Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P2

PREPARATORY EXAMINATION

SEPTEMBER 2015

NATIONAL SENIOR CERTIFICATE

GRADE 12

MARKS: 150

TIME: 3 hours

N.B. This question paper consists of 12 pages and an Information Sheet.

QUESTION ONE

Ten athletes took part in a javelin throwing competition. Their height, in *cm*, and their arm span, in *cm*, is shown in the table below.

Athlete	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Height (in *cm*)	156	173	181	174	167	170	169	174	177	168
Arm span (in *cm*)	164	181	193	178	172	178	165	183	190	173

1.1 Represent the height and arm span for each athlete on the scatter plot provided in the answer book. (3)

1.2 Determine the equation of the least squares regression line. (4)

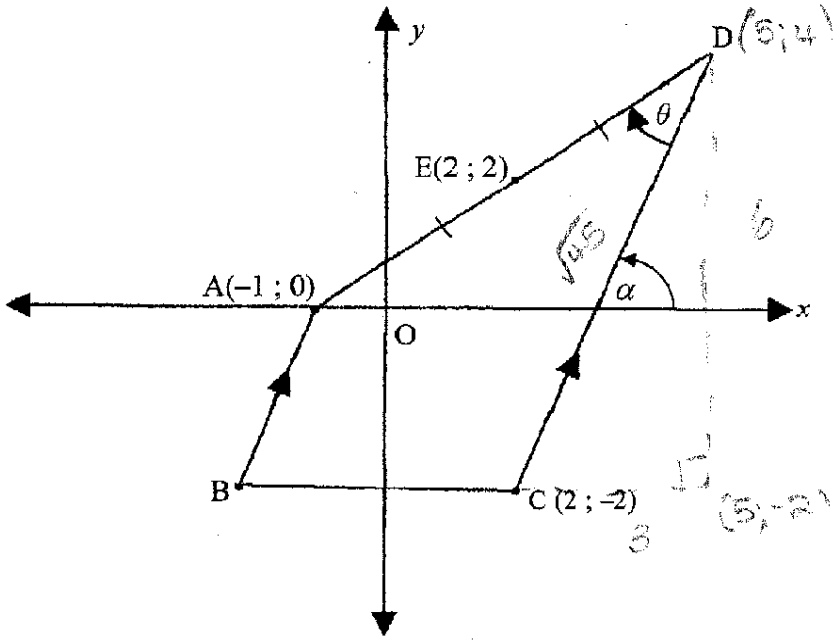
1.3 Use the equation in 1.2 to estimate the arm span of an athlete whose height is 176 *cm*. (2)

1.4 The correlation coefficient for this set of data is 0,89. Comment on the strength of the relationship between height and arm span. (1)

[10]

QUESTION THREE

In the diagram below, A(–1 ; 0), B, C(2 ; –2) and D are the vertices of a trapezium having AB || DC. The length of DC is three times the length of AB (i.e. DC = 3AB). $A\hat{D}C = \theta$. E(2 ; 2) is the midpoint of AD. The angle of inclination of DC is α.



3.1 Determine the coordinates of D. (2)

3.2 Calculate the size of α, correct to ONE decimal place. (3)

3.3 Determine the equation of AB in the form $y = mx + c$. (3)

3.4 Calculate the size of θ, correct to ONE decimal place. (3)

3.5 Calculate the coordinates of B. (5)

[16]

QUESTION FIVE

5.1 Simplify to a single trigonometric ratio of A:

$$\frac{\tan(180^\circ + A).\cos(180^\circ - A).\sin(360^\circ - A)}{\cos(90^\circ - A)} \quad (6)$$

5.2 If $\cos 26 = r$, determine the following in terms of r, in its simplest form:

5.2.1 $\cos 52^\circ$ (3)

5.2.2 $\tan 71^\circ$ (6)

5.3 Prove the identity: $\frac{\sin 2x}{\cos 2x + \sin^2 x} = 2\tan x$ (4)

[19]

QUESTION SIX

6.1 Determine the general solution of: $\cos 2x = \sin(x - 30^\circ)$. (7)

6.2 On the set of axes provided in the answer book, draw the sketch graphs of $f(x) = \cos 2x$ and $g(x) = \sin(x - 30^\circ)$ for $x \in [-180^\circ; 90^\circ]$. Clearly indicate the coordinates of the turning points and the intercepts with the axes. (6)

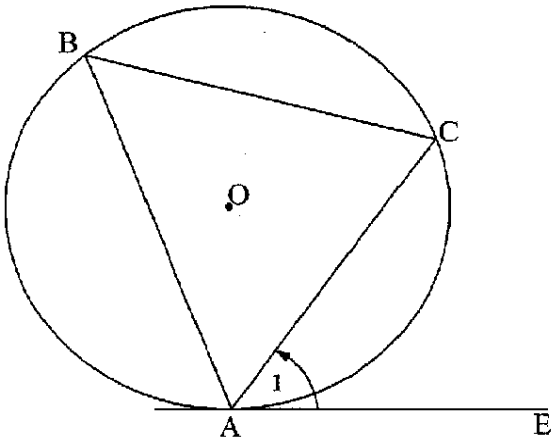
6.3 Write down the values of x for which $g(x) > f(x)$ in the given interval. (3)

[16]

NOTE: Give reasons for your statements in questions 8, 9 and 10.

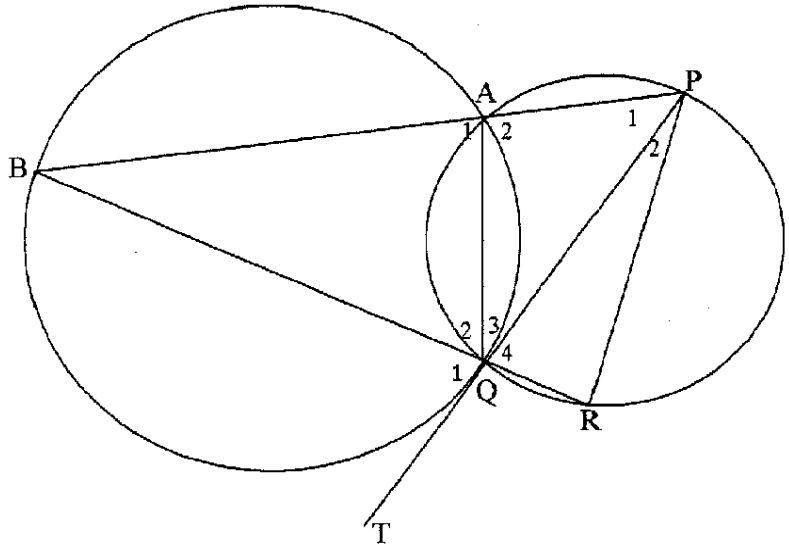
QUESTION EIGHT

8.1 In the diagram below, O is the centre of the circle passing through A, B and C. EA is a tangent to the circle at A. Use this diagram to prove the theorem which states that $E\hat{A}C = A\hat{B}C$. (6)



QUESTION NINE

In the diagram below, PQT is a tangent to the larger circle ABQ at Q. A smaller circle intersects the larger circle at A and Q. BAP and BQR are straight lines with P and R on the smaller circle. AQ and PR are drawn.



9.1 Prove that PQ = PR (7)

9.2 Prove that Δ PBQ ||| Δ PQA. (4)

9.3 Prove that the lengths of PA, PR and PB (in this order) form a geometric sequence. (3)
[14]