

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.

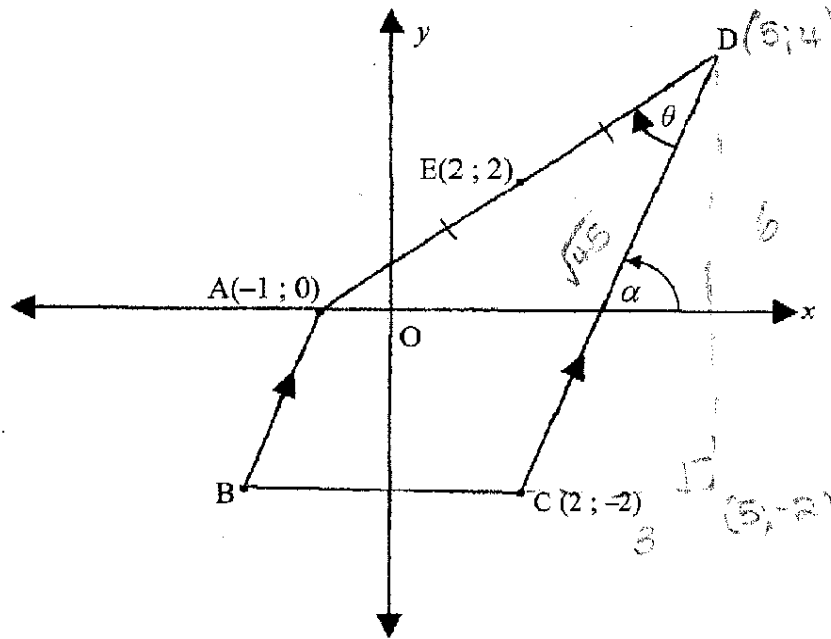
Athlete	1	2	3	4	5	6	7	8	9	10
Height (in <i>cm</i>)	156	173	181	174	167	170	169	174	177	168
Arm span (in <i>cm</i>)	164	181	193	178	172	178	165	183	190	173

- 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 $AB \parallel DC$. The length of DC is three times the length of AB (i.e. $DC = 3AB$). $\hat{ADC} = \theta$. $E(2; 2)$ 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:

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

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)

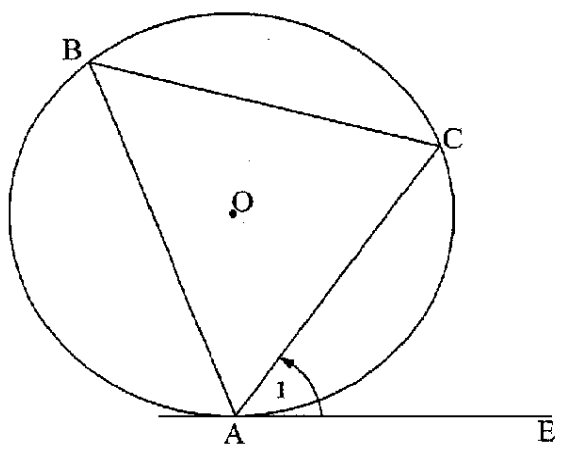
6.3 Write down the values of x for which $g(x) > f(x)$ in the given interval. (3)

[16]

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

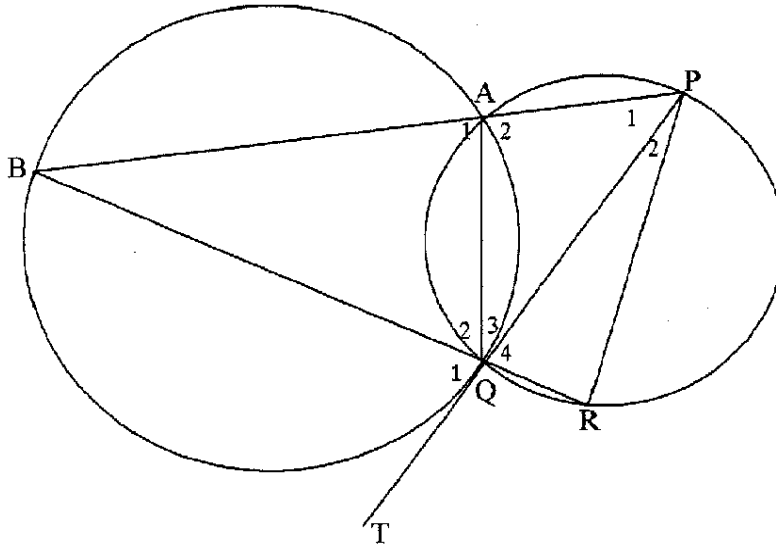
QUESTION EIGHT

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 $\hat{EAC} = \hat{ABC}$. (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 $\triangle PBQ \parallel \triangle PQA$. (4)
 - 9.3 Prove that the lengths of PA , PR and PB (in this order) form a geometric sequence. (3)
- [14]**