

# Final Examination

## Math 1204

June 2007

Value: 100 marks

Time: 3 hours

### General Instructions

1. Candidates are required to do ALL items.
2. The examination consists of the following parts:  
  
PART I: Multiple Choice (50 Questions) Value: 50 marks  
PART II: Constructed Response (10 Questions) Value: 50 marks
3. A graphing calculator may be used, where appropriate.
4. Answers to Part I are to be placed on the sheet provided.  
Only that sheet and the answers to the constructed response items should be scanned and emailed to the teacher.  
(Total of 28 pages not including the cover page)
5. For PART II items, candidates are reminded to show all necessary steps and calculations as credit may be given for incomplete or partially correct solutions. Correct answers without calculations will not merit full marks.

\* Check this exam to see that there are no missing pages.\*

Part 1: Selected Response Answer Sheet

1. c	11. c	21. a	31. a	41. d
2. c	12. b	22. a	32. c	42. a
3. b	13. d	23. c	33. b	43. d
4. b	14. b	24. d	34. b	44. a
5. c	15. b	25. b	35. a	45. b
6. c	16. c	26. a	36. b	46. c
7. a	17. b	27. d	37. d	47. d
8. c	18. c	28. b	38. d	48. d
9. c	19. c	29. b	39. b	49. a
10. a	20. a	30. a	40. c	50. d

PART I - Place the correct response on the sheet provided.  
Total Value: 50%

x	0	2	4	6	8
y	1	-3	-7	-11	-15

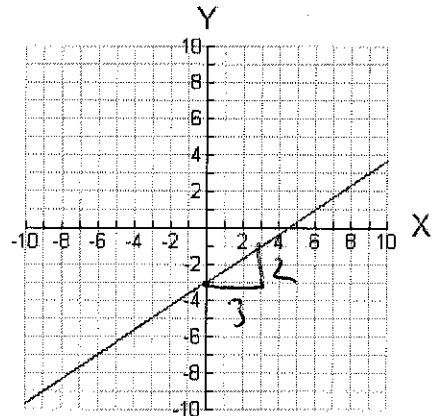
1) Which equation below would represent the data values in the above table?

- a)  $y = -4x + 2$
- b)  $y = -4x + 1$
- c)  $y = -2x + 1$
- d)  $y = \frac{1}{2}x + 1$

Slope =  $\frac{-4}{2} = -2$

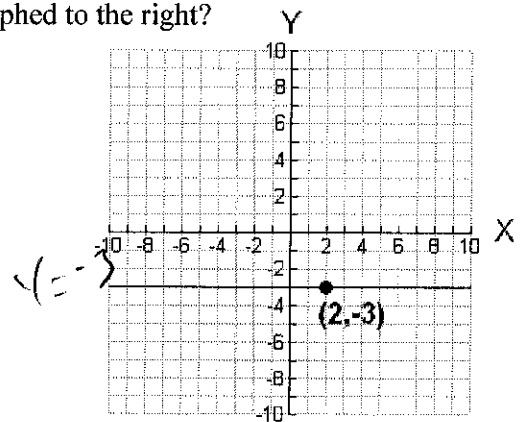
2) What is the slope of the line graphed in the diagram to the right?

- a)  $m = -1$
- b)  $m = -\frac{2}{3}$
- c)  $m = \frac{2}{3}$
- d)  $m = 1$



3) Which equation below best represents the function graphed to the right?

- a)  $x = -3$
- b)  $y = -3$
- c)  $x = 2$
- d)  $y = 2$



- 4) Chatz offers a text messaging service within North America. They charge \$12.00 per month and 2¢ per word. Which equation below describes the total monthly cost for Chatz (assume  $C$  = cost and  $w$  = number of words)?

- a)  $C = 2w + 12$   
 b)  $C = 0.02w + 12$   
 c)  $C = 12w + 2$   
 d)  $C = 12.02w$

2¢ or 0.02 for Slope  
 initial change / Slope = 12

- 5) If a line has a slope of -3 and passes through the point (5,-8), which answer below best represents the y-intercept for that line?

- a)  $b = -23$   
 b)  $b = -7$   
 c)  $b = 7$   
 d)  $b = 23$

$$y = mx + b$$

$$-8 = -3(5) + b$$

$$-8 = -15 + b$$

$$-8 + 15 = -15 + 15 + b$$

→  $7 = b$

- 6) A line passes through the point (3,4) and has an x-intercept of -5. What is the slope of the line?

- a)  $m = -\frac{5}{2}$   
 b)  $m = -\frac{1}{2}$   
 c)  $m = \frac{1}{2}$   
 d)  $m = \frac{5}{2}$

$$\begin{matrix} (3, 4) & (-5, 0) \\ x_1 & x_2 \\ y_1 & y_2 \end{matrix}$$

$$\frac{0 - 4}{-5 - 3} = \frac{-4}{-8} = \frac{1}{2}$$

- 7) What is the equation  $3x - 5y - 25 = 0$  written in slope-intercept form?

- a)  $y = \frac{3}{5}x - 5$   
 b)  $y = -\frac{3}{5}x + 5$   
 c)  $y = -\frac{3}{5}x - 5$   
 d)  $y = \frac{3}{5}x + 5$

$$3x - 5y - 25 = 0$$

$$3x - 3x - 5y - 25 = 0 - 3x$$

$$-5y - 25 = -3x$$

$$-5y - 25 + 25 = -3x + 25$$

$$\frac{-5y}{-5} = \frac{-3x + 25}{-5}$$

8) Solve for  $x$ :  $y = 2 \cos(x - 45) + 7$

a)  $\cos^{-1}\left(\frac{y+38}{2}\right)$

b)  $\cos^{-1}(2y+38)$

c)  $\cos^{-1}\left(\frac{y-7}{2}\right) + 45$

d)  $\cos^{-1}\left(\frac{y-7}{2}\right) - 45^\circ$

9) What is the correct factorization of  $-3x^2 + 4x + 4$  ?

a)  $(x-2)(3x-2)$

b)  $(x+2)(3x-2)$

c)  $(x-2)(-3x-2)$

d)  $(x+2)(-3x+2)$

$$\begin{aligned} & -3x^2 + 4x + 4 \\ & = -3x^2 + 6x + 2x + 4 \\ & = -3x(x+2) + 2(x+2) \\ & = (x+2)(-3x+2) \end{aligned}$$

10) What is  $(-3x+5)(2x-7)$ ?

a)  $-6x^2 + 31x - 35$

b)  $6x^2 + 11x - 35$

c)  $-6x^2 - 35$

d)  $6x^2 - 21x - 35$

$$\begin{aligned} & -6x^2 + 21x + 10x - 35 \\ & = -6x^2 + 31x - 35 \end{aligned}$$

11) Simplify the following:  $\frac{x^2 - 3x + 2}{x^2 - 4}$

a)  $\frac{-3x+2}{-4}$

b)  $\frac{x-1}{x-2}$

c)  $\frac{x-1}{x+2}$

d) Cannot be simplified

$$\begin{aligned} & \frac{(x-2)(x+1)}{(x+2)(x-2)} \\ & = \frac{(x-1)}{(x+2)} \end{aligned}$$

12) Solve for x:  $-2x^2 = 4x$

- a)  $x = 0, x = 2$
- b)  $x = 0, x = -2$
- c)  $x = 0, x = \frac{1}{2}$
- d)  $x = 0, x = -\frac{1}{2}$

$$\begin{aligned}
 -2x^2 - 4x &= 0 \\
 -2x(x+2) &= 0 \\
 -2x &= 0 & x+2 &= 0 \\
 x &= 0 & x &= -2
 \end{aligned}$$

13) What are the x-intercepts for the function  $y = x^2 - 8x - 9$ ?

- a)  $x = 9, x = 1$
- b)  $x = -9, x = -1$
- c)  $x = -9, x = 1$
- d)  $x = 9, x = -1$

$$\begin{aligned}
 x^2 - 8x - 9 &= 0 \\
 (x-9)(x+1) &= 0 \\
 x-9 &= 0 & x+1 &= 0 \\
 x &= 9 & x &= -1
 \end{aligned}$$

14) Solve for x:  $-5(2^x) + 4 = -156$

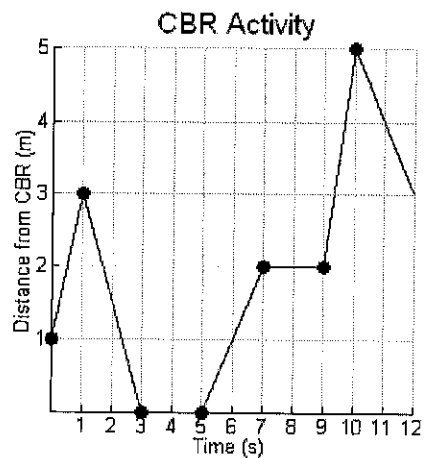
- a) 4
- b) 5
- c) 6
- d) 16

$$\begin{aligned}
 -5(2^x) + 4 &= -156 \\
 -5(2^x) + 4 - 4 &= -156 - 4 \\
 -5(2^x) &= -160 \\
 \frac{-5(2^x)}{-5} &= \frac{-160}{-5} \\
 2^x &= 32 \\
 2^x &= 2^5
 \end{aligned}$$

A math 1204 student was selected to demonstrate the use of a Calculator Based Ranger (CBR) to a group of students. The movement in from of the CBR is recorded and displayed in a graph. Questions 15 to 17 below are based on that graph.

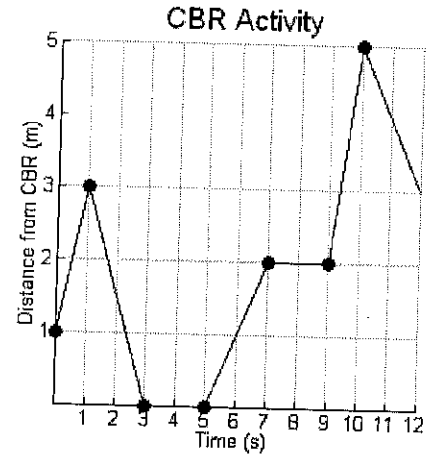
15) According to the graph, how far away from the CBR is the student initially?

- a) 0 m
- b) 1 m
- c) 2 m
- d) 3 m



16) What is the fastest speed of the student during the time the movement was recorded?

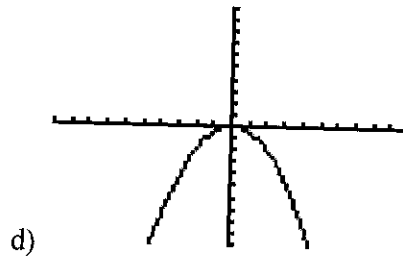
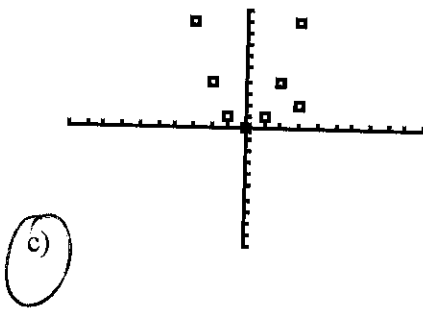
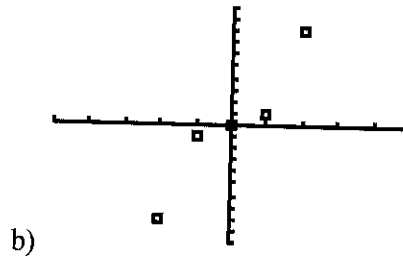
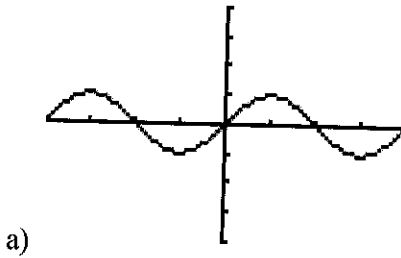
- a)  $1 \text{ m/s}$
- b)  $2 \text{ m/s}$
- c)  $3 \text{ m/s}$
- d)  $4 \text{ m/s}$



17) What is the total time the student was stopped?

- a) 2 seconds
- b) 4 seconds
- c) 8 seconds
- d) The student did not stop at all.

18) Which of the following relations is not a function?



19) Solve for  $x$ :  $3|x-5|+7=16$

- a)  $x=2$
- b)  $x=8$
- c)  $x=2, x=8$
- d) There is no possible solution.

$$3|x-5|+7=16$$

$$3|x-5|+7-7=16-7$$

$$\frac{3|x-5|}{3}=\frac{9}{3}$$

$$|x-5|=3$$

20) Solve for  $x$ :  $\sqrt{-3x+4}=\sqrt{-2x+7}$

- a)  $x=-3$
- b)  $x=3$
- c)  $x=\frac{3}{5}$
- d) There is no possible solution.

$$x-5=3$$

$$x-5+5=3+5$$

$$x=8$$

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

$$-x+5=3$$

$$-x+5-5=3-5$$

$$-x=-2$$

$$x=2$$

21) If  $f(x) = x^2 + 2x$ , what is the value for  $x$  if  $f(x) = -1$ ?

- a)  $x=-1$
- b)  $x=1$
- c)  $x=1, x=-1$
- d)  $x=0$

$$-1 = x^2 + 2x$$

$$-1+1 = x^2 + 2x + 1$$

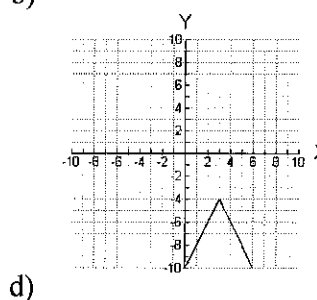
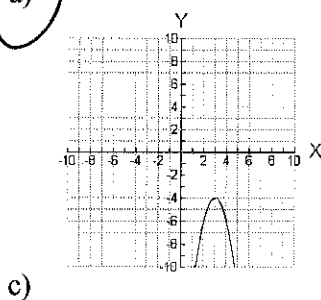
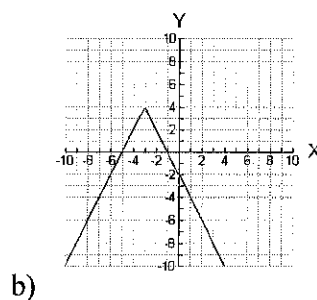
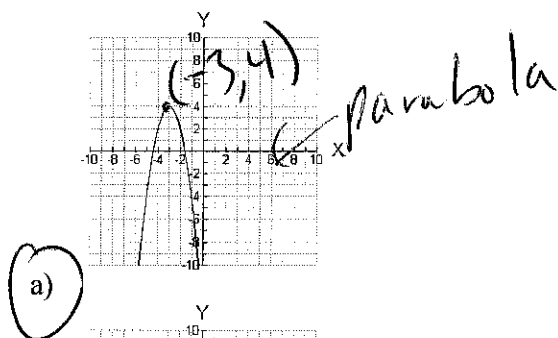
$$0 = x^2 + 2x + 1$$

$$0 = (x+1)^2$$

$$x+1=0$$

$$x=-1$$

22) Which graph below best represents the transformation of  $y = x^2$  under the mapping  $(x, y) \rightarrow (x-3, -2y+4)$ ?





23) The graph of  $y = |x|$  is stretched vertically by a factor of 3, shifted horizontally 2 units to the right with a vertical translation of 4 units upwards. Which equation below best represents this transformation of  $y = |x|$ ?

a)  $3(y-4) = |x-2|$

b)  $3(y+4) = |x+2|$

c)  $\frac{1}{3}(y-4) = |x-2|$

d)  $\frac{1}{3}(y+4) = |x+2|$

24) Trevor was given a set of data and when he performed regression analysis on the data he found the value for  $r$  to be  $-0.97$ . When Trevor graphed the data and the line of best fit what did he observe?

a) The line of best fit had a positive slope but very few of the data points were close to the line of best fit.

b) The line of best fit had a positive slope and many of the data points were close to or touching the line of best fit.

c) The line of best fit had a negative slope but very few of the data points were close to the line of best fit.

d) The line of best fit had a negative slope and many of the data points were close to or touching the line of best fit.

LinReg  
 $y = ax + b$   
 $a = 4.6$   
 $b = -2.266666667$   
 $r^2 = .787202381$   
 $r = .8872442623$

QuadReg  
 $y = ax^2 + bx + c$   
 $a = 1.095238095$   
 $b = -1.971428571$   
 $c = 5.4$   
 $R^2 = .8496787604$

← closest to 1

ExpReg  
 $y = a * b^x$   
 $a = 1.610289653$   
 $b = 1.686837962$   
 $r^2 = .4513000452$   
 $r = .6717886909$

LnReg  
 $y = a + b \ln x$   
 $a = 1.755049569$   
 $b = 10.21232442$   
 $r^2 = .6267927187$   
 $r = .791702418$

25) Different types of regression analysis were conducted on a set of data values. Screenshots of that analysis is displayed above. Based on the regression analysis displayed above, which equation below would represent the best line or curve of best fit?

- a)  $y = 4.6x + -2.3$
- b)  $y = -1.1x^2 - 2.0x + 5.4$
- c)  $y = 1.6(1.7^x)$
- d)  $y = 1.8 + 10.2 \ln(x)$

26) Solve for x:

- a) 2.
- b) 3
- c) 4
- d) 5

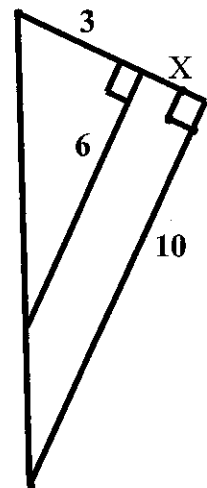
$$\frac{6}{10} = \frac{3}{3+x}$$

$$18 + 6x = 30$$

$$18 - 18 + 6x = 30 - 18$$

$$\frac{6x}{6} = \frac{12}{6}$$

$$x = 2$$



27) Which of the following is a Pythagorean Triple?

- a) 1-1-3
- b) 3-4-7
- c)  $\sqrt{2} - \sqrt{3} - \sqrt{6}$
- d)  $1 - \sqrt{4} - \sqrt{5}$

$$1^2 + (\sqrt{4})^2 = (\sqrt{5})^2$$

$$1 + 4 = 5$$

28) Irene walks East for 30 km and then walks North for 40 km. How far is Irene from her starting point?

- a) 26.5 km
- b) 50 km**
- c) 200 km
- d) 2500 km



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

$$c^2 = 30^2 + 40^2$$

$$c^2 = 900 + 1600$$

$$c^2 = 2500$$

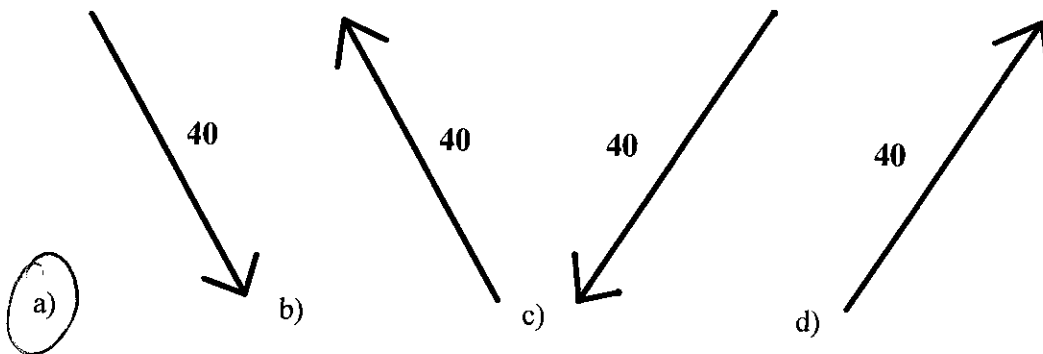
$$\sqrt{c^2} = \sqrt{2500}$$

$$c = 50$$

29) What is the exact value for the expression  $-3\sqrt{75} - 2\sqrt{12}$ ?

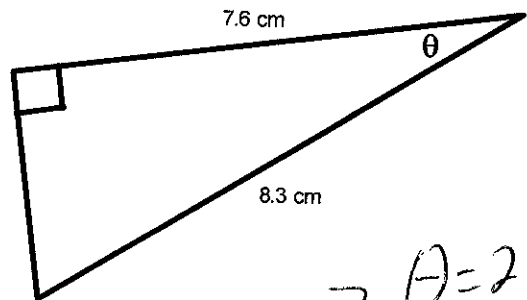
- a)  $-19\sqrt{3} - 3\sqrt{25 \times 3} + 2\sqrt{4 \times 3}$
- b)  $-11\sqrt{3} - 3 \times 5\sqrt{3} + 2 \times 2\sqrt{3}$**
- c)  $-67\sqrt{3}$
- d)  $-19.1 = -15\sqrt{3} + 4\sqrt{3} = -11\sqrt{3}$

30) Which of the following vectors could describe 40 m at a bearing of  $150^\circ$ ?



31) Solve for  $\theta$ :

- a)  $23.7^\circ$**
- b)  $42.5^\circ$
- c)  $47.5^\circ$
- d)  $66.3^\circ$



$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos \theta = \frac{7.6}{8.3}$$

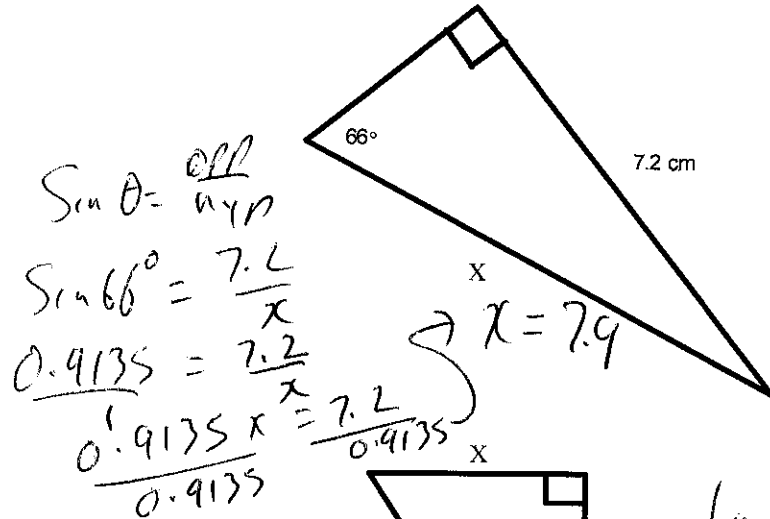
$$\cos \theta = 0.9157$$

$$\cos^{-1}(\cos \theta) = \cos^{-1}(0.9157)$$

$$\theta = 23.7^\circ$$

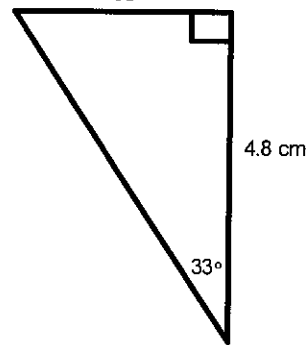
32) Solve for x:

- a) 3.2 cm
- b) 6.6 cm
- c) 7.9 cm
- d) 17.7 cm



33) Solve for x:

- a) 2.6 cm
- b) 3.1 cm
- c) 4.0 cm
- d) 7.4 cm



$\tan \theta = \frac{\text{opp}}{\text{adj}}$   
 $\tan 33^\circ = \frac{x}{4.8}$   
 $0.6494 = \frac{x}{4.8}$   
 $x = 3.1$

34) Which answer below is equivalent to  $\frac{\sin(a)}{\cos(a)}$ ?

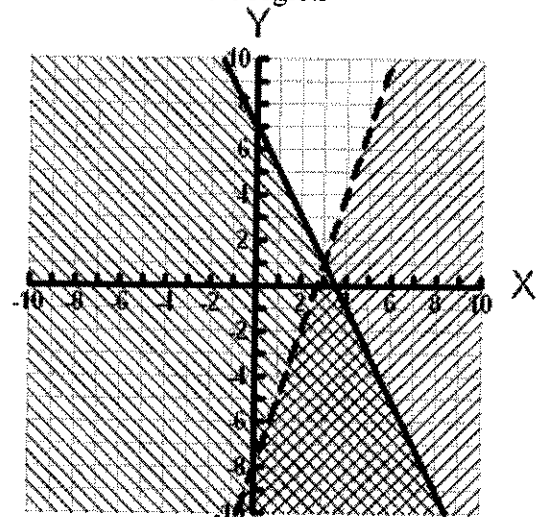
- a)  $\sin^{-1}(a)$
- b)  $\tan(a)$
- c)  $\tan(90^\circ - a)$
- d)  $\cos(90^\circ - a)$

35) Which answer is equivalent to  $\cos(a)$ ?

- a)  $\sin(90^\circ - a)$
- b)  $\sin(90^\circ + a)$
- c)  $\sin(180^\circ - a)$
- d)  $\tan(90^\circ + a)$

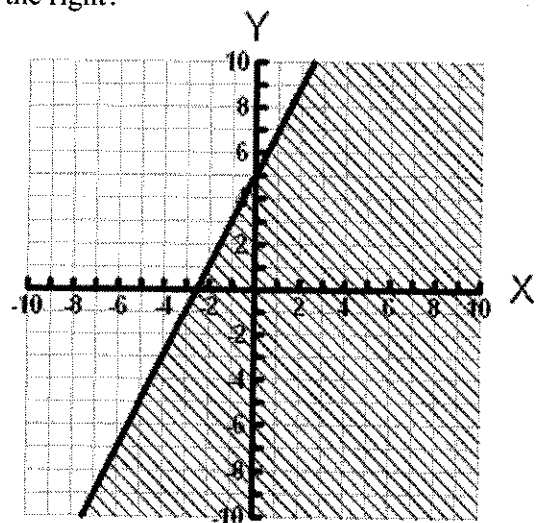
36) Which of the following ordered pairs below is included within the feasible region graphed to the right?

- a) (3,1)
- b) (1,-8)
- c) (6,0)
- d) (3,2)



37) What is the inequality that best represents the graph to the right?

- a)  $y \geq 2x + 5$
- b)  $y > 2x + 5$
- c)  $y < 2x + 5$
- d)  $y \leq 2x + 5$



$$\begin{aligned}2x - 5y + 15 &\leq 0 \\-5y &\leq -2x - 15 && \rightarrow \text{Step 1} \\ \frac{-5y}{-5} &\geq \frac{-2x - 15}{-5} && \rightarrow \text{Step 2} \\ y &\geq \frac{2}{5}x + 3 && \rightarrow \text{Step 3}\end{aligned}$$

38) Jessica wished to graph the inequality  $2x - 5y + 15 \leq 0$ . She completed the above workings to help her graph the inequality. Which step could contain a mistake?

- a) 1
- b) 2
- c) 3
- d) There is no mistake.

$$\begin{cases} x + y = 8 \\ 5y = 3x \end{cases}$$

39) What is the solution to the above system of equations?

- a)  $x = 3, y = 5$
- b)  $x = 5, y = 3$
- c)  $x = 3, y = 11$
- d)  $x = 13, y = 5$

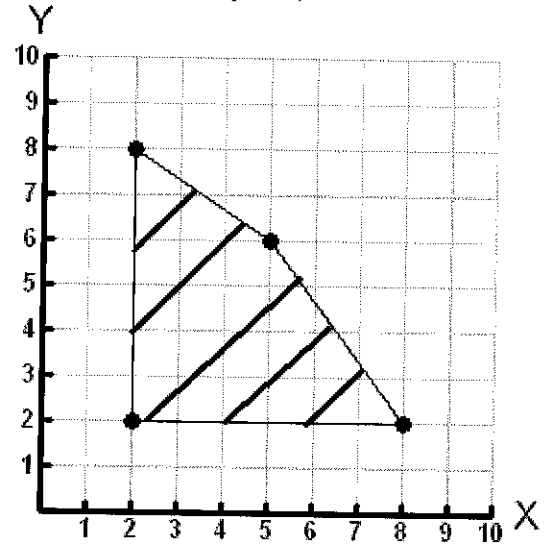
40) Marissa has a summer job assembling toy trucks and cars. It takes her thirty minutes to assemble a truck and fifteen minutes to assemble a car. She cannot work any more than forty hours in a week. If  $t$  represents the number of trucks assembled and  $c$  represents the number of cars assembled, which answer below best describes this situation?

- a)  $30t + 15c \leq 40$
- b)  $30t + 15c \geq 40$
- c)  $30t + 15c \leq 2400$
- d)  $30t + 15c \geq 2400$

$$40 \times 60 = 2400 \text{ minutes}$$

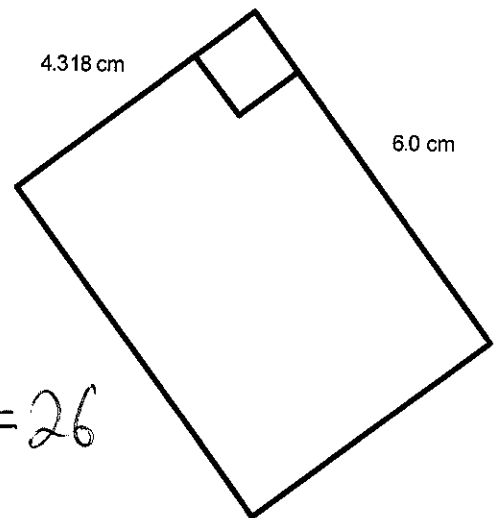
41) If the objective function (profit) is defined for the feasible region to the right as  $P = 5x + 2y$ . Which point on the graph is the optimal solution (maximum profit)?

- a) (2,2)  $5(2) + 2(2) = 14$
- b) (2,8)  $5(2) + 2(8) = 26$
- c) (5,6)  $5(5) + 2(6) = 37$
- d) (8,2)  $5(8) + 2(2) = 44$



42) What is the area of the rectangle to the right reported to the correct level of precision?

- a)  $26 \text{ cm}^2$
- b)  $25.9 \text{ cm}^2$
- c)  $25.91 \text{ cm}^2$
- d)  $25.908 \text{ cm}^2$



$A = b \times h$   
 $A = 4.318 \times 6.0$   
 $A = 25.908 \leftarrow 2. \text{ sig. dig.} = 26$   
 3.2, 3.25, 4.247, 0.0053

43) What is the mean of the above numbers reported to the correct level of precision?

- a) 2.7
- b) 2.68
- c) 2.676
- d) 2.675575

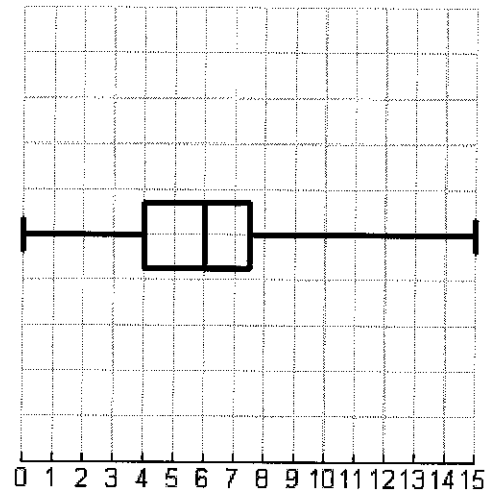
$$\frac{3.2 + 3.25 + 4.247 + 0.0053}{4}$$

$$= 2.675575$$

$$\rightarrow 1 \text{ dp} = 2.7$$

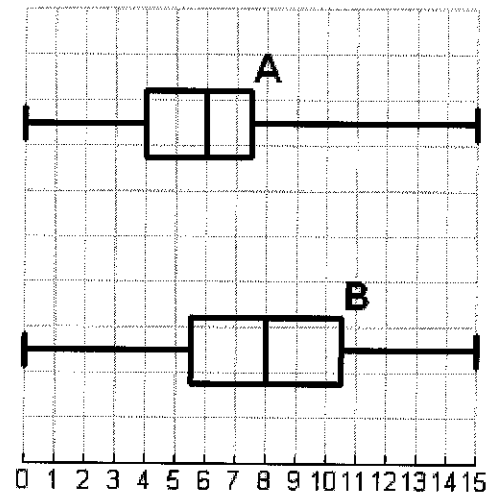
44) When looking at the box whisker plot above, which answer below is false?

- a) 50% of the data is between 4 and 6.
- b) 25% is between 0 and 4.
- c) The median is 6
- d) 0 and 15 are outliers.



45) Using the graph to the right as an example, which answer below is true?

- a) The range is greater in A than in B.
- b) The data is more clustered in A than in B.
- c) The range is greater in B than in A.
- d) The data is more clustered in B than in A





- 46) The stem and leaf plot below shows one student's results on a ruler drop experiment.  
What is the median distance for the drop?

STEM	LEAF
1	1 2 3 3
2	0 3 4 6 8
3	2 4 8
4	0 1

- a) 13 cm  
b) 24 cm  
c) 25 cm  
d) 25.4 cm
- 47) The standard deviation of the list  $\{2, 3, 4, 5, 5, 6, 7, 25\}$  is 6.9. What will the removal of the data value 25 do to the standard deviation for the list?
- a) It will make it larger.  
b) It will not change it.  
c) It will make it slightly smaller.  
d) It will make it much smaller
- 48) Jodi has sampled 1000 people online on their use of MSN. She has found that the mean usage of MSN per week is about 5 hours with a standard deviation of 0.7 hours. Jonathon uses MSN for 6.3 hours per week. Which statement below is true?
- a) He is considered as unusual because he is outside the 68% range.  
b) He is considered as typical because he is within the 68% range.  
c) He is considered as unusual because he is outside the 95% range.  
d) He is considered as typical because he is within the 95% range.
- 49) Which matrix below is an example of a square matrix?

a)  $\begin{bmatrix} -1 & 7 \\ 3 & -6 \end{bmatrix}$

b)  $\begin{bmatrix} 2 & 8 \\ -9 & 0 \\ 1 & 7 \end{bmatrix}$

c)  $[-1 \ 4 \ -8]$

- d) All the above matrices can be squared.

$$[A] = \begin{bmatrix} 2 & 4 & 6 \\ 1 & -3 & 7 \end{bmatrix} \quad [B] = \begin{bmatrix} 5 & 1 \\ -2 & 4 \\ 8 & 9 \end{bmatrix}$$

50) Which of the following statements is true when looking at the above matrices?

- a)  $[A][B]$  only can be successfully completed.
- b)  $[B][A]$  only can be successfully completed.
- c) Neither  $[B][A]$  nor  $[A][B]$  can be successfully completed.
- d) Both  $[B][A]$  and  $[A][B]$  can be successfully completed.

PART II - Constructed Response Total Value: 50%

51) Kevin and Jessica have summer employment with a virtual tutoring service. Kevin is working with Tutoring Without Borders. He will earn a base weekly wage of \$75.00 plus \$15.00 for every hour that he is online. Jessica is working with Virtual Help. She will earn \$25.00 for every hour she is online and an initial weekly wage of \$25.00.

- a) Write equations to represent the total weekly earnings for Kevin and Jessica. Define all variables. (1 mark)

$x = \text{hours of work}$   
 $y = \text{total earnings}$

Kevin  $y = 15x + 75$       Jessica  $y = 25x + 25$

- b) How many hours per week will both be online and earn the same amount? (3 marks)

$$\begin{aligned} 25x + 25 &= 15x + 75 \\ 25x - 15x + 25 &= 15x - 15x + 75 \\ 10x + 25 &= 75 \\ 10x + 25 - 25 &= 75 - 25 \\ \underline{10x} &= \underline{50} \\ 10 & \quad 10 \\ x &= 5 \end{aligned}$$

Both can work  
Show and  
make the  
same amount

- c) Kevin and Jessica are both trying to get Brian to work with them. However Brian can only commit to 6 hours per week. Which person should he work with? Why? (2 marks)

$$\begin{aligned} y &= 15(6) + 75 \\ y &= 165 \end{aligned}$$

$$\begin{aligned} y &= 25(6) + 25 \\ y &= 225 \end{aligned}$$

He should work with Jessica ...  
more money

52) Solve for x:

a)  $-9x^2 - 9x = -4$  (3 Marks)

$$\frac{-12}{-12} \times \frac{3}{3} = \frac{-36}{-36}$$

$$\frac{-12}{-12} + \frac{3}{3} = \frac{-9}{-9}$$

$$-9x^2 - 9x + 4 = -4 + 4$$

$$-9x^2 - 9x + 4 = 0$$

$$-9x^2 + 12x + 3x + 4 = 0$$

$$-3x(3x + 4) + 1(3x + 4) = 0$$

$$(3x + 4)(-3x + 1) = 0$$

$$3x + 4 = 0$$

$$3x + 4 - 4 = 0 - 4$$

$$3x = -4$$

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

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

$$-3x + 1 = 0$$

$$-3x + 1 = 0 - 1$$

$$-3x = -1$$

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

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

b)  $\frac{3x+2}{18} - \frac{3x+4}{9} = \frac{1}{3}$  (3 Marks)

L.C.D = 18

$$18\left(\frac{3x+2}{18}\right) - 18\left(\frac{3x+4}{9}\right) = 18\left(\frac{1}{3}\right)$$

$$3x + 2 - 2(3x + 4) = 6$$

$$3x + 2 + -6x + -8 = 6$$

$$-3x - 6 = 6$$

$$-3x - 6 + 6 = 6 + 6$$

$$-3x = 12$$

$$\frac{-3x}{-3} = \frac{12}{-3}$$

$$x = -4$$

53) Find the equation of the line that contains the points (-3,9) and (9,1) (3 Marks)

$$\begin{array}{cc} (-3, 9) & (9, 1) \\ x_1, y_1 & x_2, y_2 \end{array}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 9}{9 - (-3)} = \frac{-8}{12} = -\frac{2}{3}$$

$$y = mx + b$$
$$1 = -\frac{2}{3}(9) + b$$

$$1 = -6 + b$$

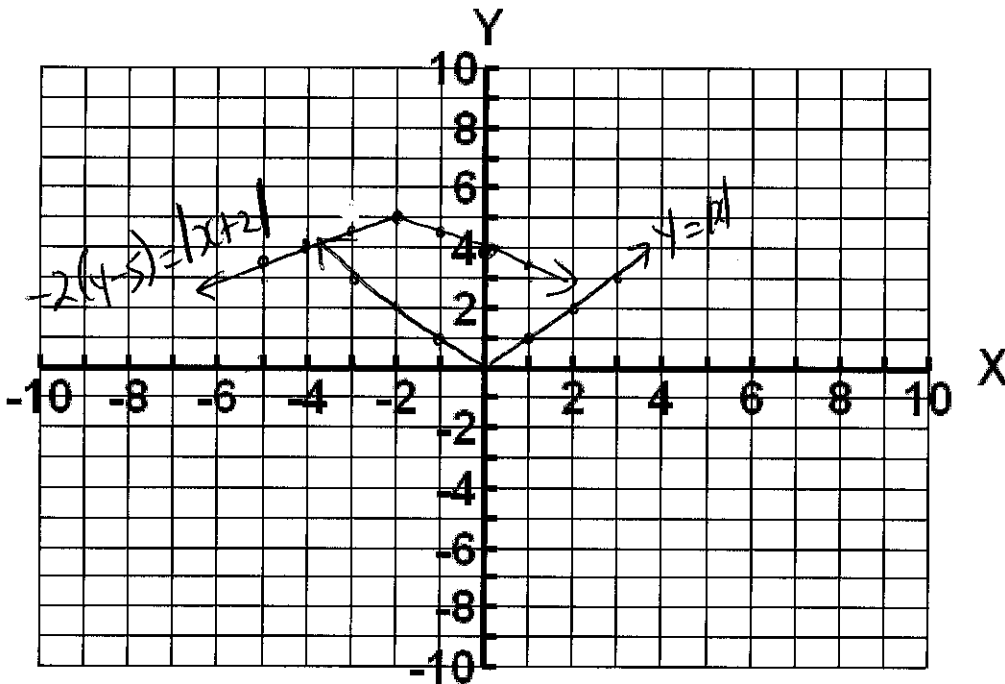
$$1 + 6 = -6 + 6 + b$$

$$7 = b$$

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

54) Graph the equations  $y = |x|$  and  $-2(y - 5) = |x + 2|$  on the grid below. Complete a table of values for each equation and write the mapping notation. (5 Marks)

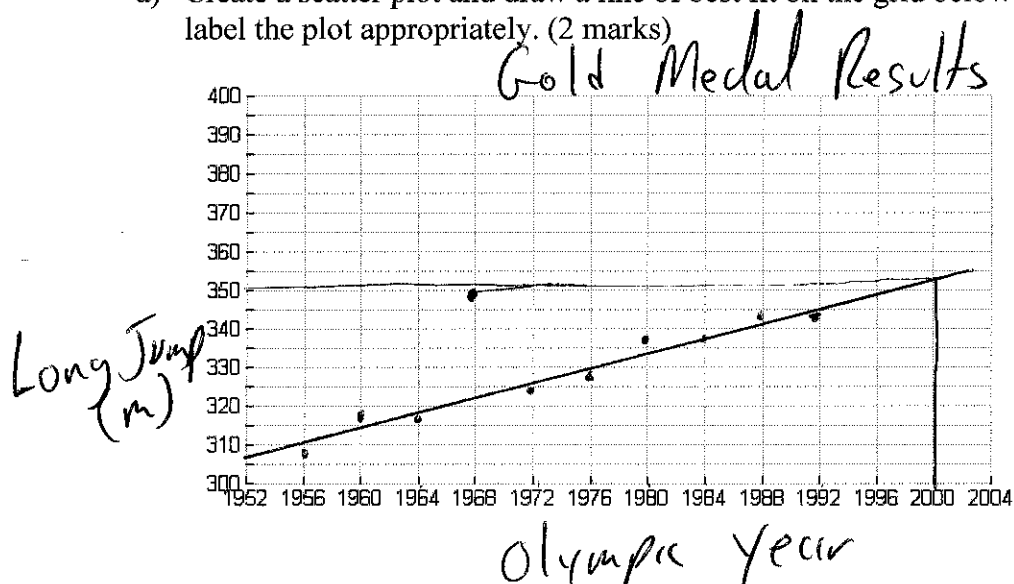
$y = x^2$		Mapping Notation:	$-2(y - 5) =  x + 2 $	
$x$	$y$	$(x, y) \rightarrow (x - 2, \frac{-1}{2}y + 5)$	$x$	$y$
-3	3		-5	3.5
-2	2		-4	4
-1	1		-3	4.5
0	0		-2	5
1	1		-1	4.5
2	2		0	4
3	3		1	3.5



Olympic Year	1956	1960	1964	1968	1972	1976	1980	1984	1988	1992
Long Jump Distance (inches)	308.25	319.75	317.75	350.5	324.5	328.5	336.25	336.25	343.25	342.5

55) The distance that has won the gold medal in the long jump competition at the Olympic Games from 1956 to 1992 has been recorded and placed in the above table.

- a) Create a scatter plot and draw a line of best fit on the grid below. Be sure to label the plot appropriately. (2 marks)



- b) Determine the equation for the line of best fit using the graphing calculator. How well does the line of best fit generated using the technology actually fit the data? Use the correlation coefficient as a part of your answer. (1 mark)

$$y = 0.80x + -1243.96 \quad r = 0.73$$

Reasonably well

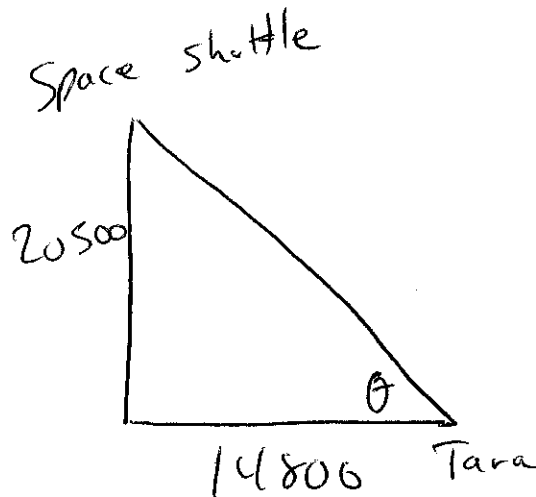
- c) What was the approximate distance in the long jump that won the gold in the 2000 Olympic Games? What is this type of prediction called? (2 marks)

355 m from graph

$$\text{or } y = 0.80(2000) + -1243.96$$

$$y = 356.04 \text{ m}$$

- 56) Tara has been invited by NASA to watch the next Space Shuttle launch in Florida. She wishes to take a picture of the separation of the solid rocket boosters from the Space Shuttle. She will be standing 14,800m from the launch pad and the solid rocket boosters separate when the Space Shuttle is approximately 20,500 m above the ground. Assuming the launch of the spacecraft is perfectly vertical, at what angle must Tara point her camera to take a picture of the separation? (3 marks)



$$\tan \theta = \frac{\text{OPP}}{\text{adj}}$$

$$\tan \theta = \frac{20500}{14800}$$

$$\tan \theta = 1.3851$$

$$\tan^{-1}(\tan \theta) = \tan^{-1}(1.3851)$$

$$\theta = 54.2^\circ$$

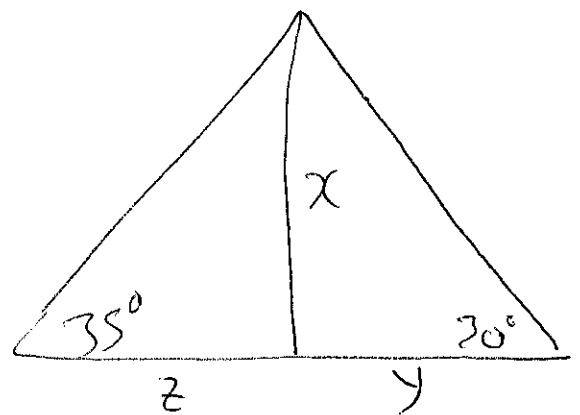
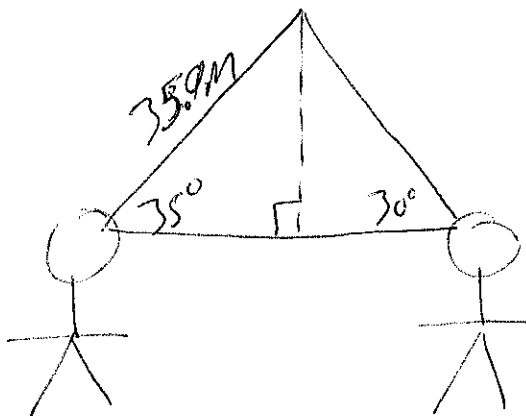
Tara must point her camera at a  $54.2^\circ$  angle to take a picture of the separation



Name: \_\_\_\_\_

57) Glenda and Grant are standing on level ground and on opposite sides of a tree. Glenda measures the angle of elevation to the treetop as  $35^\circ$  and is 35.9 m from the top of the tree. Grant measures the angle of elevation to the treetop as  $30^\circ$ . If both Glenda and Grant have their eyes 1.5 m above ground, how far apart are they?

(8 Marks)



$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 35^\circ = \frac{x}{35.9}$$

$$0.5736 = \frac{x}{35.9}$$

$$x = 20.6 \text{ m}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 35^\circ = \frac{z}{35.9}$$

$$0.8192 = \frac{z}{35.9}$$

$$z = 29.4 \text{ m}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

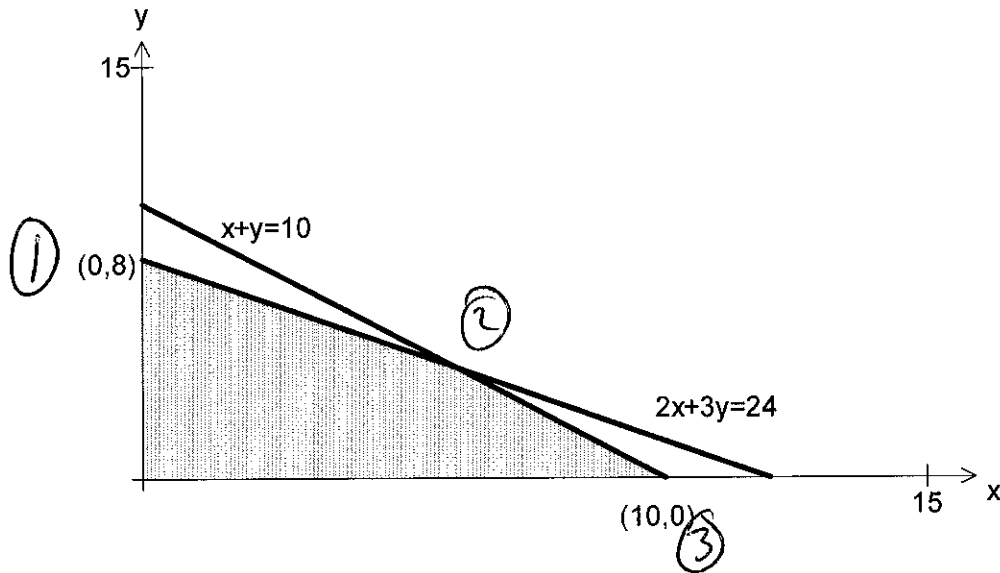
$$\tan 30^\circ = \frac{20.6}{y}$$

$$0.5774 = \frac{20.6}{y}$$

$$\frac{0.5774y}{0.5774} = \frac{20.6}{0.5774}$$

$$y = 35.7 \text{ m}$$

The two people are  $29.4 \text{ m} + 35.7 \text{ m} = 65.1 \text{ m}$  apart.



58) A hardware store makes a profit of \$4.00 for every lawn mower and \$5.00 for every barbecue assembled. The feasible region for the constraints of this store is displayed in the above graph where  $x$  represents the number of lawn mowers assembled and  $y$  represents the number of barbecues assembled. What is the maximum profit that can be made by the store when assembling these items?

$$\text{Profit} = 4x + 5y$$

(5 marks)

$$\begin{aligned} \textcircled{1} \quad P &= 4(0) + 5(8) \\ P &= 0 + 40 \\ P &= 40 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad x+y &= 10 \xrightarrow{x=2} -2x+2y=20 \\ 2x+3y &= 24 \xrightarrow{x=2} 2x+3y=24 \\ & \quad \quad \quad y=4 \\ x+y &= 10 \\ x+4 &= 10 \\ x+4-4 &= 10-4 \\ x &= 6 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad P &= 4(10) + 5(0) \\ P &= 40 \end{aligned}$$

$$\begin{aligned} P &= 4(6) + 5(4) \\ P &= 24 + 20 \\ P &= 44 \end{aligned}$$

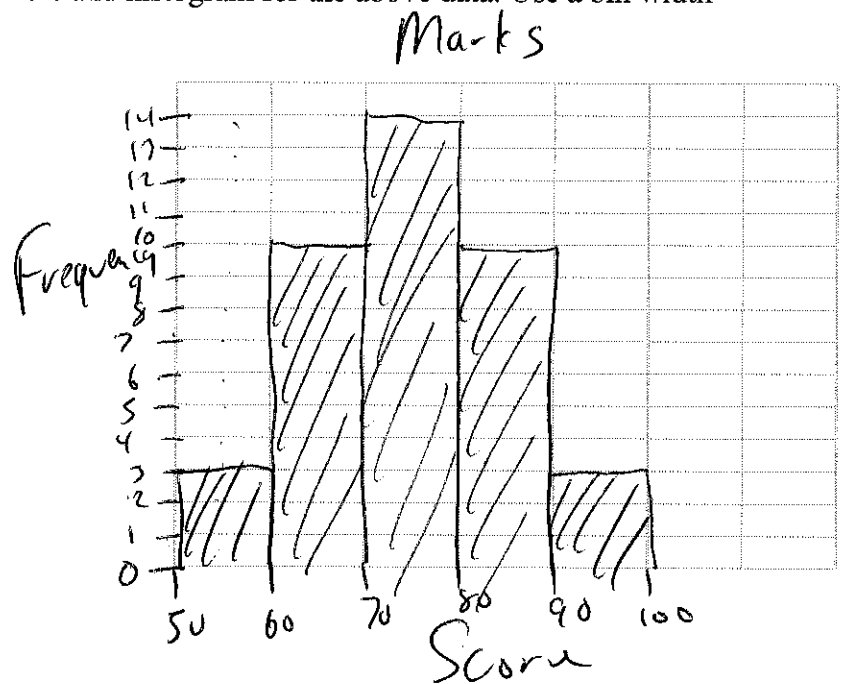
The maximum profit is \$44. This will be made by assembling 6 lawn mowers and 4 barbecues.

Math 1204 Test Scores				
50	65	73	78	85
55	67	74	78	85
57	68	74	79	87
60	69	75	80	89
60	69	75	80	89
63	71	76	81	93
64	72	76	84	97
65	72	77	84	99

59) The results of 40 Math 1204 students are recorded and displayed in the above table.

- a) Construct a frequency table and histogram for the above data. Use a bin width of 10. (4 marks)

Frequency Table	
50-60	3
60-70	10
70-80	14
80-90	10
90-100	3



- b) Respond to the following statement: The histogram shows the data is normally distributed. Use sample size, mean ( $\bar{x} = 74.9$ ), median ( $med = 75$ ) and the shape of the histogram as a part of your answer. (1 mark)

Yes Sample size  $> 30$   
Symmetrical around 75  
Median + mean are same  
bell shaped.

- c) If ( $\sigma_x = 11.1$ ), would a mark of 100 be considered as an unusual result for this class? Why or why not? (2 marks)

$$\bar{x} = 74.9$$

$$\bar{x} - 2\sigma_x = 74.9 - 2(11.1) = 52.7$$

$$\bar{x} + 2\sigma_x = 74.9 + 2(11.1) = 97.1$$

100 lies outside the 95%  
range so it is unusual  
for this class.

60) The students in Port Hope Simpson have decided to purchase their school supplies for Math 2204/05 for next year. Alannah, Angelia and Jim all decided to go to the store and buy the essentials. The tables below indicate the items they purchased and the cost.

	Cost per Unit(\$)
Pencils	0.20
Pens	0.40
Packages of Paper	1.20

	# of Pencils	# of Pens	# of Packages of Paper
Alannah	5	3	2
Angelia	3	6	1
Jim	2	2	5

Use matrix multiplication to determine the total cost for each student. Use the graphing calculator to check your answer. (2 marks)

$$\begin{bmatrix} 5 & 3 & 2 \\ 3 & 6 & 1 \\ 2 & 2 & 5 \end{bmatrix} \begin{bmatrix} 0.20 \\ 0.40 \\ 1.20 \end{bmatrix}$$

$$= \begin{bmatrix} 5 \times (0.20) + 3 \times (0.40) + 2(1.20) \\ 3(0.20) + 6(0.40) + 1(1.20) \\ 2 \times (0.20) + 2(0.40) + 5(1.20) \end{bmatrix}$$

$$= \begin{bmatrix} 4.60 \\ 4.20 \\ 7.20 \end{bmatrix}$$

$$\begin{matrix} \text{Alannah} \\ \text{Angelia} \\ \text{Jim} \end{matrix} \begin{bmatrix} \$4.60 \\ \$4.20 \\ \$7.20 \end{bmatrix}$$

Alannah spent \$4.60  
Angelia spent \$4.20  
Jim spent \$7.20