



CARLINGFORD HIGH SCHOOL

Year 10 5.3 Mathematics Yearly Exam 2018

Name: _____

Teacher: Lobejko/ Lego/Aung

Time allowed: **90 minutes**

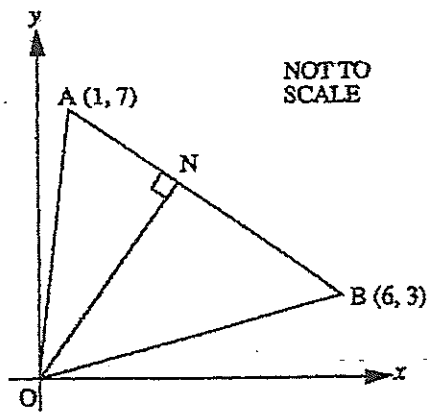
Instructions:

- Board approved calculators may be used
- Show all necessary working by using blue/ black pen
- Marks may be deducted for untidy setting out

Topic	Question 1	Question 2	Question 3	Total
Linear Functions	/8	/3		/11
Non-linear Functions & Polynomials		/24	/6	/30
Data & Probability	/9		/8	/17
Measurement	/13		/4	/17
Equations		/3	/4	/7
Logarithms			/8	/8
	/30	/30	/30	/90

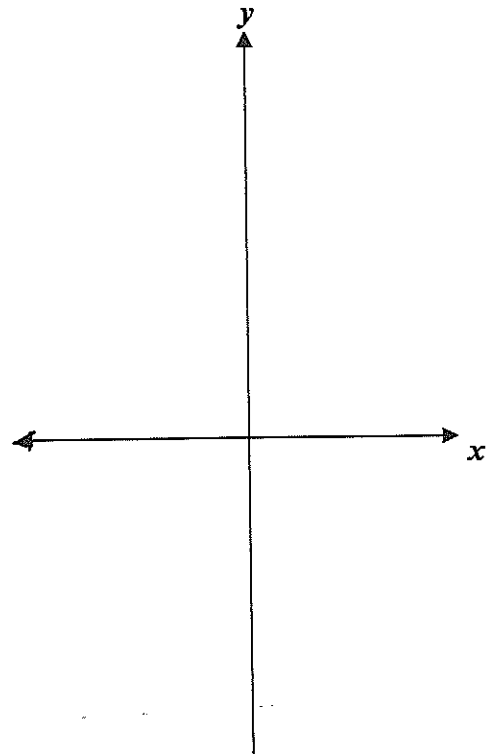
QUESTION 1 (30marks)

(a) [5marks]



- (i) Find the gradient of AB.
- (ii) Calculate the length of AB in exact form.
- (iii) Find the equation of the line ON.
- (iv) Find the midpoint of OA.

(b) Graph the region defined by $y \leq x + 2$ and $x > -1$ [3marks]

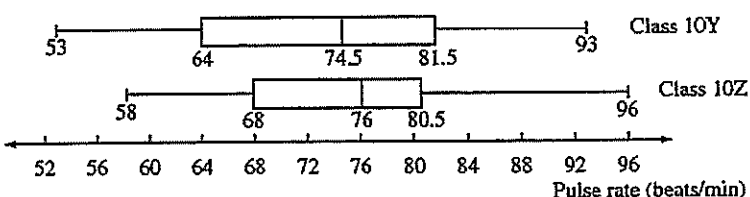


(c) For this question circle A, B, C or D. [1mark]

Six kitchen hands at a restaurant earn the following weekly wages: \$520, \$610, \$610, \$630, \$660, \$710. How will another wage of \$400 affect the mean and the standard deviation (SD) of this set of data?

- A. The mean and SD will both increase.
- B. The mean and SD will both decrease
- C. The mean will increase and the SD will decrease.
- D. The mean will decrease and the SD will increase.

- (d) Two PE classes of students have their pulse rates (in beats per minute) measured. The results are shown in the box-and-whisker plots. [6marks]



- (i) What is the lowest pulse rate across both classes?
- (ii) By how much do the medians differ?
- (iii) Find the interquartile range for class 10Z
- (iv) If there are 24 students in class 10Y how many had a pulse rate between 64 and 93?

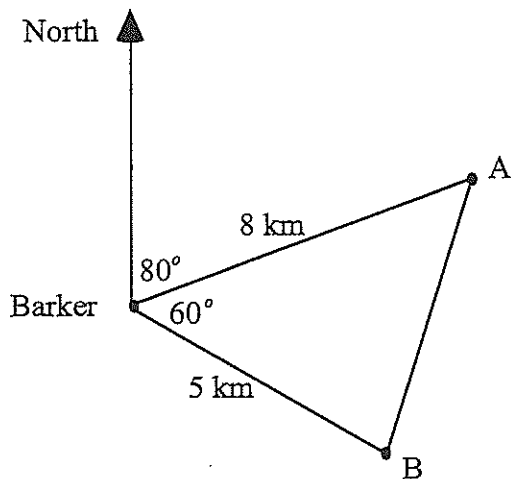
- (v) Which class had the more consistent results? Give a reason for your answer.

- (e) [2marks]

	Mark	\bar{x}	σ_a
Maths	63	70	7
Science	55	60	10

Julie compared her test results in Science and Maths. In which subject did Julie perform better? Give a reason for your answer.

- (f) Molly leaves point A and walks 8km to Barker. Tom leaves point B and walks 5km to Barker. [3marks]



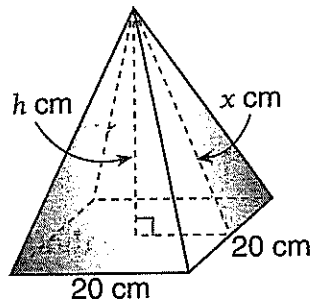
- (i) Use the cosine rule to show the distance from A to B is 7km.

- (ii) What is the bearing of Barker from B.

- (g) In a triangle ABC, $AB = 3.2\text{cm}$, $BC = 4.6\text{cm}$ and angle C is $33^\circ 47'$. Find angle A to the nearest minute. [3marks]

- (h) For what value of θ is $\tan\theta = -3.75$, correct to the nearest minute and given $0^\circ \leq \theta \leq 180^\circ$ [2marks]

- (j) A square pyramid has a total surface area of 2000 cm^2 . If the base edge is 20 cm , calculate the:
[5marks]



- (i) perpendicular height, $x \text{ cm}$ of one of the triangular faces

- (ii) perpendicular height, $h \text{ cm}$ of the pyramid in surd form.

- (iii) volume of the pyramid. (1dp)

QUESTION 2 (30 marks)

- (a) For $y = -x^2 - 2x + 8$, find the:
[7marks]

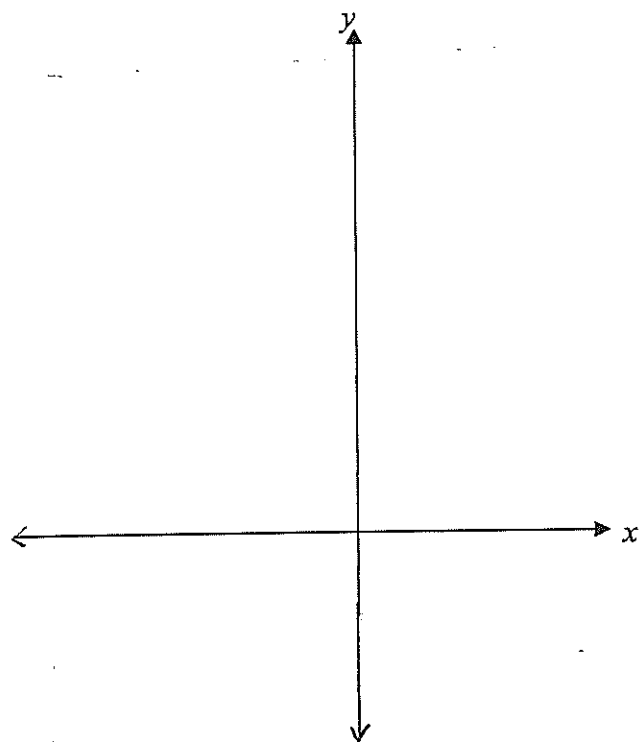
- (i) y intercept

- (ii) x intercepts

- (iii) equation of the axis of symmetry

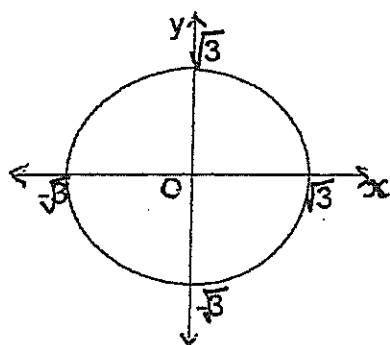
- (iv) coordinates of the vertex

(v) hence, sketch the graph showing all these features.

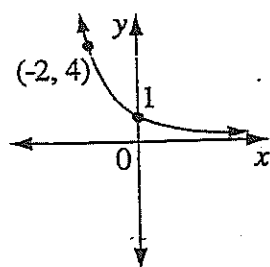


(b) Determine the equation of each of the curves below: [6marks]

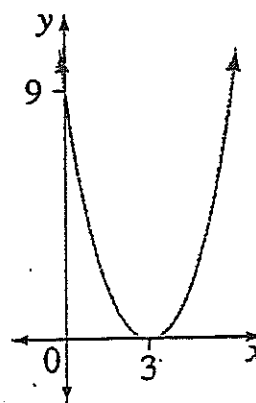
(i)



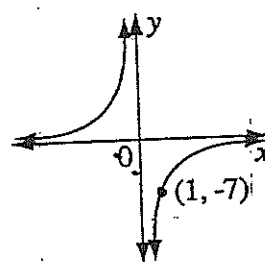
(ii)



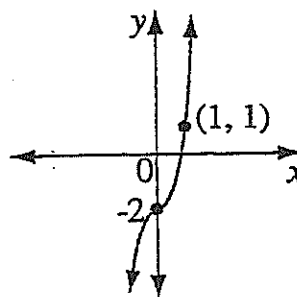
(iii)



(iv)



(v)



(c) Express the equation of the circle $x^2 + y^2 - 10y + 9 = 0$ in the form that shows the radius and centre, and hence find the radius and centre of the circle. [3marks]

(d) Solve the following equations simultaneously [3marks]
 $4x^2 + y^2 = 25$
 $x + y = 5$

(e) Given the function $f(x) = x^2 + 5$ [6marks]

(i) Find $f(-1)$

(ii) What is the domain of the function?

(iii) What is the range of the function?

(iv) Find the equation of the inverse.

(v) What restriction needs to be placed on $f(x) = x^2 + 5$ so that it does have an inverse function?

(f) Sketch the curve

$$y = x^2(x - 6)(x + 4)$$

[2marks]

(g) Given that $px - 2y - 5 = 0$ meets the line through $(3,2)$ and $(-3,4)$ at right angles, find the value of p .

[3marks]

QUESTION 3 (30 marks)

(a) A bag contains two red and two black marbles. One marble is selected at random, the colour noted and NOT replaced. A second marble is then selected in the same way.

[4marks]

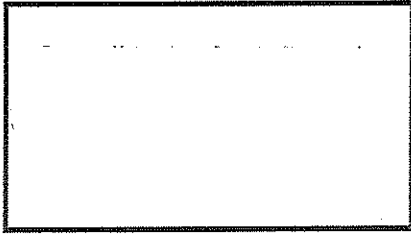
(i) Draw a probability tree to show this information.

(ii) Find the probability of selecting a red marble followed by a black marble.

(iii) Find the probability of selecting two marbles of the same colour.

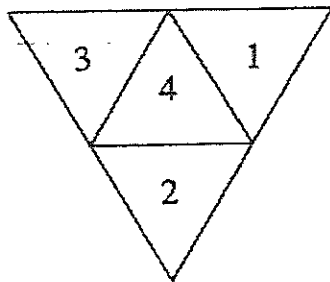
- (b) There are 30 students in a class of which 16 study History, 20 study Japanese and 5 study neither of these subjects. [2marks]

(i) Complete the Venn diagram.



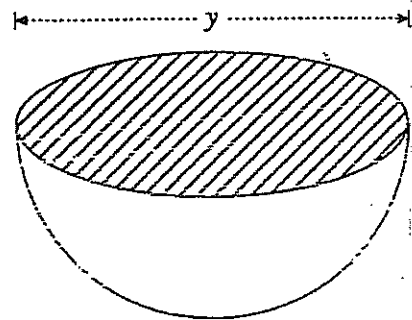
(ii) What is the probability that a student chosen at random studies only History?

- (c) A die is made in the form of a tetrahedron. The net is shown below:



If the die is rolled twice and the number on the face is recorded each time, find the probability that the sum of the two recorded numbers is 4. [2marks]

- (d) The outer surface of a closed hemisphere with a diameter of y units, is to be painted. [4marks]



(i) Find the area to be painted in terms of π .

(ii) Given another hemisphere with half the diameter, what would be the ratio of their volumes?

(e) [4marks]

(i) Make n the subject of the formula

$$\frac{1}{f} = \frac{1}{m} + \frac{1}{n}$$

(ii) Determine any restrictions on the values of the variables in the equation given in part (i).

(iii) What is the restriction on the formula with subject n ?

(f) Given the polynomial with equation $2x^3 - 3x^2 - 8x - 3 = 0$ [6marks]

(i) Show that $x = -1$ is a solution.

(ii) If $Q(x) = 2x^3 - 3x^2 - 8x - 3 \div (x + 1)$, find $Q(x)$.

(iii) Write the equation of the polynomial as a product of its three linear factors.

(iv) Hence, find the roots of the equation.

(i) Solve the equation for m [2marks]

$$4^{m+1} = \frac{1}{4\sqrt{2}}$$

(g) If $\log_x 5 = 0.56$, find: [4marks]

$$\log_x 25$$

$$\log_x 0.2$$

(h) Solve $4^x = 29$ correct to two decimal places.
[2marks]

END OF EXAM !!