 6x - 1$

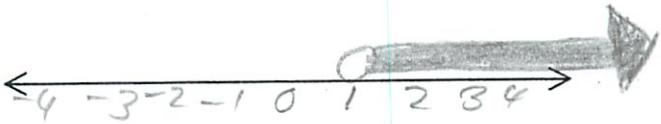
$+1 \quad +1$

$2x + 4 < 6x$

$-2x \quad -2x$

$4 < 4x$

$1 < x$



6. $3x - 2 \geq 7x - 10$

$+10 \quad +10$

$3x + 8 \geq 7x$

$-3x \quad -3x$

$8 \geq 4x$

$2 \geq x$

7. $6x + 3 \leq 3(x + 2)$

$6x + 3 \leq 3x + 6$

$-3 \quad -3$

$6x \leq 3x + 3$

$-3x \quad -3x$

$\frac{3x}{3} \leq \frac{3}{3}$

$3/3 = 1$

$x \leq 1$

8. $-2(x + 4) > 6x - 4$

$-2x - 8 > 6x - 4$

$+4 \quad +4$

$-2x - 4 > 6x$

$+2x \quad +2x$

$-4 > 8x$

$-.5 > x$

12/16 75%

Name Michael Plaorder
Period 1
Date 4/20

Solving Inequalities Review

Directions: Solve and graph each of these inequalities. Be sure you show all of your work!

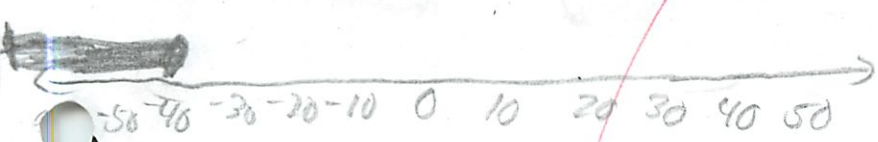
1) $\frac{x}{-4} + 10 \geq 20$

$-10 \quad -10$

$\frac{x}{-4} \geq 10$

$(-4) \quad (-4)$ Switch

$x \leq -40$

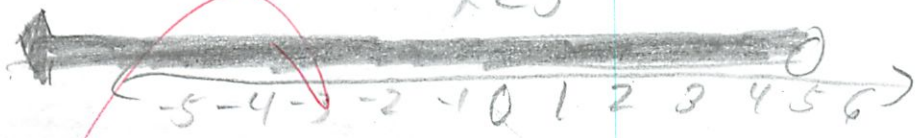


2) $3x + 15 < 30$

$-15 \quad -15$

$\frac{3x}{3} < \frac{15}{3}$

$x < 5$



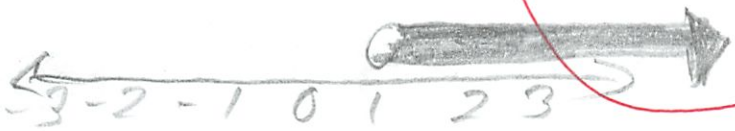
3) $5x + 6 + 5x > 16$

$10x + 6 > 16$

$-6 \quad -6$

$\frac{10x}{10} > \frac{10}{10}$

$x > 1$



4) $-3x - 12 \leq 0$

$+12 \quad +12$

$\frac{-3x}{-3} \leq \frac{12}{-3}$ (Switch)

$x \geq -4$

5) $4x - 8 - 2x + 2 > -2$

$2x - 6 > -2$

$+6 \quad +6$

$\frac{2x}{2} > \frac{4}{2}$

$x > 2$

Mistake 2

$-12x - 2x =$

$-14x$

6) $-12x + 8 - 2x \geq 16$

-2

$-14x + 8 \geq 16$

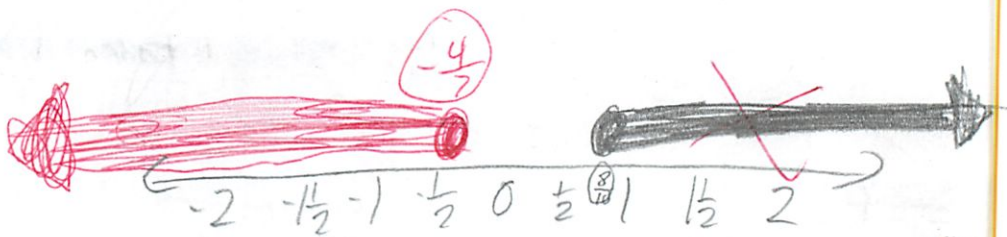
$-8 \quad -8$

$-14x \geq 8$

$\frac{-14x}{-14} \geq \frac{8}{-14}$ (5)

$x \leq \frac{-8}{14}$

$x \leq -\frac{4}{7}$



7) $7 - \frac{x}{3} - 9 \leq 14$

-2

$-2 - \frac{x}{3} \leq 14$

$+2 \quad +2$

I didn't do

$-\frac{x}{3} \leq 16$

$\times -3 \quad \times -3$

$x \geq -48$

8) $7x - 2 + 5x > 5x - 37$

$12x - 2 > 5x - 37$

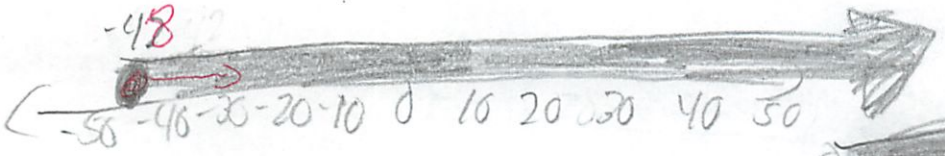
$+2 \quad +2$

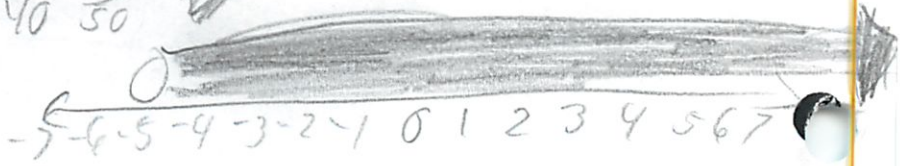
$12x > 5x - 35$

$-5x \quad -5x$

$\frac{7x}{7} > \frac{-35}{7}$

$x > -5$





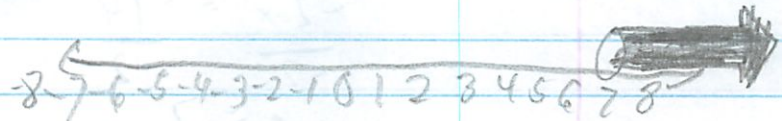
Michael Plasmeier
Behl
IAG2 HP
23 April 2006

Board Problems

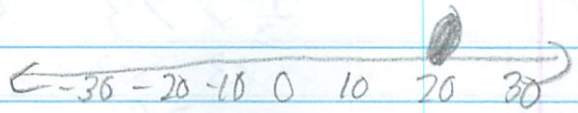
4/23

Directions: Solve for x and then graph the inequality

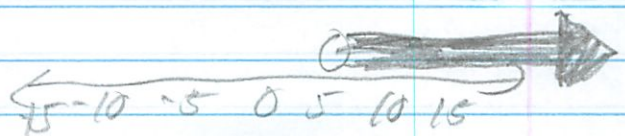
1. $2x + 3 > 17$
$-3 \quad -3$
$\frac{2x}{2} > \frac{14}{2}$
$x > 7$



2. $\frac{1}{2}x - 4 = 6$
$+4 \quad +4$
$\frac{1}{2}x = 10$
$\times 2 \quad \times 2$
$x = 20$



3. $-3x + 15 < 0$
$-15 \quad -15$
$\frac{-3x}{-3} < \frac{-15}{-3}$
$x > 5$



4. $2(x + 8) > 0$
$2x + 16 > 0$
$-16 \quad -16$
$\frac{2x}{2} > \frac{-16}{2}$
$x > -8$

5, 6 - Over

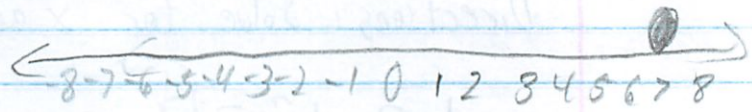
5. $2x + 4 - 4x = -10$

$-2x + 4 = -10$

$-4 \quad -4$

$\frac{-2x}{-2} = \frac{-14}{-2}$

$x = 7$



6. $3 + \frac{1}{3}x - 5 > 1$

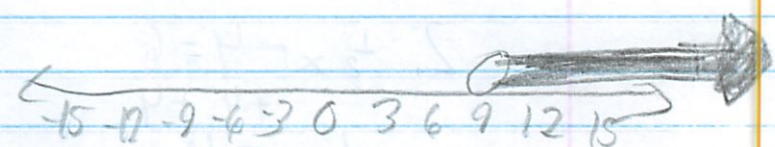
$-2 + \frac{1}{3}x > 1$

$+2 \quad +2$

$\frac{1}{3}x > 3$

$\times 3 \quad \times 3$

$x > 9$



Michael Plourier
Beh1
IAG2H9
28 April 2006

1-Variable inequality

Quiz

25
20

4/28

Solve + Graph

1. $4x - 8 - 2x + 2 \geq -2$

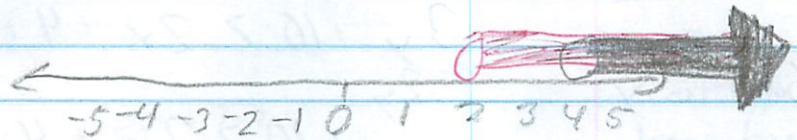
$2x - 6 \geq -2$

$+6 \quad +6$

$\frac{2x}{2} \geq \frac{4}{2}$

$x \geq 2$

-3



$4 \div 2 = 2$

2. $3x + 7 - x < 4x - 3$

$2x + 7 < 4x - 3$

$+3 \quad +3$

$2x + 10 < 4x$

$-2x \quad -2x$

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

$5 < x$

3. $7x + 5 \geq 54$

$-5 \quad -5$

$\frac{7x}{7} \geq \frac{49}{7}$

$x \geq 7$

4. $2 + \frac{x}{2} - 4 \leq 14$

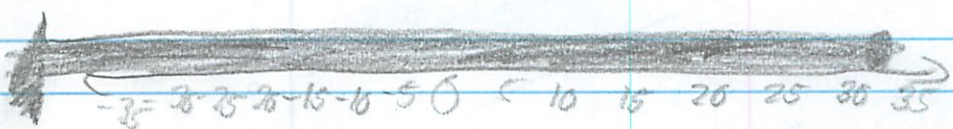
$-2 + \frac{x}{2} \leq 14$

$+2 \quad +2$

$\frac{x}{2} \leq 16$

$\times 2 \quad \times 2$

$x \leq 32$



Extra Credit

Solve for y and graph

$3y + 4|x| + 10 > 6x + 4 + 2y$

$-4x \quad -4x$

$3y + 10 > 2x + 4 + 2y$

$-2y \quad -2y$

$y + 10 > 2x + 4$

$-10 \quad -10$

$y > 2x - 6$

x	y
0	-6
3	0

$0 > 2x - 6$

$+6 \quad +6$

$\frac{6}{2} = \frac{2x}{2}$

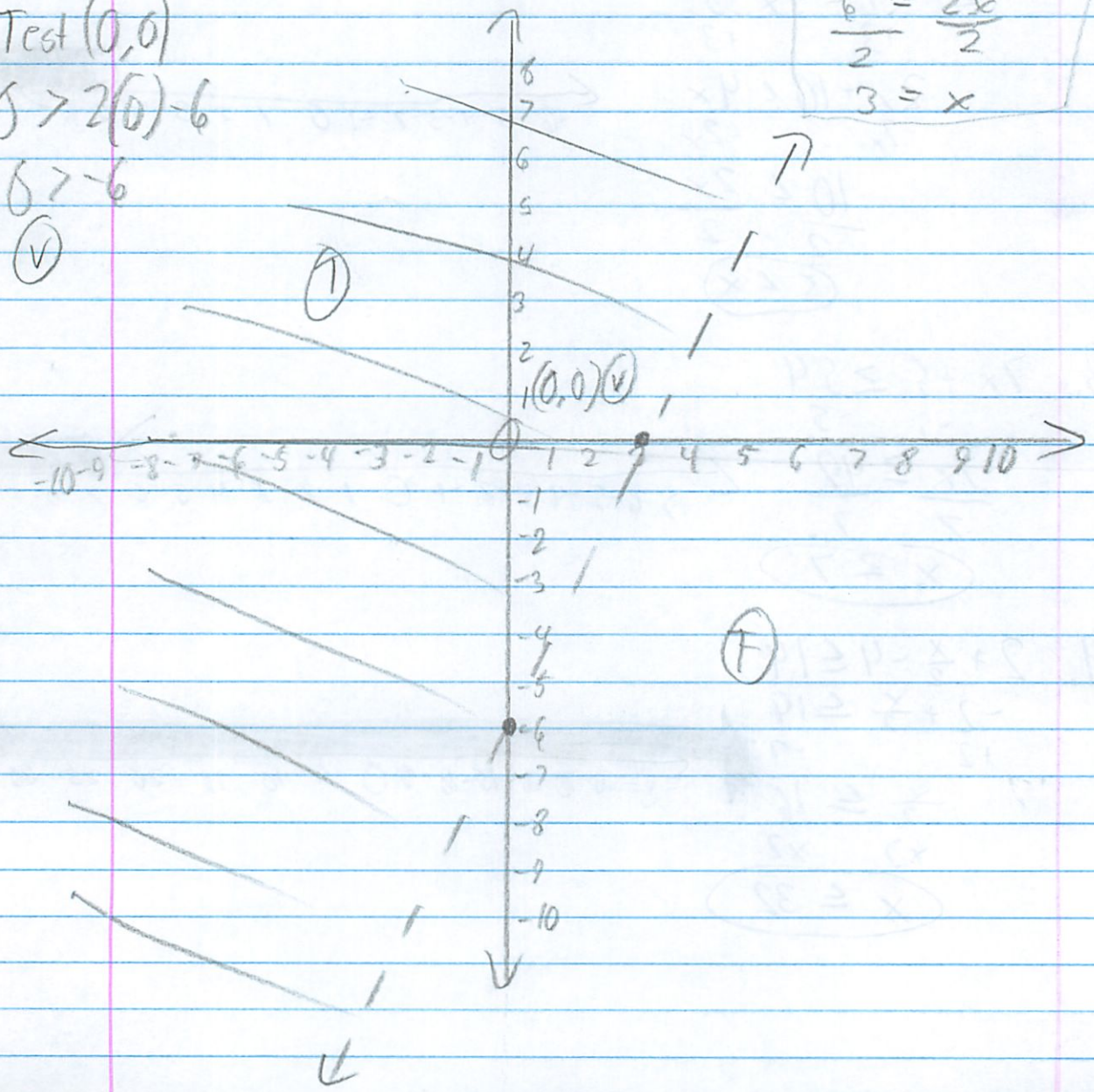
$3 = x$

Test (0,0)

$0 > 2(0) - 6$

$0 > -6$

(V)



Michael Plasmeier
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26 April 2006

Notes

(Solving + Graphing 2 Variable Inequalities) 4/26

* Always solve for y in terms of x

Steps

1. Using solving inequality skills, solve for y in terms of x
   - Remember to switch the direction of the inequality if you multiply or divide by a negitive

2. Find the x + y intercepts and plot them
   (this will give you the max points on both axes)

3. Connect the 2 points - If ● ≤ or ≥ use a solid line (non-strict)
   If ○ < or > use a dotted line (strict)

4. Test a point (usually 0,0) [not on the line] to see if it is a true statement
   - If true, shade toward the point
   - If false, shade away from the point

Examples

See next graph paper

4/26

Notes Examples
(Solving + Graphing 2 variable Inequalities)

Ex 1

$3x - 4y \leq 12$

$-3x \quad -3x$

$\frac{-4y}{-4} \leq \frac{12 - 3x}{-4}$ ⑤

$y \geq -3 + \frac{3}{4}x$

x	y
0	-3
4	0

Easy to find

$y = -3 + \frac{3}{4}(0)$

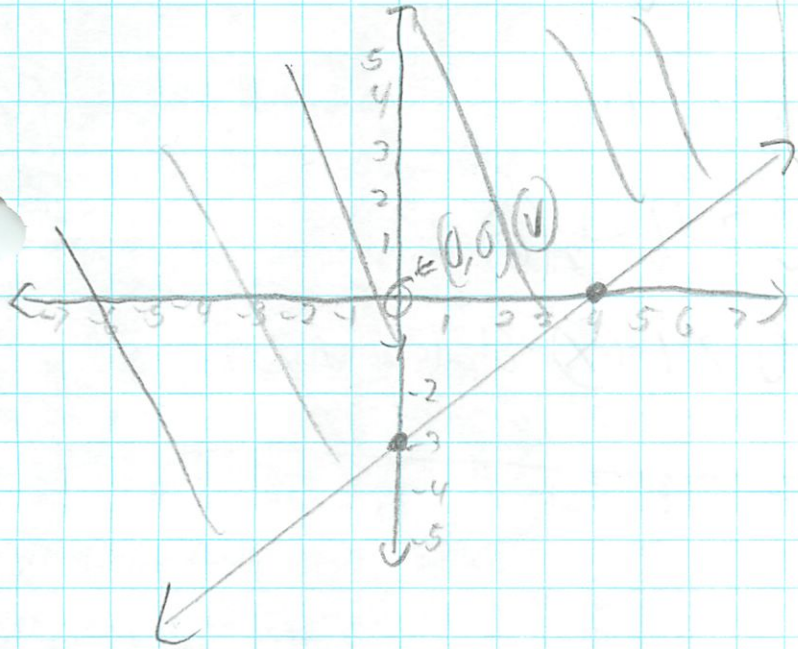
$y = -3$

$0 = -3 + \frac{3}{4}x$

$+3 \quad +3$

$\frac{3}{\frac{3}{4}} = \frac{\frac{3}{4}x}{\frac{3}{4}}$

$4 = x$



Test for 0,0

$0 \geq -3 + \frac{3}{4}(0)$

$0 \geq -3$

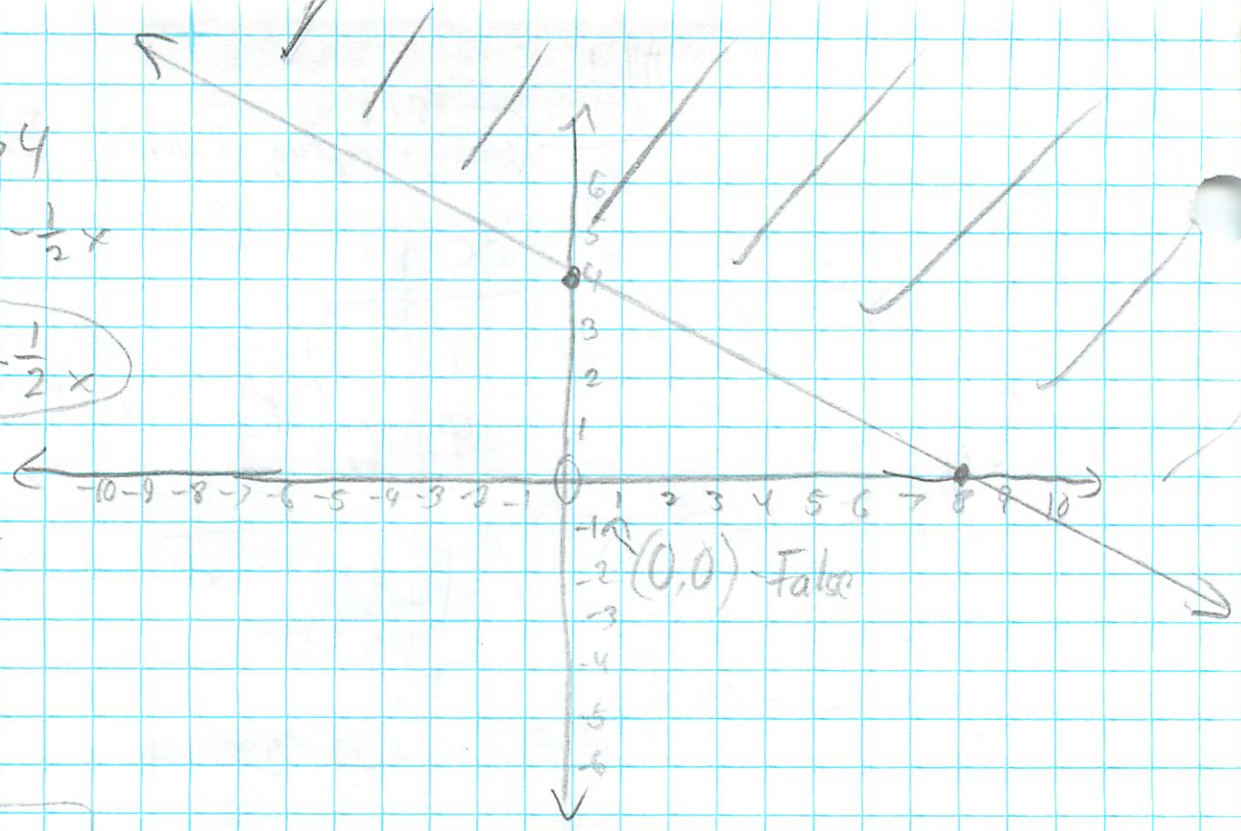
Ⓥ - Shade towards 0,0

Practice →

$\frac{1}{2}x + y > 4$

$-\frac{1}{2}x \qquad -\frac{1}{2}x$

$y > 4 - \frac{1}{2}x$



x	y
0	4
8	0

$0 = 4 - \frac{1}{2}x$

$-4 \quad -4$

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

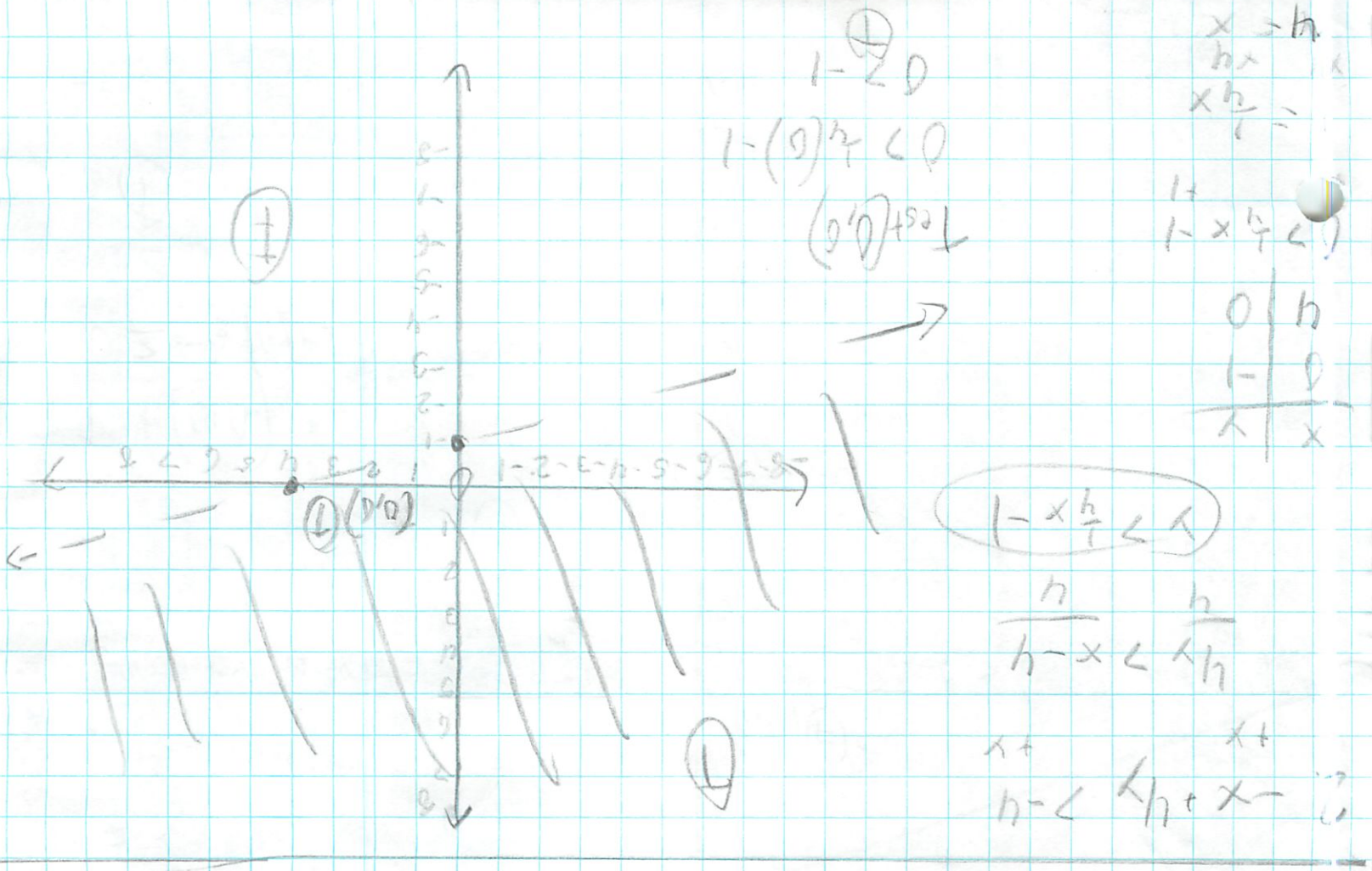
$\times -2 \quad \times -2$

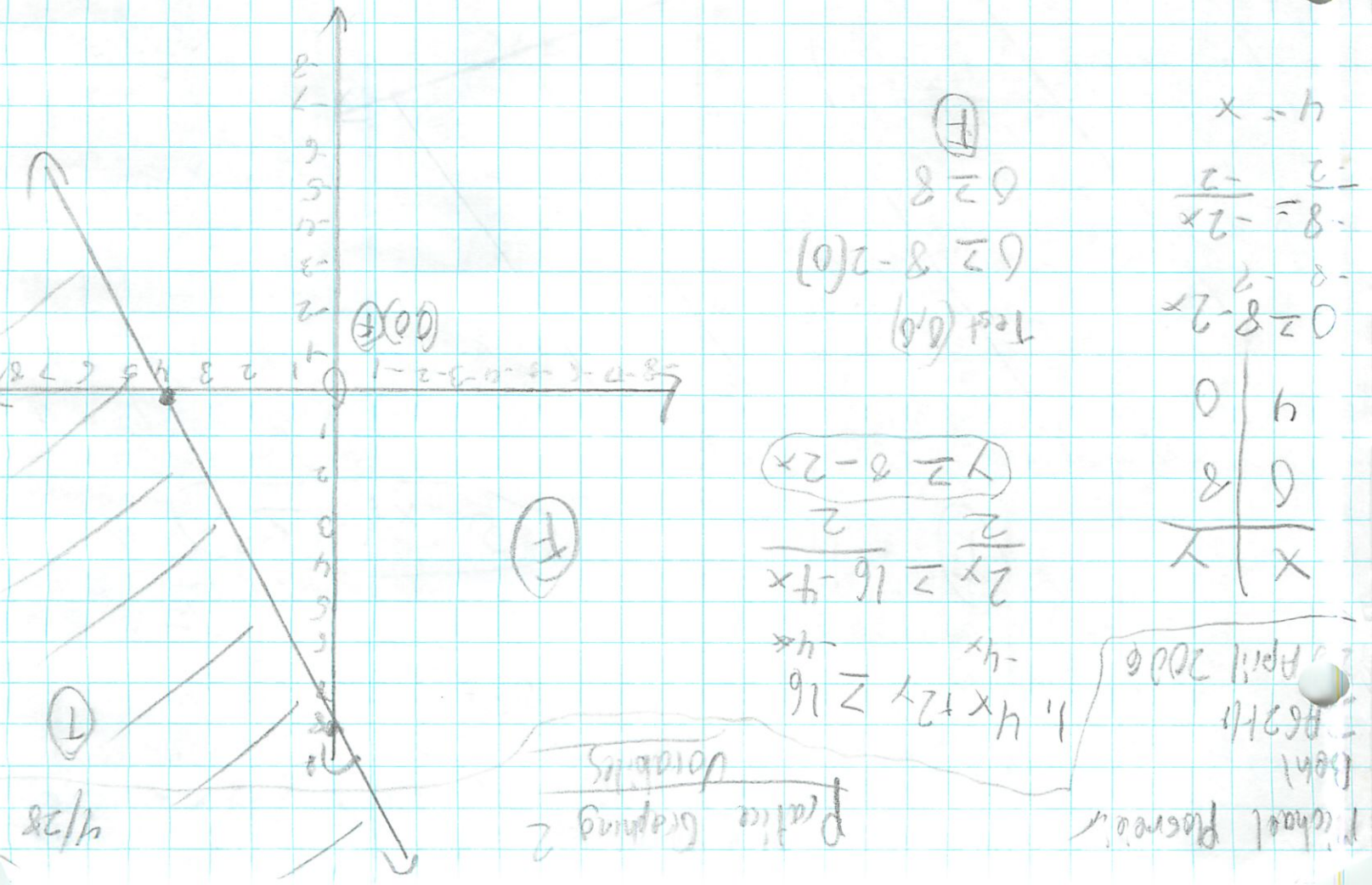
$8 = x$

Test for 0,0

$0 > 4 - \frac{1}{2}(0)$

$0 > 4$ ⊗ - Shade Away





3. $2x + 6y \geq 30$

$-2x \quad -2x$

$\frac{6y}{6} \geq \frac{-2x + 30}{6}$

$y \geq -\frac{1}{3}x + 5$

x	y
0	5
15	0

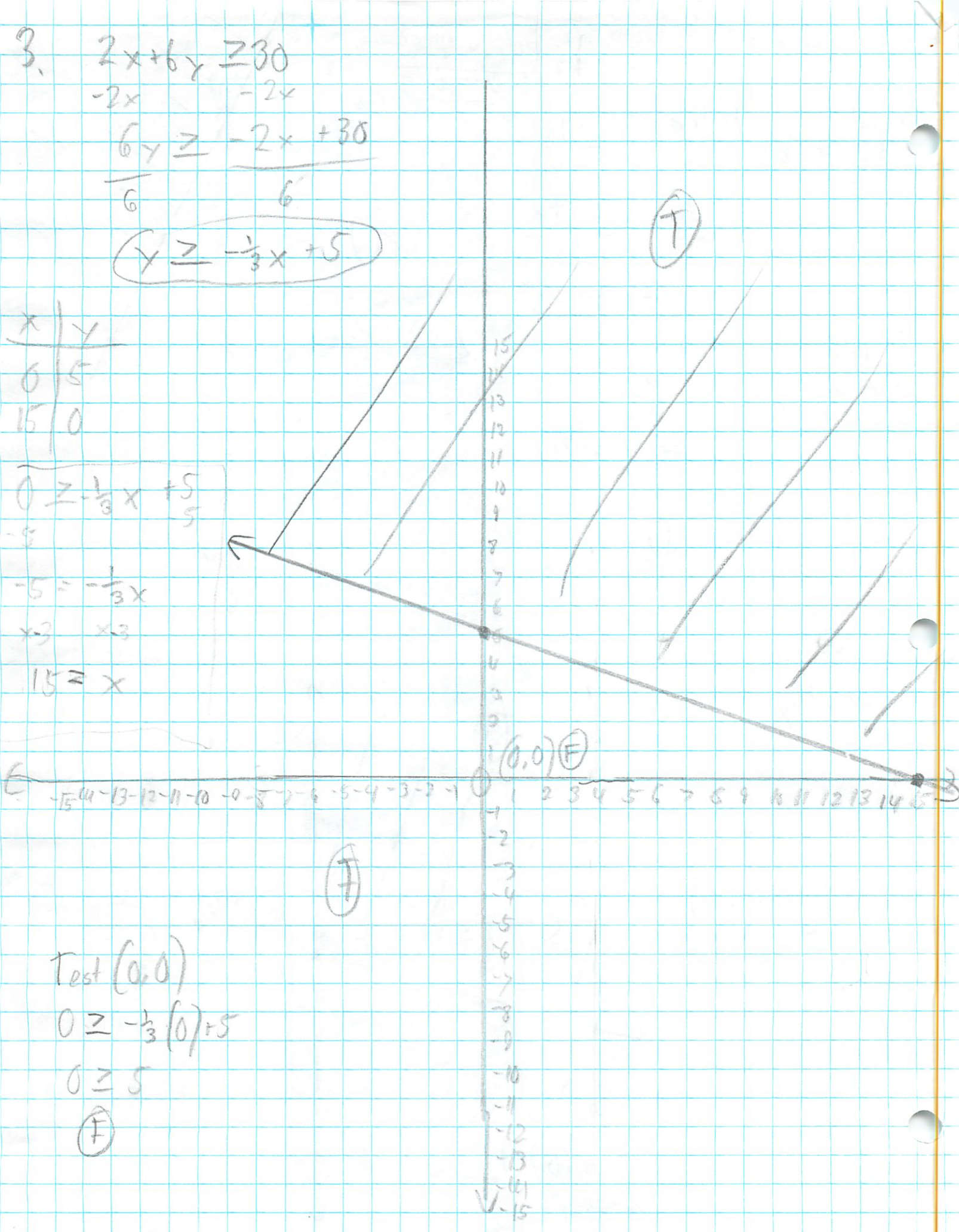
$0 \geq -\frac{1}{3}x + 5$

$-5 \quad -5$

$-5 \geq -\frac{1}{3}x$

$\times -3 \quad \times -3$

$15 \geq x$



Test (0,0)

$0 \geq -\frac{1}{3}(0) + 5$

$0 \geq 5$

F

Michael Plasmeier Solving Inequality (Part 2)

+ Graph

Solve each of the following inequalities for the variable **y**.

9. $7x + 9y < 18$

Answer: $y < 2 - \frac{7}{9}x$

$-7x \quad -7x$

$\frac{9y}{9} < \frac{18 - 7x}{9}$

$y < 2 - \frac{7}{9}x$

10. $-2x + 8y \geq 6x + 16$

Answer: $y \geq \frac{3}{2}x + 2$

$+2x \quad +2x$

$\frac{8y}{8} \geq \frac{8x + 16}{8}$

$y \geq x + 2$

11. $-x - 8y > -3(x - 24)$

Answer: $y < \frac{1}{4}x + 9$

$-x - 8y > -3x + 72$

$+x \quad +x$

$\frac{-8y}{-8} > \frac{-2x + 72}{-8}$ $72/-8 = -9$ (n) +/- mistake

$y < \frac{1}{4}x + 9$

12. $2x + y \geq -3x + 4y - 2$

Answer: $x \leq \frac{5}{3} + \frac{2}{3}$

$-2x \quad -2x$

$y \geq -5x + 4y - 2$

$-4y \quad -4y$

$\frac{-3y}{-3} \geq \frac{-5x - 2}{-3}$ (S)

$y \leq \frac{5}{3}x + \frac{2}{3}$

13. $5(-3x - 1) < 4(-3x - 10)$

Answer: $x > 11\frac{2}{3}$

$-15x - 5 < -12x - 40$

$+5 \quad +5$

$-15x < -12x - 35$

$+12x \quad +12x$

$-3x < -35 \quad /-3$

$\frac{-3}{-3} > \frac{-35}{-3}$ (S)

$x > 11\frac{2}{3}$

Find an equivalent inequality for each of the following inequalities by multiplying by a factor to eliminate decimals.

14. $0.4x - 1.2y > 32$

Answer: $4x - 12y > 320$

$\times 10 \quad \times 10$

$4x - 12y > 320$

15. $0.16x + 0.5y > 13.9$

Answer: $16x + 50y > 1390$

$\times 100 \quad \times 100$

$16x + 50y > 1390$

9. $y < 2 - \frac{7}{9}x$

x	y
0	2
2,57	0

$0 < 2 - \frac{7}{9}x$ Test (0,0)

$-2 \quad -2$

$-2 = -\frac{7}{9}x$

$\frac{-7}{9} \quad \frac{-7}{9}$

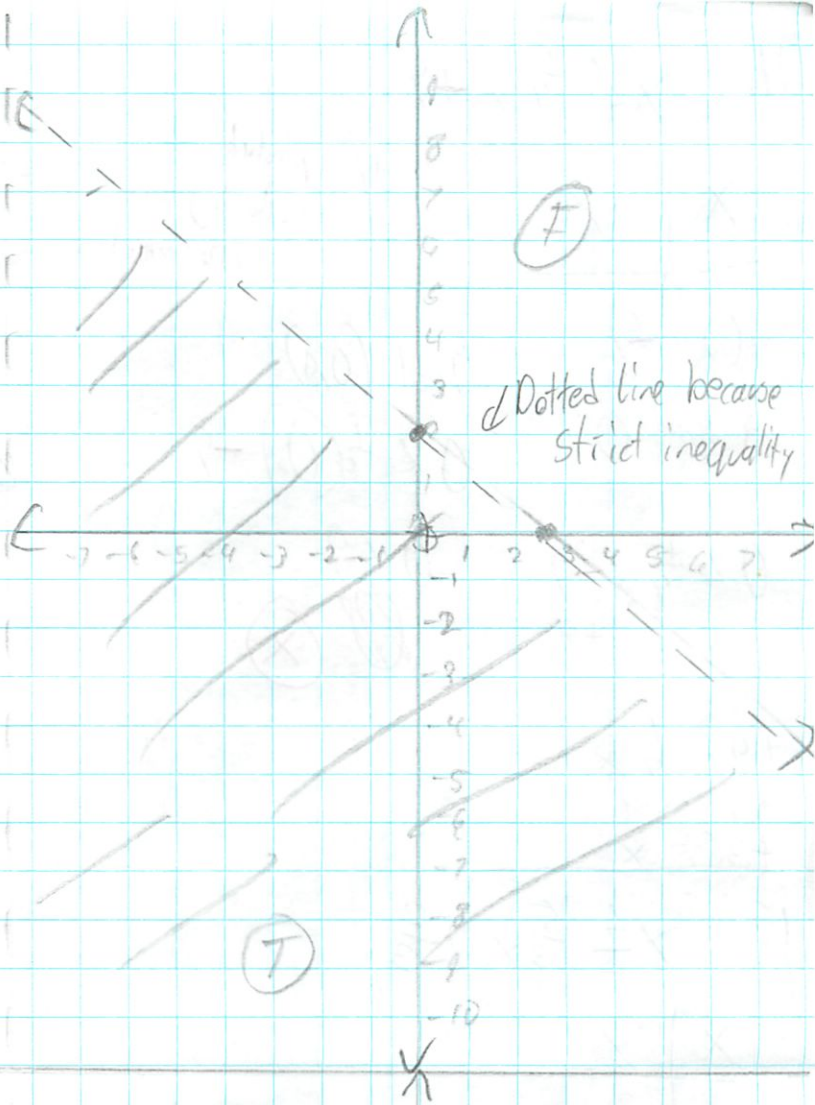
$\frac{18}{7} = x$

$2,57 = x$

$0 < 2 - \frac{7}{9}(0)$

$0 < 2$

(✓)



10. $y \geq x + 2$

x	y
0	2
-2	0

$0 \geq x + 2$

$-2 \quad -2$

$-2 \geq x$

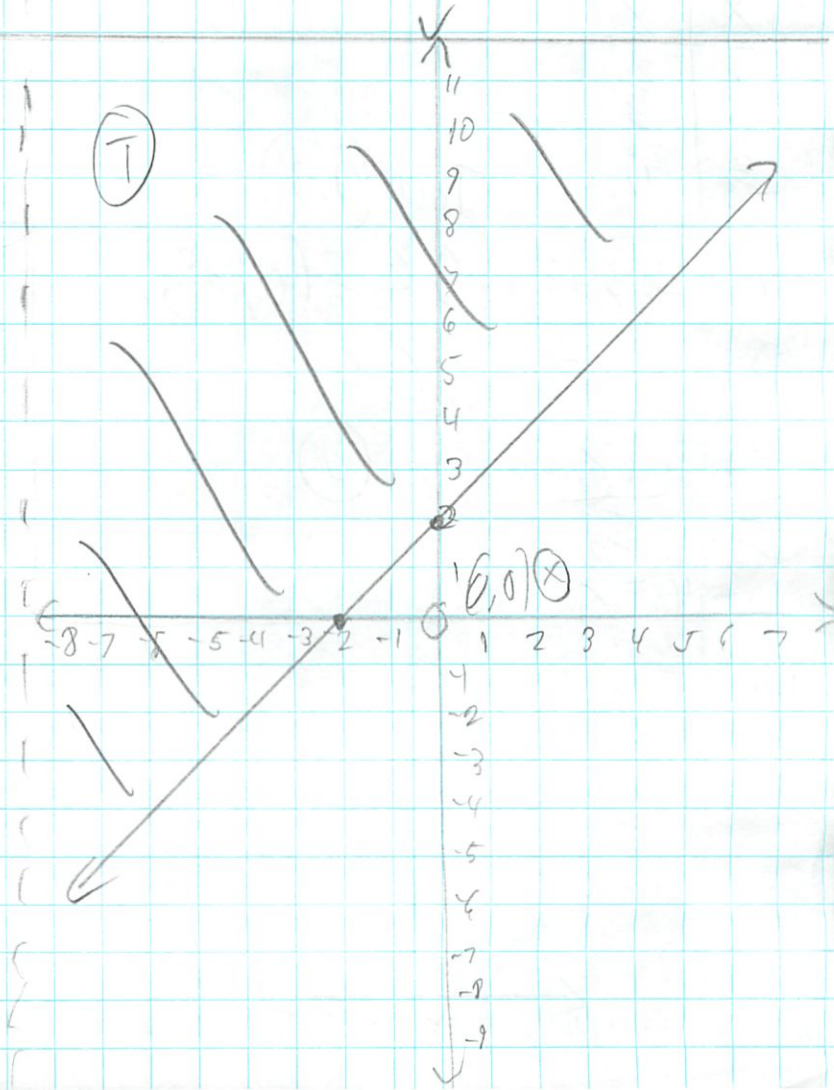
Test 0,0

$0 \geq 0 + 2$

$0 \geq 2$

(✗)

Shade away



11. $y < \frac{1}{4}x + 9$

↑ +/- mistake in reducing on other sheet

x	y
0	9
+36	0

Test (0,0)

$0 < \frac{1}{4}(0) + 9$

$0 < 9$

(J) (X)

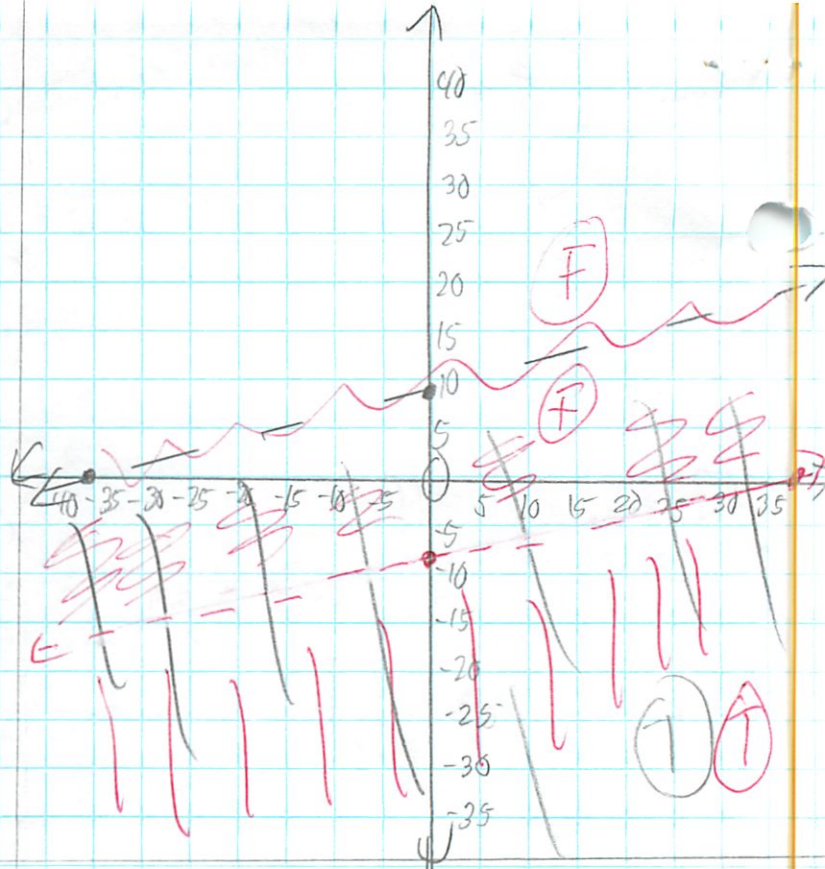
$0 < \frac{1}{4}x + 9$

$+9 \quad +9$

$+9 < \frac{1}{4}x$

$\times 4 \quad \times 4$

$+36 = x$



12. $y \leq \frac{5}{3}x + \frac{2}{3}$

x	y
0	$\frac{2}{3}$
$-\frac{2}{5}$	0

Test (0,0)

$0 \leq \frac{5}{3}(0) + \frac{2}{3}$

$0 \leq \frac{2}{3}$

(J)

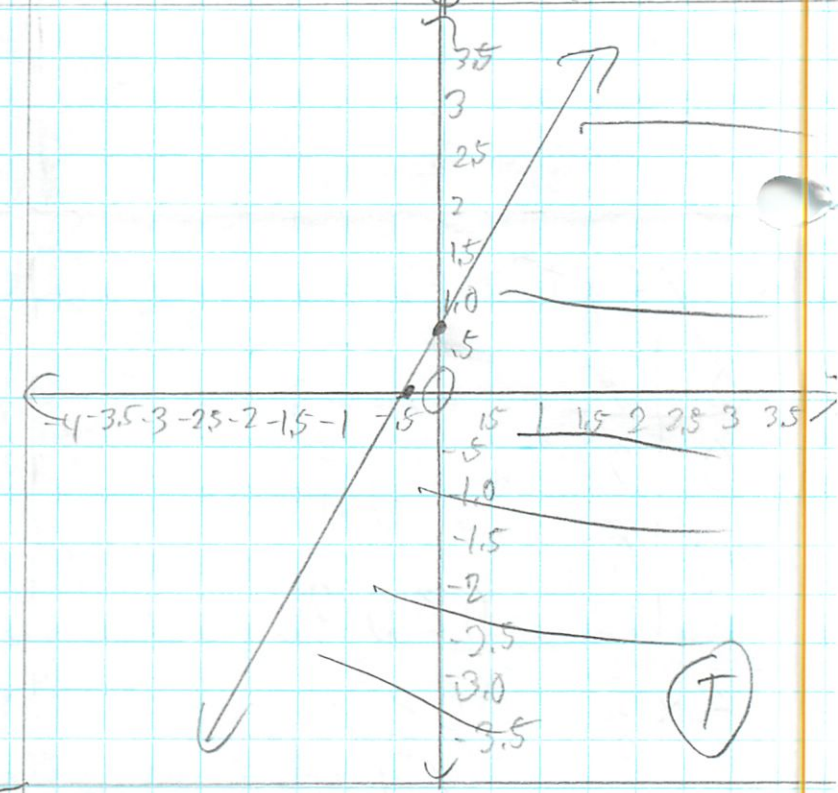
$0 \leq \frac{5}{3}x + \frac{2}{3}$

$-\frac{2}{3} \quad -\frac{2}{3}$

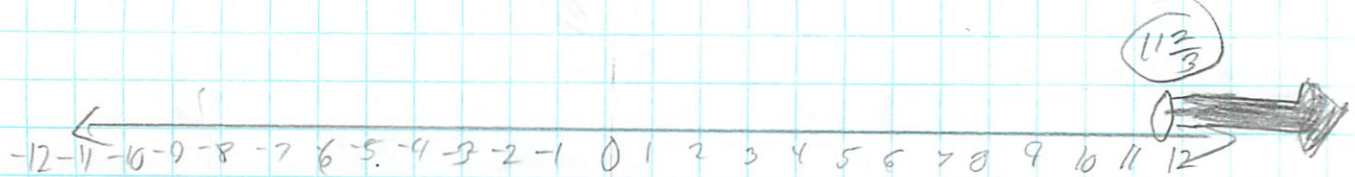
$-\frac{2}{3} = \frac{5}{3}x$

$\frac{5}{3} \quad \frac{5}{3}$

$-.4 = x$



13.



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28 April 2006

Feasible Region Notes

4/28

Feasible region - portion of the graph showing **all** of the solutions of a system

Steps

1. Solve each inequality for y
2. Graph each inequality separately
3. Determine which way to shade each inequality
   - True shade towards - False shade away
4. Find the area that is shaded in **all** inequalities - that's the Fesible Region

Example $x + y \leq 2$ **and** $-3x + 2y \geq 6$

$-y \quad -x$

$y \leq -x + 2$

$+3x \quad +3x$

$\frac{2y}{2} \geq \frac{3x + 6}{2}$

$y \geq \frac{3}{2}x + 3$

x	y
0	2
2	0

$0 \leq -x + 2$

$-2 \quad -2$

$-2 \leq -x$

$x \geq 2$

Test (0,0)

$0 \leq -0 + 2$

$0 \leq 2$ (T)

x	y
0	3
-2	0

$0 \geq \frac{3}{2}x + 3$

$-3 \quad -3$

$-3 \geq \frac{3}{2}x$

$\times \frac{2}{3} \quad \times \frac{2}{3}$

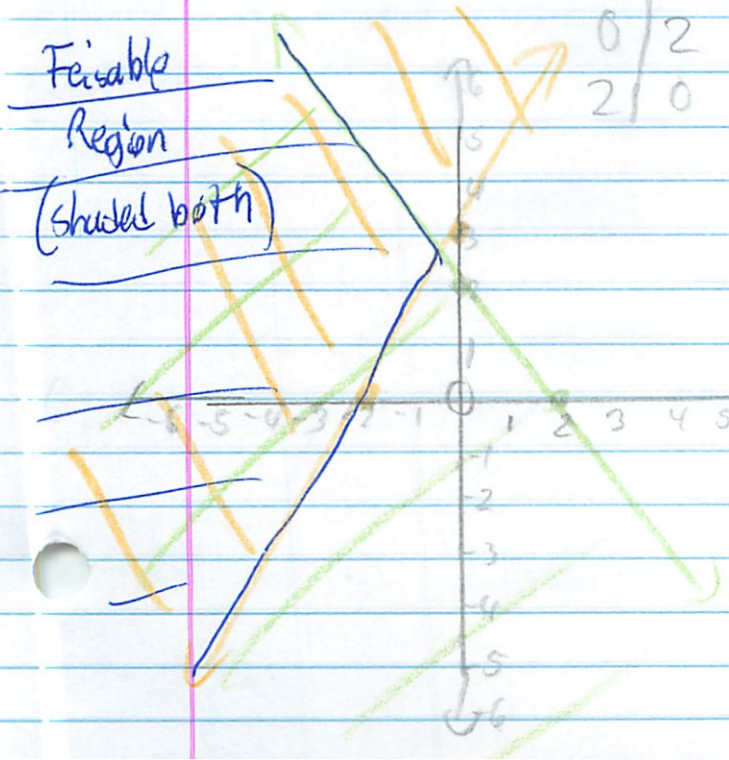
$-2 \geq x$

Test (0,0)

$0 \geq \frac{3}{2}(0) + 3$

$0 \geq 3$

(F)



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4th April 2006

Feasible Region

Homework

4/30

$2x + 4y \leq 8$

$-2x \quad -2x$

$\frac{4y}{4} \leq \frac{-2x+8}{4}$

$y \leq -\frac{1}{2}x + 2$

x	y
0	2
4	0

$0 \leq -\frac{1}{2}x + 2$

$-2 \quad -2$

$-2 \leq -\frac{1}{2}x$

$\div -\frac{1}{2} \quad \div -\frac{1}{2}$ or $\times -\frac{2}{1}$

$4 \geq x$

Normally divide, but can multiply inverse

Test (0,0)

$0 \leq -\frac{1}{2}(0) + 2$

$0 \leq 2$

(T)

$4x + 2y \leq 8$

$-4x \quad -4x$

$\frac{2y}{2} \leq \frac{-4x+8}{2}$

$y \leq -2x + 4$

x	y
0	4
2	0

$0 \leq -2x + 4$

$-4 \quad -4$

$\frac{-4}{-2} \geq \frac{-2x}{-2}$

$2 \geq x$

Test (0,0)

$0 \leq -2(0) + 4$

$0 \leq 4$

(T)

New Feasible Region

(T)

(T)

(F)

(F)

(T)

$2x + 3y \leq 12$

$-2x \qquad -2x$

$\frac{3y}{3} \leq \frac{-2x + 12}{3}$

$y \leq -\frac{2}{3}x + 4$

x	y
0	4
6	0

$0 \leq -\frac{2}{3}x + 4$

$-4 \qquad -4$

$-4 = -\frac{2}{3}x$

$\times -\frac{3}{2} \qquad \times -\frac{3}{2}$

$6 = x$

Again divide it or multiply inverse

$\times -\frac{3}{2}$ or $\times \frac{2}{3}$

Test (0,0)

$0 \leq -\frac{2}{3}(0) + 4$

$0 \leq 4$

(T)

$2x - y \leq 8$

$-2x \qquad -2x$

$-y \leq -2x + 8$

$\times -1 \qquad \times -1$

$y \geq 2x - 8$

x	y
0	-8
4	0

$0 \leq 2x - 8$

$+8 \qquad +8$

$8 = 2x$

$\frac{8}{2} = \frac{2x}{2}$

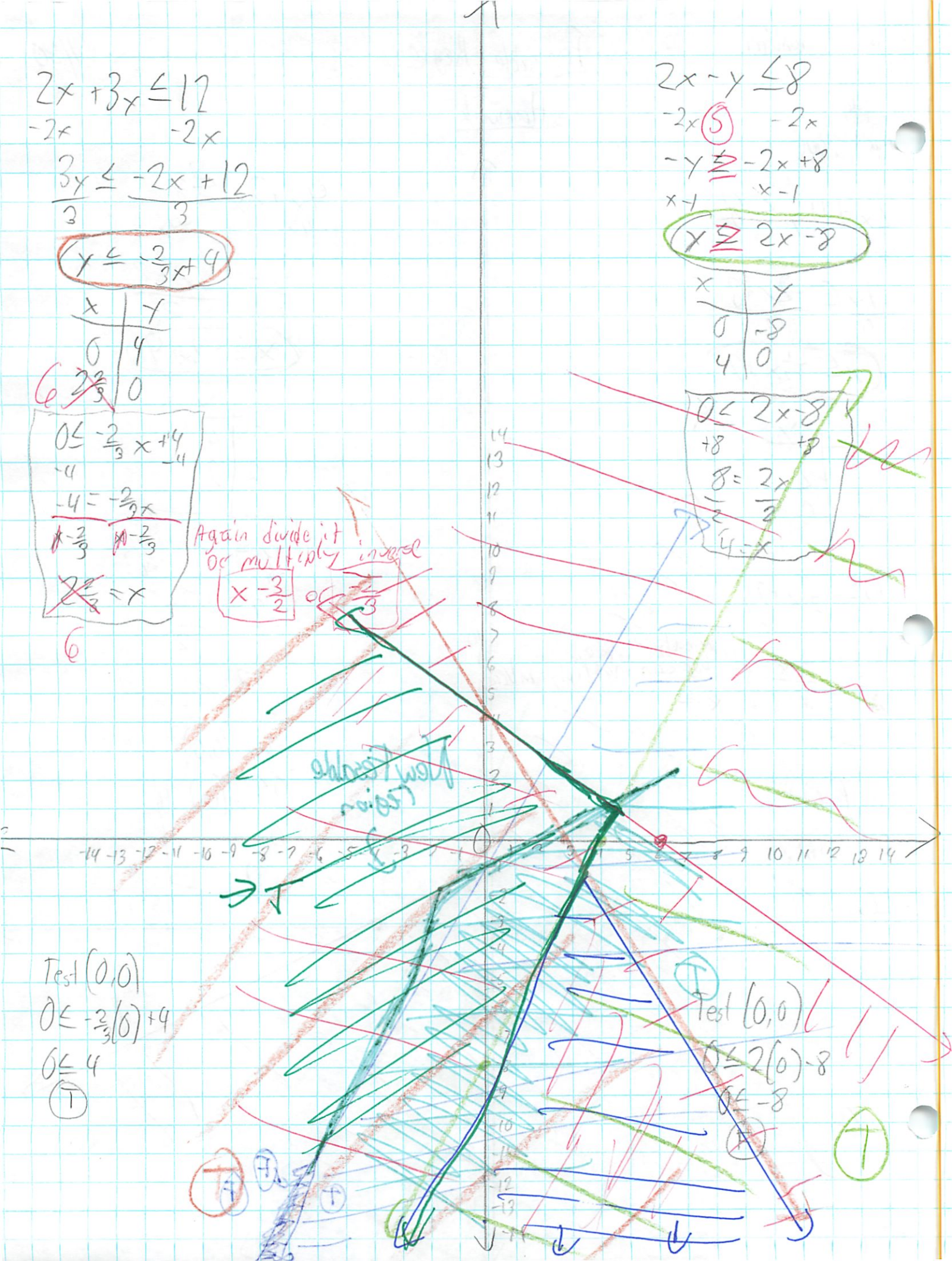
$4 = x$

Test (0,0)

$0 \leq 2(0) - 8$

$0 \leq -8$

(F)



$x \geq 2$ – horizontal line (x)

$\frac{3x + 3y \leq 12}{3}$

$x + y \leq 4$

$-x \quad -x$

$y \leq 4 - x$

x	y
0	4
4	0

$0 \leq 4 - x$

$-4 \quad -4$

$-4 = -x$

$x = 4 \quad x = 1$

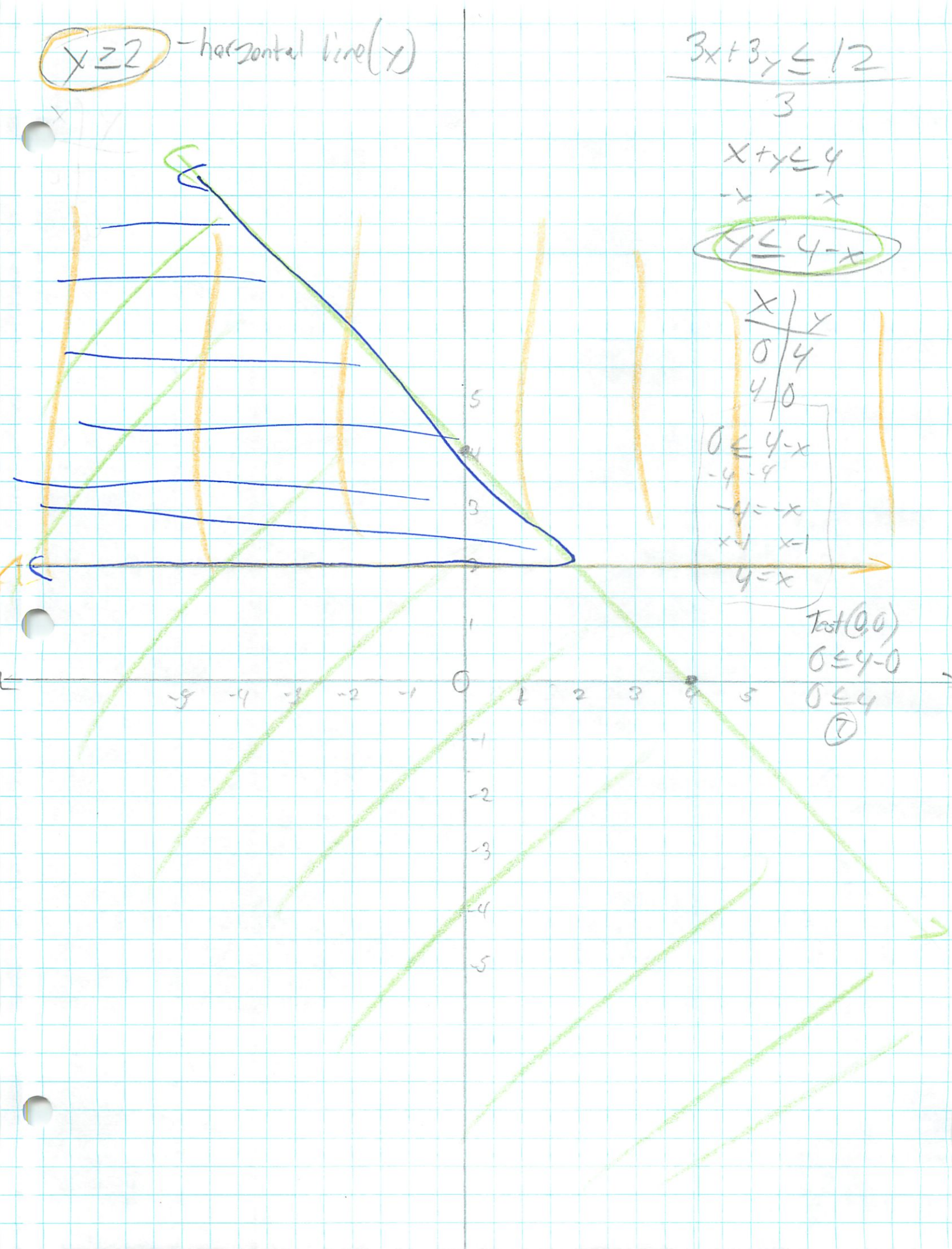
$4 = x$

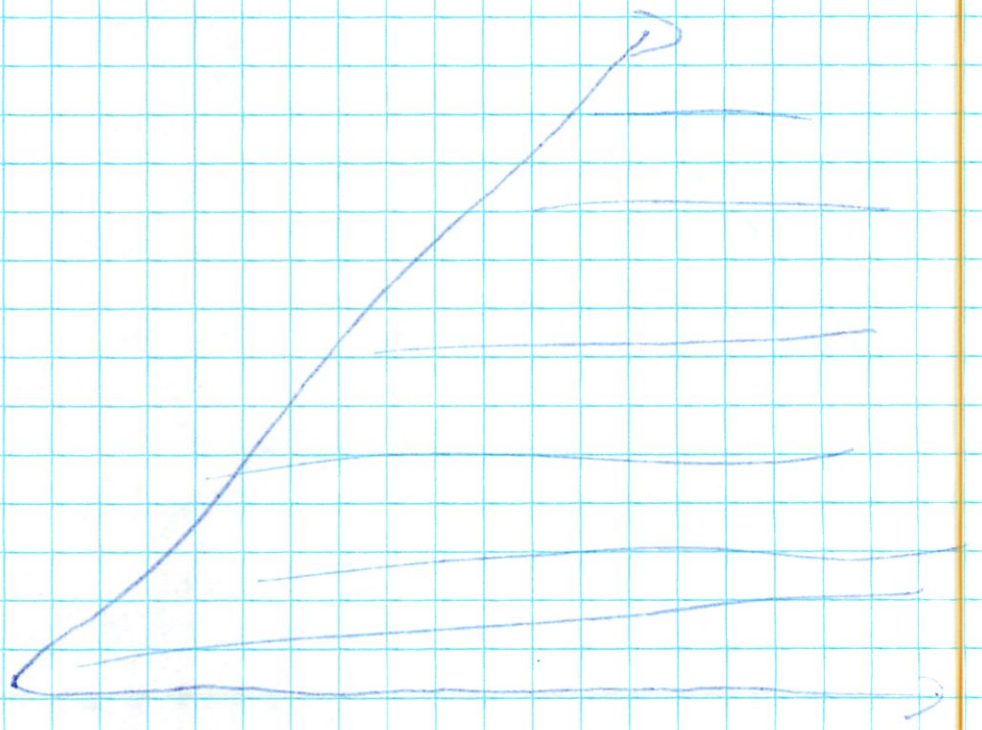
Test (0,0)

$0 \leq 4 - 0$

$0 \leq 4$

(T)





$x = 1$ - vertical line (x)

$2x + 3y \leq 12$

$-2x \quad -2x$

$\frac{3y}{3} \leq \frac{-2x + 12}{3}$

$y \leq -\frac{2}{3}x + 4$

x	y
0	4
6	0

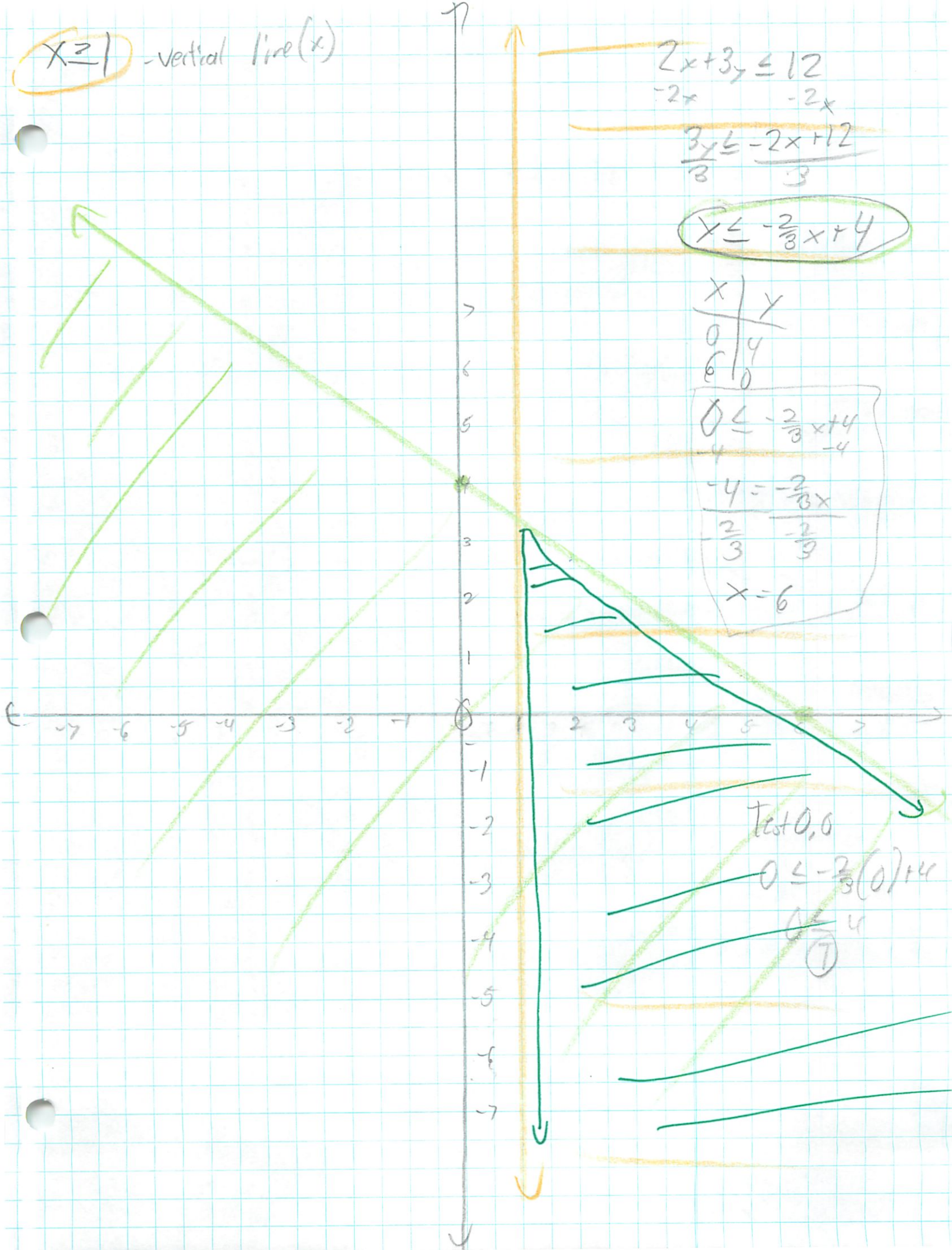
$0 \leq -\frac{2}{3}x + 4$

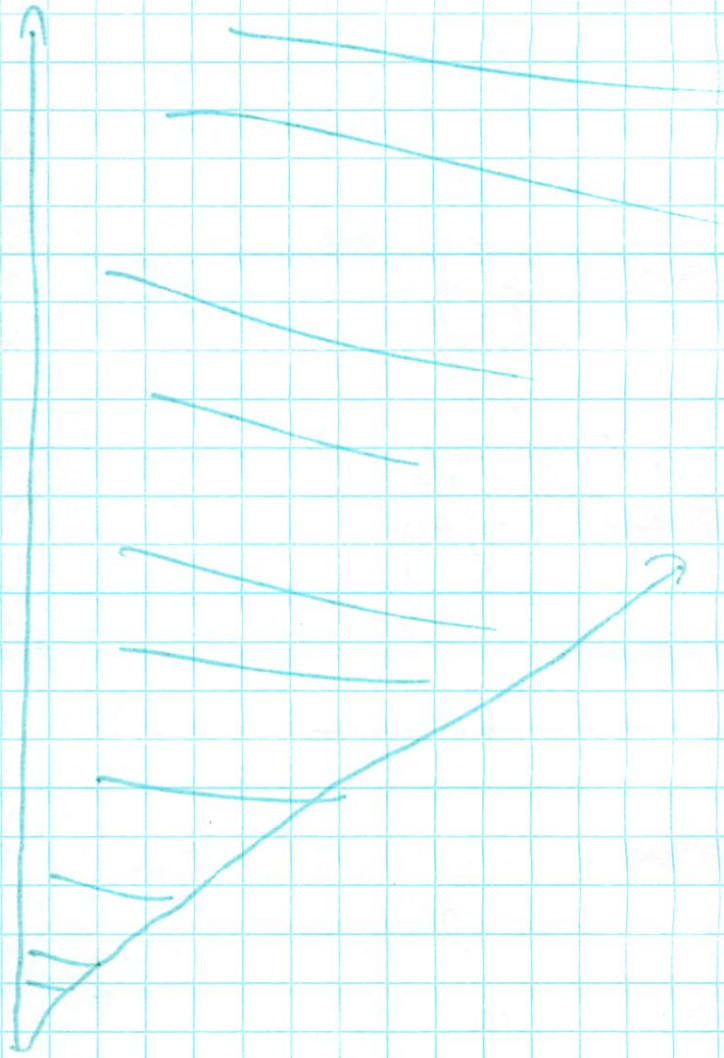
$-4 \quad -4$

$-4 = -\frac{2}{3}x$

$-\frac{2}{3} \quad -\frac{2}{3}$

$x = 6$





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May 2006

Picturing Pictures (7)

5/2

P = pastels W = watercolors

1. Constraints

$P + W \leq 16$
$5P + 15W \leq 180$
$P \geq 0$
$W \geq 0$

→ solve for y axis

$W \leq 16 - P$

P	W
0	16
16	0

$0 \leq 16 - 0$
$0 \leq 16$ (T)

and $W \leq -\frac{1}{3}P + 12$

P	W
0	12
36	0

$0 \leq \frac{1}{3}(0) + 12$
$0 \leq 12$ (T)

Profit

	P	W	Profit
1	6	10	1240
2	2	11	1180
3	8	8	1120
4	0	12	1200
5	16	0	640

Profit = $40P + 100W$ don't just copy that

~~40~~ 6 pastels and ~~100~~ 10 watercolors should be sold

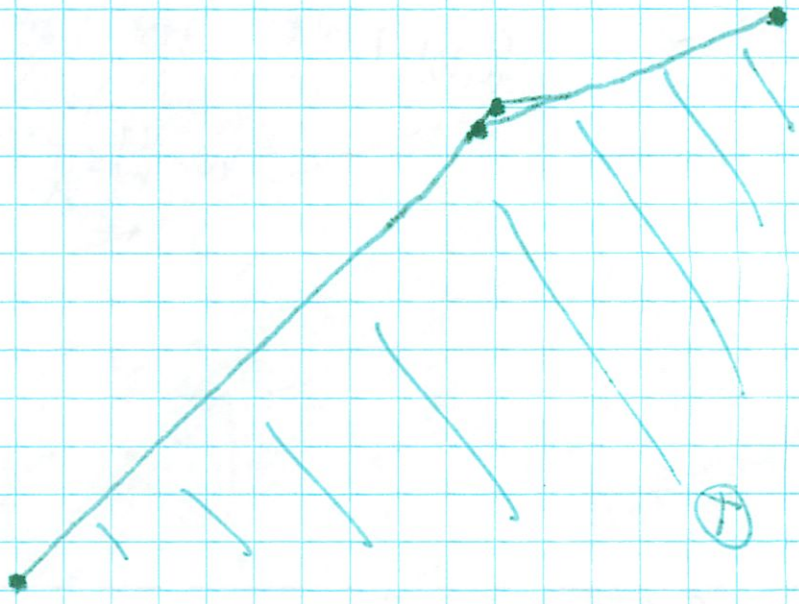
(6,10) - Most profit
- always test feasible region boundary to get max profit
- intersection points

(T)

To (36,0)

Watercolor Paintings

Pastal Paintings



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May 2006

Rock and Rap (12)

31/31

5/2

1. Constraints - reality; $k \geq 0$ $p \geq 0$ - k = rock, p = rap

Cost in $

$15{,}000k + 12{,}000p \leq 150{,}000$

$-15{,}000k \quad -15{,}000k$

$\frac{12{,}000p}{12{,}000} \leq \frac{150{,}000 - 15{,}000k}{12{,}000}$

$p \leq 12.5 - 1.25k$

x	y
0	12.5
10	0

$0 \leq 12.5 - 1.25k$

$-12.5 \quad -12.5$

$\frac{-12.5}{-1.25} = \frac{-1.25k}{-1.25}$

$10 = k$

Test (0,0)

$0 \leq 12.5 - 1.25(0)$

$0 \leq 12.5$ (T)

Hours for Union

$18k + 25p \geq 175$

$-18k \quad -18k$

$\frac{25p}{25} \geq \frac{175 - 18k}{25}$

$p \geq 7 - .72k$

x	y
0	7
$9\frac{13}{18}$	0

$0 \geq 7 - .72k$

$-7 \quad -7$

$\frac{-7}{-.72} \geq \frac{-.72k}{-.72}$

$9\frac{13}{18} \geq k$

Test (0,0)

$0 \geq 7 - .72(0)$

$0 \geq 7$ (F)

Distributor + Brand

$k \geq p$

$p \leq k$

(Its non strict because of the wording)

Can't test (0,0) - that's in the line - Testing (10,4)

$4 \leq 10$ (T)

Profit

Profit = 20000k + 30,000p

Test points

k	R	Profit
$5.\overline{55}$	$5.\overline{55}$	$277,777.\overline{77}$
4.08	4.08	$204,000
5	5	$250,000
7.5	2.5	$225,000
5	4	$220,000

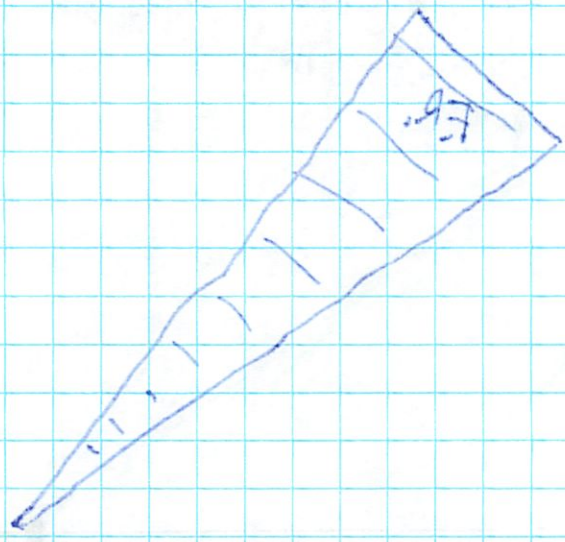
$(5.\overline{55}, 5.\overline{55})$ most profitable

F.R.

To make $5.\overline{55}$ Rock CDs and $5.\overline{55}$ rap CDs would be the most profitable.

# of Rap CDs (p)

# of Rock CDs (k)



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1 May 2006

Healthy Animals (5)

5/4

1. Constraints

Food A = A (x-axis) Food B = B (y-axis)

Protein

$2A + 6B \geq 30$

$-2A \quad -2A$

$6B \geq 30 - 2A$

$\frac{6B}{6} \geq \frac{30 - 2A}{6}$

$B \geq 5 - \frac{1}{3}A$

A	B
0	5
15	0

$0 \geq 5 - \frac{1}{3}A$

$-5 \quad -5$

$-5 = -\frac{1}{3}A$

$\frac{-5}{-\frac{1}{3}} = \frac{-\frac{1}{3}A}{-\frac{1}{3}}$

$15 = A$

Test (0,0)

$0 \geq 5 - \frac{1}{3}(0)$

$0 \geq 5$

(F)

Fat

$4A + 2B \geq 16$

$-4A \quad -4A$

$\frac{2B}{2} \geq \frac{16 - 4A}{2}$

$B \geq 8 - 2A$

A	B
0	8
4	0

$0 \geq 8 - 2A$

$-8 \quad -8$

$\frac{-8}{-2} = \frac{-2A}{-2}$

$4 = A$

Test (0,0)

$0 \geq 8 - 2(0)$

$0 \geq 8$

(F)

Total

$A + B \leq 12$

$-A \quad -A$

$B \leq 12 - A$

A	B
0	12
12	0

$0 \leq 12 - A$

$-12 \quad -12$

$\frac{-12}{-1} = \frac{-A}{-1}$

$12 = A$

Test (0,0)

$0 \leq 12 - 0$

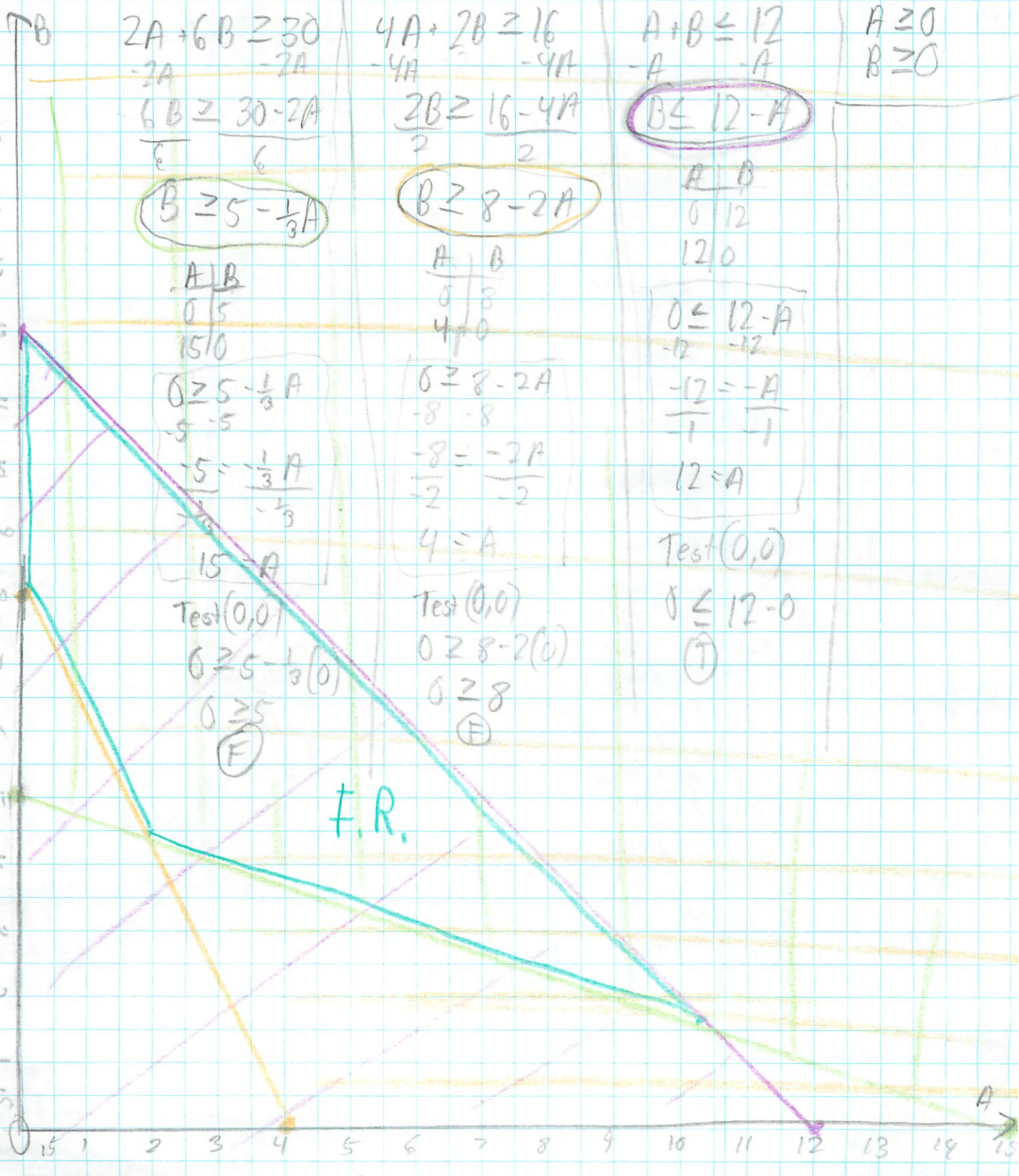
(T)

Reality (forgot)

$A \geq 0$

$B \geq 0$

F.R.



Michael Plasmeier
Behl
5/6/19
1 May 2006

You are what you eat (10)

5/4

1. Constraints

G = Sugar Glops S = Sweetums | $G \geq 0,\ S \geq 0$

Protein

$2G + 1S \geq 5$

$-2G \quad -2G$

$S \geq 5 - 2G$

X	Y
0	5
2.5	0

$0 \geq 5 - 2G$

$-5 \quad -5$

$\frac{-5}{-2} \geq \frac{-2G}{-2}$

$2.5 = G$

Test (0,0)

$0 \geq 5 - 2(0)$

$0 \geq 5$ (F)

Carbs

$15G + 10S \leq 50$

$-15G \quad -15G$

$\frac{10S}{10} \leq \frac{50 - 15G}{10}$

$S \leq 5 - 1.5G$

X	Y
0	5
$3\frac{1}{3}$	0

$0 \leq 5 - 1.5G$

$-5 \quad -5$

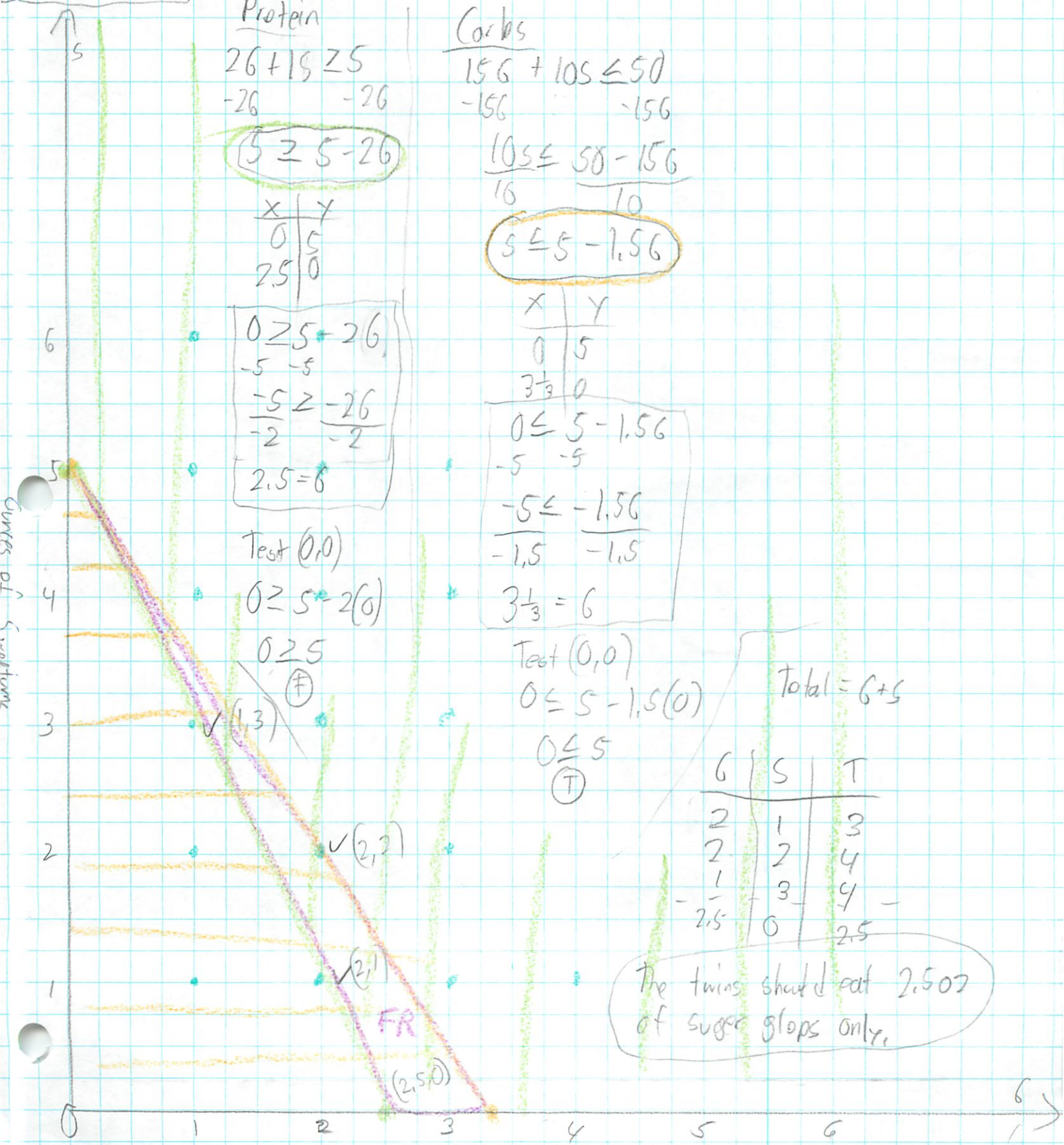
$\frac{-5}{-1.5} \leq \frac{-1.5G}{-1.5}$

$3\frac{1}{3} = G$

Test (0,0)

$0 \leq 5 - 1.5(0)$

$0 \leq 5$ (T)



Total = G + S

G	S	T
2	1	3
2	2	4
1	3	4
2.5	0	2.5

The twins should eat 2.5oz of sugar glops only.

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8 May 2006

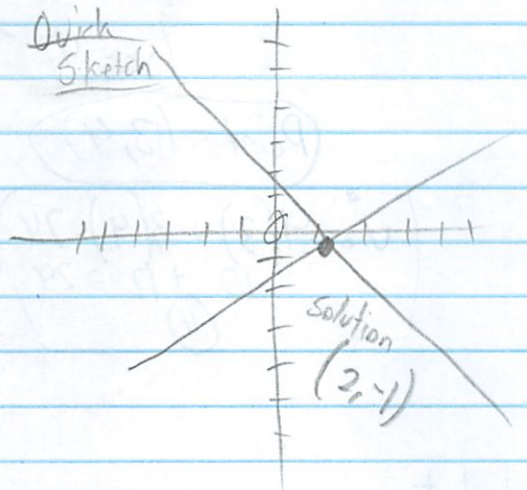
Solving System (of Linear Equations) Notes

5/8

goal - to find a solution (an ordered pair, a point in a plane) that satisfies all equations given

3 ways to solve

① graphing (by hand + calculator)
solve +
- graph each equation + find an intersection point
Ex: $3x+2y=4 \rightarrow y=-1.5x+2$
$-x+3y=-5 \rightarrow y=\frac{1}{3}x-\frac{5}{3}$



or do on calculator by entering lines in y= and finding intersection

② linear combination
- manipulating equations to find a solution
Ex: $2x+3y=7$
$+\ -2x+2y=-2$
$0x+5y=5$ ← add the two to get x or y 0
$\frac{5y}{5}=\frac{5}{5}$
$y=1$ ← now plug it into one → $2x+3(1)=7$
$2x+3=7$
$-3\ -3$
$\frac{2x}{2}=\frac{4}{2}$
$x=2$

Point is (2, 1) (can test this on either equation)

over →

linear combination (another example)

Ex: $-y + 2x = 2$

$4x + 3y = 24$ → rewrite to put it in order + cancle out (like terms in colums)

$2x - y = 2$

$4x + 3y = 24$ ← multiply to get opposites (only 1)

$\times 2$ ↓ $\times -2$ ↓ combine

$-4x + 2y = -4$

$0x + 5y = 20$

$\frac{5y}{5} = \frac{20}{5}$

$y = 4$

Point = $(3, 4)$

Sub in: $-(4) + 2x = 2$

$-4 + 2x = 2$

$+4 \quad +4$

$\frac{2x}{2} = \frac{6}{2}$ ← Solve

$x = 3$

J. $4(3) + 3(4) = 24$

$12 + 12 = 24$ ✓ ← check by substituting in other one

(3) Substitution

(see other sheet from May 12 2006)

28/31

Name Michael Plasmeier

Date 5/8

Solving Systems of Linear Equations

Directions: Solve these systems of linear combination by using the graphing method. Be sure to show all of your work!

1. $4x + y = -22$
   $-5x + 2x = -22$

$\rightarrow -4x \rightarrow y = -4x - 22$

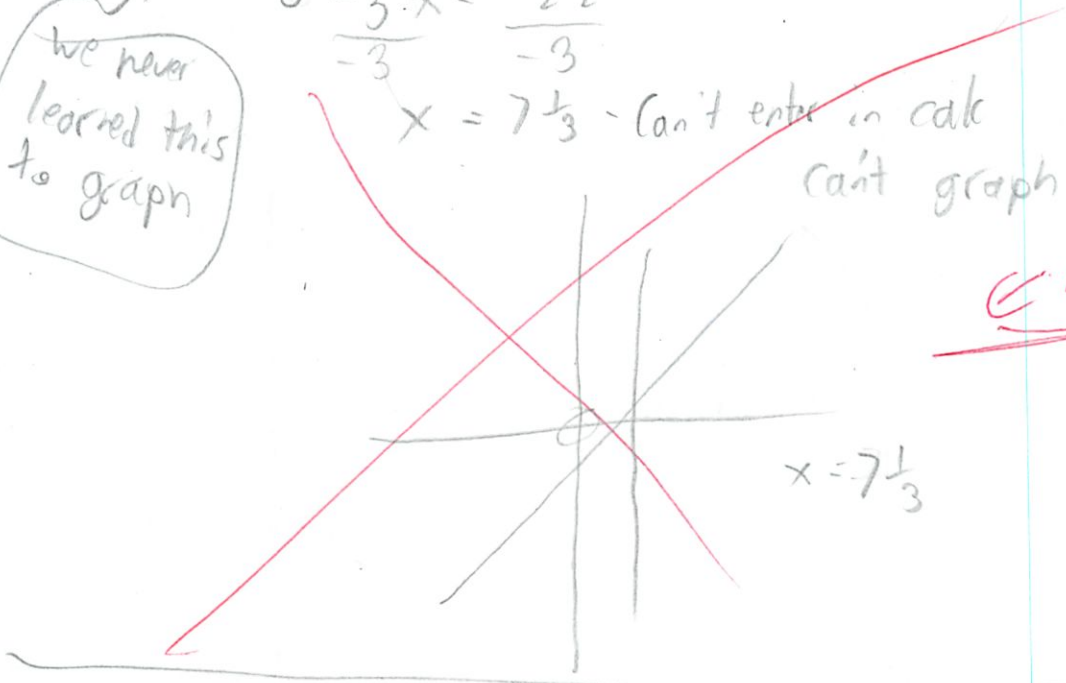
$\frac{-3x}{-3} = \frac{-22}{-3}$

$x = 7\frac{1}{3}$ - Can't enter in calc

Can't graph vertical

not counted

we never learned this to graph



2. $x + 3y = -2$
   $-3x + y = 6$
   $+3x \quad +3x$

$\rightarrow -x \rightarrow \frac{3y}{3} = \frac{-2 - x}{3}$

$y = -\frac{2}{3} - \frac{1}{3}x$

$y = 6 + 3x$

Entered in calc (-2, 0)

$y: 0 = 6 + 3(-2)$

$0 = 6 + -6$

$0 = 0$ ✓

Directions: Solve these systems of linear equations by using linear combination method. Be sure to show all of your work!

3. $4x - y = -2$
   $-2x + y = 3$

$\frac{2x}{2} = \frac{1}{2}$

$x = \frac{1}{2}$

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

$2 - y = -2$

$-2 \quad -2$

$-y = -4$

$x = 4$

$(\frac{1}{2}, 4)$

✓: $-2(\frac{1}{2}) + (4) = 3$

$-1 + 4 = 3$

$3 = 3$ ✓

4. $y - 4x = 2$
   $x - 2y = -11$

$-4x + y = 2$

$x - 2y = -11$

$\times 4 \quad \times 4$

$4x - 8y = -44$

$(6) \quad -4x = 2$

$-6 \quad -6$

$\frac{-4x}{-4} = \frac{-4}{-4}$

$x = -1$

$(1, 6)$

$\frac{-7y}{-7} = \frac{-42}{-7}$

$y = 6$

✓: $(1) - 2(6) = -11$

$1 - 12 = -11$

$-11 = -11$ ✓

Directions: Solve these systems of linear equations by using either the graphing or linear combination method. Be sure to show all of your work!

5. $9x - 5y = -30$
   $x + 3y = 18$

$-x \quad -x$

$\frac{3y}{3} = \frac{18 - x}{3}$

$y = 6 - \frac{1}{3}x$

$9x - 5y = -30$
$-9x \quad -9x$

$\frac{-5y}{-5} = \frac{-9x - 30}{-5}$

$y = 1.8x + 6$

I forgot to transfer the −

✓

Intersection; from calc (0, 0)

✓: $(5.625) + 3(4.125) = 18$

$5.625 + 12.375 = 18$

✓ but how does it check? - doesn't check on other one

-3

$(0) + 3(6) = 18$

$18 = 18$ ✓

6. $x - 4y = 20$
   $2x + 5y = 1$

$x-2 \quad x-2$

$-2x + 8y = -40$

$\frac{13y}{13} = \frac{-39}{13}$

$y = -3$

$2x + 5(-3) = 1$

$2x - 15 = 1$

$+15 \quad +15$

$\frac{2x}{2} = \frac{16}{2}$

$x = 8$

(8, −3)

✓: $(8) - 4(-3) = 20$

$8 + 12 = 20$

$20 = 20$ ✓

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8 Mar 2006

Linear Combination Practice

5/8

1. $x + 2y = 14$
$x - 2y = 10$ combine

remember → $x + x = 2x$

$\frac{2y}{2} = \frac{24}{2}$

$x = 12$

$(12) + 2y = 14$
$-12 \quad -12$

$\frac{2y}{2} = \frac{2}{2}$

$y = 1$

$(12, 1)$

V: $(12) - 2(1) = 10$
$12 - 2 = 10$
$10 = 10$ ✓

2. $4x + 3y = 8$
$x = 2y - 13$
$x - 4 \quad x - 4$

$-4x + 8y = 52$ combine

$\frac{11y}{11} = \frac{-44}{11}$

$y = -4$

$4x + 3(-4) = 8$
$4x + -12 = 8$
$+12 \quad +12$

$\frac{4x}{4} = \frac{20}{4}$

$x = 5$

$(5, -4)$

V: $(5) - 2(-4) = 13$
$5 + 8 = 13$
$13 = 13$ ✓

3. $6x - 5y = 3$
$8y - 12x = 5$ ↓ line up collems

$-12x + 8y = 5$
$12x - 10y = 6$ ×2

Combine ×2

$-2y = 11$

$\frac{-2y}{-2} = \frac{11}{-2}$

$y = -5.5$

$(-4.083, -5.5)$

$6x - 5(-5.5) = 3$
$6x + 27.5 = 3$
$-27.5 \quad -27.5$

$\frac{6x}{6} = \frac{-24.5}{6}$

$x = -4.083$

V: Matches Teacher Answer ✓

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Board Problems (of sub)

5/10

Solve either way

1. $2x - 3y = -16$, $x + 3y = 19$

$x = 19 - 3y$

$2(19 - 3y) - 3y = -16$

$38 - 6y - 3y = -16$

$-9y = -54$

$y = 6$

$x = 19 - 3(6)$

$x = 1$

$(1, 6)$

V: $2(1) - 3(6) = -16$

$2 - 18 = -16$

$-16 = -16$ ✓

2. $-2x + y = 5$, $x + y = 8$

$y = 5 + 2x$, $y = 8 - x$

$5 + 2x = 8 - x$

$3x = 3$

$x = 1$

$y = 8 - 1$

$y = 7$

Calc: $(1, 7)$

V: $(1) + (7) = 8$

$8 = 8$ ✓

3. $2x + y = 4$, $x + y = 3$

$y = 4 - 2x$, $y = 3 - x$

$4 - 2x = 3 - x$

$1 = x$

$y = 3 - 1$

$y = 2$

Calc: $(1, 2)$

V: $(1) + (2) = 3$

$3 = 3$ ✓

4. $x + 2y = 0$, $-x + y = -3$

$x = -2y$

$-2y + y = -3$

$-y = -3$

$y = 3$

$x = -2(3)$

$x = -6$

$(-6, 3)$

V: $(-6) + 2(3) = 0$

$-6 + 6 = 0$

$0 = 0$ ✓

5. $4x - 9y = 8$, $8x - 18y = 19$

$y = -\frac{8}{9} + \frac{4}{9}x$, $y = -\frac{19}{18} + \frac{4}{9}x$

$-\frac{8}{9} + \frac{4}{9}x = -\frac{19}{18} + \frac{4}{9}x$

$-\frac{16}{18} + \frac{4}{9}x = -\frac{19}{18} + \frac{4}{9}x$

$0 = -\frac{3}{18}$

$0 = -\frac{1}{6}$

Calc: $\left(\frac{3}{16}, -\frac{35}{36}\right)$

V: $4\left(\frac{3}{16}\right) - 9\left(-\frac{35}{36}\right) = 8$

$\frac{3}{4} - 8\frac{3}{4} = 8$

$8 = 8$ ✓

$-4/-9 = +\frac{4}{9}$ That should be pos, but it checks right

Lines are parallel. No solution

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10 May 2006

Charity Rock (19)

5/10

1. $5x + 2y = 11$
$x + y = 4$
$x{-}2 \quad x{-}2$
$-2x + -2y = -8$
$3x = 3$
$\frac{3x}{3} = \frac{3}{3}$
$x = 1$ — $(1, 3)$

$5(1) + 2y = 11$
$5 + 2y = 11$
$-5 \qquad -5$
$2y = 6$
$\frac{2y}{2} = \frac{6}{2}$
$y = 3$

V: $(1) + (3) = 4$
$4 = 4$ ✓

2. $2p + 5q = 15$
$-2p \qquad -2p$
$5q = 15 - 2p$
$\frac{5q}{5} = \frac{15-2p}{5}$
$q = 3 - \frac{2}{5}p$

$6p + 15q = -29$
$-6p \qquad -6p$
$15q = -29 - 6p$
$\frac{15q}{15} = \frac{-29-6p}{15}$
$q = -\frac{29}{15} - \frac{6}{15}p$

When you graph you see
No solution
same slope
parallel lines — symbol ∥
If combo method, both p + q cancle out · but not intger

3. $3a + b = 4$
$-3a \qquad -3a$
$b = 4 - 3a$

$6a + 2b = 8$
$-6a \qquad -6a$
$2b = 8 - 6a$
$\frac{2b}{2} = \frac{8-6a}{2}$
$b = 4 - 3a$

✓ Every point a solution
Lines are the exact same
Lines always intersect
If combo method, all 3 cancle out

Part 2
Night 1: $230R + 835G = 23{,}600$ — 1st Night
$250R + 980G = 27{,}100$ — 2nd Night
$-230R \qquad -250R$
$835G = 23{,}600 - 230R$
$\frac{835G}{835} = \frac{23{,}600 - 230R}{835}$
$G = \frac{23600}{835} - \frac{230}{835}R$

Don't need to simp

$980G = 27{,}100 - 250R$
$\frac{980G}{980} = \frac{27{,}100 - 250R}{980}$
$G = \frac{27100}{980} - \frac{250}{980}R$

Re-type

Mixed # $(5 + 1/2)$ ↑ put plus parenthese

Calc: $(30, 20)$

$20 \times (835 + 980) / 2$
Charity \$18,150

A Reserved seat is \$30
A GA seat is \$20

W: Other Person got same thing ✓

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More Linear System (18)

31/31

5/10

1. $3(c+4) - 2c = 16 - 4(c+5)$
$3c + 12 - 2c = 16 - 4c - 20$
$c + 12 = -4 - 4c$
$-12 \quad -12$
$c = -16 - 4c$
$+4c \quad +4c$
$\frac{5c}{5} = \frac{-16}{5}$
$c = -3.2$

Calc: Enter each side - results to 8.8 ✓

2. $t + 2(t-4) = 5(1-2t)$
$t + 2t - 8 = 5 - 10t$
$3t - 8 = 5 - 10t$
$+8 \quad +8$
$3t = 13 - 10t$
$+10t \quad +10t$
$\frac{13t}{13} = \frac{13}{13}$
$t = 1$

Calc V: ✓

3. $\frac{r+5}{2} = 12 - 3r$
$(r+5) = 12 - 3r$
$\times 2 \quad \times 2$
$r + 5 = 24 - 6r$
$-5 \quad -5$
$r = 19 - 6r$
$+6r \quad +6r$
$\frac{7r}{7} = \frac{19}{7}$
$r = 2\frac{5}{7}$ or $19/7$

Calc: ✓

4. $7w + 2(3 - 2w) = 4(w+2) - (w-6)$

$7w + 6 - 4w = 4w + 8 - w + 6$

$3w + 6 = 3w + 14$

$-6 \quad -6$

$\frac{3w}{3} = \frac{3w + 8}{3}$

$w = w + 2\frac{2}{3}$

↙ Can't be done

V: ? How?

Part 2

Find variables separately

$4a - 5b = -4$

$3a + 6b = 10$

$\times -\frac{4}{3}$

$-4a - 8b = -13\frac{1}{3}$

$-13b = 9\frac{1}{3}$

$-13 \quad -13$

$b = -\frac{7}{9}$

look for making sense

$4a - 5\left(-\frac{7}{9}\right) = -4$

$4a + 3\frac{8}{9} = -4$

$-3\frac{8}{9} \quad -3\frac{8}{9}$

$\frac{4a}{4} = \frac{-7\frac{8}{9}}{4}$

$a = -1\frac{35}{36}$

$\left(-1\frac{35}{36}, -\frac{7}{9}\right)$

V: $3\left(-1\frac{35}{36}\right) + 6\left(-\frac{7}{9}\right) = 10$

$-4 - 8 - 12$

No, keep 13

See other Page →

2. $u - v = 3$

$-u \quad -u$

$-v = 3 - u$

$\times -1 \quad \times -1$

$v = -3 + u$

$2u + 2v = 10$

$-2u \quad -2u$

$\frac{2v}{2} = \frac{10 - 2u}{2}$

$v = 5 - u$

Calc (4, 1)

(u, v)

V: $(4) - (1) = 3$

$3 = 3$

✓

3. $2x + 3y = 1$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{1 - 2x}{3}$

$y = \frac{1}{3} - \frac{2}{3}x$

$\frac{6y}{6} = \frac{7 - 4x}{6}$

$y = \frac{7}{6} - \frac{2}{3}x$

Same slope, line parallel

Mixed # in calc as

(5 + (1/2)) NOT 5(1/2)

#1 Again otherway

$4a - 5b = -4$ $\quad -4a \quad -4a$

$\frac{-5b}{-5} = \frac{-4-4a}{-5}$

$\boxed{b = \frac{4}{5} + \frac{4}{5}a}$

$3a + 6b = 10$ $\quad -3a \quad -3a$

$\frac{6b}{6} = \frac{10-3a}{6}$

$\boxed{b = 1\frac{2}{3} - \frac{1}{2}a}$

Calc Intersection $\left(\frac{2}{3}, 1\frac{1}{3}\right)$

V: $3\left(\frac{2}{3}\right) + 6\left(1\frac{1}{3}\right) = 10$

$2 + 8 = 10$

$10 = 10$ (J)

Jeeze, that was easy

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12 May 2006

Substitution Method
Solving Systems

5/12

3rd method we learned

Ex $2x - 3y = -16$
$x + 3y = 19$
$-3y \quad -3y$
$\boxed{x = 19 - 3y}$

$2(19 - 3y) - 3y = -16$
$38 - 6y - 3y = -16$
$38 - 9y = -16$
$-38 \quad -38$
$\frac{-9y}{-9} = \frac{-54}{-9}$
$\boxed{y = 6}$

$x + 3(6) = 19$
$x + 18 = 19$
$-18 \quad -18$
$\boxed{x = 1}$

(1, 6) - Then ✓ like before

Ex 2 $2x + y = 4$
$x + y = 3$
Can also → $-y \quad -y$
$-x$ to get y= $\boxed{x = 3 - y}$

$2(3 - y) + y = 4$
$6 - 2y + y = 4$
$6 - y = 4$
$-6 \quad -6$
$\frac{-y}{-1} = \frac{-2}{-1}$
$\boxed{y = 2}$

$x + (2) = 3$
$-2 \quad -2$
$\boxed{x = 1}$

(1, 2) - Then ✓ like before

Ex 3 $-2x + y = 5$
$x + y = 8$
$-x \quad -x$
$\boxed{y = 8 - x}$

$-2x + (8 - x) = 5$
$-2x + 8 - x = 5$
$-3x + 8 = 5$
$-8 \quad -8$
$\frac{-3x}{-3} = \frac{-3}{-3}$
$\boxed{x = 1}$

$(1) + y = 8$
$-1 \quad -1$
$\boxed{y = 7}$

(1, 7)

Ex 4

$x + 2y = 0$

$-x + y = -3$

$+x \quad +x$

$y = -3 + x$

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

$x + -6 + 2x = 0$

$3x - 6 = 0$

$+6 \quad +6$

$\frac{3x}{3} = \frac{6}{3}$

$x = 2$

$(2) + 2y = 0$

$-2 \quad -2$

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

$y = -1$

$(2, -1)$

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IAG 2 – ~~H~~
BEHL

Don't forget solid = nonstrict = ≤
dashed = strict = <

Cookies Unit ~~Quiz~~ Review

1. Solve and graph this inequality for x

$2 - 3x \leq 11$

$-2 \quad -2$

$\frac{-3x}{-3} \leq \frac{9}{-3}$ ← you can combine them - there are no variables

$x \geq -3$ ← Don't have to, if you notice $-2/-3 = \frac{2}{3}$ not $\frac{1}{3}$

(S) witch

2. Solve and graph the following inequality. Be sure to label your axes and scale them appropriately

$4x - 2y \geq 1$

$-4x \quad -4x$

$\frac{-2y}{-2} \geq \frac{1-4x}{-2}$ (S)

$y \leq -\frac{1}{2} + 2x$

x	y
0	$\frac{1}{2}$
$\frac{1}{4}$	0

$0 = -\frac{1}{2} + 2x$

$+\frac{1}{2} \quad +\frac{1}{2}$

$\frac{\frac{1}{2}}{2} = \frac{2x}{2}$

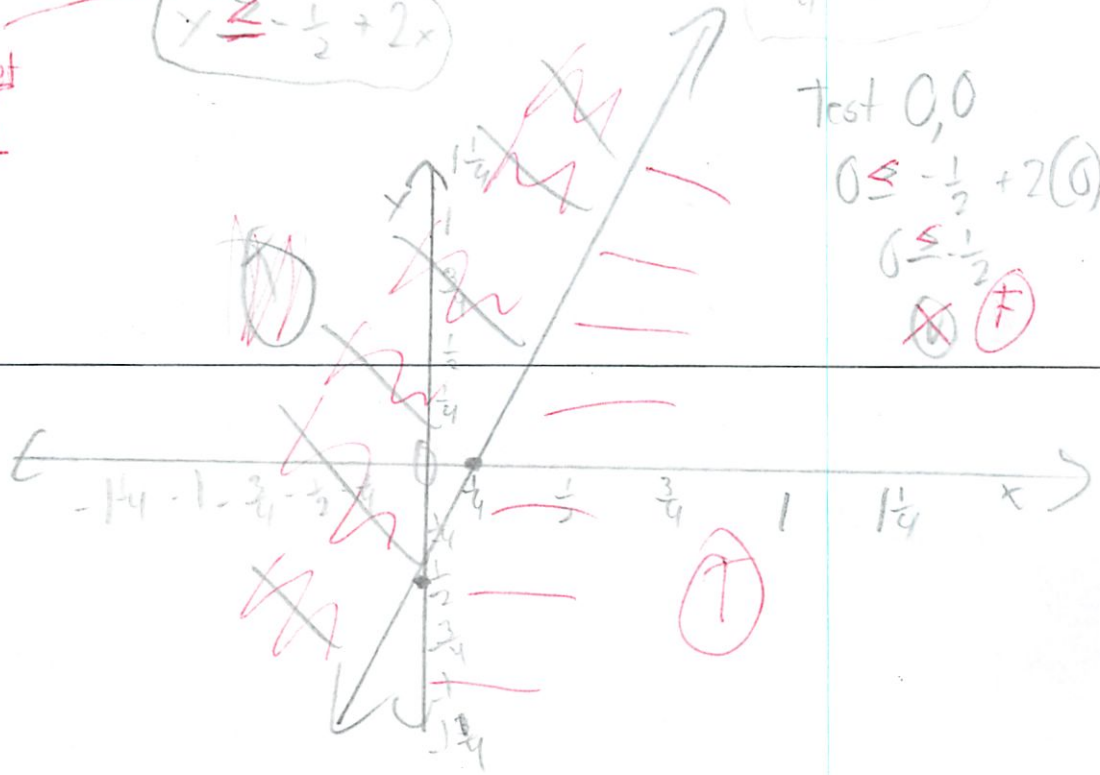
$\frac{1}{4} = x$

x or ÷ by − Don't forget to (S)

Test 0,0

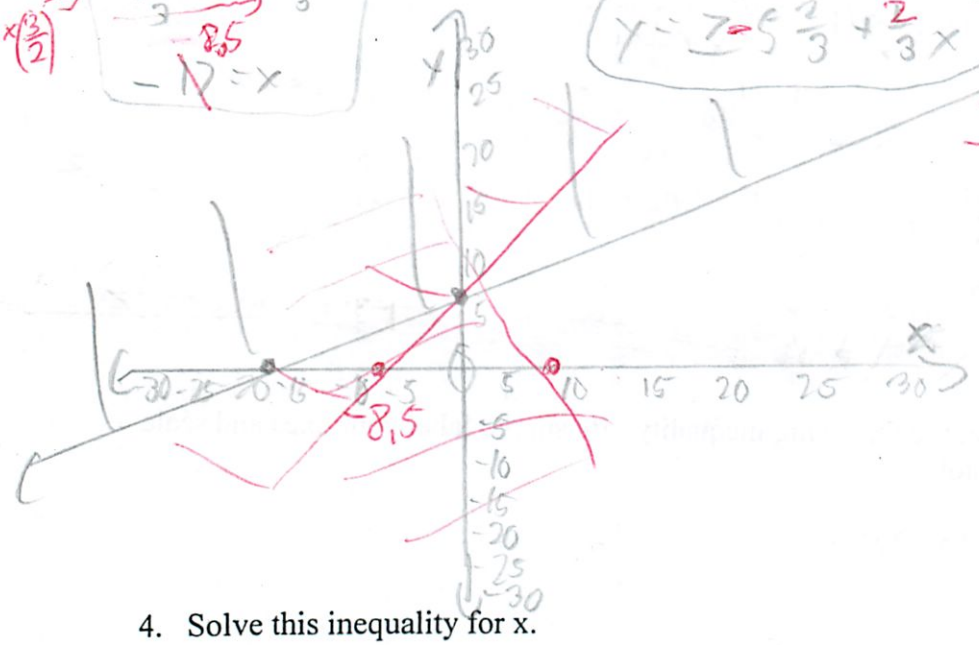
$0 \leq -\frac{1}{2} + 2(0)$

$0 \leq -\frac{1}{2}$ (F)



3. Solve and graph the following inequality. Be sure to label your axes and scale them appropriately.

$2x - 3y \leq 17$

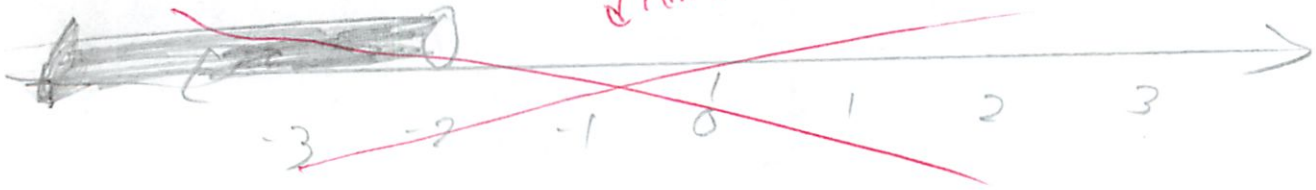


Same mistake as before

4. Solve this inequality for x.

$-11 - 9(4x + 2) < 43$

-forgot to



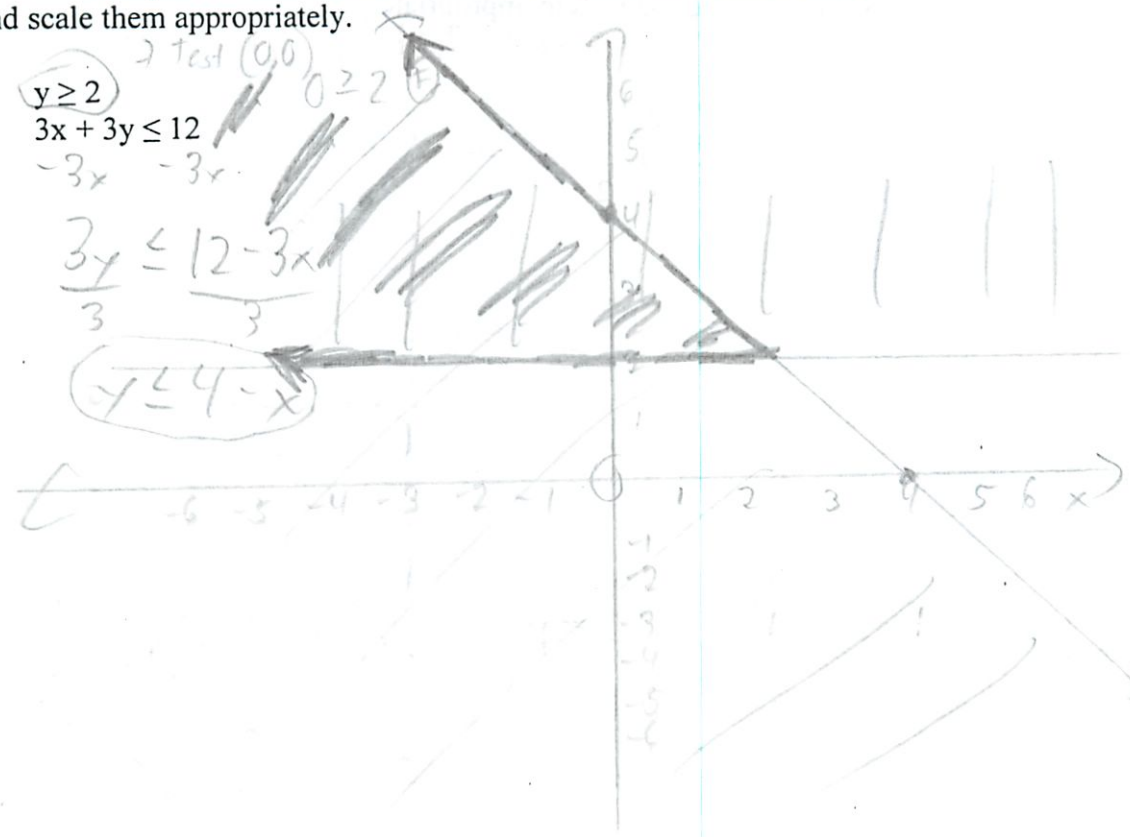
didn't need to graph

1st one Correct

5. Solve each of these inequalities and find their feasible region. Be sure to label your axes and scale them appropriately.

$y \geq 2$

$3x + 3y \leq 12$

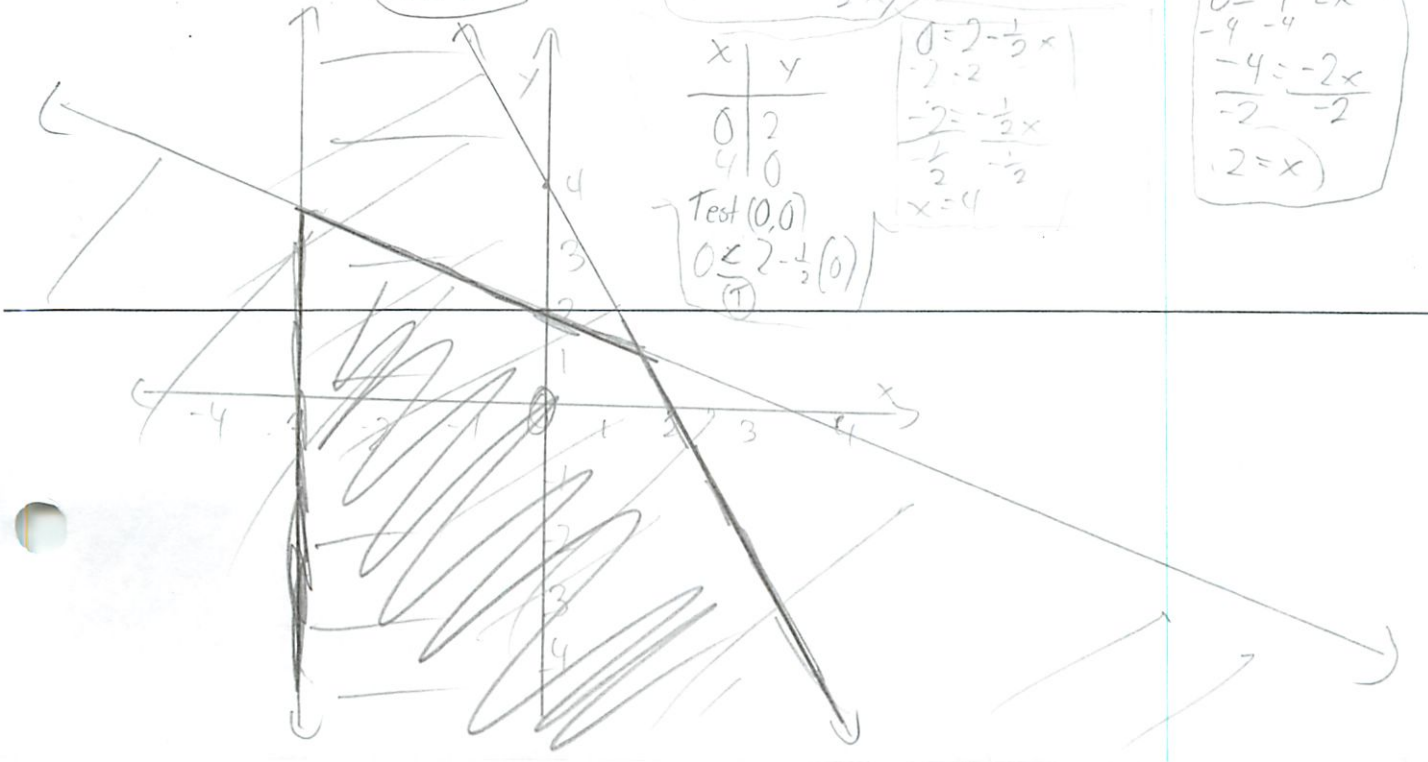


6. Solve each of these inequalities and find their feasible region. Be sure to label your axes and scale them appropriately.

$2x + 4y \leq 8$

$4x + 2y \leq 8$

$x \geq -3$



Much better now

7. Solve each of these inequalities and find their feasible region. Be sure to label your axes and scale them appropriately.

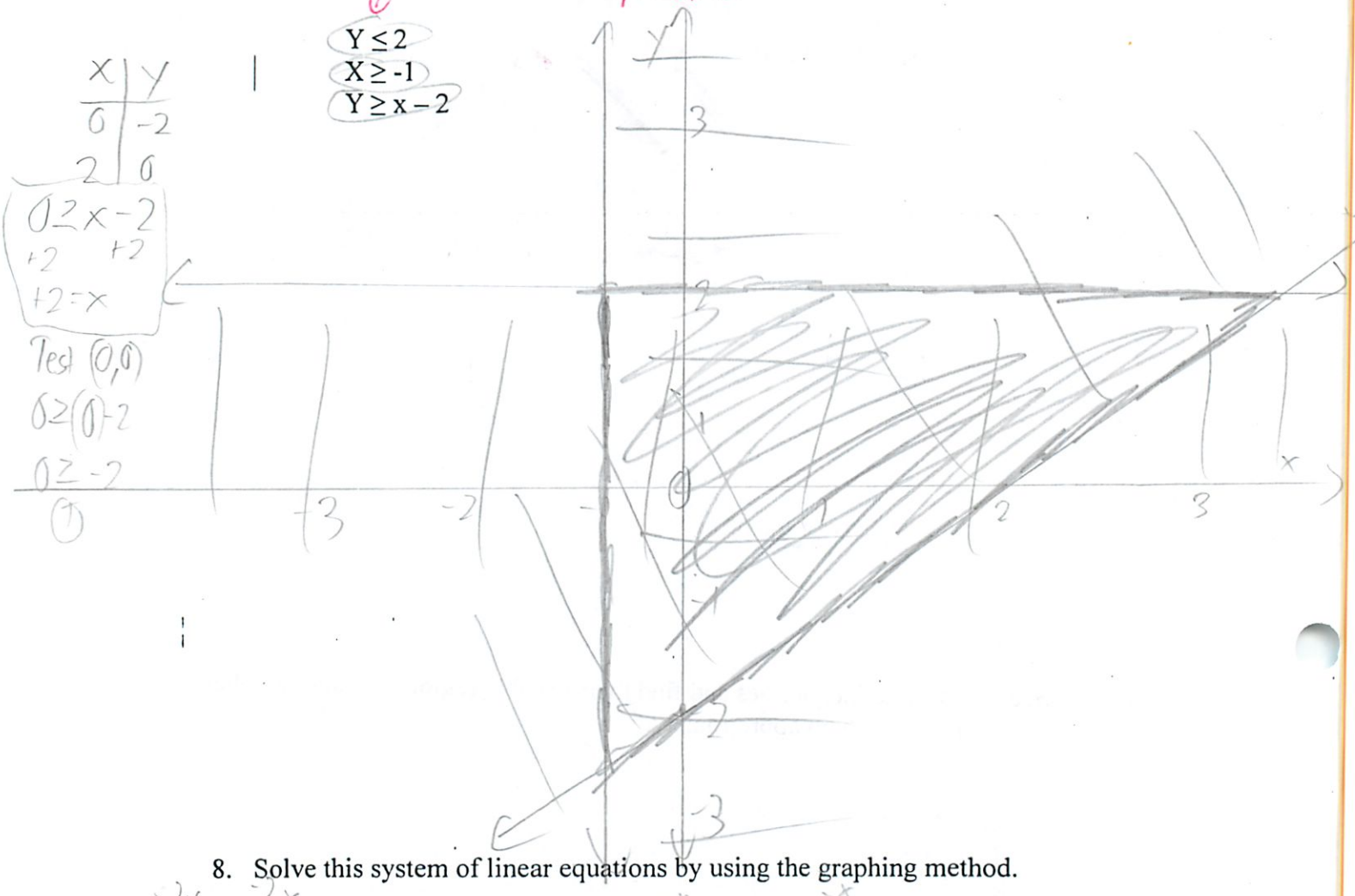
remember strict/nonstrict

$Y \leq 2$
$X \geq -1$
$Y \geq x - 2$

x	y
0	-2
2	0

$0 \geq x - 2$
$+2 \quad +2$
$+2 \geq x$

Test (0,0)
$0 \geq (0) - 2$
$0 \geq -2$



8. Solve this system of linear equations by using the graphing method.

$2x - 3y = -16$
$x + 3y = 19$

$-3y = -16 - 2x$
$\frac{-3y}{-3} = \frac{-16 - 2x}{-3}$
$y = 5\frac{1}{3} + \frac{2}{3}x$

$\frac{3y}{3} = \frac{19 - x}{3}$
$y = 6\frac{1}{3} - \frac{1}{3}x$

Calc: (1, 6)

Ver: $2(1) - 3(6) = -16$
$2 - 18 = -16$
✓

9. Solve this system of linear equations by using the linear combination method. Be sure to show all of your work!

$-2x + y = 5$
$-8 + x = -y$

$-x \quad -x$
$-8 = -x - y$

$-x - y = -8$

$\frac{-3x}{-3} = \frac{-3}{-3}$

$x = 1$

$-8 + (1) = -y$

$-7 = -y$

$\frac{-7}{-1} = \frac{-y}{-1}$

$7 = y$

$(1, 7)$

$-2(1) + (7) = 5$

$-2 + 7 = 5$

$5 = 5$

✓

10. Miss Behl has decided to sell some of her photography in order to make a little extra cash. She can create black and white pictures and color pictures. Each type of picture takes Miss Behl about the same amount of time to develop. She figures that has time to make a total of at most 16 photos. The materials for each black and white photo costs her \$5 and the material for each color photo will cost her \$15. Miss Behl has \$180 to spend on the materials. She will make a profit of \$20 on each black and white photo and a profit of \$35 on each color photo.

a. Express Miss Behl's constraints as inequalities, using x for the black and white photos, and y for the color photos.

Total $x + y \leq 16$

Supplies $5x + 15y \leq 180$

Reality $x \geq 0$

$y \geq 0$

b. Make are graph that shows Miss Behl's feasible region.

-see other page

c. Write an algebraic expression to represent Miss Behl's profit in terms of x and y.

Profit

$20x + 35y = \text{Profit}$

d. Determine how many black and white photos and color photos Miss Behl will have to make in order to maximize her profit.

x	y	$
0	12	420
16	0	320
6	10	470 ← 6 Black + Whites + 10 Colors give max profit of $470
9	5	355
12	3	345
1	11	405

Only need these boundary points

Don't forget

Extra Credit:

1. Solve this system of linear equations by using any method you like. You must show all of your work to get any credit.

$4x - 9y = 8$
$8x - 18y = 19$

$\frac{-9y}{-9} = \frac{8-4x}{-9}$ $\quad y = (8-4x)/-9$

$\frac{-18y}{-18} = \frac{19-8x}{-18}$ $\quad y = (19-8x)/-18$

Calc
Parallel Lines
No intersection points

2. Solve this system of linear equations by using the substitution method. You must show all of your work to get any credit.

$2x + y = 4$
$3 = y + x$

$y = 4 - 2x$

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

$2(1) + y = 4$
$2 + y = 4$
$y = 2$

$(1, 2)$

$3 = (2) + (1)$
$3 = 3$ ✓

I got better toward the end, don't forget to ⑤ when graphing and ÷ or × by a ⁻number

Behl's Photos (Review Packet) Michael Placmier 5/16

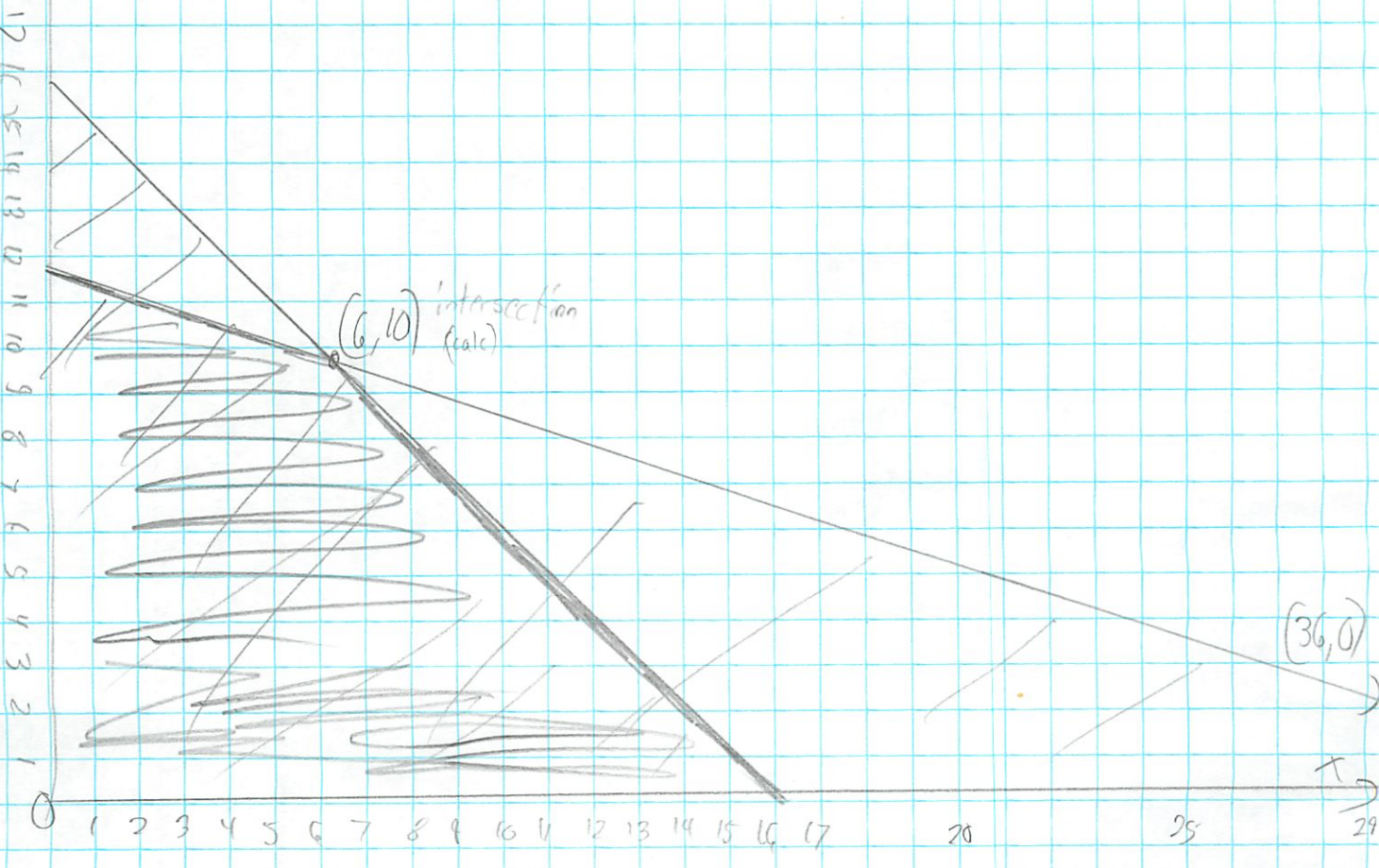
Total: $x + y \leq 16$

x	y
0	16
16	0

Supplies: $5x + 15y \leq 180$

x	y
0	12
36	0

Show solving for y



Unit Test Review

Name _____
IAG 2 – H
BEHL

Cookies Unit Quiz Practice

1. Solve and graph this inequality for x

Re-do

$2 - 3x \leq 11$

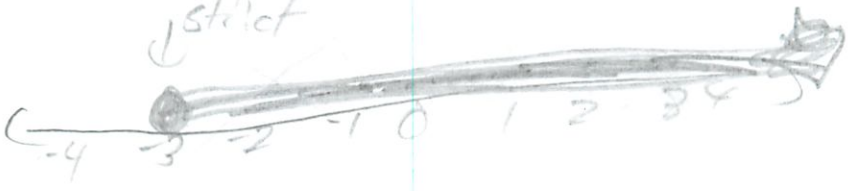
$-2 \quad -2$

$-3x \leq 11 - 2$

Switch → $\frac{-3x}{-3} \leq \frac{9}{-3}$

$x \geq -3$

C



2. Solve and graph the following inequality. Be sure to label your axes and scale them appropriately

$4x - 2y \geq 1$

$-4x \quad -4x$

$-2y \geq 1 - 4x$

Switch → $\frac{-2y}{-2} \geq \frac{1-4x}{-2}$

$x \leq -4/-2 = +2$

$y \geq -\frac{1}{2} + 2x$

Forgot to actually switch, even though I wrote it

3. Solve and graph the following inequality. Be sure to label your axes and scale them appropriately.

$2x - 3y \leq 17$

$-2x \quad -2x$

$\frac{-3y \leq 17 - 2x}{-3} \quad (\leq) \quad \frac{}{-3}$

$y \geq -5\frac{2}{3} + \frac{2}{3}x$

Actually switch

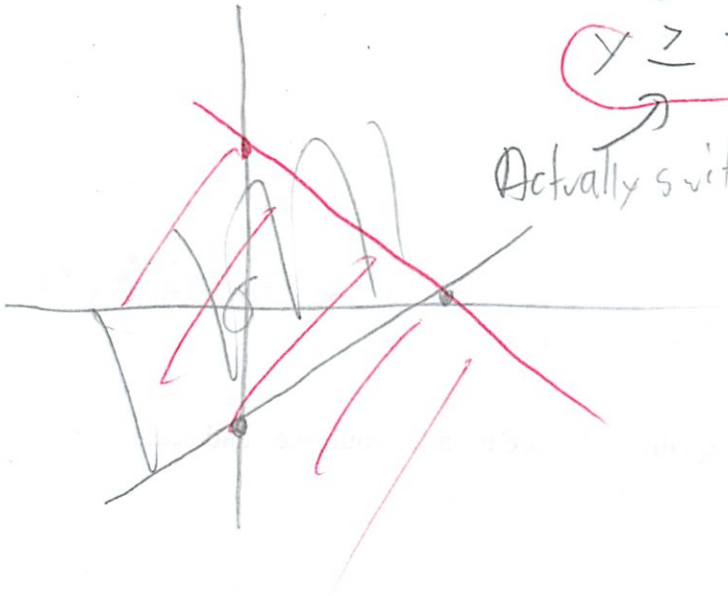
x	y
0	$-5\frac{2}{3}$
2.5	0

Calc error

$0 \geq -5\frac{2}{3} + \frac{2}{3}x$

$+5\frac{2}{3} \quad +5\frac{2}{3}$

$\frac{5\frac{2}{3}}{\frac{2}{3}} \geq \frac{\frac{2}{3}x}{\frac{2}{3}}$



Test (0,0)

$0 \geq -5\frac{2}{3} + \frac{2}{3}(0)$

$0 \geq -5\frac{2}{3}$

(T)

4. Solve this inequality for x.

$-11 - 9(4x + 2) < 43$

$-11 - 36x - 18 < 43$

$-29 - 36x < 43$

$+29 \quad +29$

$\frac{-36x < 72}{-36} \quad (<) \quad \frac{}{-36}$

$x > -2$

Don't need to graph

Unit Test Review

Name _____

Date _____

Solving and Graphing Inequalities Review

Directions: Solve and graph each of these inequalities. Be sure to show all of your work.

1) $4x - 8 - 2x + 2 > -2$ ----------

$2x - 6 > -2$

$+6 \quad +6$

$\frac{2x}{2} > \frac{4}{2}$

$x > 2$

2) $7 + \frac{x}{3} - 9 \leq 14$ ----------

$-2 + \frac{x}{3} \leq 14$

$+2 \quad +2$

$\frac{x}{3} \leq 16$

$\times 3 \quad \times 3$

$x \leq 48$

Directions: Solve each of these inequalities for y in terms of x.

6) $3y + 4x + 10 > 6x + 4 + 2y$

$-4x \quad -4x$

$3y + 10 > 2x + 4 + 2y$

$-10 \quad -10$

$3y > 2x - 6 + 2y$

$-2y \quad -2y$

$y > 2x - 6$

7) $7y + 3 - 5x \geq 8y - 2 - 10x$

$-3 \quad -3$

$7y - 5x \geq 8y - 5 - 10x$

$+5x \quad +5x$

$7y \geq 8y - 5 - 5x$

$-8y \quad -8y$

$-1y \geq -5 - 5x$

$y \leq 5 + 5x$

8) $3x + 4 + 10y \leq 9x - 6 + 12y$

$-3x \quad -3x$

$4 + 10y \leq 6x - 6 + 12y$

$-4 \quad -4$

$10y \leq 6x - 10 + 12y$

$+12y \quad +12y$

$-2y \leq 6x - 10$

$-2 \quad -2 \quad -2$

$\frac{-2y}{-2} \leq \frac{6x - 10}{-2}$

$y \leq -3x + 5$

$y \leq -\frac{1}{4}x - \frac{5}{12}$

Unit Test Review

Name _____

Period _____

Date _____

Solving Inequalities Review

Directions: Solve and graph each of these inequalities. Be sure you show all of your work!

1) $\frac{x}{-4} + 10 \geq 20$

$-10 \quad -10$

$\frac{x}{-4} \geq 10$

$\times -4 \quad \times -4$

$x \leq -40$

2) $3x + 15 < 30$

$-15 \quad -15$

$\frac{3x}{3} < \frac{15}{3}$

$x < 5$

3) $5x + 6 + 5x > 16$

$10x + 6 > 16$

$-6 \quad -6$

$\frac{10x}{10} > \frac{10}{10}$

$x > 1$

4) $-3x - 12 \leq 0$

$+12 \quad +12$

$\frac{-3x}{-3} \leq \frac{12}{-3}$

$x \geq -4$

5) $4x - 8 - 2x + 2 > -2$

$2x$

6) $-12x + 8 - 2x \geq 16$

$-14x + 8 \geq 16$

$-8 \quad -8$

$\frac{-14x}{-14} \geq \frac{8}{-14}$

$x \leq -\frac{4}{7}$

See Solving + Graphing inequalities Worksheet

7) $7 - \frac{x}{3} - 9 \leq 14$

8) $7x - 2 + 5x > 5x - 37$

$12x - 2 > 5x - 37$

$+2 \quad +2$

$12x > 5x - 35$

$-5x \quad -5x$

$\frac{7x}{7} > \frac{-35}{7}$

$x > -5$

Cookies Unit Test

5/17

Reminder Sheet

- When × or ÷ by a - number SWITCH!!! (5)
- You can combine in 1 variable inequalities like $-3x \leq 11 - 2$ (when there aren't 2 variables)
  $-3x \leq 9$
- $-2/-3 = \frac{2}{3}$ not $\frac{1}{3}$ (how could I make that mistake 2x)
- Transfer correctly (duh)
- $\leq$ or $\geq$ are non strict - solid line or solid dot
- $<$ or $>$ are strict - dotted line or hollow dot
- Always check (when possible - ~~sometimes~~ always check both!)
  * for both *
- in word problem - show solving for y and $\begin{array}{c|c} x & y \\ \hline 0 & \\ & 0 \end{array}$ table
- write sentance answer for word problem
- study substution method

100%

114/114

Switch
Strict/Non strict - Solid/Dashed
(V) for both (if possible)

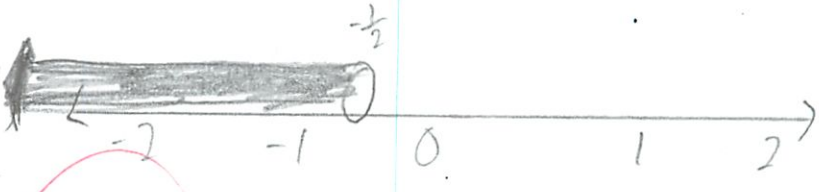
Name Michael Plasmeier
IAG 2 – H
BEHL
5/23/06

Cookies Unit Test

1. Solve and graph this inequality for x

$-2(x + 4) > 6x - 4$

$-2x - 8 > 6x - 4$
$+4 \quad +4$
$-2x - 4 > 6x$
$+2x \quad +2x$
$\frac{-4}{8} > \frac{8x}{8}$
$-\frac{1}{2} > x$

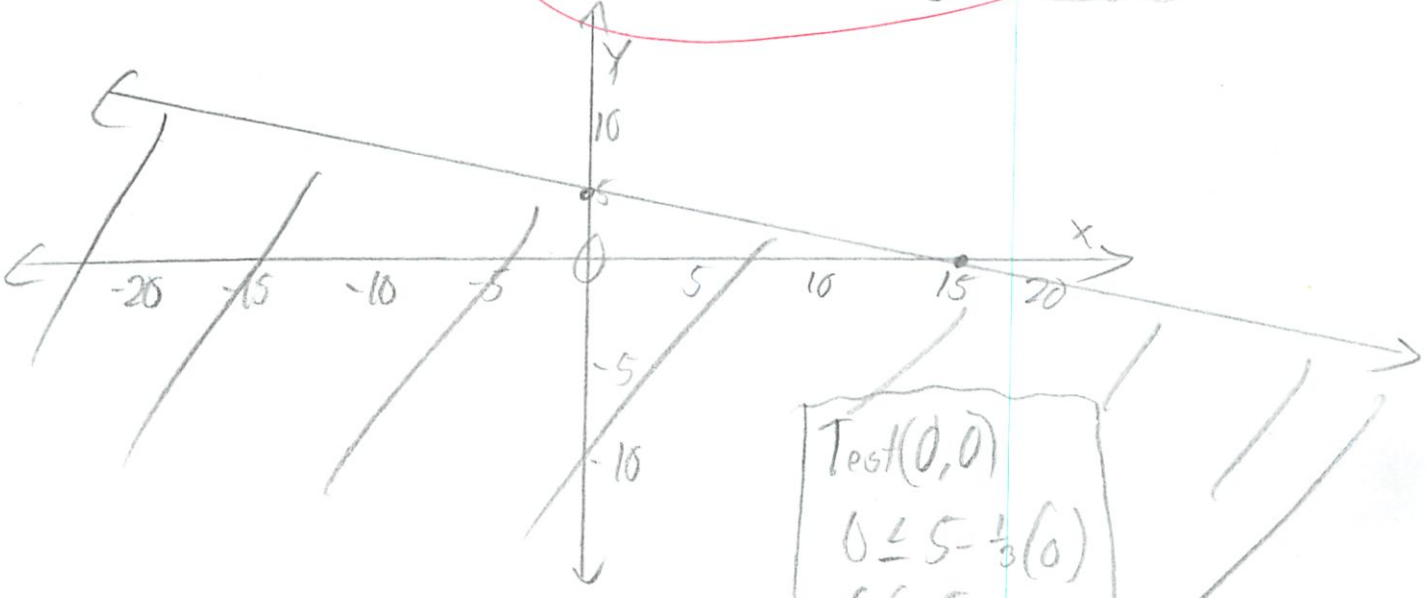


2. Solve and graph the following inequality. Be sure to label your axes and scale them appropriately

$2x + 6y \leq 30$
$-2x \quad -2x$
$\frac{6y}{6} \leq \frac{30 - 2x}{6}$
$y \leq 5 - \frac{1}{3}x$

x	y
0	5
15	0

$0 \leq 5 - \frac{1}{3}x$
$-5 \quad -5$
$\frac{-5}{-\frac{1}{3}} \leq \frac{-\frac{1}{3}x}{-\frac{1}{3}}$
$15 \geq x$



Test (0,0)
$0 \leq 5 - \frac{1}{3}(0)$
$0 \leq 5$
T

3. Solve this inequality for y in terms of x. No Graph

$3x + 4 + 10y < 9x - 6 + 12y$

$-4 \quad -4$

$3x + 10y < 9x - 10 + 12y$

$-3x \quad -3x$

$10y < 6x - 10 + 12y$

$-12y \quad -12y$

$\frac{-2y}{-2} < \frac{6x - 10}{-2}$ (S) → (S)

$y > -3x + 5$

4. Solve each of these inequalities and find their feasible region. Be sure to label your axes and scale them appropriately. Label the feasible region clearly.

$x \leq 1$ → Vertical line at 1 → Test (0,0)

$0 \leq 1$

(T)

$2x + 3y \leq 12$

$-2x \quad -2x$

$\frac{3y \leq 12 - 2x}{3} \quad \frac{}{3}$ (S) →

$y \leq 4 - \frac{2}{3}x$

x	y
0	4
6	0

$0 \leq 4 - \frac{2}{3}x$

$-4 \quad -4$

$-4 \leq -\frac{2}{3}x$

$-\frac{2}{3} \quad -\frac{2}{3}$

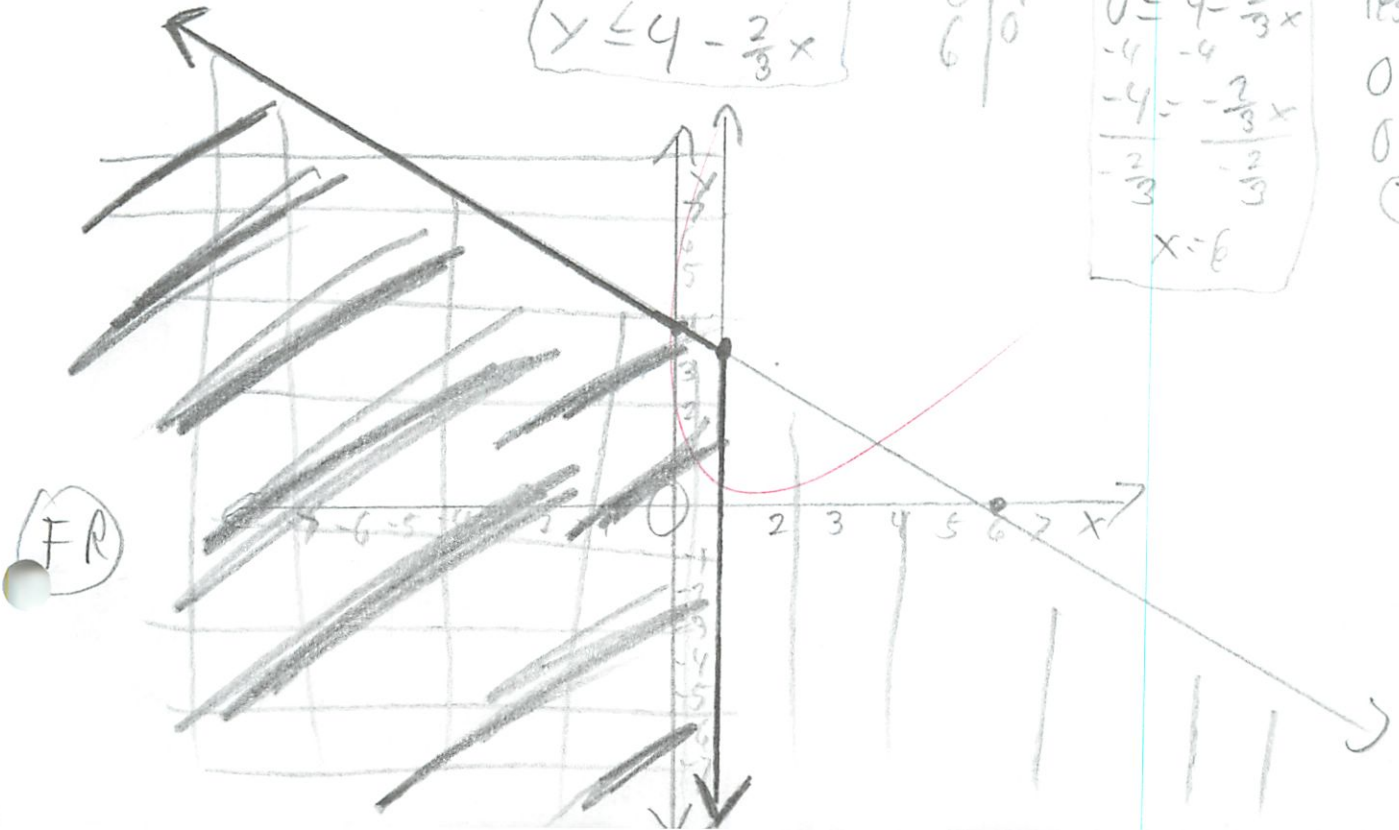
$x \geq -6$

Test (0,0)

$0 \leq 4 - \frac{2}{3}(0)$

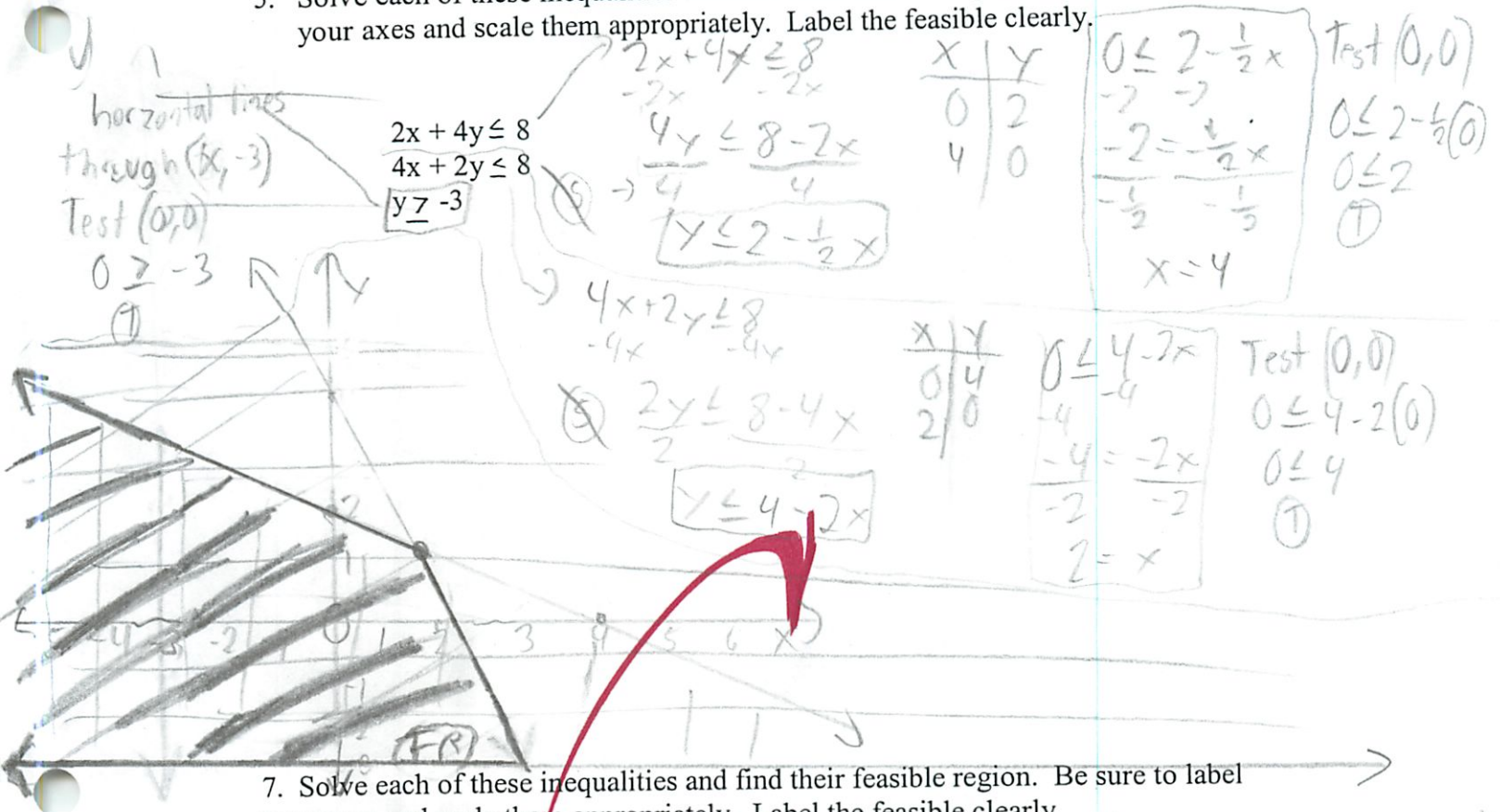
$0 \leq 4$

(T)



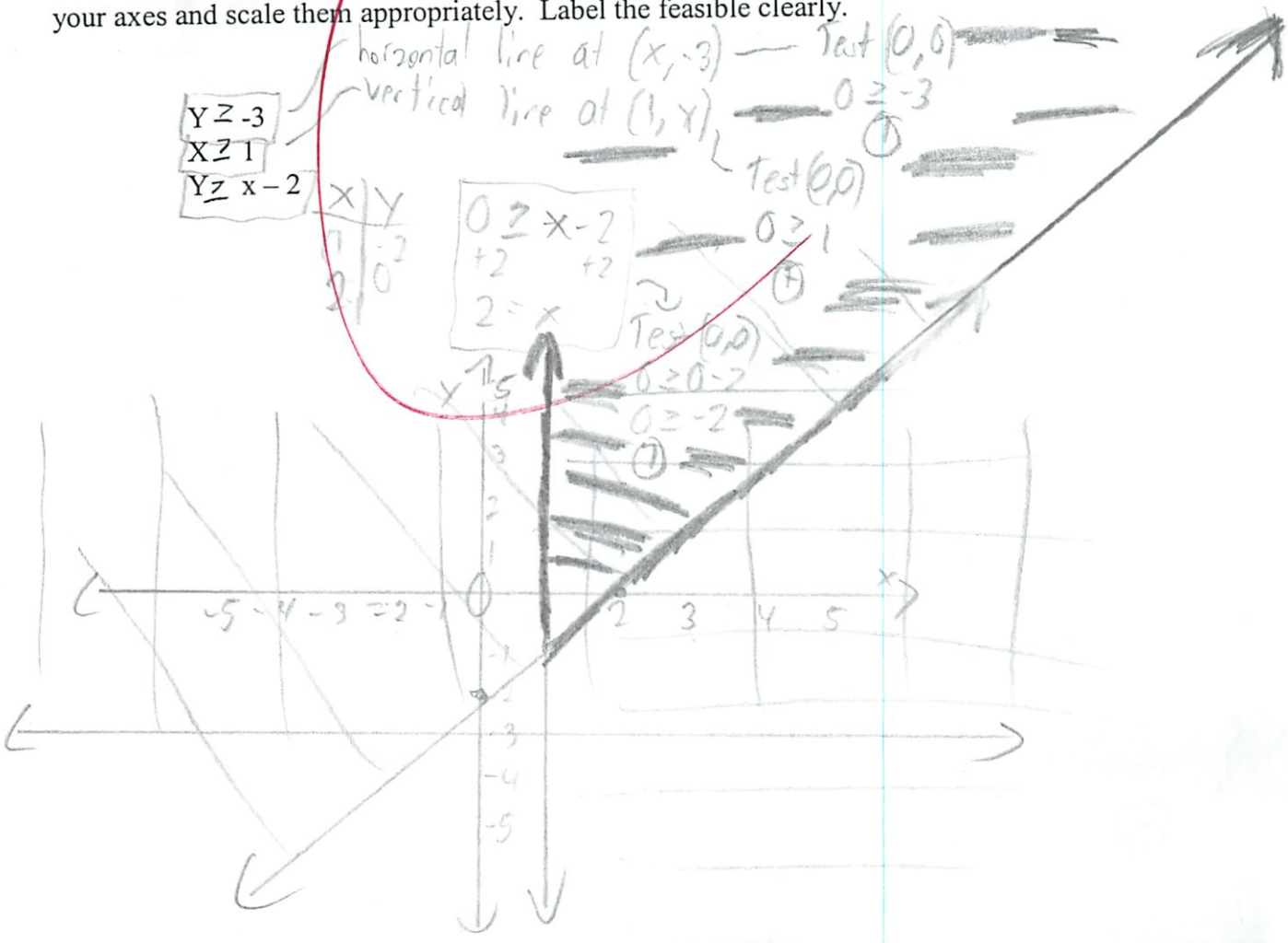
5. Solve each of these inequalities and find their feasible region. Be sure to label your axes and scale them appropriately. Label the feasible clearly.

$2x + 4y \leq 8$
$4x + 2y \leq 8$
$y \geq -3$



7. Solve each of these inequalities and find their feasible region. Be sure to label your axes and scale them appropriately. Label the feasible clearly.

$Y \geq -3$
$X \geq 1$
$Y \geq x - 2$



8. Solve this system of linear equations by using the graphing method.

$5x + 2y = 11$
$x + y = 4$

$-x \quad -x$

$y = 4 - x$

$5x + 2y = 11$
$-5x \quad -5x$

$\frac{2y}{2} = \frac{11 - 5x}{2}$

$y = 5.5 - 2.5x$

Calc Intersection Point: (1, 3)

$Y_1: (1) + (3) = 4$
$4 = 4$ ✓

$Y_2: 5(1) + 2(3) = 11$
$5 + 6 = 11$
$11 = 11$ ✓

(✓)

9. Solve this system of linear equations by using the linear combination method. Be sure to show all of your work!

$3x + y = 4$
$8 = 6x + 2y$

$3x + y = 4$
$\times(-2) \quad \times(-2)$
$-6x - 2y = -8$

$6x + 2y = 8$
$-6x - 2y = -8$

All 3 line up {Lines are exactly the same
On top of each other, infinite intersection points

(✓)

10. Solve this system of linear equation by using the substitution method. Be sure to show all of your work!

$-2x + y = 5$
$-8 + x = -y$

$x-1 \quad x-1$

$8 - x = y$

$-2x + (8 - x) = 5$

$-3x + 8 = 5$

$-8 \quad -8$

$\frac{-3x}{-3} = \frac{-3}{-3}$

$x = 1$

$-8 + (1) = -y$

$-7 = -y$

$x-1 \quad x-1$

$7 = y$

$(1, 7)$ Intersection

(✓)

J_1: $-2(1) + (7) = 5$

$-2 + 7$

$5 = 5$

(J_1 ✓)

J_2: $-8 + (1) = -(7)$

$-7 = -7$

(J_2 ✓)

(J_1 ✓) + (J_2 ✓) = (✓)

11. The Rocking Pebbles are playing a concert at Big State University, where the auditorium seats 2200 people. The concert manager decides to sell some tickets at $10 each and the rest at $15 each. How many of each should there be if the manager wants the ticket sales to total $26, 600? (Assume that all the tickets will be sold) Find the answer to the problem by setting up and solving a system of two linear equations with two unknowns. Show and explain your work clearly.

x = # \$10 tickets
y = # \$15 tickets

Sentence answer
Solve for y and do x/y table

Sales: $\#10x + \#15y = \$26,600$

Capacity: $x + y = 2200$

$-x \quad -x$

$y = 2200 - x$

$10x + 15(2200 - x) = 26,600$

$10x + 33000 - 15x = 26600$

$-5x + 33000 = 26600$

$-33000 \quad -33000$

$\frac{-5x}{-5} = \frac{-6400}{-5}$

$x = 1280$

$(1280) + y = 2200$

$-1280 \quad -1280$

$y = 920$

$(1280, 920)$

J_1: $10(1280) + 15(920) = 26,600$

$12800 + 13800 = 26,600$

$26,600 = 26,600$

(J_1 ✓)

J_2: $(1280) + (920) = 2200$

$2200 = 2200$

(J_2 ✓)

(J_1 ✓) + (J_2 ✓) = (✓)

They should sell 1280 \$10 tickets and 920 \$15 tickets to meet both of their constraints of selling all 2200 seats and making exactly 26,600 dollars.

12. Miss Behl is concerned about her diet. A nutritionist has recommended that her diet include at least 16 grams of carbohydrates and at least 25 grams of protein. Miss Behl has two types of food available to eat – Food A and Food B. Each once of Food A supplies 2 grams of carbohydrates and 4 grams of protein. Food B supplies 6 grams of carbohydrates and 2 grams of protein. Miss Behl should not eat a total of more than 12 ounces of food per day. (Some diet huh?) I would like to vary my diet but still meet these requirements.

Variables Declaration
Food A = A = x
Food B = B = y

a. Choose variables to represent the amount of each type of food I should include in my daily diet. State clearly what the variable represents.

b. State each of the constraints as inequalities.

c. Create a graph of this situation. Be sure to label and scale your graph appropriately. See Graph paper

d. Label the feasible region clearly.

Constraints
Reality $A \geq 0$ Carbs $2A + 6B \geq 16$
$B \geq 0$ Protein $4A + 2B \geq 25$
Total $A + B \leq 12$

Carbs
$2A + 6B \leq 16$
$-2A \quad -2A$
$6B \geq 16 - 2A$
$\frac{6B}{6} \geq \frac{16}{6} - \frac{2A}{6}$
$B \geq 2\frac{2}{3} - \frac{1}{3}A$

X	Y
0	$2\frac{2}{3}$
8	0

$0 \geq 2\frac{2}{3} - \frac{1}{3}A$
$-2\frac{2}{3} \quad -2\frac{2}{3}$
$-2\frac{2}{3} = -\frac{1}{3}A$
$\frac{-2\frac{2}{3}}{-\frac{1}{3}} = \frac{-\frac{1}{3}A}{-\frac{1}{3}}$
$A = 8$

Protein
$4A + 2B \leq 25$
$-4A \quad -4A$
$2B \geq 25 - 4A$
$\frac{2B}{2} \geq \frac{25}{2} - \frac{4A}{2}$
$B \geq 12.5 - 2A$

X	Y
0	12.5
6.25	0

$0 \geq 12.5 - 2A$
$-12.5 \quad -12.5$
$-12.5 = -2A$
$\frac{-12.5}{-2} = \frac{-2A}{-2}$
$6.25 = A$

Total
$A + B \leq 12$
$-A \quad -A$
$B \leq 12 - A$

X	Y
0	12
12	0

$0 \leq 12 - A$
$-12 \quad -12$
$-12 = -A$
$\frac{-12}{-1} = \frac{-A}{-1}$
$12 = A$

Solution Ms. Behl can eat anything inside of the Feisble Reigon shown in dark on the graph paper

#12 Behl's Diet

Unit Test

Michael Plasmeier

5/23

$2A + 6B \leq 16$

$4A + 2B \leq 28$

$A + B \leq 12$

Carbs Test (0,0)

$0 \geq 2\frac{2}{3} - \frac{1}{3}(0)$

$0 \geq 2\frac{2}{3}$

(F)

Protein Test (0,0)

$0 \geq 12,5 - 2(0)$

$0 \geq 12,5$

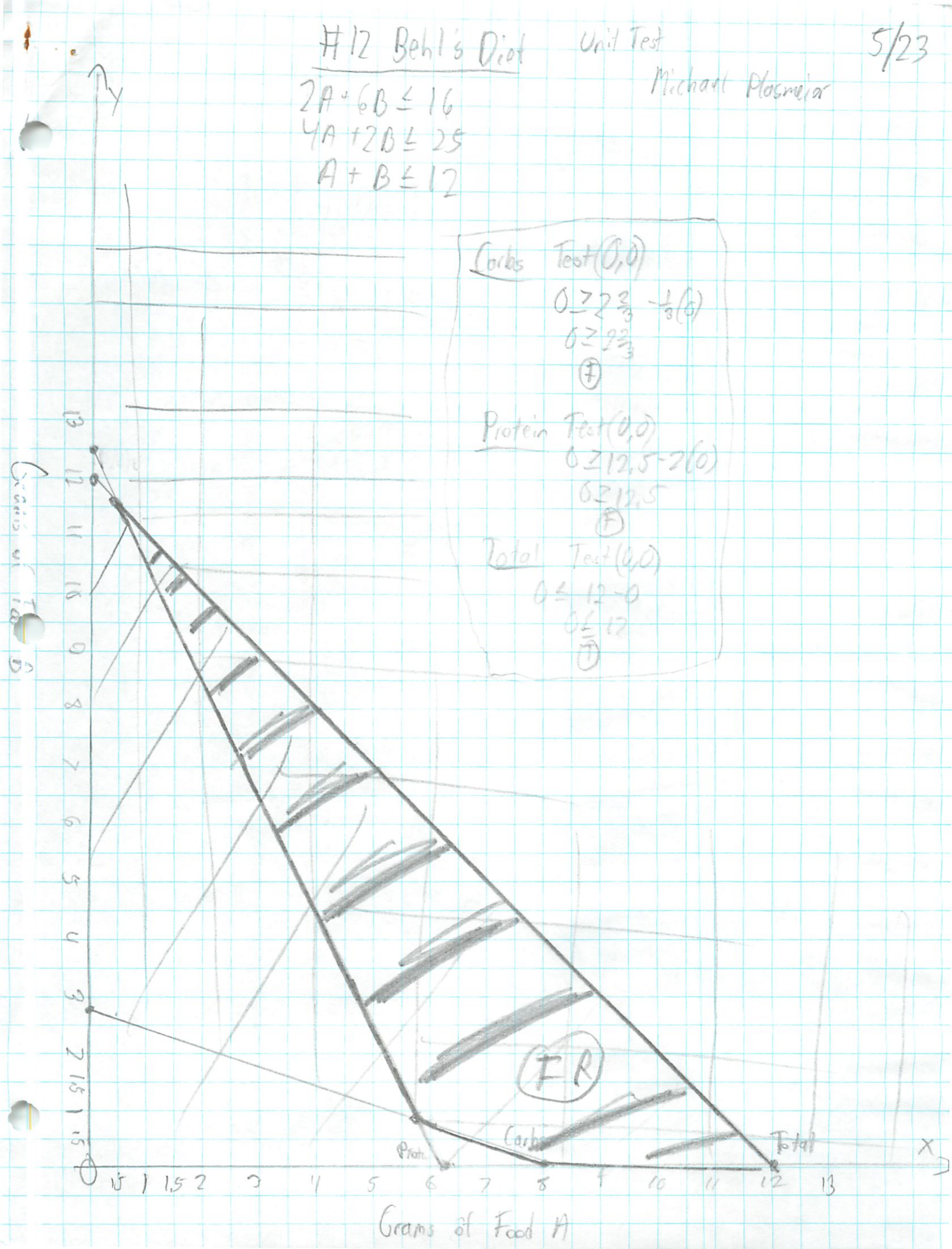
(F)

Total Test (0,0)

$0 \leq 12 - 0$

$0 \leq 12$

(T)



Name Michael Ploemeier
Date 5/25

18.5
23

5/25

Cookies Notebook Quiz

1. **Solving Inequalities** worksheet, what is the answer to #8?

-2 ~~1~~

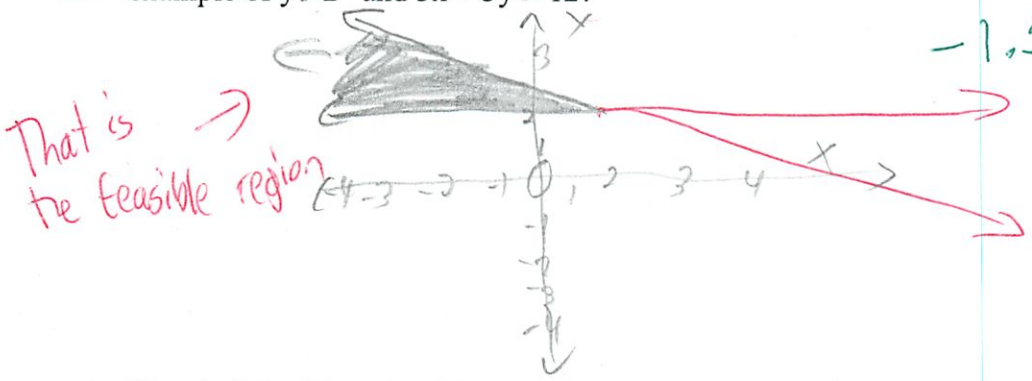
$-.57x$ Need to graph

2. **Solving Inequalities Review** worksheet, what is the answer to #7?

$x \geq -48$ -1 graph Need to graph

6

3. **More Feasible Region Practice**, what does the feasible region look like for the example of $y \geq 2$ and $3x + 3y \leq 12$?



4. **Hmwk # 7 – Picturing Pictures**, How many of each kind of painting should be sold to get the max profit?

stupid mistake

-1 ~~10~~ 6 pastels + ~~100~~ 10 watercolor should be sold $1240 profit

5. **Hmwk # 12 – Rock 'n' Rap**, What is the cost constraint for this problem?

$15{,}000k + 12{,}000P \leq 150{,}000$

6. **Hmwk # 18 – More Linear Systems**, what is the answer to #1c?

$r = 2\frac{5}{7}$ or $\frac{19}{7}$

7. **Hmwk # 19 – A Charity Rock**, what is the cost of the general admission tickets?

$20

8. **Cookies Unit Quiz** worksheet, what is the answer to #4? -Review Packet

$x > -2$

9. **Solving Systems of Linear Equation** worksheet, what is the answer to #5?

(0,6)

10. **My Simplest Inequality**, what is the answer to #1a?

$x < \frac{3}{2}$ #1 graph?

Michael Plesnicar
Behl
IAC2H9
25 May 2006

The wonderful world of Exponets

Notes + Pratice 5/25

1. Multiplying with exponets

$a^n = \underbrace{a \times a \times a \times a}_{n \text{ times}}$ a: base, n: exponent

$a^2 \times a^3 = a^5$

* To multiply powers having the same base, Add the exponents

$(a^2)^4 = a^8 = a^2 \times a^2 \times a^2 \times a^2$

* To find a power of a power multiply the exponents

$(a^m)^n = a^{m \times n}$

$(a \times b)^m = a^m \times b^m$

$(a \times b)^2 = a^2 \times b^2$

* To find the power of a product find the power of each factor and Multiply

You can combine $x^4 \cdot x^5$ to $x^{4+5} = x^6$

Pratice

1. $4^2 \times 4^2 = 4^{2+3} = 4^5$
2. $(2x)^3 = 2^3 \times x^3$ (2x copy error; combine by adding)
3. $3x^2(2x)^3 = 3x^2 \times 2^3 \times x^3 = 3 \times 2^3 \times x^5$ ✗
4. $[(-9)^2]^4 = -9^2 \times -9^2 \times -9^2 \times -9^2 = (-9)^{2 \times 4} = (-9)^8$ (add) (must be in parentheses to not take opp of 9s)
5. $(16 \times 2)^2 = 16^2 \times 2^2$
6. $2x^3 \times (3x^2) = 2 \cdot x^3 \cdot 3 \cdot x^2 = 6 \cdot x^5$ (combine; combine; add (3+2))
7. $x \times x^5 = x^6$ (combine)
8. $(4a)^2 \cdot a = 4^2 \cdot a^2 \times a = 4_2 \times a^3$ (add 2+1)
9. $10^2 \times 10^3 = 10^{2+3} = 10^5$ (combine)
10. $(-2xy)^3(-x^2) = -2^3 \cdot x^3 \cdot y^3 \cdot -x^2$ (neg × neg = pos)

$2^3 \times x^3 \times y^3 \times x^2$

$2^3 \cdot x^5 \times y^3$

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Exponets Review

30 May 2006

5/30

1. $(4a)^2 \cdot a \rightarrow 4^2 \cdot a^2 \cdot a = 4^2 \cdot a^3$ (distribute)

2. $(3a)^2 \cdot (-4a)^4 \rightarrow 3^2 \cdot a^2 \cdot (-4)^4 \cdot a^4 \rightarrow 3^2 \cdot (-4)^4 \cdot a^6$

3. $(a^2 \cdot b)^3 = (a^2)^3 \cdot (b)^3 = a^6 \cdot b^3$ (multiply)

4. $x^2 \cdot (xy)^2 = x^2 \cdot x^2 \cdot y^2 = x^4 \cdot y^2$ (add)

5. $8^2 \cdot (xy)^2 \cdot 2x = 8^2 \cdot x^2 \cdot y^2 \cdot 8^2 \cdot 2 \cdot x^3 \times y^2$?
Though that was there anyway

6. $(a^2)^3 \cdot a^3 = a^6 \cdot a^3 = a^9$

Rules

$a^b \cdot a^m = a^{b+m}$

$(a^b)^m = a^{b(m)}$

$(a \cdot b)^m = a^m \cdot b^m$

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Negitive + Zero Exponents Negs

5/30

$2^5 = 32$
$2^4 = 16$
$2^3 = 8$
$2^2 = 4$
$2^1 = 2$
$2^0 = 1$
$2^{-1} = \frac{1}{2}$
$2^{-2} = \frac{1}{4}$
$2^{-3} = \frac{1}{8}$
$2^{-4} = \frac{1}{16}$
$2^{-5} = \frac{1}{32}$

* Each time the exponet decreases by 1, the number is divided by base

$3^{-1} = \frac{1}{3}$) /3 Cbase
$3^{-2} = \frac{1}{9}$

* x^0 always $= 1$

To Find -
Raise it to power ex $2^3 = 8$
then take reciptical $2^{-3} = \frac{1}{8}$
(inverse)) Not opposite

examples

1. 2^{-2} = Try $2^2 = 4$ then take reciptical $= \frac{1}{4}$

2. $(-2)^0 = 1 = a^0$ always $= 1$

3. $(2x)^{-3}$ = get rid of neg first $\frac{1}{(2x)^3} = \frac{1}{2^3 \cdot x^3} = \frac{1}{8x^3}$

4. $3 \cdot 3^{-1} = 3 \times \frac{1}{3} = 1$

5. $2x^{-2}y^{-3} = 2 \cdot \frac{1}{x^2} \cdot \frac{1}{y^3} = \frac{2}{x^2 \cdot y^3}$

6. $\frac{3x^{-2}}{4}$ $\frac{3 \cdot \frac{1}{x^2}}{4} = \frac{3}{4x^2}$

7. $\frac{1}{3x^{-4}}$ bring to top $\frac{x^4}{3}$ (no neg)

when neg - change location (take reciprical)

Over

8. $3^{-2} \cdot 3^2$ add them $3^{-2+2} = 3^0 = 1$ Ent 3

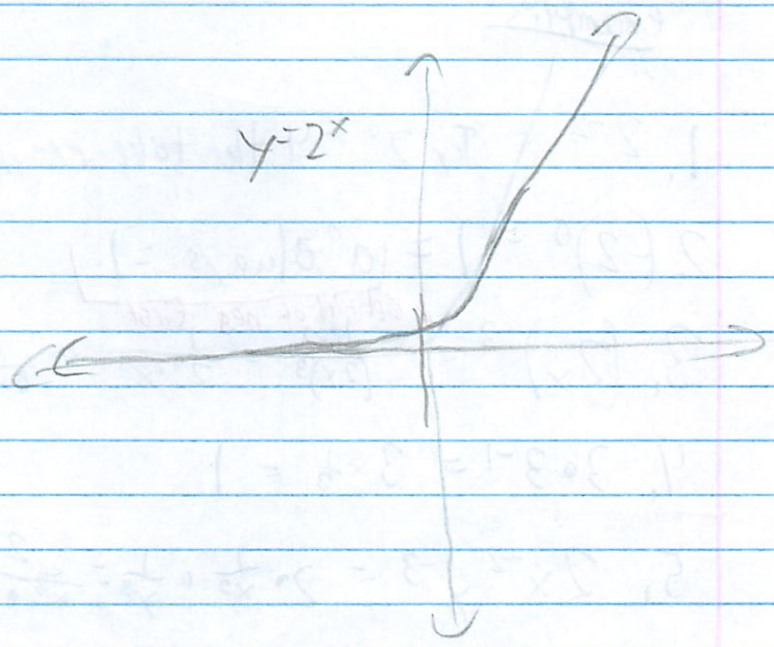
9. $(4^{-2})^2$ $4^{-2 \cdot 2} = 4^{-4} = \frac{1}{4^4} = 16$

10. $(5a)^{-2} = (5)^{-2}(a)^{-2} = \frac{1}{5^2} \cdot \frac{1}{a^2} = \frac{1}{25a^2}$

11. $\frac{1}{a^{-n}} = a^n$

Graph In

x	y $= 2^x$
-3	$\frac{1}{8}$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8



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30 May 2006

More Exponent Pratice

✓ 5/5

5/30

1. $x^{-7} = \frac{1}{x^7}$

2. $x^{-2}y^3 = \frac{1}{x^2} \cdot y^3$

3. $4^{-3} \cdot 4^2 = 4^{-3+2} = 4^{-1} = \frac{1}{4}$

4. $\frac{5}{a^{-4}} = 5a^4$

5. $\frac{1}{(4x)^{-3}} = (4x)^3 = 4^3 \cdot x^3$

6. $5(x^{-4}) = 5 \cdot \frac{1}{x^4} = \frac{5}{x^4}$ ← Make sure to know

7. $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ $\quad 3^2 = 3 \cdot 3$

8. $2^0 \cdot 3^{-3}$ $1 \cdot \frac{1}{3^3} = \frac{1}{27}$ ✓

9. $(-3x)^{-1} \cdot 2y = \frac{1}{-3x} \cdot 2y = \frac{2y}{-3x}$

10. $(2a^{-3})^3 = (2)^3 \cdot (a^{-3})^3 = 8 \cdot a^{-3 \cdot 3} = 8a^{-9} = 8 \cdot \frac{1}{a^9} = \frac{8}{a^9}$

Just for a

$2^3 = 2 \cdot 2 \cdot 2$

Make stupid exponet figuring mistakes - use a calculator

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1 June 2006

Divison Property of Exponents

[Part 3 of 3]

6/1

* To divide powers that have the same base Subtract the exponent

$$\frac{2^5}{2^3} = 2^2 = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2}$$

$$\frac{a^m}{a^n} = a^{m-n} \text{ if } a \neq 0$$

* to find the power of the quotient find the power of the numerator + denomenator - then divide

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \text{ if } b \neq 0$$

Examples

1. $\frac{5^4}{5^3} = 5^{4-3} = 5$

Look → * 2. $\frac{(-6)^3}{(-6)^3} = (-6)^{3-3} = (-6)^0 = 1$

3. $x^2 \cdot \frac{1}{x^3} \rightarrow \frac{x^2}{x^3}$ $x^{-1} = \frac{1}{x}$

4. $\frac{8^2 \cdot 8}{8^5}$ $\frac{8^3}{8^5} = 8^{3-5} =$

$8^{-2} = \frac{1}{8^2} = \frac{1}{64}$

All of the Rules

$a^n \cdot a^m = a^{n+m}$
$(a^n)^m = a^{n \cdot m}$
$(a \cdot b)^m = a^m \cdot b^m$
$a^0 = 1$
$a^{-n} = \frac{1}{a^n}$
$\frac{a^n}{a^m} = a^{n-m}$
$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

More problems →

6/2

1. $\frac{6^6}{6^4} = 6^{6-4} = 6^2 = 36$

2. $\frac{(-3)^9}{(-3)^9} = (-3)^{9-9} = (-3)^0 = 1$

3. $\frac{8^5 \cdot 8^2}{8^5} = \frac{8^7}{8^5} = 8^{7-5} = 8^2 = 64$

4. $\left(\frac{9}{6}\right)^{-1} = \frac{9^{-1}}{6^{-1}} = \frac{6}{9}$

5. $\frac{3x^2y}{3xy} \cdot \frac{6xy^3}{3y} = x \cdot 2x y^2 = 2x^2y^2$

6. $\frac{(x^2)^3(x^4)}{x^7} \quad \frac{x^{2\times3+4}}{x^7} = \frac{x^{10}}{x^7} = x^{10-7} = x^3$

7. $(-3x^2y^{-3})^{-2} = (-3)^{-2}(x^2)^{-2}(y^{-3})^{-2} \rightarrow 9^{-1} \times x^{2\times-2} \times y^{-3\times-2}$

$\frac{1}{9} \times x^{-4} \times x^6 \rightarrow \frac{1}{9} \times \frac{1}{x^4} \times x^6$

Must go faster

$\frac{1}{1\times x^4} \times x^6$

$\rightarrow \frac{x^6}{9x^4}$ ← That is the correct answer

EXERCISES

Guided Practice

CRITICAL THINKING about the Lesson

1. Can $\frac{x^{10}}{y^4}$ be simplified? Why or why not?
2. Does $\frac{x^{-4}}{x^{-5}}$ simplify as x or $\frac{1}{x}$?
3. When you divide powers with the same base, do you add or subtract exponents?
4. What is the relationship between $\frac{x^4}{x^2}$ and $\frac{x^{-4}}{x^{-2}}$? Are they equivalent or are they reciprocals of each other? Explain.

Independent Practice

In Exercises 5–16, evaluate the expression.

5. $\frac{6^6}{6^4}$
6. $\frac{8^3}{8^1}$
7. $\frac{(-4)^5}{(4)^5}$
8. $\frac{(-3)^9}{(-3)^9}$
9. $\frac{2^2}{2^{-3}}$
10. $\frac{8^3 \cdot 8^2}{8^5}$
11. $\frac{7^4 \cdot 7}{7^5}$
12. $\left(\frac{3}{4}\right)^2$
13. $\left(\frac{5}{3}\right)^3$
14. $\left(-\frac{2}{3}\right)^3$
15. $\left(-\frac{4}{5}\right)^2$
16. $\left(\frac{9}{6}\right)^{-1}$

In Exercises 17–28, simplify the expression.

17. $\left(\frac{2}{x}\right)^4$
18. $\frac{x^4}{x^5}$
19. $\left(\frac{1}{x}\right)^6$
20. $x^3 \cdot \frac{1}{x^2}$
21. $x^7 \cdot \frac{1}{x^9}$
22. $\frac{3x^2y^2}{3xy} \cdot \frac{6xy^3}{3y}$
23. $\frac{4xy^3}{2y} \cdot \frac{5xy^{-3}}{x^2}$
24. $\frac{16x^3y}{-4xy^3} \cdot \frac{-2xy}{-x}$
25. $\frac{-9x^5y^7}{x^2y^3} \cdot \frac{(2xy)^2}{-6x^2y^2}$
26. $\frac{6x^{-2}y^2}{xy^{-3}} \cdot \frac{(4x^2y)^{-2}}{xy^2}$
27. $\frac{7x^{-1}y^3}{x^2y^{-2}} \cdot \frac{(3xy^2)^{-1}}{xy}$
28. $\left(\frac{2xy^{-2}y^4}{3yx^{-1}}\right)^{-2} \cdot \left(\frac{4xy}{2x^{-1}y^3}\right)^2$

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Exercises Worksheet

10/10

6/5

Critical Thinking Section

1. No $\frac{x^{10}}{y^4}$ can not be simplified because there are two different bases x and y only like bases can be simplified by subtraction.

2. $\frac{x^{-4}}{x^{-5}} = x^{-4--5} = x^1 = x$ - No it simplifies as just x because $-4--5 = 1$ not -1 which it would have to do if the answer should be $\frac{1}{x}$

3. Subtract

4. $\frac{x^4}{x^2} = x^{4-2} = x^2$
$\frac{x^{-4}}{x^{-2}} = x^{-4--2} = x^{-2} = \frac{1}{x^2}$ > They are reciprocals of each other because when I simplified them $\frac{x^4}{x^2}$ came to x^2 and $\frac{x^{-4}}{x^{-2}}$ came to $\frac{1}{x^2}$. Also $\frac{x^{-4}}{x^{-2}}$ can also be $\frac{x^2}{x^4}$ which is the reciprocal of $\frac{x^4}{x^2}$

Pratice Section

7. $\frac{(-4)^5}{4^5} = \frac{-1024}{1024} = -1$ Go the extra step

11. $\frac{7^{4+3}}{7^7} = \frac{7^5}{7^7} = 7^{5-7} = 7^{-2} = \frac{1}{7^2} = \frac{1}{49}$

13. $\left(\frac{5}{3}\right)^3 = \frac{5^3}{3^3} = \frac{125}{27} = 4\frac{17}{27}$

21. $x^7 \cdot \frac{1}{x^9} = x^7 \cdot x^{-9} = x^{7+-9} = x^{-2} = \frac{1}{x^2}$

24. $\frac{16x^3y}{-4xy^3} \cdot \frac{-2xy}{-x} = -4x^2y^{-2} \cdot -2x^2y = 8x^4y^{-1} =$

$8x^4\frac{1}{y}$

~~23.~~ $\frac{6x^{-2}y^2}{xy^{-3}} \cdot \frac{(4x^2y)^{-2}}{xy^2} \rightarrow 6x^{-3}y^5 \cdot \frac{(4)^{-2}(x^2)^{-2}(y)^{-2}}{xy^2} \rightarrow$

$6x^{-3}y^5 \cdot \frac{4^{-2} \cdot x^{-4} \cdot y^{-2}}{xy^2} \rightarrow 6x^{-3}y^5 \cdot \frac{1}{16} \cdot x^{-5} \cdot y^{-4}$

$\frac{3}{8}x^{-8}y \rightarrow \left(\frac{3}{8}\right)\left(\frac{1}{x^8}\right)\left(\frac{y}{1}\right)$ $\frac{3y}{8x^8}$

Clean up more

~~22.~~ $\left(\frac{2xy^{-2}y^4}{3yx^{-1}}\right)^{-2} \cdot \left(\frac{4xy}{2x^{-1}y^3}\right)^2$ $\frac{(2)^{-2}(x)^{-2}(y^{-2})^{-2}(y^4)^{-2}}{(3)^{-2}(y)^{-2}(x^{-1})^{-2}}$ ...

$\frac{9y^2y^4}{x^24x^2y^8} \cdot \frac{(4)^2(x)^2(y)^2}{(2)^2(x^{-1})^2(y^3)^2} = \frac{9y^6}{4x^2y^8} \cdot \frac{16x^2y^2x^2}{4y^6}$

$2.25 \cdot y^{-2} \cdot x^{-2} \cdot 4y^{-4}x^4 \rightarrow 9y^{-6}x^2$

$9x^2\frac{1}{y^6}$

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7 June 2006

Before the Quiz Practice

6/7

1. $x^4 \cdot y^2 = x^{4+2} = y^6$
2. $(x^2)^{-4} = x^{2 \cdot -4} = x^{-8} = \frac{1}{x^8}$
3. $3x(2x^2) = 3 \cdot x \cdot 2^2 \cdot x^2 = 12x^3$
4. $\frac{x^7}{x^2} = x^{7-2} = x^5$
7. $\frac{(-4)^3}{4^3} = \frac{-64}{64} = -1$
8. $2^0 x^2 (y^{-2} x)\ 1 x^3 \frac{1}{y^2} = \frac{x^3}{y^2}$
5. $\frac{2x^2y}{x^3y^2} \cdot \frac{4x^7y^2}{2x^3} = 2x^{-1}y^{-1}\ 2x^4y^2$ $(4x^3y)$ ☺ Check it

$$4x^4y^2x^3$$

6. $\frac{(3xy^2)^{-1}}{3x} \quad \frac{(2x^2y)^2}{x^{-3}} \quad \frac{1}{3xy^2 3x}$

$$\frac{4x^7y^2}{9x^2y^2} = \left(\frac{4}{9}x^5\right) \text{ or } \frac{4x^5}{9}$$

→ Perfect

Name Michael Plasmeier

Date 6/7

70/76

Remember $\frac{1}{x^{-5}}$ goes to x^{5}

Exponent Quiz

Directions: Simplify each example to the further possible step. Be sure to show all of your steps/work. Circle your final answer.

1.) $x \cdot x^5 = x^6$

2.) $(x^3)^6 = x^{3 \cdot 6} = x^{18}$

3.) $2x^3 \cdot (3x)^2 = 2x^3(3)^2(x)^2 = 2x^3 9x^2 = 18x^5$

4.) $(x^2 \cdot y)^3 = (x^2)^3 \cdot (y)^3 = x^6 y^3$

5.) $2^{-4} = \frac{1}{2^4} = \frac{1}{16}$

6.) $8^4 \cdot 8^{-4} = 8^{4+-4} = 8^0 = 1$

7.) $(-4x)^0 = (-4)^0(x)^0 = 1$

8.) $\frac{4}{x^{-2}} = 4x^2$

9.) $2^0 \cdot 3^{-3} = 1 \cdot \frac{1}{3^3} = \frac{1}{27}$

10.) $\frac{(-5)^9}{5^9} = \frac{-1953125}{1953125} = -1$

11.) $\frac{2^3}{2^{-4}} = 8 \cdot 2^4 = 8 \cdot 16 = 128$

12.) $\frac{3^2 \cdot 3^4}{3^9} = \frac{3^{2+4}}{3^9} = \frac{3^6}{3^9} = 3^{6-9} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$

13.) $\left(\frac{3}{2}\right)^{-2} = \frac{(3)^{-2}}{(2)^{-2}} = \frac{4}{9}$

14.) $\frac{2x^2y}{x^3y^2} \cdot \frac{4x^7y^2}{2x^3} = 2x^{-1}y^{-1} \cdot 2x^4y^2$

$4x^3y$

15.) $\frac{3xy^4}{2x^5y} \cdot \frac{6x^{-3}y^2}{4y} = \frac{3}{2}x^{-4}y^{-3} \cdot \frac{3}{2}x^{-3}y$

$\frac{9}{4x^7}$ ~~y^{-3}~~ copy error

$\frac{9y^3}{4x^7}$

-2 and neg moves up from bottom

16.) $\frac{4x^{-2}y^{-1}}{3x^{-3}} \cdot \frac{6x^{-3}y^{-2}}{8y^{-7}} = \frac{4}{3}x^{-1}y^{-1} \cdot \frac{3}{4}x^{-3}y^{5}$

$x^{-2}y^{4}$

Simplify completely

-2

Doh, didn't see that

$\frac{y^{4}}{x^{2}}$

17.) $\left(\frac{2x^{2}y}{3y}\right)^{-3} \cdot \left(\frac{4y^{3}}{x^{4}}\right)^{2} = \frac{(3)^{3}(y)^{3}}{(2)^{3}(x^{2})^{3}(y)^{3}} \cdot \frac{(4)^{2}(y^{3})^{2}}{(x^{4})^{2}}$

$\frac{27y^{3}}{8x^{6}y^{3}} \cdot \frac{16y^{6}}{x^{8}} = \frac{27}{8x^{6}} \cdot \frac{16y^{6}}{x^{8}} \quad \frac{432y^{6}}{8x^{14}} \quad \frac{54y^{6}}{x^{14}}$

18.) $\frac{5x^{-1}y^{3}}{xy^{-4}} \cdot \frac{(-2x^{2})^{-3}}{y} = \frac{5x^{-1}y^{3}}{xy^{-4}} \cdot \frac{(-2)^{-3}(x^{2})^{-3}}{y}$

$5x^{-2}y^{7} \cdot -\frac{1}{8} \cdot x^{-6}y^{-1} = -\frac{5}{8} \cdot x^{-8}y^{6}$

$-\frac{5y^{6}}{8x^{8}}$

forgot to transfer

-2

Scientific Notation

Sometimes, especially when you are using a calculator, you may come up with a very long number. It might be a big number, like 2,890,000,000. Or it might be a small number, like 0.0000073.

Scientific notation is a way to make these numbers easier to work with. In scientific notation, you **move the decimal place until you have a number between 1 and 10.** Then you **add a power of ten that tells how many places you moved the decimal.**

In scientific notation, 2,890,000,000 becomes 2.89×10^9. How?

- Remember that any whole number can be written with a decimal point. For example: 2,890,000,000 = 2,890,000,000.0
- Now, move the decimal place until you have a number between 1 and 10. If you keep moving the decimal point to the left in 2,890,000,000 you will get 2.89.
- Next, count how many places you moved the decimal point. You had to move it 9 places to the left to change 2,890,000,000 to 2.89. You can show that you moved it 9 places to the left by noting that the number should be multiplied by 10^9.

  $2.89 \times 10^9 = 2.89 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$
  $2.89 \times 10^9 = 2,890,000,000$

Scientific notation can be used to turn 0.0000073 into 7.3×10^{-6}.

- First, move the decimal place until you have a number between 1 and 10. If you keep moving the decimal point to the right in 0.0000073 you will get 7.3.
- Next, count how many places you moved the decimal point. You had to move it 6 places to the right to change 0.0000073 to 7.3. You can show that you moved it 6 places to the right by noting that the number should be multiplied by 10^{-6}.

  $7.3 \times 10^{-6} = 0.0000073$

Remember: in a power of ten, the exponent—the small number above and to the right of the 10—tells which way you moved the decimal point.

- A power of ten with a **positive exponent,** such as 10^5, means the decimal was **moved to the left.**
- A power of ten with a **negative exponent,** such as 10^{-5}, means the decimal was **moved to the right.**

Name _____ Date _____

Scientific Notation

In the first part, write the number in scientific notation.
In the second part, write the scientific notation number in standard form.

1. 35,600 3.56×10^4	2. 0.01 1×10^{-2}
3. 0.7 7×10^{-1}	4. 4,052 4.052×10^3 (Round?) N/a
5. 260,000 2.6×10^5	6. 1,230 1.23×10^3
7. 1,149,000 1.149×10^6 (Round?)	8. 0.56 5.6×10^{-1}
9. 69,000	10. 0.007
11. 0.0082	12. 192,200
13. 44,000	14. 1,696
15. 9,597	16. 93,000
17. 809,000	18. 0.03
19. 0.06	20. 530
21. 3,521,000	22. 0.003
23. 8,303	24. 0.039
25. 6.6×10^2 662	26. 7.249×10^3 7249
27. 6.4×10^{-1} 0.64	28. 3×10^{-2} .03
29. 1.76×10^4 17600	30. 2.619×10^3 2619
31. 9.4×10^3 9400	32. 1.8×10^{-3} .0018
33. 4×10^{-2}	34. 9.011×10^5
35. 3.5×10^4	36. 9.972×10^6
37. 3×10^{-3}	38. 9×10^{-3}
39. 5.23×10^3	40. 1.728×10^4
41. 8.1×10^3	42. 5×10^{-2}
43. 8.353×10^3	44. 3.318×10^5

Don't forget to switch + check both

IAG 2 Final Review

Solve It

- Solving equations
- Factoring expressions
- Distributive method
- Writing equations for a line on a graph (slope and y-intercept)
- Writing equations from word problems, graphing that information, and determine a rule

Cookie

- Solving inequality for x
- Solving systems of linear equations
- Graphing inequalities (shading above and below)
- Feasible region

Bees

- Area of a triangle (area formula, trig, other methods)
- Altitudes
- Volume
- Using Trig to find missing side lengths
- Using Trig to find missing angle measurements
- Surface area of prisms
- Area of a hexagon
- Using Pythagorean theorem to find missing lengths

[redacted]

Alice

- Exponent Rules
- Scientific Notation
- Log

IAG 2 Formula Sheet

Simple Interest: $I = prt$

Compound Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Figure	Perimeter	Area
Rectangle	$P = 2(l + w)$	$A = l \cdot w$
Triangle	*P = sum of the sides*	$A = \frac{1}{2} b \cdot h$
Circle	$C = 2\pi r$	$A = \pi r^2$
Trapezoid	*P = sum of the sides*	$A = \frac{1}{2}(b_1 + b_2) \cdot h$
Parallelogram	*P = sum of the sides*	$A = b \cdot h$
Regular Polygon	*P = sum of the sides*	$A = \frac{1}{2} a \cdot p$

Figure	
Right Prism	Lateral Surface Area: $LSA = P_B \cdot H$
	Total Surface Area: $TSA = P_B \cdot H$ [redacted]
	Volume: $V = A_B \cdot H$

DO NOT WRITE ON THIS SHEET.

IAG 2 Final Review Packet

Solve-It

1. Solve this equation for x

$-3(5x + 4) = -10x + 5$

$-15x - 12 = -10x + 5$

$+12 \quad +12$

$-15x = -10x + 17$

$+10x \quad +10x$

$\frac{-5x}{-5} = \frac{17}{-5}$

$x = -3.4$

2. Solve this equation for x

$2x + 1x = 9x - (3x - 18)$

$3x = 9x - 3x + 18$

$3x = 6x + 18$

$-6x \quad -6x$

$-3x = 18$ ÷ -3

$x = -6$

3. Factor this expression $x^2 + 23x + 132$ larger # ? review square

$(x + 12)(x + 11)$

4. Factor Completely $6xy - 36y$ remember

$6x(x - 6)$ remember

5. What does $7(x + y) - (7x - y)$ equal?

$7x + 7y - 7x + y$

$8y$

6. Evaluate the following expression when x = 2 and y = 6

$X^2 - 5(x + y)$

$(2)^2 - 5(2 + 6)$

$4 - 5(8)$

$4 - 40$

-36 forgot to transfer

7. Solve this equation for y in terms of x

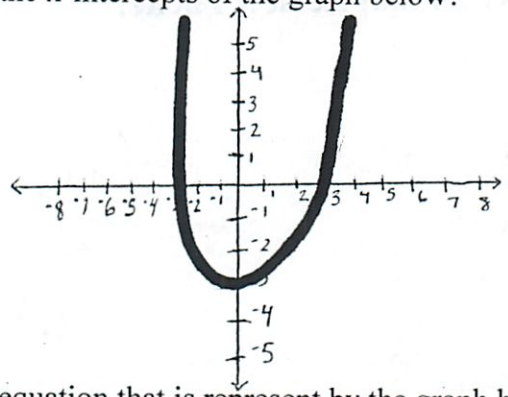
$4x - 12y = 36$

$-4x \quad -4x$

$\frac{-12y}{-12} = \frac{36 - 4x}{-12}$

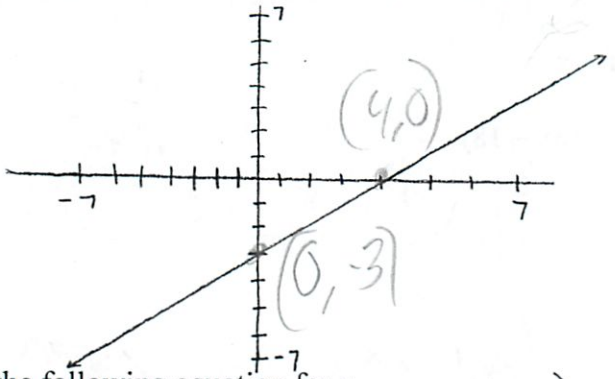
$y = -3 + \frac{1}{3}x$

8. What are the x-intercepts of the graph below?



(-3,0)
(3,0)

9. Write the equation that is represent by the graph below.



(4,0)
(0,-3)

$\frac{\Delta y}{\Delta x}$ $\frac{-3}{-4}$

Slanted upward & positive slope \ = neg slope

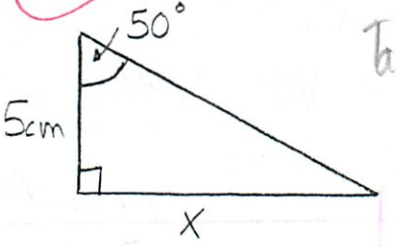
$y = \frac{3}{4}x - 3$

10. Solve the following equation for x

$8(x+2) - 2(x+9) = 15$
$8x + 16 - 2x - 18 = 15$
$6x - 2 = 15$
$+2 \quad +2$
$\frac{6x}{6} = \frac{17}{6}$
$x = 2\frac{5}{6}$

Bee's

1. Find the area of this triangle

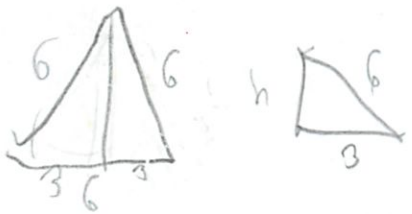


$\frac{1}{2}(59.5877)(5)$
148.9691
148.7cm²

$\tan(50) = \frac{x}{50}$
$1.1918(50) = x$
$x = 59.5877$ → 59.6°

2. Find the area of an equilateral triangle with sides measuring 6 cm

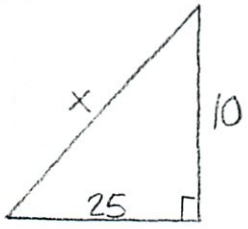
?? all sides =, I see now



$3^2 + h^2 = 6^2$
$9 + h^2 = 36$
$-9 \quad -9$
$h^2 = 27$
$\sqrt{\quad} \quad \sqrt{\quad}$
$h = 5.1961$

$\frac{1}{2}(6)(5.1961)$
$h = 15.5884$
15.59cm

3. In this right triangle, what is the length of x?



$a^2 + b^2 = c^2$

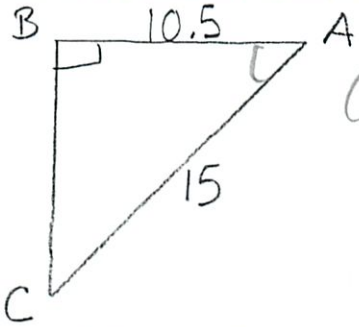
$10^2 + 25^2 = c^2$

$100 + 625 = 725$

$x = 26.9258$

27 units

4. In this right triangle, What is the measure of angle A = (Round your answer to the nearest degree)

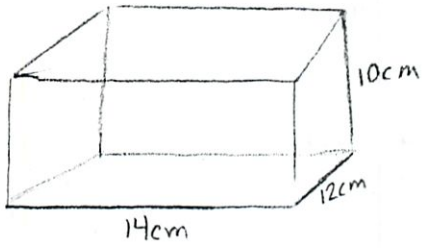


$\cos(A) = \frac{10.5}{15}$

45.5729

46°

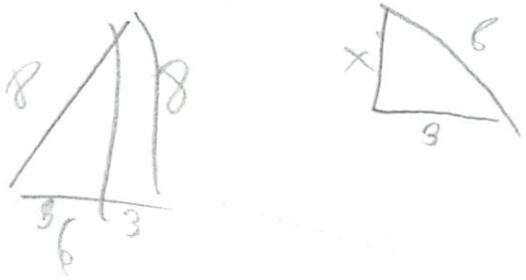
5. Find the total surface area of this rectangle prism



$TSA = 2(10 \times 12) + 2(2 \times 14) + 2(14 \times 10)$

856 cm²

6. Find the height of an isosceles triangle with a base of 6 & the other sides are 8 ft.



$x^2 + 3^2 = 8^2$

$x^2 + 9 = 64$

$-9 \quad -9$

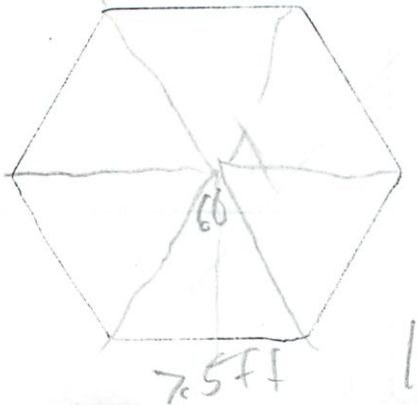
$x^2 = 55$

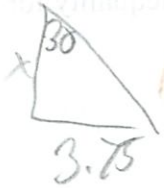
$x = 7.416198$

7.42 ft

7. Find the area of this regular hexagon with sides length of 7.5 ft.

$360/6 = 60$





$\tan(30) = \frac{3.75}{x}$

$.5774x = 3.75$

$.5774 \quad .5774$

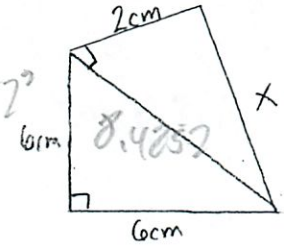
$x = 6.49519$

$\frac{1}{2}(7.5)(6.49519) = 24.3569 \times 6$

146.1417

146.1 ft²

8. In this sketch, both triangle are right triangle, Find the length of x.



$a^2+b^2=c^2$

$6^2+6^2=8.4853^2$

$8.4853^2+2^2=x^2$

$76=x^2$

$x=8.717798$

8.7 cm

Cookies

1. Solve for x

$5-8x<21$

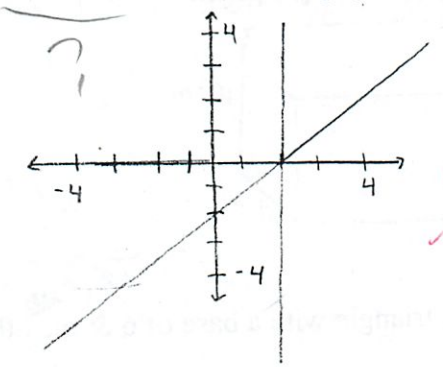
$-5 \quad -5$

$\frac{-8x}{-8} < \frac{16}{-8}$

$x > -2$

Don't forget to switch

2. What is the solution of the following system of equations



(2,8)

just the intersection point

3. Solve this system for x and y

$6x+8y=12$ suppose to be y

$10x+4y=-8$

$-4y \quad -4y$

$10x=-55$

$x=-5.5$

$-10x-13\frac{1}{3}y=-20$

$-13\frac{1}{3}y=-75$

$-13\frac{1}{3} \quad -13\frac{1}{3}$

$y=5.625$

$6x+8(5.625)=12$

$6x+45=12$

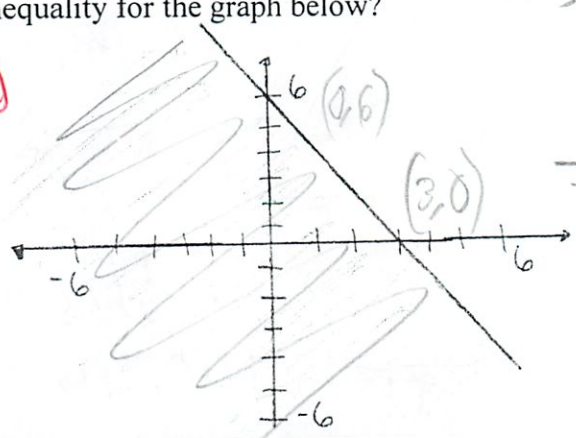
$-45 \quad -45$

$\frac{6x}{6}=\frac{-33}{6}$

$x=-5.5$

Check Both

4. What is the inequality for the graph below?



neg

Stop

$\frac{6}{-3}$

$y<-2x+6$

test 10

07-210

076

5. What is the solution to $6x - 9y \geq 27$

$y \geq -3 + \frac{2}{3}x$

$-6x \quad -6x$

$\frac{-9y}{-9} \geq \frac{27 - 6x}{-9}$

6. Solve for x

$-10 + 5 - (2x + 8) < 25$

$-5 - 2x - 8 < 25$

$-13 - 2x < 25$

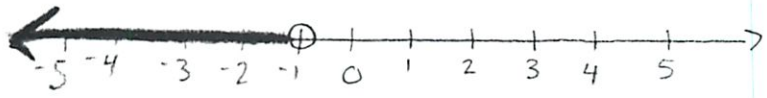
$+13 \quad +13$

$\frac{-2x}{-2} < \frac{38}{-2}$

$x > -19$

Don't forget to flip

7. What is the inequality of the graph below?



$x < -1$ (strict)

8. Solve this system of linear equations

$X + 1.5y = 1.075$
$1.5x + y = 1.3$

(.7, .25)

$x + 1.5y = 1.075$

$-1.5y \quad -1.5y$

$x = 1.075 - 1.5y$

$1.5(1.075 - 1.5y) + y = 1.3$

$1.6125 - 2.25y + y = 1.3$

$-1.6125 \qquad -1.6125$

$\frac{-1.25y}{-1.25} = \frac{-3.125}{-1.25}$

$y = .25$

$x + 1.5(.25) = 1.075$

$x + .375 = 1.075$

$x = .7$

✓Both

$(.7) + 1.5(.25) = 1.075$ ✓

$1.5(.7) + (.25) = 1.3$ ✓

✓