Question 1

a) simplify the following expression 12p-14pq-6q+2r-13-q+6q-4p

(2 marks)

b) Expand the expression (3z-5)(z+2)

(3 marks)

c) Factorise the following expression x-5x-36

(3 marks)

d) Simplify the following fraction 4m-28

 m-3m-28

(4 marks)

e) Simplify the following subtraction so that involves only one algebraic fraction

 5x - 3y

 2z 5x

( 4 marks)

f) Perform the following multiplication and division involving algebraic fractions and express your result so that it is in the simplest from possible

 4c X 3ab4 ÷ 3c

 abd X 16cd ÷ 2abd

( 4 marks)

(total: 20 marks)

Question 2

a) change the subject of the following equation to that indicated in bold and square brackets at the end of the equation.

F = √ 3(2x + y)

 z (y)

(3 marks)

b) solve the following linear equation and so find the value of x.

 3x + 4 = 5x - 10

( 3 marks)

c) Solve the following pair of simultaneous equations using either the method of elimination or substition:

 5x = -3y + 11 (i)

y = 4x - 19 (ii)

( 6 marks)

d) Determine whether the solution ( given in square brackets) satifies the following simultaneous equations.

-7x = 2y + 3 (i)

 5x = -y - 12 (ii)

(∴x = -7, and y=23)

(3 marks)

(total: 15 marks)

Question 3

a) Find the roots of the following quadratic using the formula for quadratics.

 4.7x - 9.6x + 3.4 = 0

State your answers to 4 decimal places of precision. Check your answers, showing your workings clearly.

( 4 marks)

b) Given the functions:

f (x) = 3x-4

g (x) = x + 4x + 3

h (x) = 28 - x

.... find the values of the following:

i) f (0)

ii) g (f(0))

iii) h(g(f(0)))

iv) f(g(h(3)))

v) f(2x + 1)

vi) g(-a)

c) For the following pair of functions

 f (x) = 5x + 11

 4

 g (x) = 4x - 5

 11

evaluate f(g(x)) and based upon your solution state wether or not the functions f(x) and g(x) are inverses

(4 marks)

d) Express the following rule as a function in mathematical notation.

Take an input and add thirteen, then double it, next square it, then divide the result by sixteen and finally subtract seven.

( 3 marks)

(Total: 20 marks)

Question 4

Solve the following pairs of simultaneous equations graphically. You must first construct a table of values for -3 ≤ x ≤ 6 then plot the points, draw the lines and estimate the coordinatesof the point of intersection. Check your solutions by solving the equations algebraically.

i) Y = 3x - 4 and Y = 2x + 7 ( 12 marks)

ii) 4Y = 8x + 14 and 2Y = 4x + 7 ( 8 marks)

(toatl: 20 marks)

Question 5

a) find the roots of the follwing quadratic equations graphically. You must first construct a table of values for -1 ≤ x ≤ 10 then plot the points, draw the curve and estimate the coordinates of the roots.

Comment on your graphs by referring to the value of the discriminant

which is true in each case .... b - 4ac > 0, b - 4ac = 0 or b - 4ac < 0?

i) y = 0.5x - 5x+9 ( 12 marks)

ii) y = 0.5x - 5x+13 ( 6 marks)

b) On the same graph as your produces for (a) above, for the equation y= 0.5x - 5x+9

only draw the tangeant to the curve at the point x = 8, y = 1 and so estimate the gradient of the tangeant at that point.

( 7 marks)

(total: 25 marks)

Overall total: 100 marks