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EASTERN CAPE EDUCATION DEPARTMENT
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IIMVIWO ZEBANGA LESHUMI ELINANYE
GRADE 11 EXAMINATIONS
GRAAD 11-EKSAMEN

NOVEMBER 2008

MATHEMATICS – SECOND PAPER

IXESHA: 3 iiyure	**TIME: 3 hours**	**TYD: 3 uur**
AMANQAKU: 150	**MARKS: 150**	**PUNTE: 150**

Write on the cover of the answer book after the word, "Subject"-
MATHEMATICS – SECOND PAPER

This question paper consists of 10 pages, 1 diagram sheet and a formula sheet.

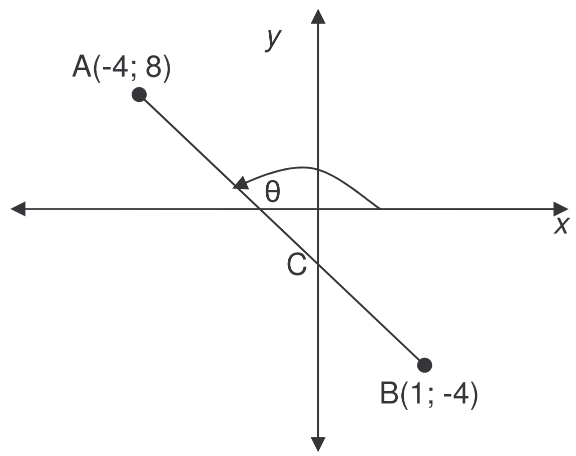
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. This question paper consists of 11 questions. Answer ALL the questions.
2. Show clearly ALL calculations, diagrams, graphs, etc. which you have used in determining the answers.
3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Diagrams are NOT necessarily drawn to scale.
7. It is in your own interest to write legibly and to present the work neatly.
8. An information sheet with formulae is attached.
9. A diagram sheet is provided.

QUESTION 1

In the diagram below, A(-4 ; 8) and B(1 ; -4) are two points in a Cartesian plane. C is the y-intercept of the line.



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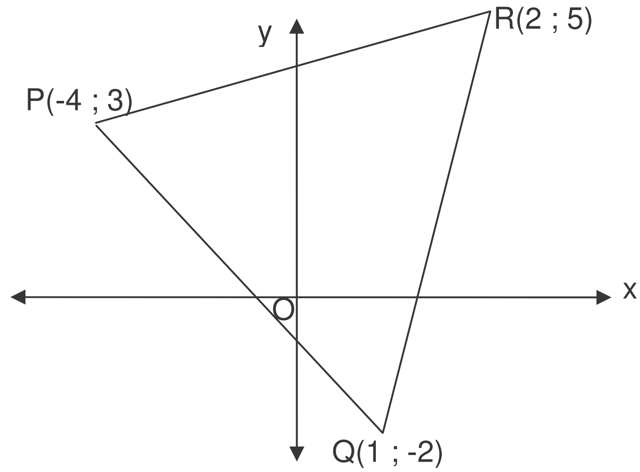
1.1	Calculate the distance between A and B.	(3)
1.2	Determine the gradient of AB.	(3)
1.3	Determine the size of θ, the angle of inclination of AB, rounded off to ONE decimal place.	(3)
1.4	Determine the equation of the line AB.	(3)
1.5	Determine the coordinates of the point C.	(2)
1.6	Hence, determine whether C is the midpoint of AB or not.	(4)
		[18]

QUESTION 2

2.1 In the diagram P(-4 ; 3), R(2 ; 5) and Q(1 ; -2) are points in a Cartesian plane.



2.1.1 Determine the coordinates of M, the midpoint, of PR. (2)

2.1.2 Prove that $PR \perp QM$. (4)

2.1.3 Determine the area of ΔRMQ. (4)

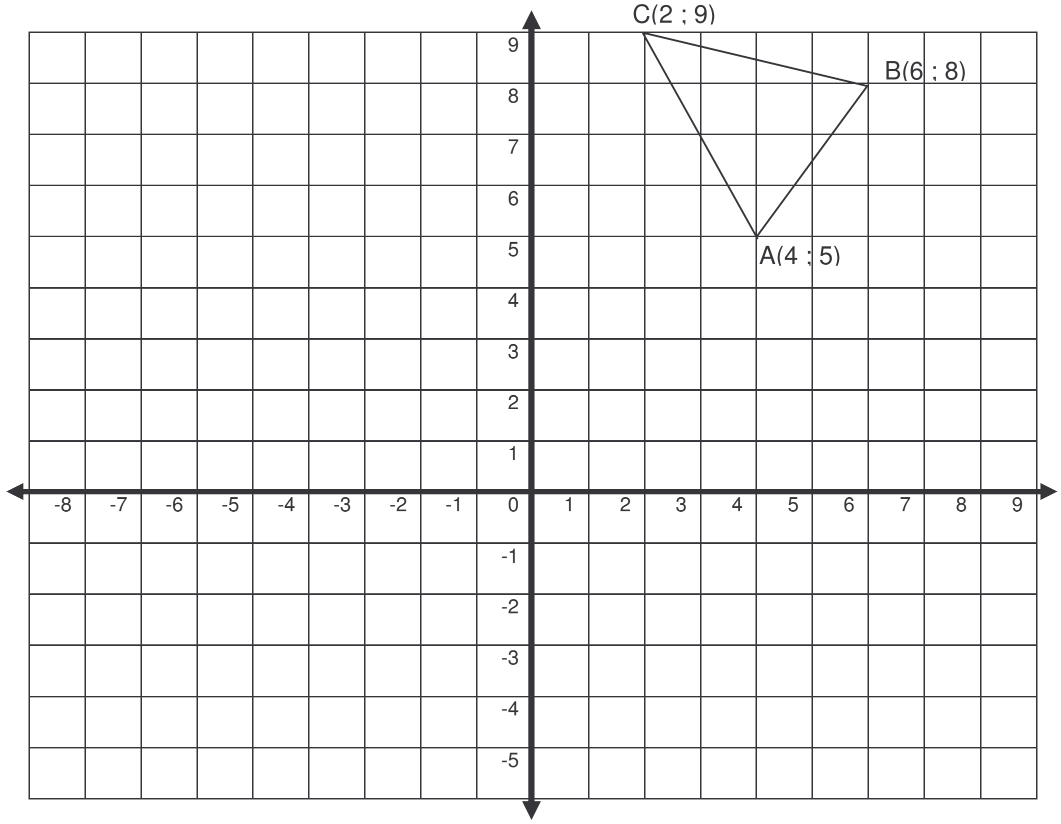
2.2 Determine the equation of the straight line which is parallel to $2y - 3x + 7 = 0$ and which passes through the point (2 ; -4). (4)

2.3 A(-4 ; -1), B(-2 ; 0) and C(2 ; p) are on the same straight line. Determine the value of p. (4)

[18]

QUESTION 3

3.1 The figure shows triangle ABC.



3.1.1 Sketch and label the coordinates of the vertices of the reflection of ΔABC in the y-axis. (3)

3.1.2 Use the rule, $(x ; y) \rightarrow (x - 6 ; y - 9)$ to translate ΔABC. Draw this translation ΔEFG on the grid and label the coordinates of the vertices. (3)

3.1.3 Write down the coordinates of D, the reflection of B in the line $y = -x$. (2)

3.1.4 ΔABC is transformed to ΔJKL with vertices J(5 ; -4), K(8 ; -6) and L(9 ; -2). Describe in detail the transformation used. (3)

3.1.5 If A is rotated around the origin through 180°, what will the coordinates of the resulting point be? (2)

3.2 The coordinates of ΔPQR are P(3 ; 2), Q(4 ; 5) and R(7 ; 3).

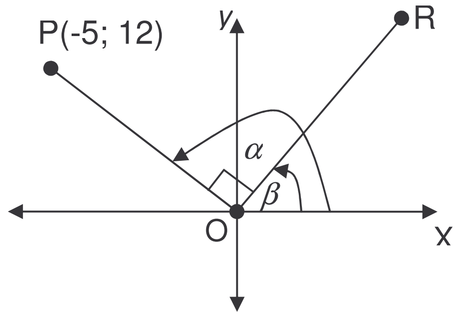
3.2.1 What is the scale factor if ΔPQR is enlarged to $\Delta P'Q'R'$ with P'(6 ; 4), Q'(8 ; 10) and R'(14 ; 6)? (1)

3.2.2 Write down the coordinates of P", Q" and R" if ΔPQR is reduced by a factor of 3. (3)

[17]

QUESTION 4

4.1 $P\hat{O}X = \alpha$ and $R\hat{O}X = \beta$. Use the diagram below to answer the questions:



4.1.1 Determine the length of OP. (2)

4.1.2 Calculate the value of $\tan(180° + \alpha)$. (2)

4.1.3 If $P\hat{O}R = 90°$, determine the value of $\sin\beta$. (4)

4.2 Prove the following identities:

4.2.1 $\sin x.\cos x.\tan x = 1 - \cos^2 x$ (3)

4.2.2 $1 + \cos y = \dfrac{\sin^2 y}{1 - \cos y}$ (3)

[14]

QUESTION 5

Simplify, without using a calculator:

5.1 $$\frac{\cos(90° + \theta).\sin(-\theta)}{\sin(180° + \theta).\tan(360° + \theta)}$$ (6)

5.2 $$\frac{\sin 220°.\cos 150°.\tan 405°}{\cos 50°.\sin 240°.\cos 180°}$$ (8)

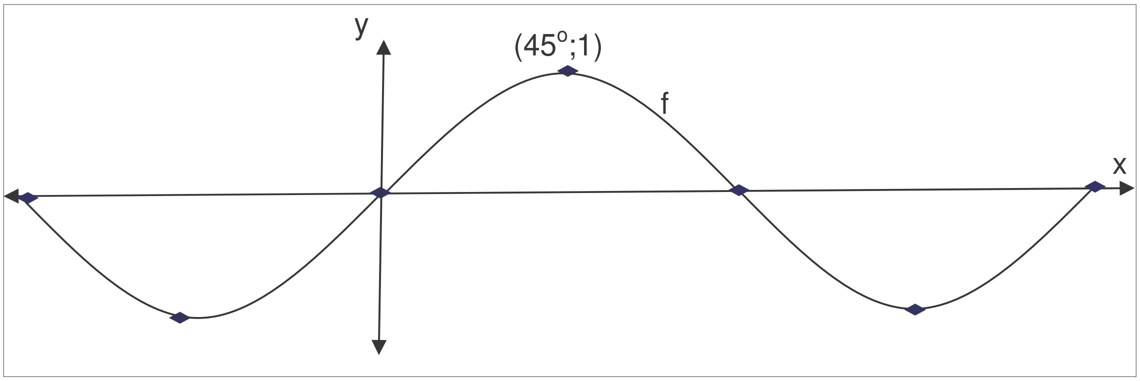
[14]

QUESTION 6

6.1 Solve for θ if: $3 \tan \theta = 6$ and $\theta \in [90°; 360°]$ (4)

6.2 Determine the general solution of $\sin 2x.(2\cos x + 1) = 0$. (9)

6.3 Sketch graph of $f(x) = \sin px$ is shown below:



6.3.1 Determine the value of p. (1)

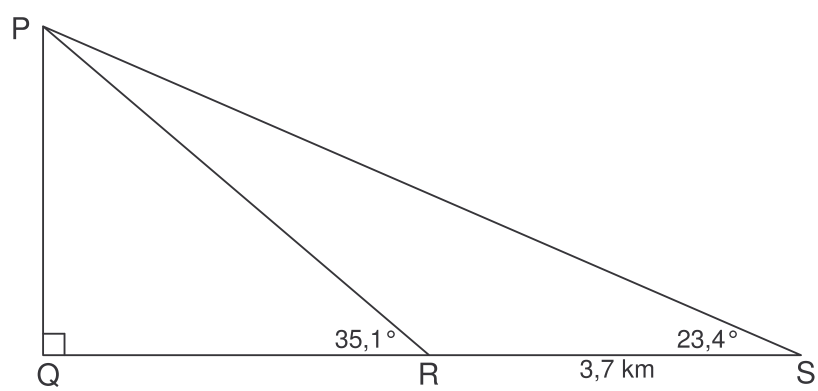
6.3.2 Determine the values of x if $f(x) = 0$ (2)

6.3.3 What is the minimum value of $f(x)$? (1)

[17]

QUESTION 7

P represents the cable station on top of Table Mountain and Q is the foot of the mountain. Two people at positions R and S find that the angles of elevation are 35,1° and 23,4° respectively. The distance between them is 3,7 km.



7.1 How far is the cable station from the person at S? (5)

7.2 Calculate the height of the mountain (PQ). (3)

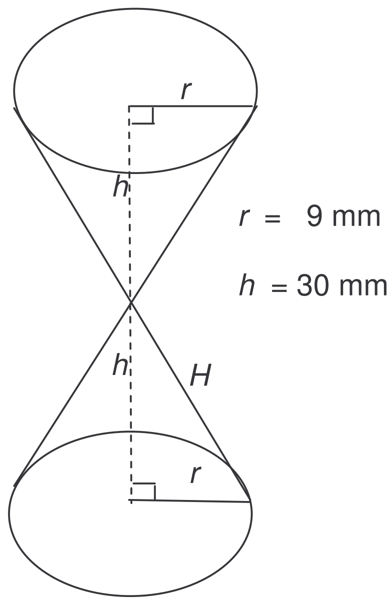
7.3 Calculate the area of ΔPRS. (3)

[11]

QUESTION 8

An hour-glass consists of two identical cones. The top section is filled with sand.

(*Surface area* = $\pi r^2 + \pi rH$; *Volume* = $\frac{1}{3}\pi r^2 h$)



8.1 Determine the slant height (H) of each cone. (2)

8.2 Determine the total exterior surface area of the hour glass. (Round the answer off to the nearest mm²). (4)

8.3 If it takes 1 hour for the top section to empty, what will the volume of sand be in the bottom section after 15 minutes? (5)

[11]

QUESTION 9

The following data represents the marks a Grade 11 class obtained in a test.

9 10 12 10 28 16 9 7 9 8

Determine the following:

9.1 9.1.1 the mode (1)

9.1.2 arithmetic mean (2)

9.1.3 median (2)

9.1.4 lower quartile (Q_1) and upper quartile (Q_3) (2)

9.1.5 the range (1)

9.2 Draw a box and whisker diagram and hence comment on the distribution of marks. (4)

[12]

QUESTION 10

The following data represents the marks for Mathematics Paper 2 of 30 learners at Majombozi High School.

40	37	73	85	36	38	53	89	70	65	86	45	63	68	65
73	46	58	39	61	72	80	60	58	68	73	68	47	55	58

10.1 Complete the following table: (3)

Interval	Tally	Frequency	Cumulative Frequency
30 – 39			
40 – 49			
50 – 59			
60 – 69			
70 – 79			
80 – 89			

10.2 Draw an ogive curve for the above data. (3)

10.3 Calculate the mean and standard deviation of the 10 sample marks given below:

40 73 85 39 38 72 65 68 63 47 (6)

[12]

QUESTION 11

Bafana Bafana scored a certain number of goals during 9 consecutive matches. The data below represents the matches and number of goals per match.

Match	Goals
1	0
2	2
3	1
4	3
5	4
6	5
7	5
8	7
9	6

11.1 Draw a scatter plot to represent the above data on the diagram sheet. (3)

11.2 Which of a linear, quadratic or exponential function would best fit the data? (1)

11.3 Draw the graph for the best fit function on your scatter plot. (1)

11.4 Estimate the number of goals that can be scored during the 10th match. (1)

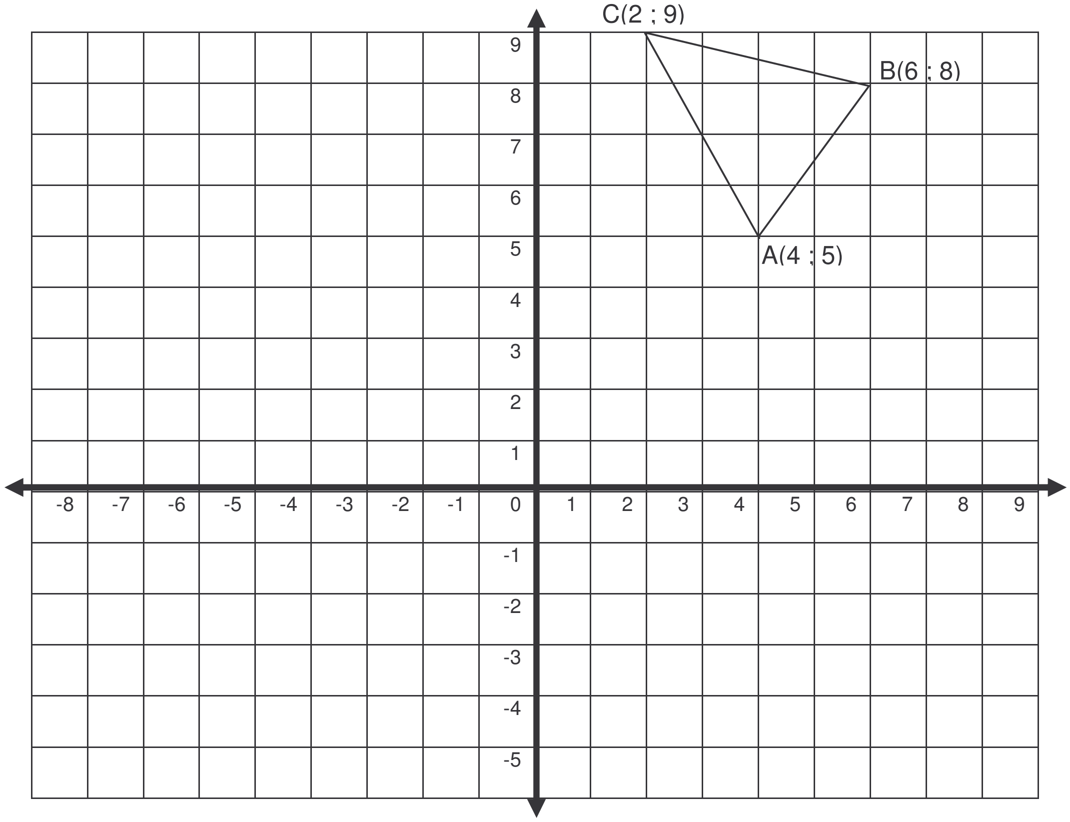
[6]

TOTAL: 150

DIAGRAM SHEET NAME OF CANDIDATE:____________________

QUESTION 3.1

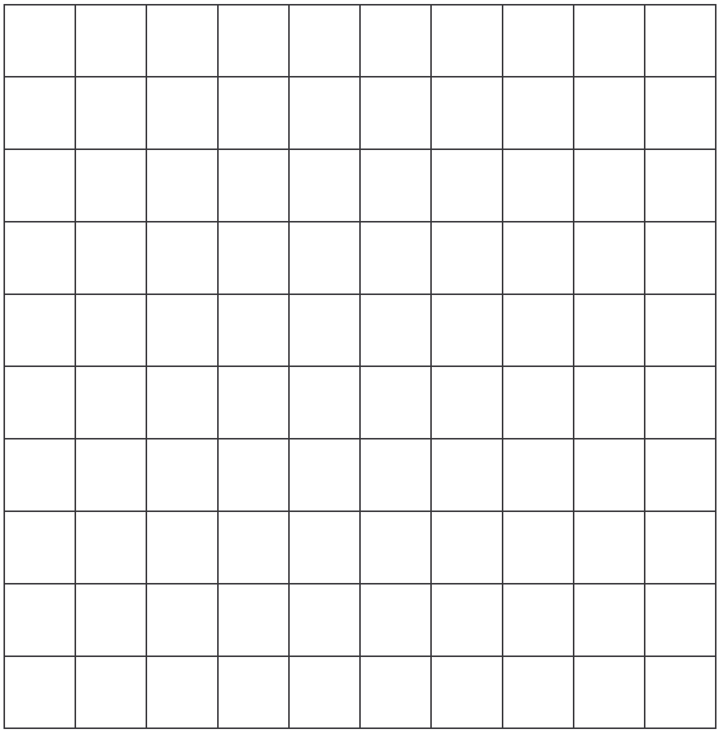
The figure shows triangle ABC.



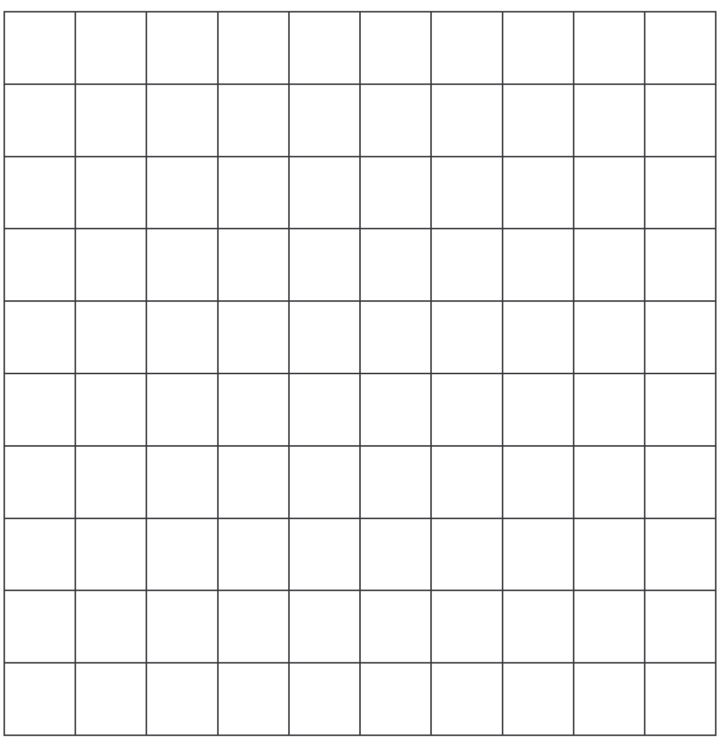
QUESTION 10.1

Interval	Tally	Frequency	Cumulative Frequency
30 – 39			
40 – 49			
50 – 59			
60 – 69			
70 – 79			
80 – 89			

QUESTION 10.2



QUESTION 11.1



INFORMATION SHEET: MATHEMATICS
INLIGTINGSBLAD: WISKUNDE

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

$A = P(1 + ni)$ $\qquad$ $A = P(1 - ni)$

$A = P(1 - i)^n$ $\qquad$ $A = P(1 + i)^n$

$\sum_{i=1}^{n} 1 = n$ $\qquad$ $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$

$$\sum_{i=1}^{n} (a + (i-1)d) = \frac{n}{2}(2a + (n-1)d)$$

$\sum_{i=1}^{n} ar^{i-1} = \frac{a(r^n - 1)}{r - 1}$; $r \neq 1$ $\qquad$ $\sum_{i=1}^{\infty} ar^{i-1} = \frac{a}{1-r}$; $-1 < r < 1$

$F = \frac{x[(1+i)^n - 1]}{i}$ $\qquad$ $P = \frac{x[1-(1+i)^{-n}]}{i}$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\qquad$ $M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $\qquad$ $y - y_1 = m(x - x_1)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\qquad$ $m = \tan\theta$ $\qquad$ $(x - a)^2 + (y - b)^2 = r^2$

In ΔABC:

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $\qquad$ $a^2 = b^2 + c^2 - 2bc.\cos A$ $\qquad$ $\text{area}\,\Delta ABC = \frac{1}{2}ab.\sin C$

$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\alpha$ $\qquad$ $\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\alpha$

$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$ $\qquad$ $\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$

$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases}$ $\qquad$ $\sin 2\alpha = 2\sin\alpha.\cos\alpha$

$\bar{x} = \frac{\sum fx}{n}$ $\qquad$ $\partial^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n}$

$P(A) = \frac{n(A)}{n(S)}$ $\qquad$ *P(A or B) = P(A) + P(B) – P(A and B)*