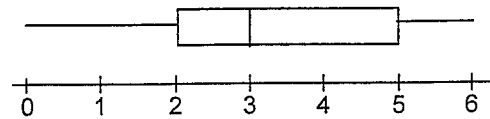


1. Consider the following set of numbers {4, 2, 3, 4, 2, 3, 2, 1, 0, 5, 1} and calculate: [5 marks]

- a. Mean = 2.45 ✓
 b. Mode = 2 ✓
 c. Median = 2 ✓
 d. Range = 5 ✓
 e. Standard Deviation = 1.437 ✓

2. The diagram below is the median box plot associated with a set of six scores. All the scores are whole numbers. [6 marks]



- (a) Given that the mean is $3\frac{1}{6}$, find the six numbers within this set.

$$3\frac{1}{6} \times 6 = 19$$

∴ 0, 2, 3, 3, 5, 6

1 mark for every correct number.

3. A weatherman decided to record daily maximum temperatures and atmospheric pressures for a two-week period. His results are listed below: [10 marks]

Day	1	2	3	4	5	6	7
Temp °C	24	26	23	19	19	20	27
Pressure	1012	1024	1002	991	992	995	1026

Day	8	9	10	11	12	13	14
Temp °C	30	34	30	29	26	26	28
Pressure	1037	1056	1036	1030	1024	1025	1028

- a. Calculate the mean daily maximum temperature over the two-week period.

$$\bar{x} = 25.79$$

- b. Calculate the mean daily atmospheric pressure over the two-week period.

$$\bar{x} = 1019.86$$

- c. Describe the relationship between daily maximum temperatures and atmospheric pressure over the two-week period.

strong positive correlation. ✓✓

- d. Derive a linear equation that expresses the relationship between daily atmospheric pressure and maximum temperature. Coefficients should be stated accurate to 3 significant figures.

$$y = 4.25x + 910$$

- e. Use this equation to predict the atmospheric pressure on a day when the temperature reaches a maximum of 25 °C.

$$\approx 1016.25$$

- f. Use this equation to predict the maximum daily temperature (accurate to 1 decimal place) when the atmospheric pressure is measured at 1050.

$$1050 = 4.25x + 910$$

$$1050 - 910 = 4.25x$$

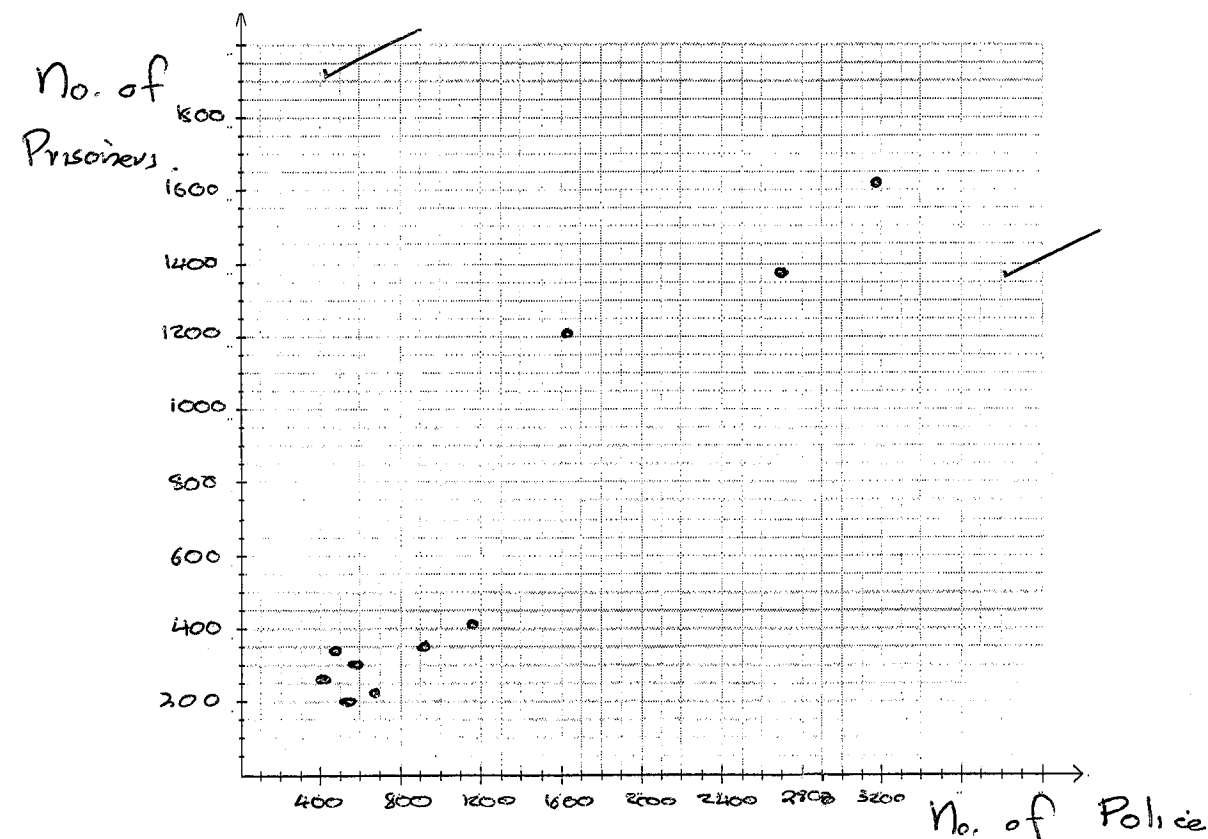
$$140 = 4.25x$$

$$\frac{140}{4.25} = x$$

$$\underline{\underline{32.9^\circ}}$$

4. Draw a scatter diagram to present the following data in the space below.
[6 marks]

Year	No. of Police	No. of Prisoners
1901	519	360
1911	481	323
1921	493	211
1931	573	319
1941	638	211
1951	877	362
1961	1169	526
1971	1616	1261
1981	2656	1350
1991	3168	1612



- a. Determine the correlation co-efficient for the above data. [1]

$$r = 0.956$$

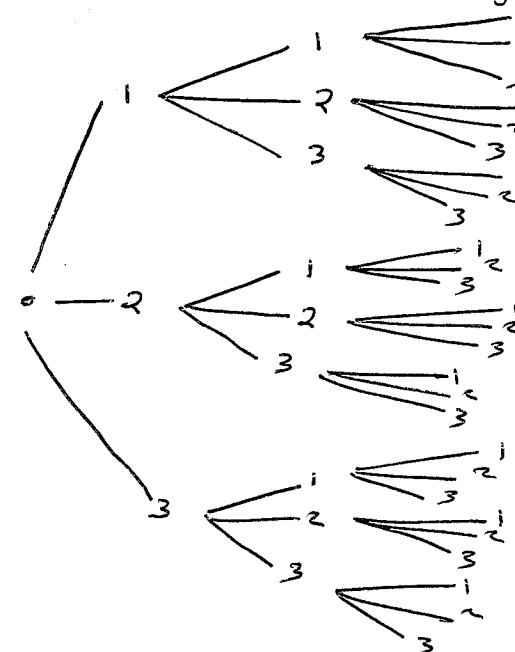
- b. Determine the equation for the linear regression line. [2]

$$y = 0.527x + 10.65$$

$$\text{no. of prisoners} = 0.527 (\text{No. of Police}) + 10.65$$

5. Three cards labelled 1, 2, and 3 are placed in a hat. A card is drawn, its number recorded, then replaced. This is then repeated, and the two numbers added.
[7 marks]

- a. Draw a tree diagram to show all the possible outcomes.



determine the probability that:

- b. The total is exactly five? [1]

$$\frac{2}{9}$$

- c. The total is less than three? [1]

$$\frac{1}{9}$$

- d. The total is at least four? [1]

$$\frac{6}{9} = \frac{2}{3}$$

- e. The total is more than six? [1]

$$\frac{0}{9}$$

6. 100 students were surveyed about their favourite subject and the results recorded. Unfortunately the student conducting the survey spilled a drink on her records and some of the results are unreadable. The remaining results are shown:

[7 marks]

	Year 8	Year 9	Year 10	Total
Maths	28	1	30	59
Other	12	17	12	41
Total	40	18	42	100

- a. Complete the missing values in the table above.

[3]

minus one for every incorrect answer (max -3)

- b. What is the probability that the student was in year 8?

[1]

$$\frac{40}{100} = \frac{2}{5}$$

- c. What is the probability that the student's favourite subject was maths?

[1]

$$\frac{59}{100}$$

- d. What is the probability that a randomly selected student is NOT a year 9 whose favourite subject is maths?

[2]

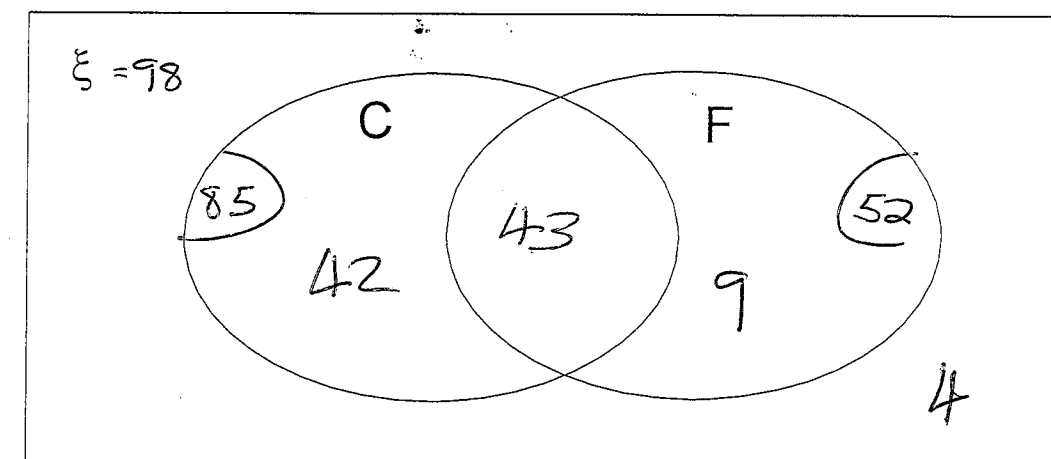
$$\frac{58}{100} = \frac{29}{50}$$

✓

✓

A sample 98 members of the school population was asked questions about whether they had eaten chocolate or fruit that day. 85 said they had eaten chocolate. 52 said they had eaten fruit. 43 had eaten both chocolate and fruit.

[5 marks]



minus 1 for every incorrect answer (max -2)

- c. Show all relevant amounts on the Venn diagram above.

[2]

- d. What is the probability that a student chosen at random has eaten chocolate but has not eaten fruit?

[1]

$$\frac{42}{98} = \frac{21}{49} = \frac{3}{7}$$

- e. What is the probability that a student chosen at random has eaten fruit but has not eaten chocolate?

[1]

$$\frac{9}{98}$$

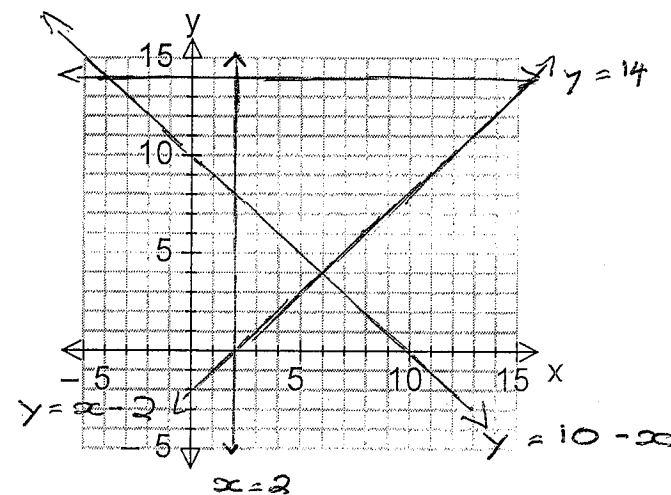
- f. What is the probability that a student chosen at random has eaten neither chocolate nor fruit?

[1]

$$\frac{4}{98} = \frac{2}{49}$$

7. On the grid provided, plot and label the following lines: [8 marks]

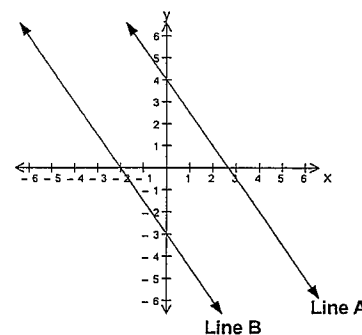
- a. $y = x - 2$
- b. $y = 10 - x$
- c. $x = 2$
- d. $y = 14$



graph must be labelled. (-1) if not

8. a. In the diagram given below, Line A has the equation $y = -1.5x + 4$

[4 marks]



If Line B is parallel to the given line, what is its equation? [2]

$$y = -1.5x - 3$$

b. Give the equation of a line that would be perpendicular to Line B.

[2]

$$\begin{aligned} m_1 \times m_2 &= -1 \\ -1.5 \times m_2 &= -1 \\ m_2 &= \frac{-1}{-1.5} \\ m_2 &= \frac{2}{3} \end{aligned}$$

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

9. Find the equation of the line which passes through these points: (Show all your Working. [6 marks])

- a) (1,4) and (2,3)

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

$$m = \frac{3 - 4}{2 - 1}$$

$$m = \frac{-1}{1}$$

$$m = -1$$

$$\begin{aligned} y &= -x + c \quad (2,3) \\ 3 &= -2 + c \\ 5 &= c \end{aligned}$$

$$y = -x + 5$$

- b) (-1,8) and (1,-2)

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

$$m = \frac{-2 - 8}{1 - (-1)}$$

$$m = \frac{-10}{2}$$

$$m = -5$$

$$y = -5x + c \quad (1,-2)$$

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

$$-2 = -5 + c$$

$$-2 + 5 = c$$

$$3 = c$$

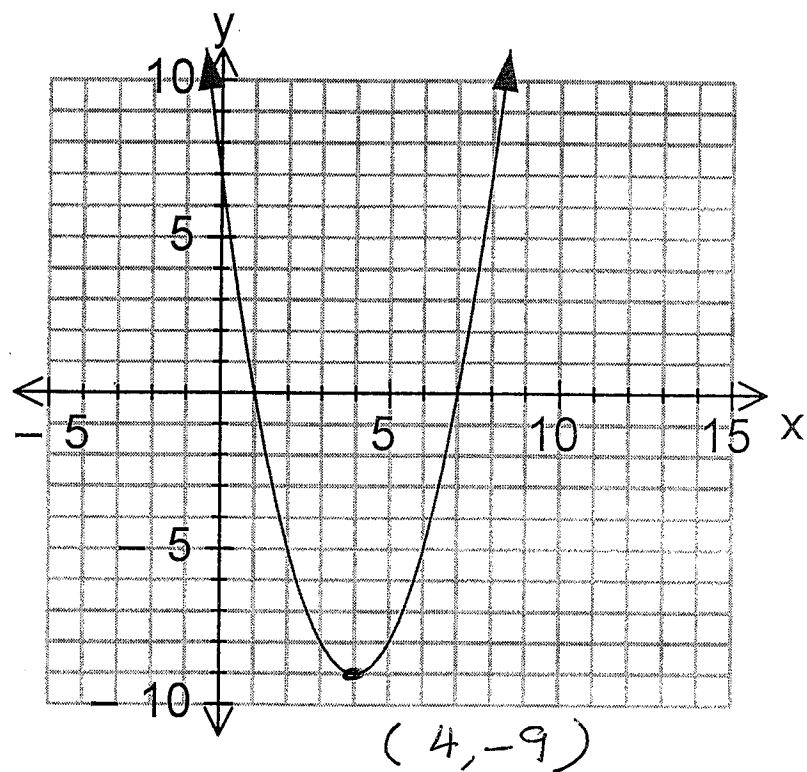
$$y = -5x + 3$$

10. Study the following graph and express the quadratic equation in the form stated. [6 marks]

a. Turning point form: $y = (x-4)^2 - 9$

b. Factor form: $y = (x-7)(x-1)$

c. General form: $y = x^2 - 8x + 7$



$$y = (x-4)(x-4) - 9$$

$$y = x^2 - 8x + 16 - 9$$

$$y = x^2 - 8x + 7$$

$$y = (x-7)(x-1)$$

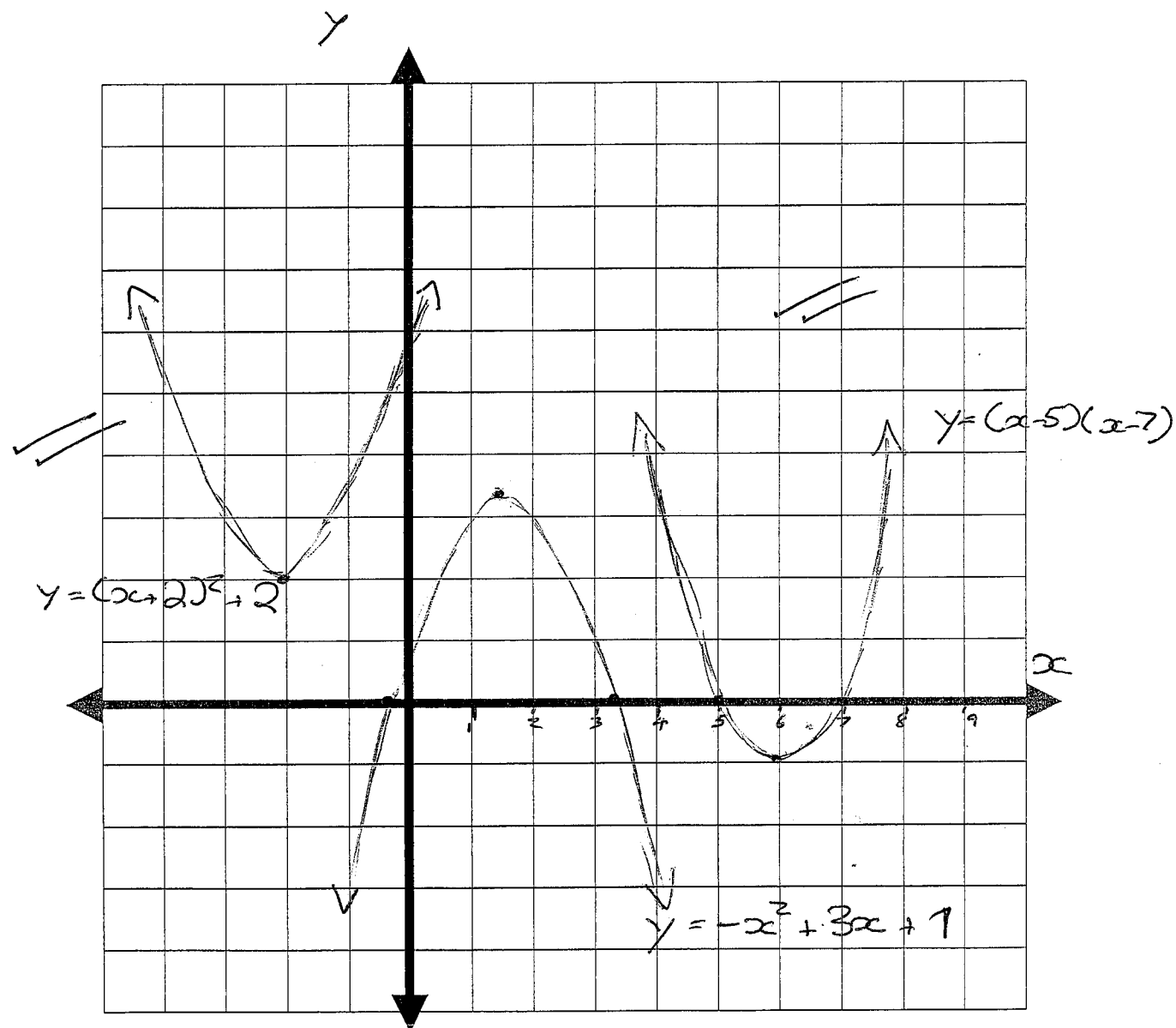
12. Draw the following quadratic equations on to the grid below, labelling each curve and the axes appropriately: [6 marks]

a. $y = -x^2 + 3x + 1$

b. $y = (x+2)^2 + 2$

c. $y = (x-5)(x-7)$

$$y = x^2 - 12x + 35$$



13. Solve the following quadratic equations using the quadratic formula.

(Show all your working.)

[6 marks]

a. $5x(3x + 15) = 0$

$$15x^2 + 75x = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-75 \pm \sqrt{75^2 - 4 \times 15 \times 0}}{2(15)}$$

$$x = \frac{-75 \pm 75}{30}$$

$$x = \frac{-75 + 75}{30} \text{ or } x = \frac{-75 - 75}{30}$$

$$x = 0 \text{ or } x = -5$$

///

b. $3x(x - 3) = x + 8$

$$3x^2 - 9x = x + 8$$

$$3x^2 - 9x - x - 8 = 0$$

$$3x^2 - 10x - 8 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{10 \pm 14}{6} \text{ or } x = \frac{10 - 14}{6}$$

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

$$x = \frac{10 \pm \sqrt{10^2 - (4 \times 3 \times -8)}}{6}$$

$$x = \frac{10 \pm \sqrt{100 - (-96)}}{6}$$

$$x = \frac{10 \pm 14}{6}$$

///

14. For the following equation determine: (show all working)

[8 marks]

i. the line of symmetry

ii. the turning point

iii. the x-intercepts (if any)

iv. the y-intercept

(2 marks each.)

a) $y = (x - 3)(x + 5)$

$$y = x^2 + 5x - 3x - 15$$

$$y = x^2 + 2x - 15$$

L.O.S: $x = -\frac{b}{2a}$ $x = -\frac{2}{2}$ $x = -1$

T.P: $y = -1^2 + 2(-1) - 15$
 $y = 1^2 - 2 - 15$
 $y = -16$

(-1, -16)

x-intercepts:

$$(x - 3)(x + 5) = 0$$

$$x - 3 = 0 \text{ or } x + 5 = 0$$

$$x = 3 \text{ or } x = -5$$

END OF PAPER

y-intercept

$$y = 0^2 + 2(0) - 15$$

$$y = -15$$

(0, -15)