Second Measurement Review

This is a work in progress. Please make the following adjustments:

Page 10: Add 12 inches = 1 foot

Page 12: Do not do # 11

Page 17-20: Just plot the points. Do not do anything else

Page 21 & 22: Just plot the points. Don't do anything else.

Page 23: just draw the best fit line

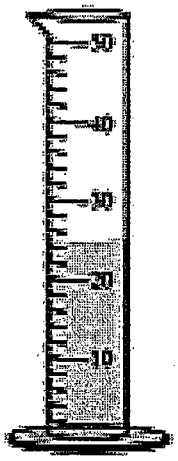
Page 24: Draw the best fit line
Calculate slope (show work)
Get the equation of the line
Then: What would be the umbrella sales when Sales of Raincoats gets to 200 (use your line equation to solve)

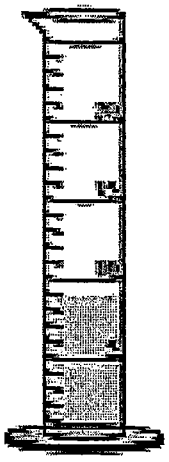
* Still plotting some of the graphs. Will re-post after the weekend

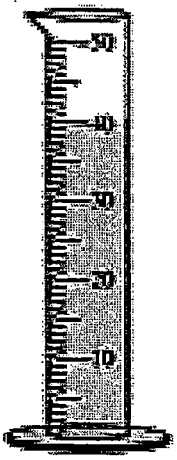
Another Measurement Review

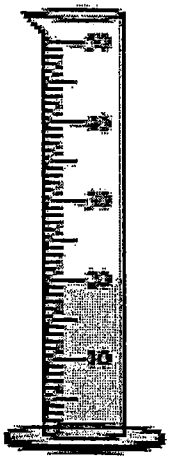
Graduated Cylinders Name:

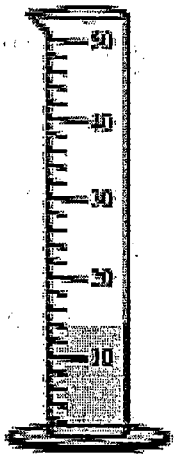
...ine how much liquid is in each graduated cylinder.

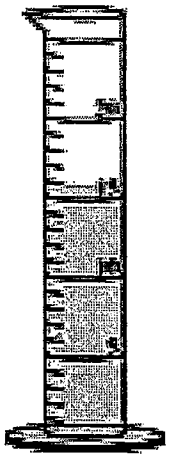
1) 

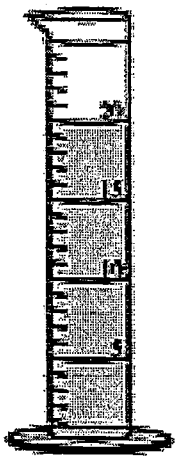
2) 

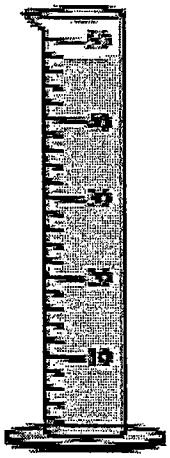
3) 

4) 

5) 

6) 

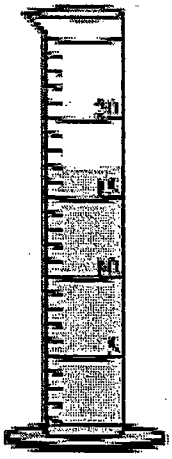
7) 

8) 

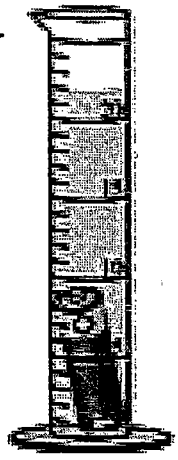
Answers

1. 24.8 ± 0.2mL
2. 9.0 ± 0.1mL
3. 40.0 ± 0.1mL
4. 20.0 ± 0.1mL
5. 14.0 ± 0.2mL
6. 16.0 ± 0.1mL
7. 20.0 ± 0.1mL
8. 48.0 ± 0.2mL
9. A
10. B

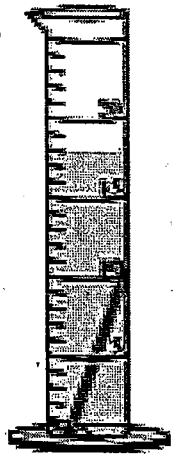
Four different objects were placed in a graduated cylinder 1 at a time:



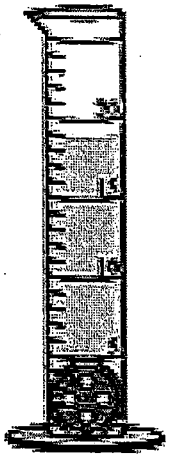
Empty

A. 

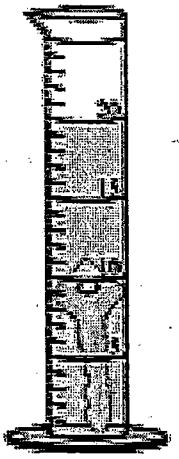
battery

B. 

nail

C. 

lemon

D. 

key

9) Which object had the greatest volume?

10) Which object had the least volume?

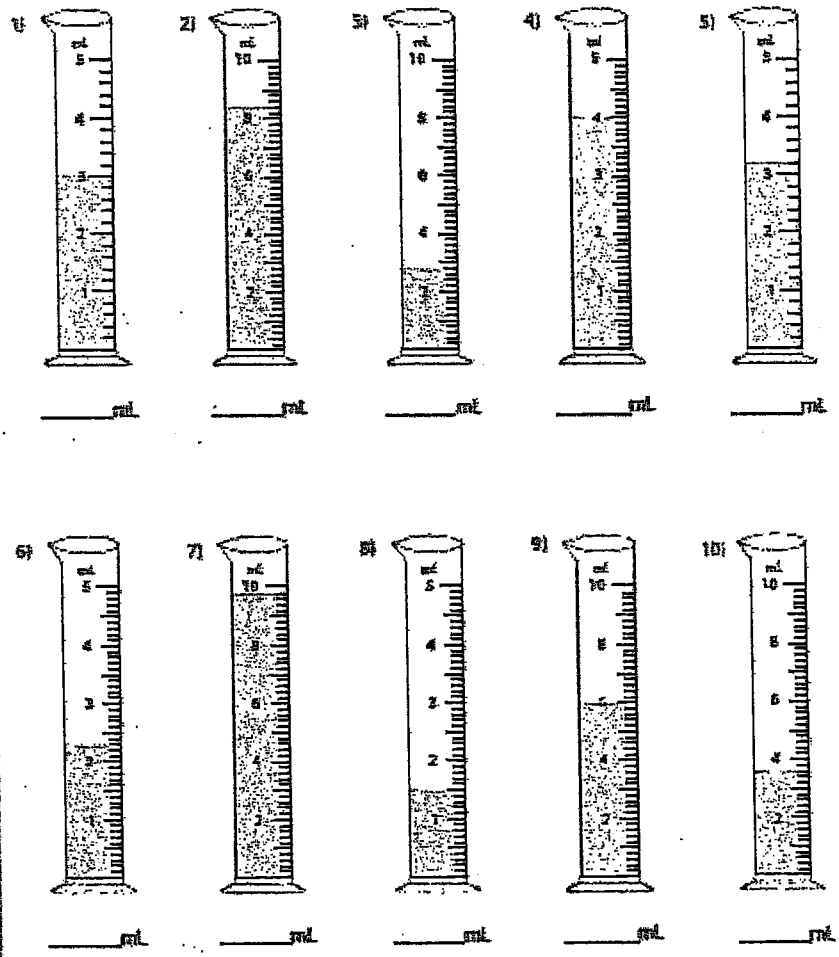
1

1-10	90	80	70	60	50	40	30	20	10	0

Name : _____ Score : _____

Reading Graduated Cylinder

Write the reading shown by each graduated cylinder.



Can barely see these Measurements are very estimated

Focus mostly on the uncertainty

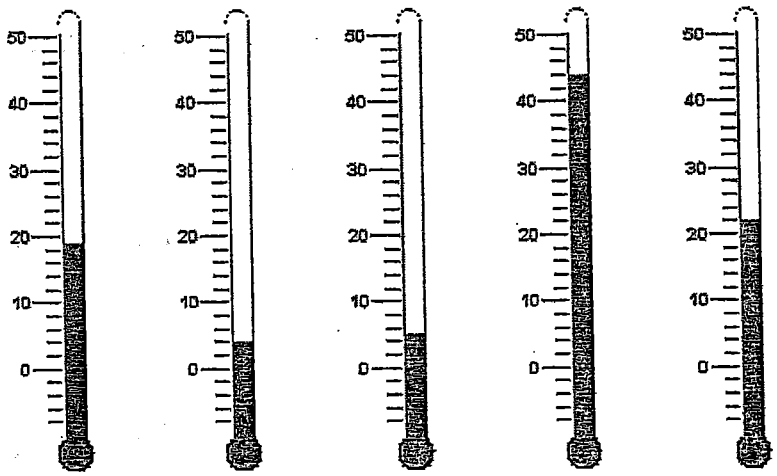
1) 3.00 ± 0.02 mL
2) 8.40 ± 0.02 mL
3) 2.80 ± 0.02 mL
4) 4.0 ± 0.1 mL
5) 3.20 ± 0.02 mL
6) 2.30 ± 0.01 mL
7) 9.80 ± 0.02 mL
8) 1.50 ± 0.01 mL
9) 6.00 ± 0.02 mL
10) 3.60 ± 0.02 mL

2

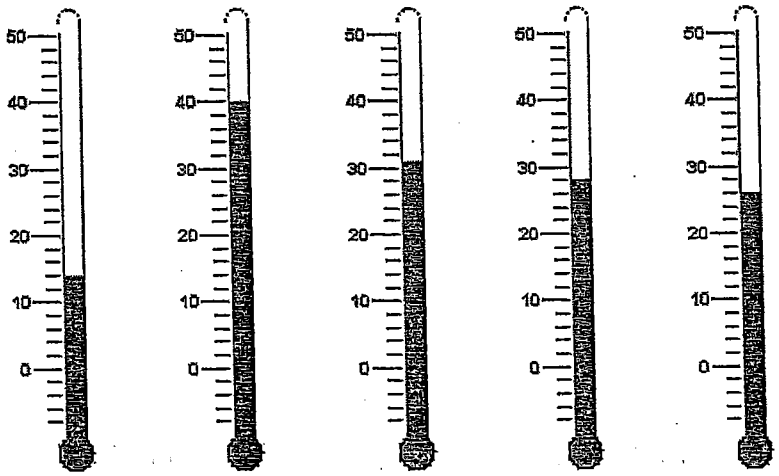
Name : _____ Score : _____

Teacher : _____ Date : _____

Find the temperature for each thermometer.



1. _____ 2 _____ 3. _____ 4. _____ 5. _____



6. _____ 7. _____ 8. _____ 9. _____ 10. _____

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1) 19.0 ± 0.2°C

2) 4.0 ± 0.2°C

3) 4.5 ± 0.2°C

4) 44.0 ± 0.2°C

5) 22.0 ± 0.2°C

6) 14.0 ± 0.2°C

7) 40.0 ± 0.2°C

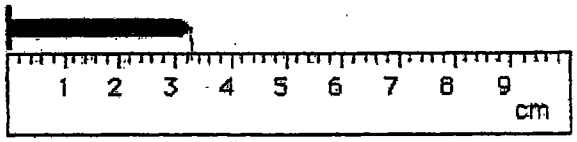
8) 31.0 ± 0.2°C

9) 28.0 ± 0.2°C

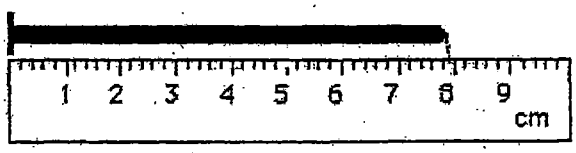
10) 26.0 + 0.2°C

3

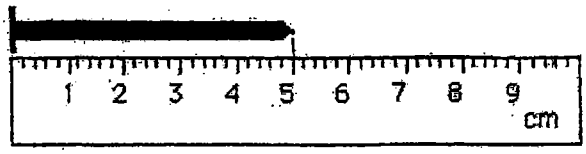
6. Estimate the measurement of each nail with uncertainty. (3 marks)



a. Length of nail 3.22 ± 0.02 cm

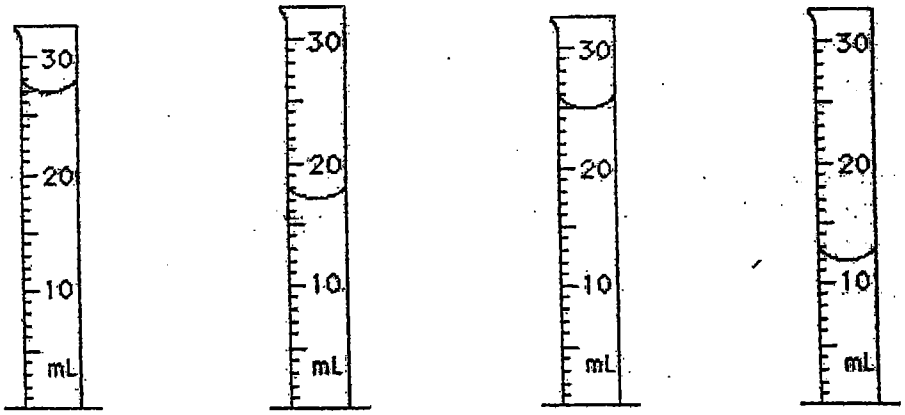


b. Length of nail 7.90 ± 0.02 cm



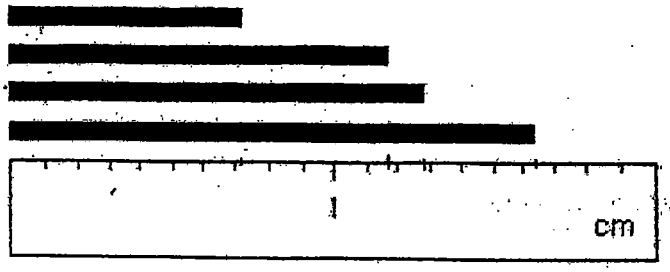
c. Length of nail 5.00 ± 0.02 cm

7. Estimate the volume of liquid in each of the graduated cylinders with uncertainty. (4 marks)



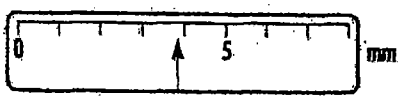
a. 27.0 ± 0.1 mL b. 17.0 ± 0.1 mL c. 25.0 ± 0.1 mL d. 12.0 ± 0.1 mL

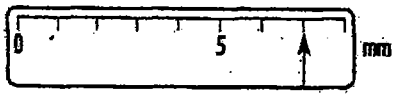
8. Estimate the length of each bar to 3 significant figures with uncertainty. (4 marks)



a. 0.71 ± 0.01 cm b. 1.18 ± 0.01 cm c. 1.29 ± 0.01 cm d. 1.64 ± 0.01 cm

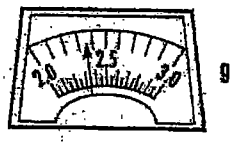
9. Represent the measurements indicated by the arrow on the ruler (include the units). (2 marks)

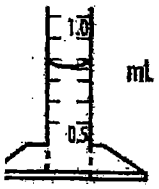


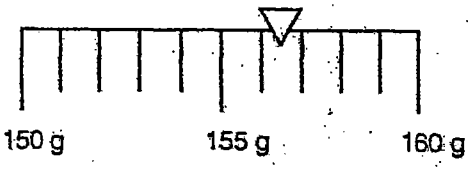


a. 3.9 ± 0.1 mm b. 7.0 ± 0.1 mm

10. Read and record the following measurements (include the units and uncertainty). (4 marks)





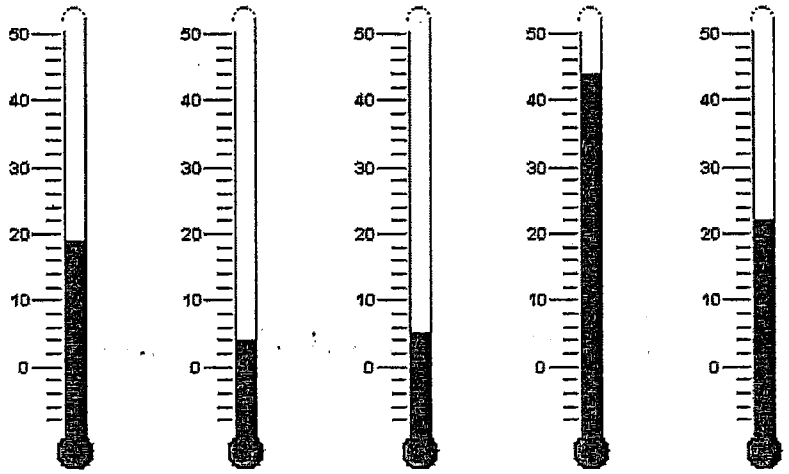


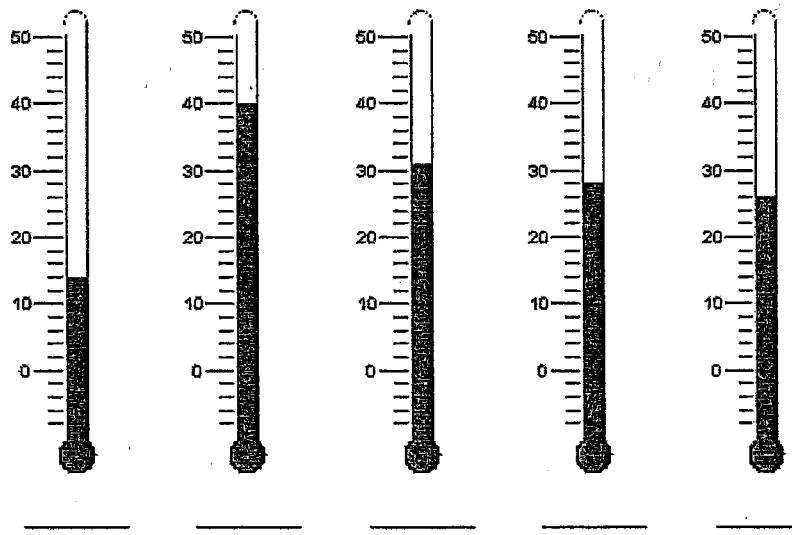
a. 2.350 ± 0.005 g b. 0.87 ± 0.01 c. 156.5 ± 0.1 g

Name : _____ Score : _____

Teacher : _____ Date : _____

Find the temperature for each thermometer.





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Same as page 3.

6

Name: _____ Date: _____

Significant Figures

Addition and Subtraction

Complete the following problems and round to the correct number of significant figures.

1. 35.6 + 56.27 = 91.87 → 91.9
2. 4.337 + 84.7128 = 89.0498 → 89.050
3. 6.2 + 4.114 = 10.314 → 10.3
4. 7.331 + 12.42 = 19.751 → 19.75
5. 22.5285 + 22.14 + 4.266 = 48.9345 → 48.93
6. 88.489 + 7.133 + 6.5 = 102.122 → 102.1
7. 48.835 – 9.1 = 39.735 → 39.7
8. 16.221 – 8.28 = 7.941 → 7.94
9. 101.12 – 98.7 = 2.42 → 2.4
10. 13.7 + 25.466 = 39.166 → 39.2
11. 45.758 – 33.22 = 12.538 → 12.54
12. 19.6 – 8.77 = 10.83 → 10.8
13. 23 + 16.4 + 22.0 = 61.4 → 61
14. 24.5764 – 1.9833 = 22.5931 → 22.5931
15. 8.31 + 7.2 + 9.4626 = 24.9726 → 25.0
16. 3.94 + 68.77 + 83.197 = 155.907 → 155.91
17. 12.484 + 3.6 = 16.084 → 16.1
18. 19.117 – 8.11 = 11.007 → 11.01
19. 7.6924 + 9.6 – 4.888 = 12.4044 → 12.4
20. 19.8 – 8.75 + 11 = 22.05 → 22.

Alpha #_____ Name:_____ Date:_____ Period:_____

Significant Figures & Scientific Notation Practice Problems!

Counting Significant Figures: RULES For Counting Sig. Figs:

1) **Nonzero integers- (1-9) Always count as significant figures.**
2) **Zeros-There are three classes of Zeros.**
   a. **Leading Zeros are zeros that precede all of the nonzero digits. They never count as Sig Figs.**
   b. **Captive Zeros- are zeros that fall between nonzero digits. They always count as Sig Figs.**
   c. **Trailing Zeros- are zeros at the right end of the number. They are significant only if the number is written with a decimal point.**

1) 7000 7×10^3 (1 S.F.)
2) 450.0 4.500×10^2 (4 S.F.)
3) 350 3.5×10^2 (2 S.F.)
4) 44 578 4.4578×10^4 (5 S.F.)
5) 305 3.05×10^2 (3 S.F.)
6) 0.006200 6.2×10^{-3} (4 S.F.)
7) 565.05 5.6505×10^2 (5 S.F.)
8) 5500 5.5×10^3 (2 S.F.)
9) 74.00 7.4×10^1 (4 S.F.)
10) 7040.0 7.04×10^3 (5 S.F.)
11) 23.7×10^{-2} 0.237 (3 S.F.)
12) 1.4×10^7 14000000 (2 S.F.)
13) 4.293×10^4 4293 (4 S.F.)
14) 705 7.05×10^2 (3 S.F.)
15) 600 6×10^2 (1 S.F.)
16) 4301.0 4.301×10^3 (5 S.F.)
17) 0.00056 5.6×10^{-4} (2 S.F.)
18) 40280 4.028×10^4 (4 S.F.)
19) 33214 3.3214×10^4 (5 S.F.)
20) 2.003 2.003×10^0 (4 S.F.)

Adding & Subtracting Sig Figs:
RULE: When adding or subtracting your answer can only show as many decimal places as the measurement having the fewest number of decimal places.

1) 4.60 + 3 = 7.60 → 8
2) 0.008 + 0.05 = 0.058 → 0.06
3) 22.4420 + 56.981 = 79.423 → 79.423
4) 200 - 87.3 = 112.7 → 113
5) 67.5 - 0.009 = 67.491 → 67.5
6) 71.86 - 13.1 = 58.76 → 58.8
7) 357.89 + 0.002 = 357.892 → 357.89
8) 17.95 + 32.42 + 50 = 100.37 → 100.
9) 5.5 + 3.7 + 2.97 = 12.17 → 12.2
10) 84.675 - 3 = 81.675 → 82
11) 75 - 2.55 = 72.46 → 72
12) 10 - 9.9 = 0.

Significant Figures

Name:_____ Hr: __

Also known as "Sig Figs", these are the values in measurements which indicate how precise a measurement is.

1. All non-zero numbers are <u>always</u> significant

2. Zero <u>IS</u> significant if:
   - a.) it is sandwiched between nonzero digits, or — 78.005 (5)
   - b.) it is the last digit in a number with a decimal, or — 5.870 (4)
   - c.) it is the ending zero in a number that <u>ends</u> with a decimal — 5600. (4)

3. Zero is <u>NOT</u> significant if:
   - a.) it follows non-zero numbers <u>without</u> a decimal — 634000 (3)
   - b.) it leads nonzero digits — 0.0024 (2)

Identify the number of significant figures in each of the following:

1. 56700 3	6. 6.0307 5	11. 409 3	16. 0.0004 1
2. 0.00045 2	7. 89004 5	12. 68,000 2	17. 506090 5
3. 68.000 5	8. 3.00060 6	13. 68,000. 5	18. 4.56700 6
4. 235.0060 7	9. 123.005 6	14. 0.000456 3	19. 4500. 4
5. 0.0050060 5	10. 40.0 3	15. 45708 5	20. 400 1

<u>Round</u> each of the numbers shown below to the number of significant figures indicated in the parentheses. (5 or greater, round up)

21. 105.762 (4) 105.8	28. 23,443 (2) 23 000
22. 0.00717 (2) 0.0072	29. 234.9, (3) 235
23. 0.5168 (3) 0.050	30. 699.9 (3) 700
24. 0.0502 (2) 27.2	31. 345.566 (4) 345.6
25. 27.155 (3) 27.2	32. 56,678 (3) 567 00
26. 2,005.02 (5) 2005.0	33. 304.00 (4) 304.0
27. 450.679 (5) 450.68	34. 567,457 (2) 570 000

Name _____

Date _____

Class Period _____

Dimensional Analysis Worksheet

Set up and solve the following using dimensional analysis.

1 mile = 5,280 ft
1 inch = 2.54 cm
3 feet = 1 yard
454 g = 1lb
946 mL = 1 qt
4 qt = 1 gal

Don't forget: What you want / What you've got

12 inches = 1 feet

1) 5,400 inches to miles

$$5\,400 \text{ inches} \times \frac{1 \text{ ft}}{12 \text{ inches}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} = 0.0852 \text{ miles}$$

2) 16 weeks to seconds

$$16 \text{ wks} \times \frac{\text{days}}{\text{wks}} \times \frac{24 \text{ hr}}{1 \text{ days}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}}$$

$$= 9676800 \text{ sec.}$$

3) 54 yards to mm

$$\times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{12 \text{ inches}}{1 \text{ ft.}} \times \frac{2.54 \text{ cm}}{1 \text{ inches}} \times \frac{10 \text{ mm}}{1 \text{ cm.}}$$

$$= 49377 6 \text{ mm}$$

4) 36 cm/sec to mph

$$36 \frac{\text{cm}}{\text{sec}} \times \frac{1 \text{ inches}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ inches}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr.}}$$

$$= 0.805 \text{ mph.}$$

5) 1.09 g/mL to lbs/gal

$$1.09 \frac{g}{mL} \times \frac{1 \text{ lbs}}{454 \text{ g}} \times \frac{946 \text{ mL}}{1 \text{ qt}} \times \frac{4 \text{ qt}}{1 \text{ gal}} = 9.08 \text{ lbs/gal.}$$

6) 19 inches to feet

$$19 \text{ inches} \times \frac{1 \text{ ft}}{12 \text{ inches}} = 1.58 \text{ ft}$$

7) 840 inches to cm $\times \frac{2.54 \text{ cm}}{1 \text{ inch}} = 2133.6 \text{ cm}$

8) 4.22 g/cm to lbs./ft

$$4.22 \frac{g}{cm} \times \frac{1 \text{ lbs}}{454 \text{ g}} \times \frac{\text{cm}}{\text{in.}} \times \frac{12 \text{ in}}{1 \text{ ft}} = 0.283 \text{ lbs/ft}$$

9) 32 ft/sec to meters/min

$$32 \frac{ft}{sec} \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in.}} \times \frac{1 \text{ m}}{100 \text{ cm}}$$

$$= 585.2 \text{ m/min.}$$

10) Write, and then solve your own dimensional analysis problem. Be creative!

(23 COVIDS = 10 SARS)(65 SARS = 85 MERS)(100 MERS = 3000 Plagues)

How many COVIDS are in 22 plagues?

$$22 \text{ plagues} \times \frac{100 \text{ MERS}}{3000 \text{ plagues}} \times \frac{65 \text{ SARS}}{85 \text{ MERS}} \times \frac{23 \text{ COVIDS}}{10 \text{ SARS}}$$

$$= 1.2898 \text{ COVIDS}$$

11) You have the Heebie-Geebies. Your grandmother sends you a remedy for the Heebie-Geebies with the following instructions: "Take 1 drop per 10 lbs. of body weight per day divided into 4 doses until the Heebie-Geebies are gone." How many drops do you take per dose??

I don't get it

☹

(I think you need your weight?)

12) You're throwing a pizza party for 15 people and figure that each person will eat 4 slices. You call up the pizza place and lam that each pizza will cost you $14.78 and it will be cut into 12 slices. How much is the pizza going to cost you? You only have $70. Will you have enough money?

(1 person = 4 slices) (12 slice = $14.78)

$$15 \text{ people} \times \frac{4 \text{ slices}}{1 \text{ people}} \times \frac{\$14.78}{12 \text{ Slices}} = \$73.90$$

13) Every three times I clean my bedroom, my mother makes me an apple pie. I cleaned my bedroom 9 times. How many apple pies does she owe me? (What?! Your mother doesn't reward you for cleaning your bedroom? Aren't there child labor laws? To make up for that injustice, you may have this very easy problem.)

(3 cleans = 1 pie)

$$9 \text{ cleans} \times \frac{1 \text{ pie}}{3 \text{ cleans}} = 3 \text{ pies}$$

14) In my chemistry class, 28 students are each given 3 pens. If there are 8 pens in one package, priced at $1.88 per package, what is the total cost of giving away pens?

(1 student = 3 pens) (8 pens = $1.88)

$$28 \text{ students} \times \frac{3 \text{ pens}}{1 \text{ student}} \times \frac{\$1.88}{8 \text{ pens}} = \$19.74$$

15) Convert 5.70 Kilograms to milligrams. Show your work!

$$5.70\ Kg \times \frac{1000\ g}{1\ Kg} \times \frac{1000\ mg}{1\ g} = 5.7 \times 10^6\ mg$$

OR

5 700 000 mg

16) You find 13,406,190 pennies. How many dollars did you actually find? If each penny weighs 4 grams, how much did all that loot weigh in lbs.?
(2.2 lbs = 1 Kilogram ($1 = 100 pennies) (1 penny = 4g)

a) $$13\ 406\ 190\ pennies \times \frac{\$\ 1}{100\ pennies} = \$134\ 061.90$$

b) $$13\ 406\ 190\ pennies \times \frac{4\ g}{1\ penny} \times \frac{1\ kg}{1000\ g} \times \frac{2.2\ lb}{1\ kg}$$

$= 117\ 974.472$

17) Assume a movie ticket costs $9, how many movie tickets could you buy with the pennies you found in #~~8~~? 16

$$13\ 406\ 190\ pennies \times \frac{\$\ 1}{100\ pennies} \times \frac{1\ ticket}{\$9} = 14\ 895.77\ tickets$$

Significant Figures

Multiplication and Division

Complete the following problems and round to the correct number of significant figures.

1. 6×0.30 = 1.8 ⇒ 2
2. $0.03 \times 7 \times 210$ = 44.1 ⇒ 40
3. 11.6×6.24 = 72.384 ⇒ 72.4
4. 0.004×5280 = 21.12 ⇒ 20
5. $500.55 \div 5.11$ = 97.954... ⇒ 98.0
6. $1000 \div 8.2$ = 121.951... ⇒ 100
7. 51.6×31.4 = 1620.24 ⇒ 1620
8. 8088×0.4 = 3235.2 ⇒ 3000
9. $204.17 \div 3.2$ = 63.803... ⇒ 64
10. 31.2×4.1 = 127.92 ⇒ 130
11. $8000 \div 9.7$ = 824.742... ⇒ 800
12. 35.45×6.1 = 216.245 ⇒ 220
13. 1.1×3.25 = 3.575 ⇒ 3.6
14. $1000 \div 19.7$ = 50.7614... ⇒ 50
15. 10.0×0.02 = 0.2 ⇒ 0.2
16. $6848 \div 2.4$ = $2853.3\overline{3}$ ⇒ 2900
17. 3.3×2.7 = 8.91 ⇒ 8.9
18. $31.66 \div 0.02$ = 1583 ⇒ 2000
19. $9.66 \div 0.33$ = $29.\overline{27}$ ⇒ 29
20. $12.4 \times 12.8 \times 16$ = 2539.52 ⇒ 2500

Scientific Notation (A)

Write each number in either standard form or scientific notation.

2.71×10^{9} = 2710000000

4.4296×10^{3} = 4429.6

2.1×10^{6} = 2100000

1×10^{-4} = 0.0001

5.6×10^{-5} = 0.000056

2.68×10^{2} = 268

4.4×10^{-9} = 0.0000000044

8.26×10^{0} = 8.26

3.77185×10^{1} = 37.7185

3.054×10^{-9} = 0.000000003054

7.8903×10^{-1} = 0.78903

5.73×10^{6} = 5730000

6×10^{2} = 600

9.91×10^{-7} = 0.000000991

2.4×10^{-1} = 0.24

1.9×10^{4} = 19,000

4.07369×10^{0} = 4.07369

2.3991×10^{3} = 2,399.1

8.163×10^{2} = 816.3

3.6683×10^{4} = 36,683

7.7×10^{-2} = 0.077

5.9×10^{-5} = 0.000059

3.3×10^{-3} = 0.0033

6.3338×10^{-1} = 0.63338

Scientific Notation (A)

Convert between scientific notation and ordinary numbers.

8.1×10^{-5}	$= 0.000081$	0.00117	$= 1.17 \times 10^{-3}$
0.000000029	$= 2.9 \times 10^{-8}$	3.5×10^{-8}	$= 0.000000035$
0.00000284	$= 2.84 \times 10^{-6}$	8,430	$= 8.43 \times 10^{3}$
0.00006398	$= 6.398 \times 10^{-5}$	7.79×10^{6}	$= 7790000$
9.096×10^{-4}	$= 0.0009096$	6.2×10^{3}	$= 6200$
0.0000009784	$= 9.784 \times 10^{7}$	7,800	$= 7.8 \times 10^{3}$
0.000019	$= 1.9 \times 10^{-5}$	9.68×10^{6}	$= 9680000$
0.0000874	$= 8.74 \times 10^{-5}$	0.0000081	$= 8.1 \times 10^{-6}$
0.00029	$= 2.9 \times 10^{-4}$	1.83×10^{-8}	$= 0.0000000183$
0.002065	$= 2.065 \times 10^{-3}$	5.89×10^{-7}	$= 0.000000589$

Graphing Practice Problems:

#1 Ethylene is a plant hormone that causes fruit to ripen. The following data shows the amount of time it takes for the fruit to ripen/mature from the time of the first application of ethylene by spraying a field of trees.

Amount of Ethylene (mL/m^3)	Wine Sap Apples: Days to Maturity	Golden Apples: Days to Maturity	Gala Apples: Days to Maturity
10	14	14	15
15	12	12	13
20	11	9	10
25	10	7	9
30	8	7	8
35	8	7	7

a) On the graph paper on the next page plot 3 lines for each type of apple – Days to Maturity vs. Amount of Ethylene.

b) Draw best fit lines for each type of apple. Calculate slope for each and then get the equation of each line in the form $y = mx + b$.

c) If the trend continues, how many days would expect it to take the Gala Apples to mature if 45 mL/m^3 of Ethylene was applied to the tree? (use your line equation to calculate this and be able to show your work)

d) If it takes 5 days for a Wine Sap Apple to mature, what would be the expected amount of Ethylene that was applied? (use your line equation to calculate this and be able to show your work)

just plot the points

Fail!

17

#2 A clam farmer has been monitoring the effect of water temperature on the number of clams developing from fertilized eggs. The data collected is shown below:

Water Temperature (°C)	Number of Developing Clams
15	75
20	90
25	120
30	140
35	75
40	40
45	15
50	0

a) On the graph paper on the next page, plot – Water Temperature vs. Number of Clams.
b) Draw best fit line, calculate slope, and then get the equation of the line in the form y = mx + b.
c) If the water temperature dropped to 5°C, what would be the anticipated number of clams that would develop? (use your line equation to calculate this and be able to show your work)

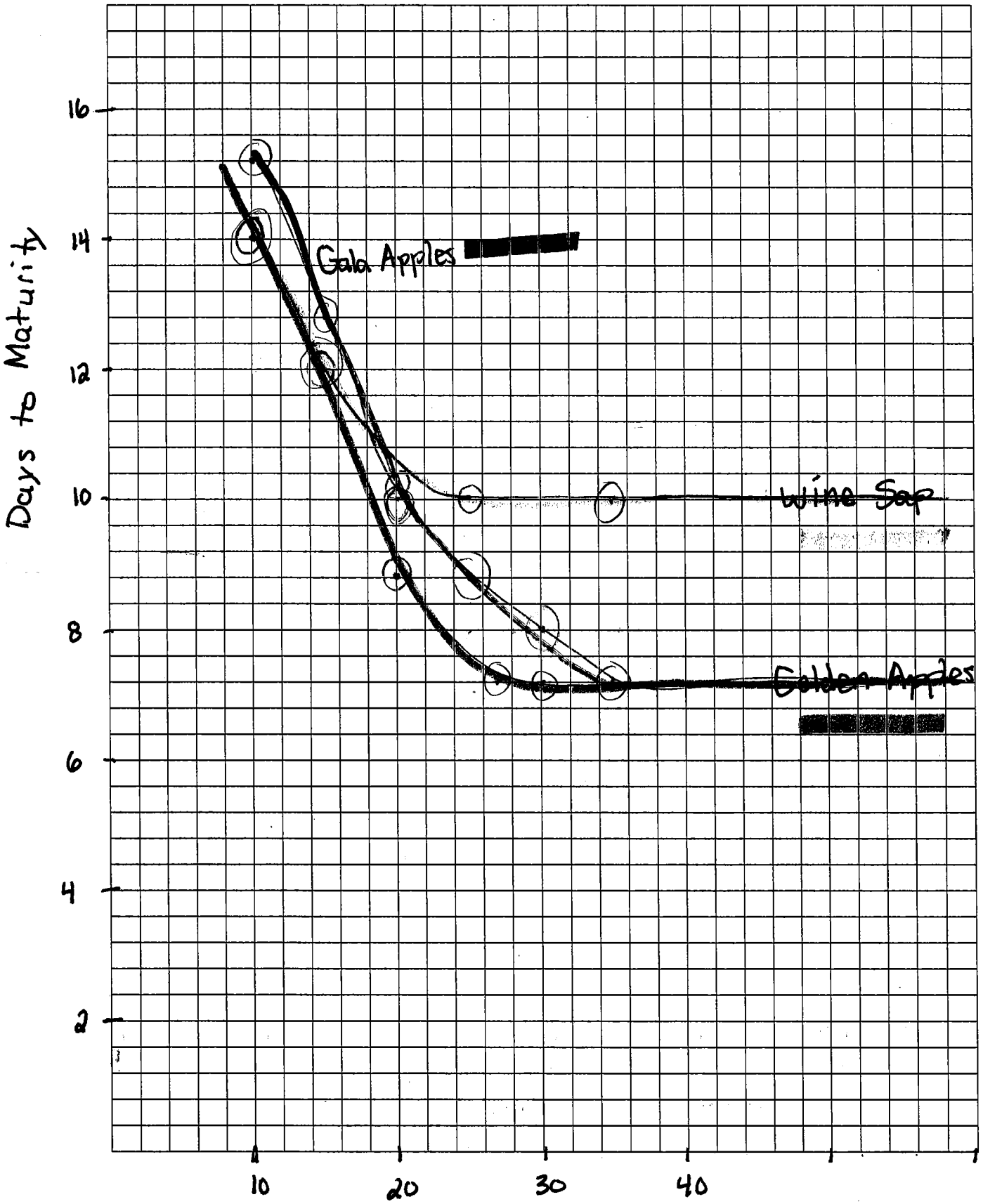
Yuck!

just draw the graph and stop there.

Fail!

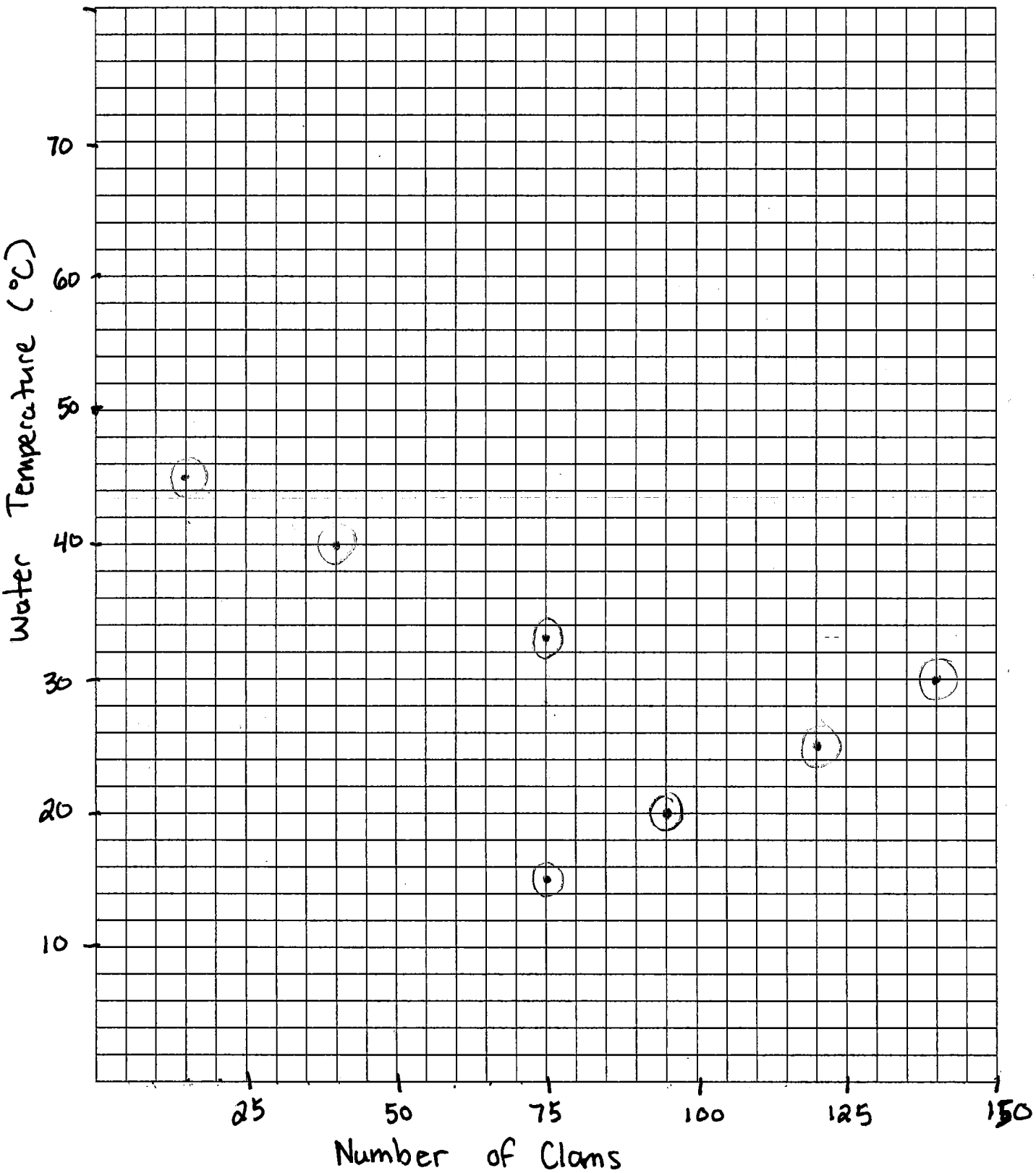
18

Ethylene Application and Apple Growth



just graph

Water Temperature and Clam Production.



Just graph

20

Graph #1

Plant Growth in Soils with Different pH Values

- Plot Growth (y) vs pH (x)
- Draw Best Fit Line
- calculate slope
- write equation of line

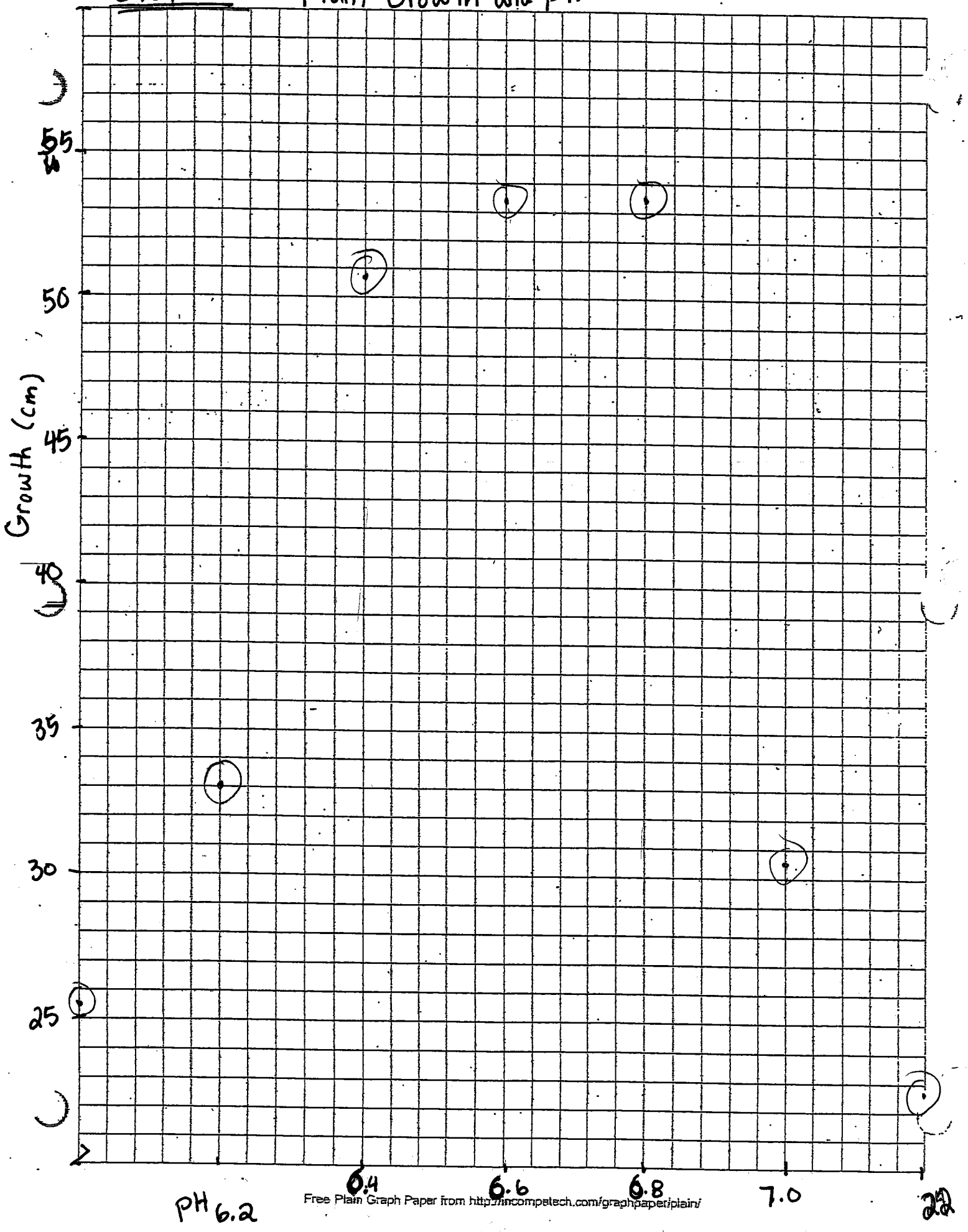
Plant Group	pH of Soil	Average Plant Growth (cm)
1	6.0	25.4
2	6.2	33.0
3	6.4	50.8
4	6.6	53.3
5	6.8	53.3
6	7.0	30.5
7	7.2	22.9

Just plot your points

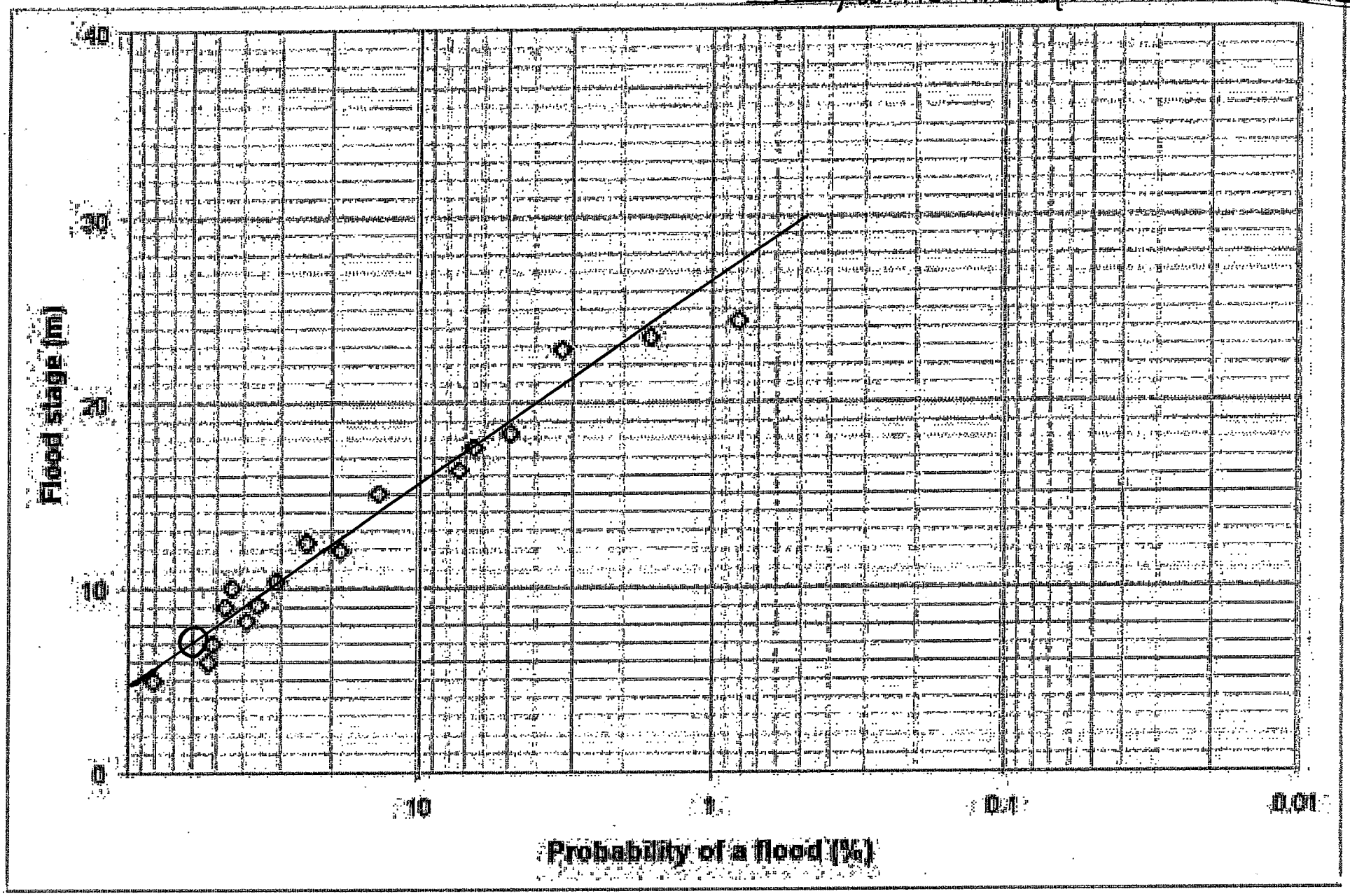
Fail

Q1

Graph #1 Plant Growth and pH



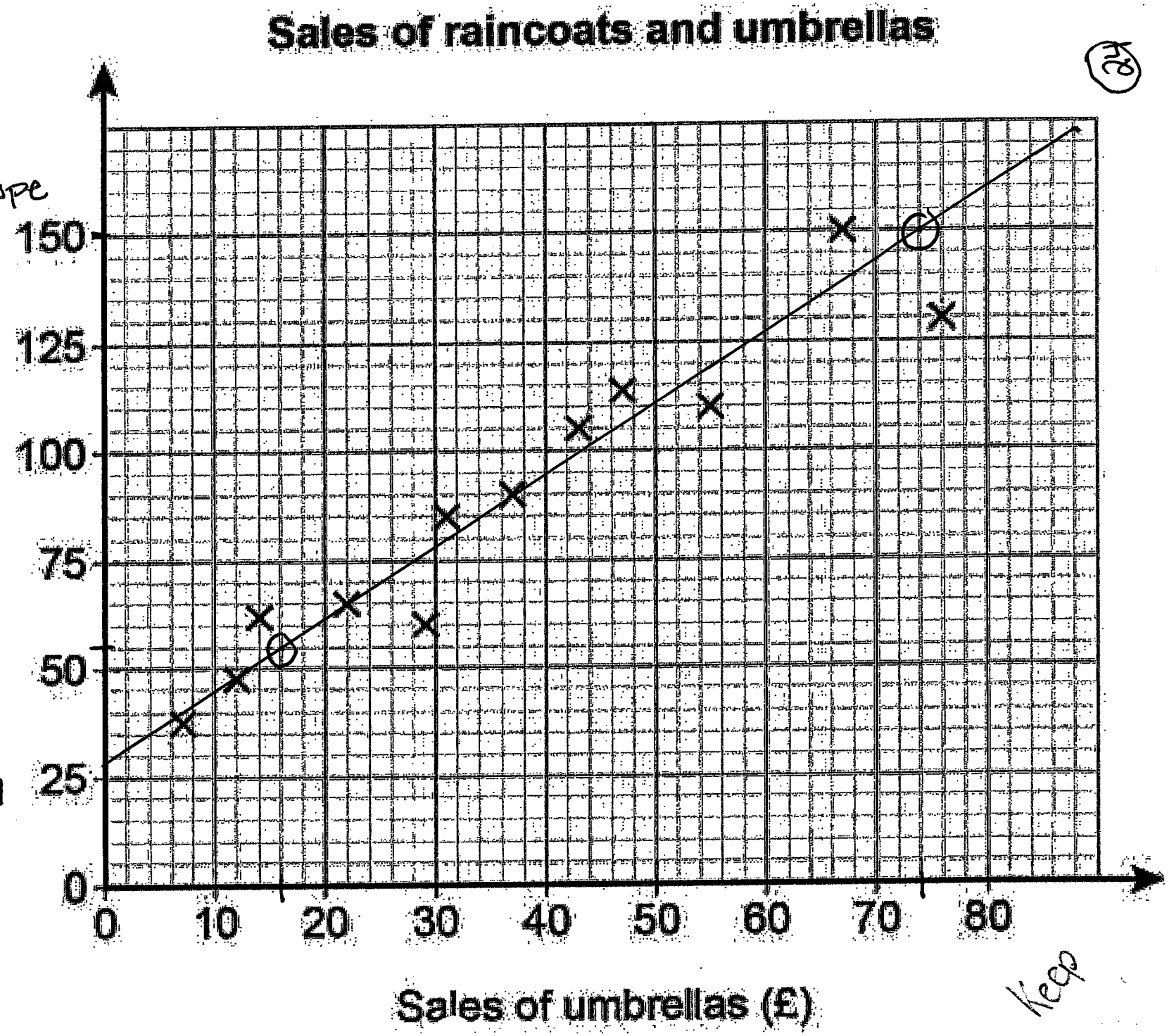
~~Calculate slope after~~ drawing your best fit line ~~(show work)~~.
~~Then, write the equation of the line.~~



Graph #2.

Graph #3:

- draw best fit line
- calculate slope
- equation of the line



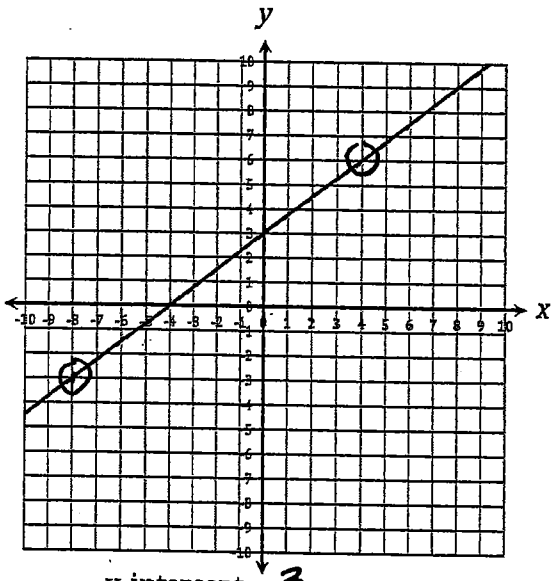
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{150 - 55}{74 - 16} = 1.64$$

$$\boxed{y = 1.64x + 29}$$

Keep

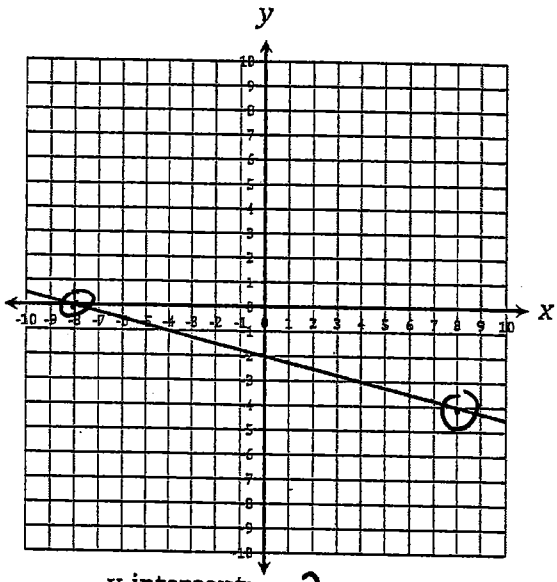
Determine the y-intercept and slope of each line from its graph.



y-intercept: 3

Slope: $m = \frac{6-(-3)}{4-(-8)}$

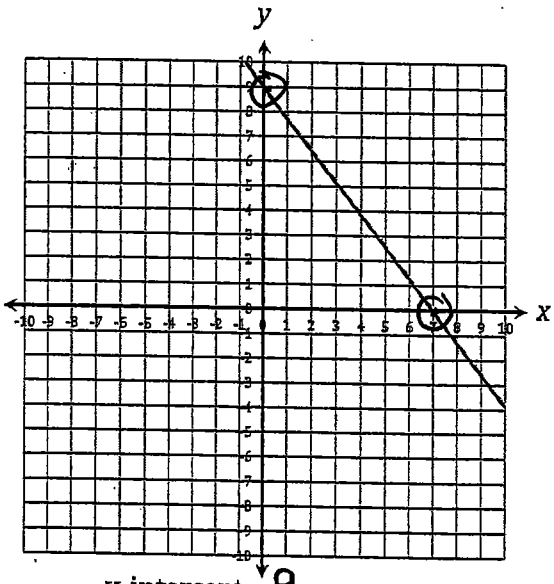
$= 0.75$



y-intercept: -2

Slope: $m = \frac{0-(-4)}{-8-(8)}$

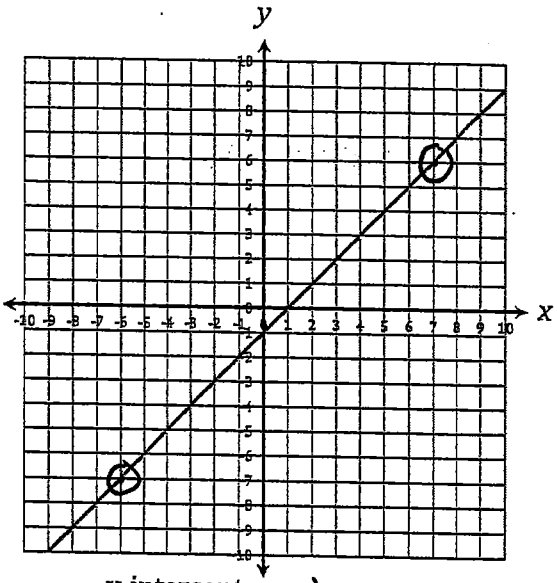
$= -0.25$



y-intercept: 9

Slope: $m = \frac{9-0}{0-7}$

$= -1.29$



y-intercept: -1

Slope: $m = \frac{6-(-7)}{7-(-7)}$

$= 0.93$

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