

Midterm Examination
Math 1204
January 2007

Value: 100 Marks

Time: 2 Hours

General Instructions

1. Candidates are required to do ALL items.
2. The examination consists of the following parts:
 - PART I:** Selected Response (30 Questions) Value: 30%
 - PART II:** Constructed Response (7 Questions) Value: 70%
3. A graphing calculator may be used for calculations and to obtain special values.
4. Answers to selected-response items are to be placed on the sheet provided. Only that sheet and the answers to the constructed response items should be scanned/e-mailed to the teacher.
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 I Selected Response (Multiple Choice) 30%

Reminder: Only the solution sheet that you will record your answers on should be scanned and e-mailed to your teacher. Do not send every single page with every multiple choice question, just the answers.

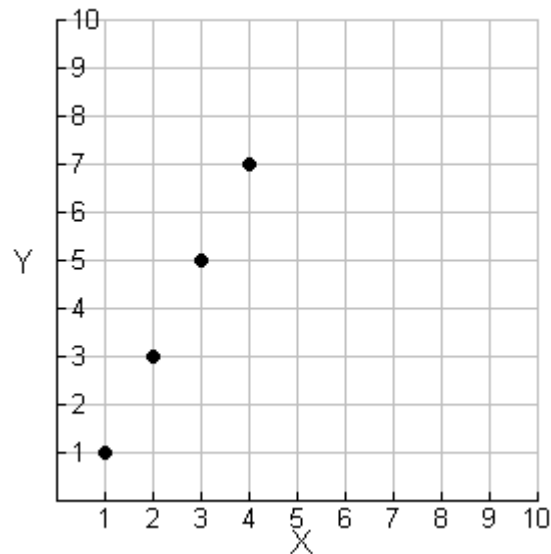
| | | | | |
|---|----|-----|-----|-----|
| x | 3 | 6 | 9 | 12 |
| y | -7 | -19 | -31 | -43 |

1) In the above table which answer below would best represent the data?

- a) $y = -4x - 7$
- b) $y = -12x - 7$
- c) $y = -4x + 5$
- d) $y = 4x + 5$

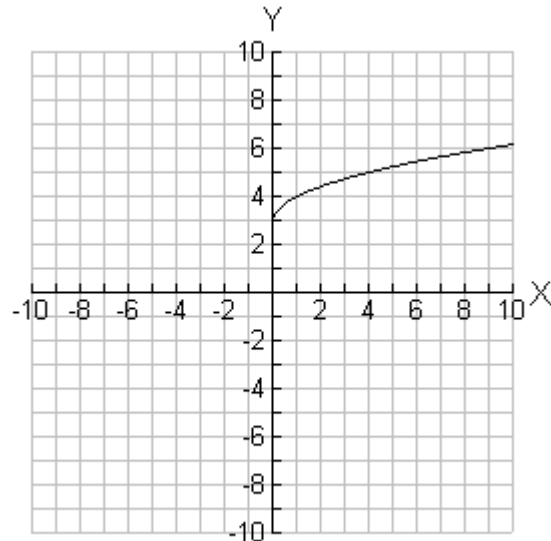
2) What is the range for the graph to the right?

- a) $\{y \mid 1 \leq y \leq 7, y \in R\}$
- b) $\{y \mid 1 \leq y \leq 7, y \in I\}$
- c) $\{x \mid 1 \leq x \leq 3, x \in I\}$
- d) $\{1, 3, 5, 7\}$



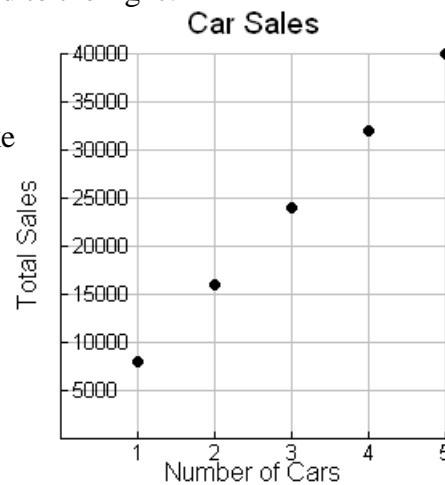
3) Given the graph to the right, which answer below best describes the domain?

- a) $\{x \mid x \in \mathbb{R}\}$
- b) $\{x \mid x \geq 0, x \in \mathbb{I}\}$
- c) $\{x \mid x \geq 0, x \in \mathbb{R}\}$
- d) $\{y \mid y \geq 3, y \in \mathbb{R}\}$



4) Which answer below best describes the data graphed to the right?

- a) The data is linear because it makes sense to connect the data points.
- b) The data is discrete because it does not make sense to connect the data points.
- c) The data is continuous because it makes sense to connect the data points.
- d) The data is non-linear because the data points cannot be connected

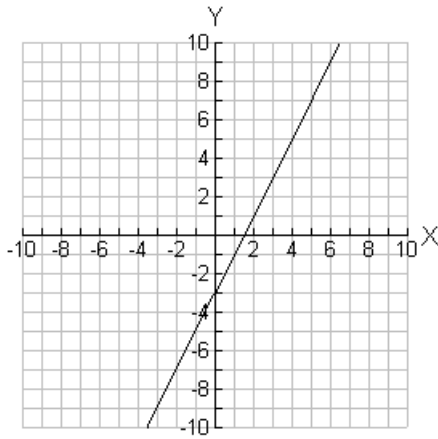


5) What is the value for x in the equation $3x - 14 = 4x + 7$?

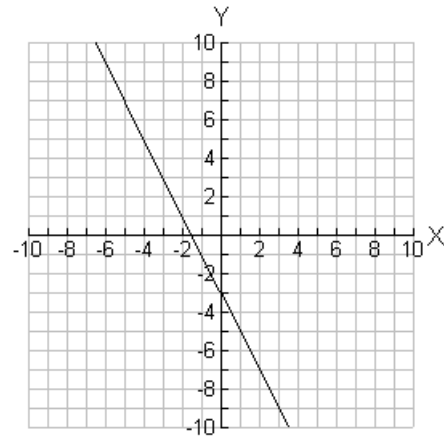
- a) -21
- b) -4
- c) 4
- d) 21

- 6) Acme Internet Services charges a monthly fee of twenty dollars plus a charge of ten cents per hour for every hour of use over fifty hours. If C represents the total cost of Acme Internet Services and h represents the hours of use over fifty hours, which equation below best represents total internet costs for Acme?
- a) $C = 10h + 25$
 - b) $C = 0.10h + 25$
 - c) $C = 0.10(h + 50) + 25$
 - d) $C = 25h + 10$
- 7) If the equation $x = -4$ and $y = -2x + 4$ were graphed, which answer below would indicate their point of intersection?
- a) $(-4, 12)$
 - b) $(-4, -4)$
 - c) $(4, -4)$
 - d) $(-4, 4)$

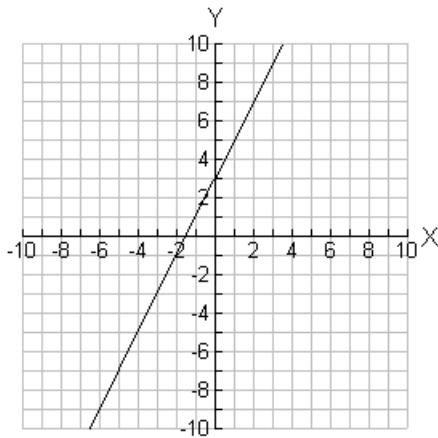
8) Which graph below correctly displays the equation $4x + 2y - 6 = 0$?



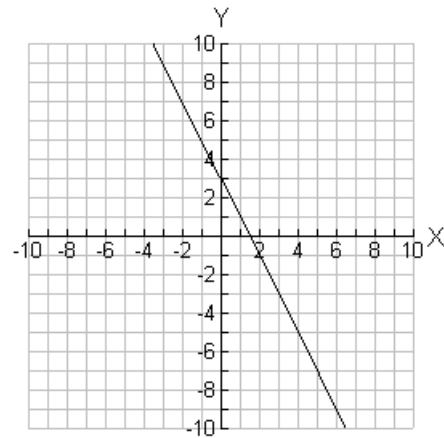
a.



b.



c.



d.

9) Which equation below represents the line that has a slope which is the least steep?

a) $y = -\frac{19}{2}x + 7$

b) $y = \frac{7}{6}x - \frac{1}{5}$

c) $y = \frac{1}{4}x + \frac{4}{7}$

d) $y = -\frac{3}{5}x - 2$

10) Which point below does the line $y = -4x - 9$ actually pass through?

a) $(-4, 7)$

b) $(-2, 2)$

c) $(4, 25)$

d) $(1, 14)$

11) A line passes through the points $(9, -6)$ and $(5, 7)$. Which answer below would represent the slope for that line?

a) $-\frac{13}{4}$

b) $-\frac{4}{13}$

c) $-\frac{1}{4}$

d) $\frac{13}{4}$

12) If a line has a y-intercept of 8 and an x-intercept of -4, which answer below best represents that line?

a) $y = -\frac{1}{2}x + 8$

b) $y = \frac{1}{2}x + 8$

c) $y = -2x + 8$

d) $y = 2x + 8$

13) If $V^2 = U^2 + 2as$, what is s ?

a) $V^2 + U^2 - 2a$

b) $\frac{V^2 - U^2}{2a}$

c) $\frac{V^2 - U^2}{-2a}$

d) $V^2 - U^2 - 2a$

14) What is $-3(x-7)(x+4)$ in expanded form?

a) $-3x^2 - 33x + 84$

b) $-3x^2 + 33x - 84$

c) $-3x^2 + 9x + 84$

d) $-3x^2 - 9x - 84$

15) What is the solution to $n^2 - 36 = 5n$?

a) $n = -4, n = 9$

b) $n = -4, n = -9$

c) $n = 4, n = 9$

d) $n = 4, n = -9$

16) What is the solution to the equation $-3x^3 + 48x = 0$?

- a) $x = 0$
- b) $x = 0, x = 4$
- c) $x = 0, x = 4, x = -4$
- d) $x = 0, x = 8, x = -8$

17) If the solutions to a quadratic equation are $x = -3$ and $x = 6$, which answer below is a possible equation?

- a) $y = x^2 - 3x + 18$
- b) $y = x^2 + 3x + 18$
- c) $y = x^2 - 3x - 18$
- d) $y = x^2 + 3x - 18$

18) What is the solution to the equation $3^x = 2187$?

- a) $x = 6$
- b) $x = 7$
- c) $x = 8$
- d) $x = 729$

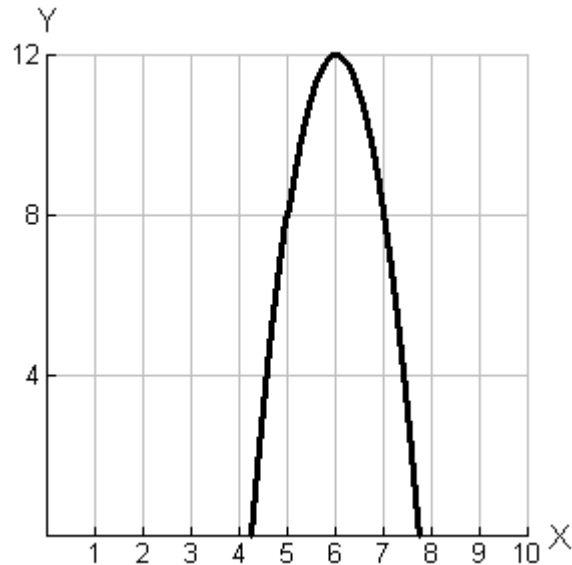
19) The graph of $y = x^2$ is transformed under the mapping $(x, y) \rightarrow \left(x - \frac{3}{5}, -\frac{1}{7}y + \frac{2}{9}\right)$.

Which equation below best represents the equation of the transformed graph?

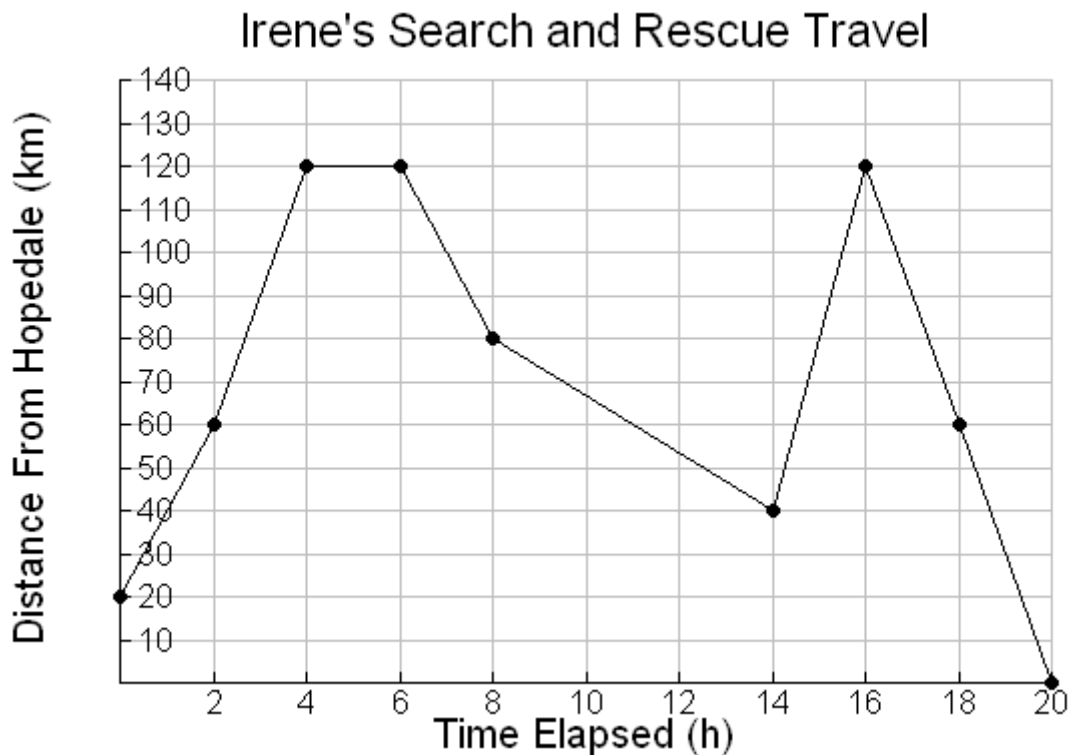
- a) $-7\left(y - \frac{2}{9}\right) = \left(x + \frac{3}{5}\right)^2$
- b) $-7\left(y - \frac{2}{9}\right) = \left|x + \frac{3}{5}\right|$
- c) $\frac{1}{7}\left(y + \frac{2}{9}\right) = \left(x - \frac{3}{5}\right)^2$
- d) $\frac{1}{7}\left(y - \frac{2}{9}\right) = \left(x + \frac{3}{5}\right)^2$

20) What is the equation for the graph displayed to the right?

- a) $(y-12) = (x-6)^2$
- b) $-(y-12) = (x-6)^2$
- c) $-4(y-12) = (x-6)^2$
- d) $-\frac{1}{4}(y-12) = (x-6)^2$



Irene and her friend have decided to help look for a missing hunter from Hopedale. Since it is in the fall they decide to conduct their search using a 4-wheel all terrain vehicle. They have a GPS (Global Positioning System) device with them which allows for the measuring of the distance away from Hopedale. Their travels are recorded in the graph below.



Use the graph on the previous page to answer questions 21 to 24 below.

21) How long do Irene and her friend stop to rest?

- a) 1 hour.
- b) 2 hours.
- c) 3 hours.
- d) They never stop.

22) How far from Hopedale were Irene and her friend when data recording with the GPS started?

- a) 0 km
- b) 10 km
- c) 20 km
- d) 60 km

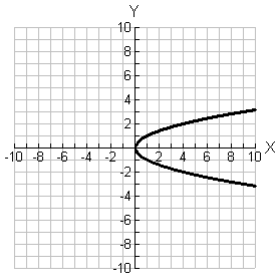
23) What is the maximum speed reached by Irene?

- a) 30 km/h
- b) 40 km/h
- c) 60 km/h
- d) 80 km/h

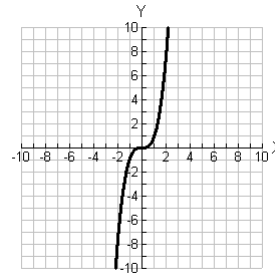
24) When do Irene and her friend return to Hopedale?

- a. After 14 hours.
- b. After 16 hours.
- c. After 20 hours.
- d. After 21 hours.

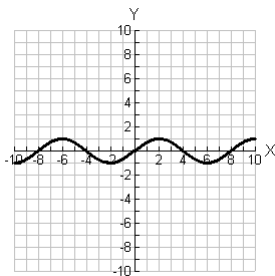
25) Which graph below does not represent a function?



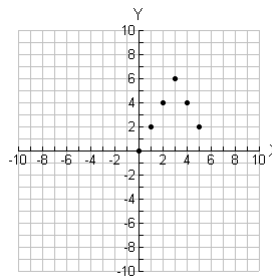
a.



b.



c.



d.

26) Which statement below is true for the equation $D(t) = 9.8t - 4.9t^2$?

- a) t is the independent variable
- b) D is the independent variable
- c) Both variables are independent
- d) Both variables are dependent

27) If $T(m) = 100(0.65)^m$, what is $T(3.9)$?

- a) 18.64
- b) 253.5
- c) 11758775.29
- d) 41012227.39

28) If $P(x) = x^2 + 2x - 3$, what is the value for x if $P(x) = 0$?

- a) $x = -3$
- b) $x = -3, x = -1$
- c) $x = 3, x = 1$
- d) $x = -3, x = 1$

29) Data has been entered into the TI-84 Plus and regression analysis completed. Which screen capture below would you use to write the best line or curve of best fit?

LinReg
 $y = ax + b$
 $a = -2.49465$
 $b = 12.22151667$
 $r^2 = .6409346257$
 $r = -.8005839279$

QuadReg
 $y = ax^2 + bx + c$
 $a = 1.143075893$
 $b = -10.49618125$
 $c = 22.890225$
 $R^2 = .9280148916$

a.

b.

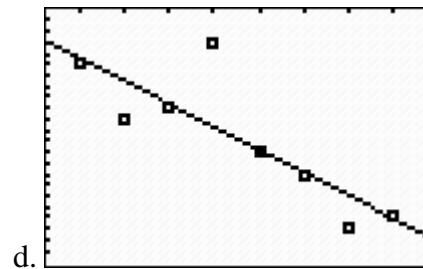
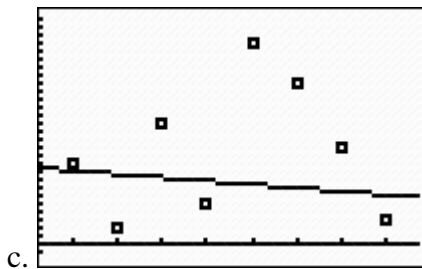
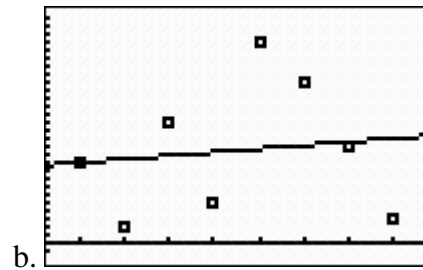
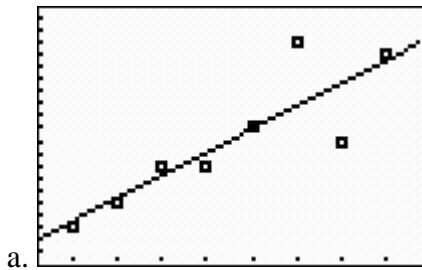
ExpReg
 $y = a * b^x$
 $a = 46.01472488$
 $b = .3085672982$
 $r^2 = .9982274596$
 $r = -.9991133367$

PwrReg
 $y = a * x^b$
 $a = 25.59693458$
 $b = -3.218176019$
 $r^2 = .9381293205$
 $r = -.9685707618$

c.

d.

30) Which graph below would have a correlation coefficient of $r = 0.002$?



Place answers to selected response (multiple choice) here.

| | | |
|----|----|----|
| 1 | 11 | 21 |
| 2 | 12 | 22 |
| 3 | 13 | 23 |
| 4 | 14 | 24 |
| 5 | 15 | 25 |
| 6 | 16 | 26 |
| 7 | 17 | 27 |
| 8 | 18 | 28 |
| 9 | 19 | 29 |
| 10 | 20 | 30 |

Part II Constructed Response (Long Answers) 70%

All questions in this section should be completed on the paper provided. Full marks will be rewarded for workings shown, variables defined, and math sentences written where appropriate. Fractional answers should be written in simplest form.

1. Jonathon has a computer repair company started. He will fix your computer in your home. While looking through some old invoices he noticed that for 3 hours of work he billed a client \$44.05 for a home visit and for 8 hours of work he billed a client \$100.80.

a. Algebraically determine the hourly rate Jonathon charges his clients. (4 marks)

b. Algebraically determine the amount of money Jonathon charges just to show up at a client's house?. (4 marks)

c. Write the equation (using functional notation) that would represent the total cost for Jonathon's company. Define all variables. (2 marks)

d. What would Jonathon bill a client if he were at their home for 5 hours? Use your equation from part (c) in your solution. (2 marks)

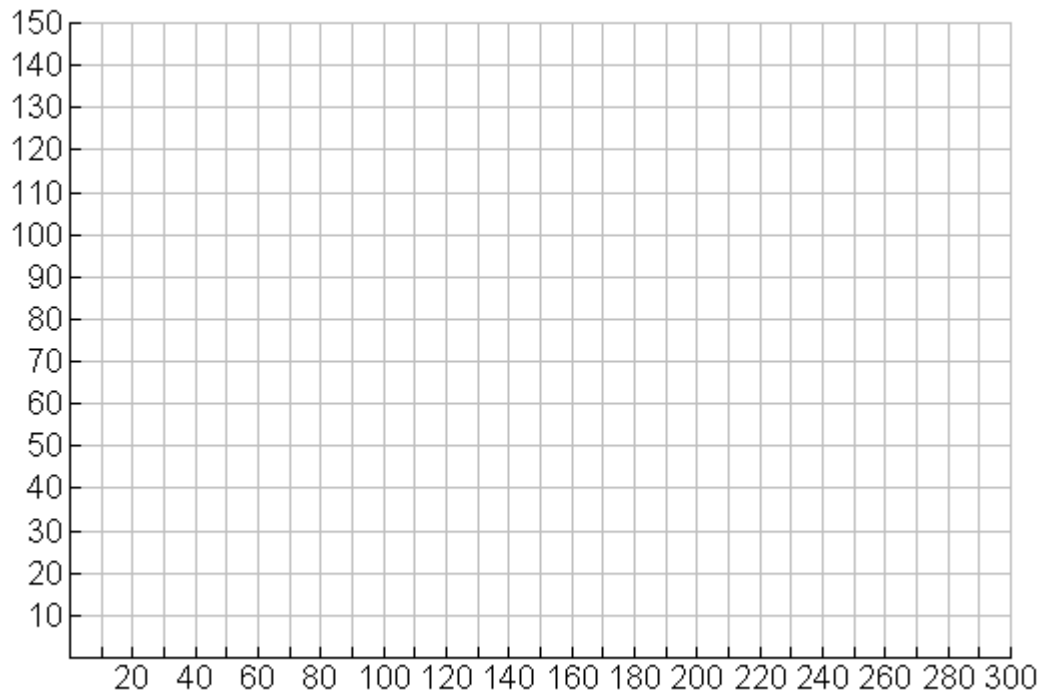
e. Jonathon issued a bill for \$191.60. How many hours did he spend in the client's home? Use your equation from part (c) in your solution. (2 marks)

2. Jodi wishes to rent a car for a trip to St. John's . She calls two rental companies to obtain quotes for their services. Rent-A-Car offers a plan of \$98.00 per week plus \$0.06 per kilometer to rent a Honda Civic. Car-For-Rent has the same vehicle for \$76.00 per week and \$0.16 per kilometer driven.

a. Write equations to represent both rental plans below. Label variables appropriately. (2 marks)

b. Complete the following table and graph both plans on the grid provided below. Be sure to properly label your graph. (3 marks)

| Number of Kilometers | Cost for Rent-A-Car | Cost for Car-For-Rent |
|----------------------|---------------------|-----------------------|
| 50 | | |
| 100 | | |
| 150 | | |



c. Algebraically determine the number of kilometers Jodi would have to drive using both rental companies and still pay the same amount of money? What will that amount be?? (4 marks)

- d. How your solution in question 2c show up in the graph in question 2b. Explain.
(2 marks)

3. Solve the following:

a. $\frac{m+3}{8} = \frac{2m}{3} - \frac{1}{6}$ (3 marks)

b. $-3w^2 = -7w - 6$ (3 marks)

c. $-5(2^x) + 126 = -194$ (3 marks)

4. Factor and simplify wherever possible.

a.
$$\frac{p^3 - 2p^2 - 3p}{4p^2 - 4}$$

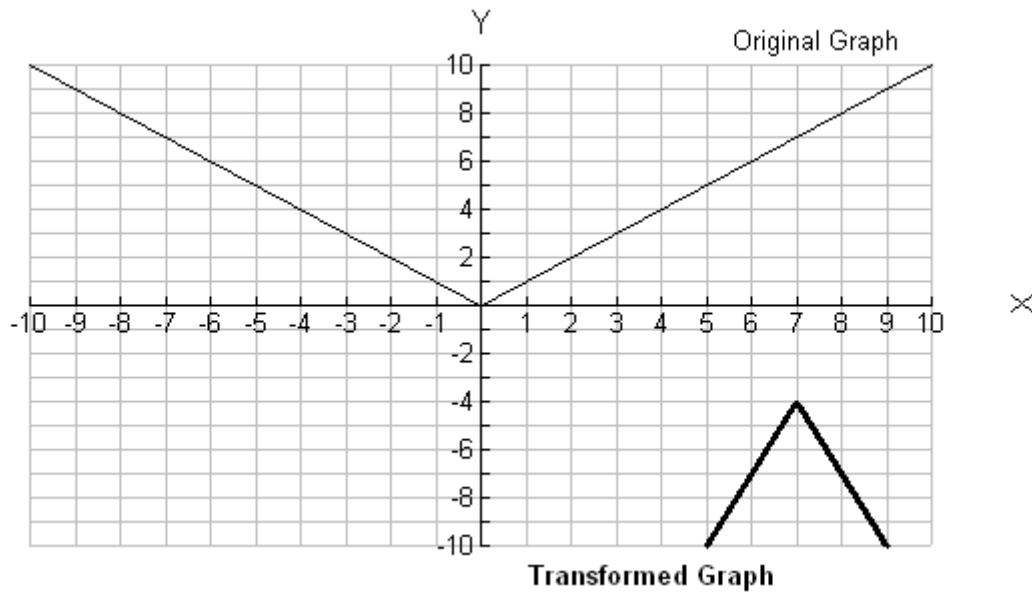
(4 marks)

b.
$$\frac{x^2 + x - 12}{2x^2 - 11x + 15}$$

(4 marks)

5. Fill in the information as requested.

(8 marks)



Horizontal translation: _____

Vertical translation: _____

Vertical Stretch: _____

Reflection... Yes or No _____

Equation: _____

Mapping Notation: _____

6. For the equation $2(y-5) = (x+4)^2$ complete the table of values for the graph of $y = x^2$ and the transformed graph. Place both graphs on the grid provided.

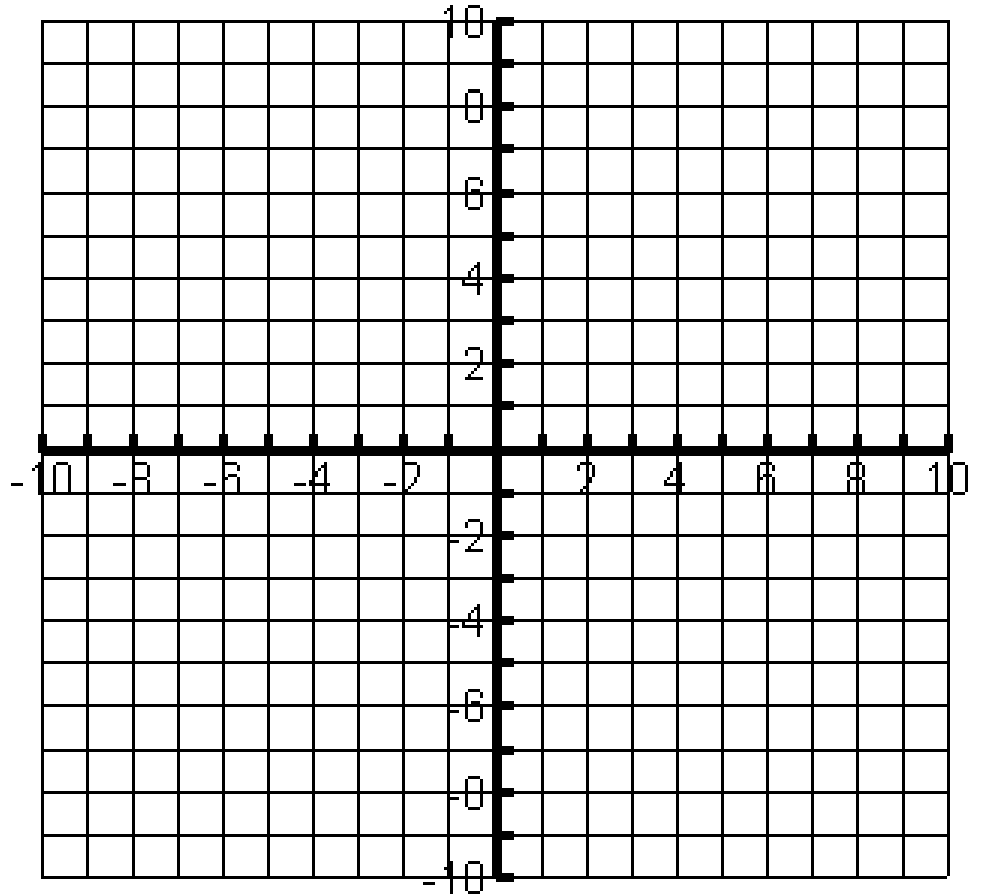
(6 marks)

$$y = x^2$$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

$$2(y-5) = (x+4)^2$$

| x | y |
|---|---|
| | |
| | |
| | |
| | |
| | |



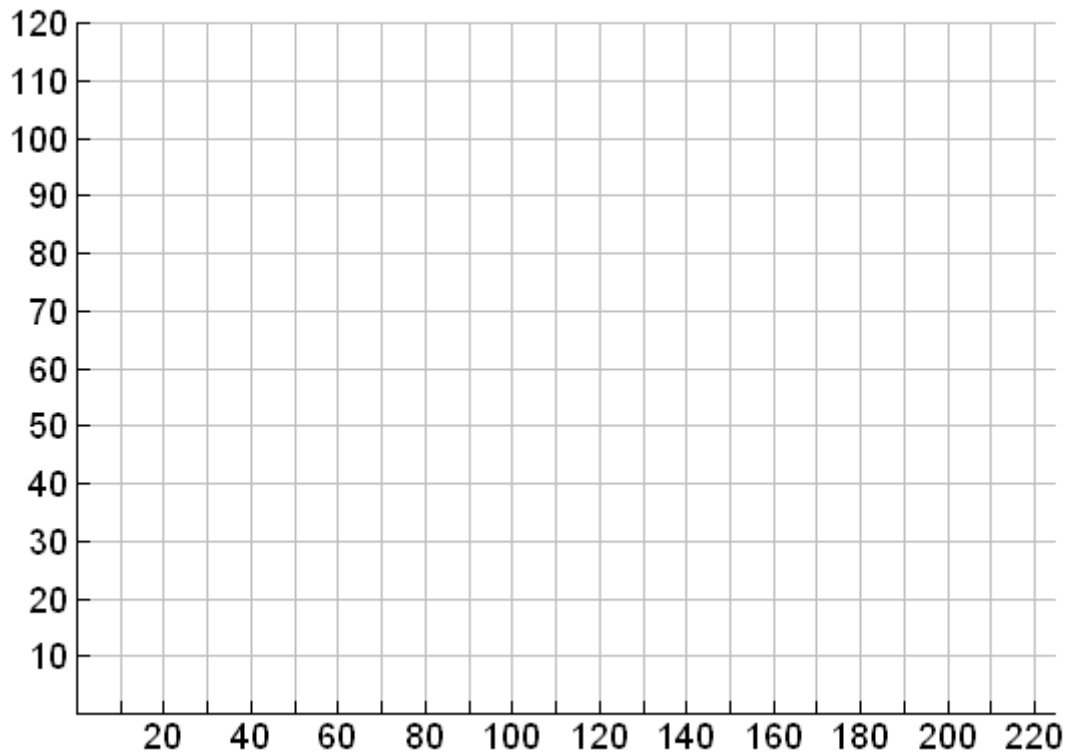
Mapping Notation: _____

| | | | | | |
|-------------------------|----|-----|-----|-----|-----|
| Fahrenheit degrees (°F) | 86 | 122 | 150 | 200 | 212 |
| Celsius degrees (°C) | 30 | 50 | 70 | 90 | 100 |

7. The above table displays temperatures measured in Celsius (Centigrade) and Fahrenheit.

a. Use the grid below to create a scatter plot of the data and to draw a line of best fit.

(4 marks)



b. Algebraically determine the equation for the line of best fit you have drawn for the data.

(5 marks)

c. Use the graphing calculator and regression analysis to determine another equation for the line of best fit. What is the correlation coefficient? What does it tell you about the data?

(3 marks)

d. If the temperature in degrees Fahrenheit is 50, what would your prediction be for the temperature in degrees Celsius? What is this type of prediction called?

(2 marks)