

**MATHEMATICS
PAPER 2
GRADE 11
17 JUNE 2015**

**TIME: 2 HOURS
MARKS: 100**

RONDEBOSCH BOYS' HIGH SCHOOL

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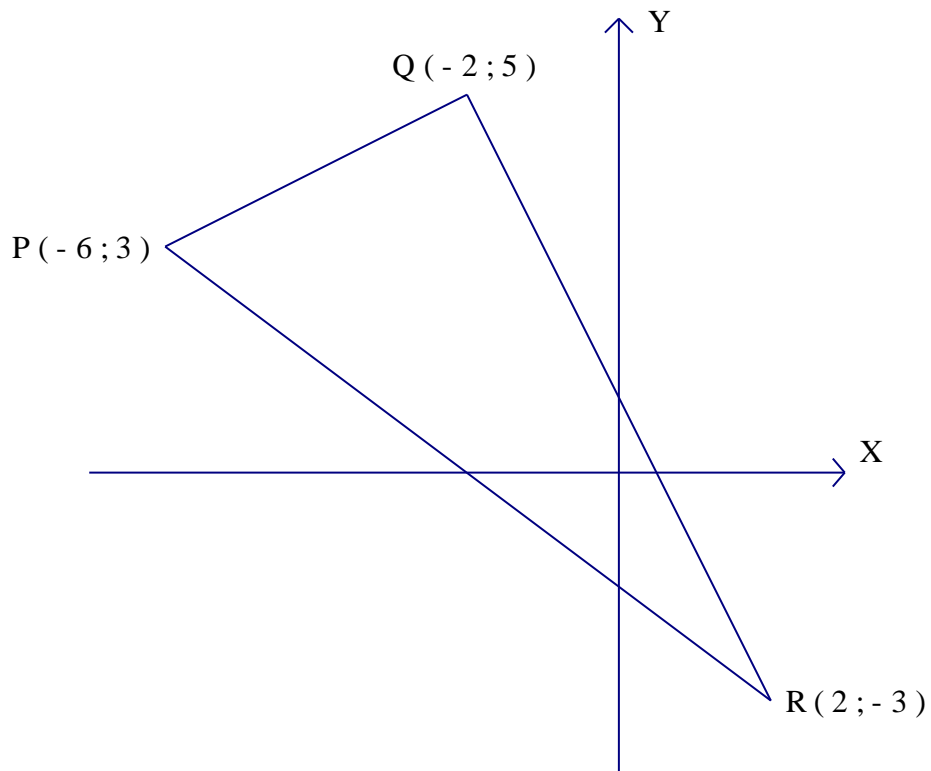
This question paper consists of 7 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. Start each question on a clean side of paper.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Number the answers correctly according to the numbering system used in this question paper.
10. Write neatly and legibly.

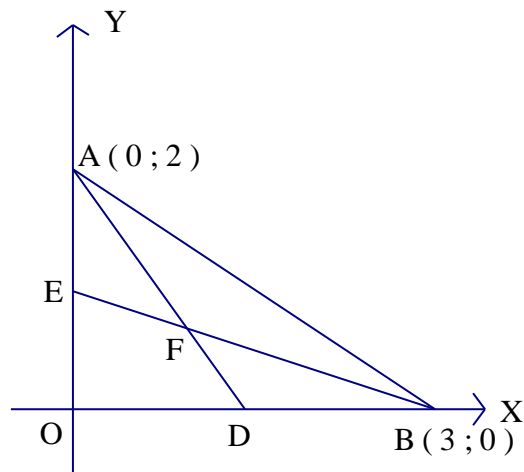
QUESTION 1



ΔPQR has $P(-6; 3)$, $Q(-2; 5)$ and $R(2; -3)$

- 1.1 Determine the length of QR , in simplified surd form. (2)
 - 1.2 Determine, by calculation, if $PQ \perp QR$. (3)
 - 1.3 Find the angle of inclination of QR . (2)
 - 1.4 Calculate the value of k , if P , Q and $T(k; k + 4)$ are collinear. (3)
- [10]

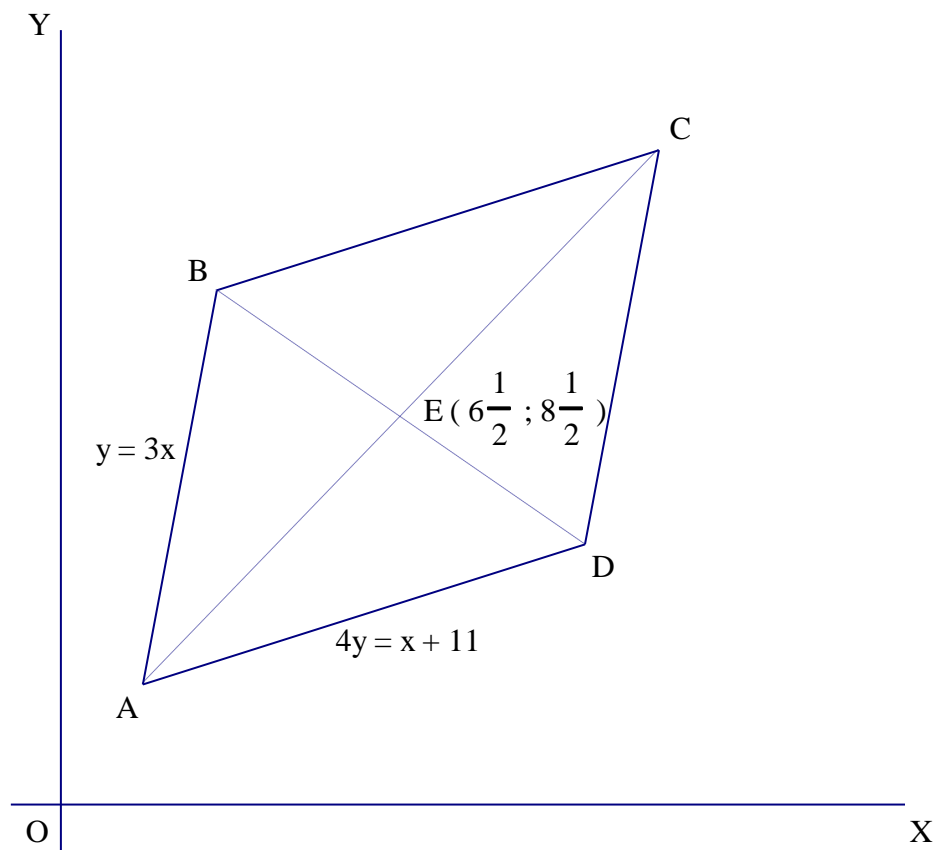
QUESTION 2



ΔABO is drawn with $A(0; 2)$ and $B(3; 0)$. AD and BE are medians, intersecting at F .

- 2.1 Find the equation of median BE . (2)
 - 2.2 Find the equation of median AD . (2)
 - 2.3 Determine the co-ordinates of F . (3)
 - 2.4 Determine the area of ΔAFB . (3)
- [10]

QUESTION 3



The diagram, which is not drawn to scale, shows a parallelogram, $ABCD$, in which the equation of AB is $y = 3x$ and the equation of AD is $4y = x + 11$. The diagonals AC and BD meet at the point $E(6\frac{1}{2}; 8\frac{1}{2})$.

- 3.1 Determine the co-ordinates of A . (4)
 - 3.2 If $A(1; 3)$, calculate the co-ordinates of C . (2)
 - 3.3 Calculate the equation of CD . (3)
 - 3.4 Determine the co-ordinates of D . (4)
 - 3.5 Find the co-ordinates of P if $AEDP$ is a parallelogram. (2)
- [15]

QUESTION 4

CALCULATORS MAY NOT BE USED IN THIS QUESTION

4.1 If $\tan \theta = -\frac{2}{3}$ and $\sin \theta > 0$, use a sketch to calculate the value of:
 $\cos \theta \cdot \sin \theta$ (5)

4.2 Simplify to a single trigonometric ratio of A :

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

4.3 Calculate the numerical value of:

$$\frac{\cos 315^\circ \cdot \cos 208^\circ \cdot \sin(-135^\circ)}{\tan^2 150^\circ \cdot \sin 62^\circ} \quad (7)$$

[18]

QUESTION 5

CALCULATORS MAY NOT BE USED IN THIS QUESTION

5.1 If $\sin 54^\circ = p$, express, without using a calculator, the following in terms of p :

5.1.1 $\sin 234^\circ$ (2)

5.1.2 $\cos 126^\circ$ (2)

5.1.3 $\tan^2 36^\circ$ (3)

5.2 Prove the identity $\frac{\tan x + 1}{\sin x \tan x + \cos x} = \sin x + \cos x$ (4)

5.3 Consider $\left(\frac{1}{\sin \theta} + \frac{1}{\tan \theta}\right)^2 = \frac{1 + \cos \theta}{1 - \cos \theta}$

5.3.1 For what value(s) of θ is the identity undefined if $0^\circ \leq \theta \leq 180^\circ$? (3)

5.3.2 Prove the identity. (5)

[19]

QUESTION 6

6.1 Solve for x :

6.1.1 $4 \cos^2 x = \tan 45^\circ$ $x \in [0^\circ; 360^\circ]$ (5)

6.1.2 $2 \sin x \cos x = \sin x$ $-90^\circ \leq x \leq 270^\circ$ (5)

6.2 Given $x^2 + \frac{1}{x^2} = 1$.

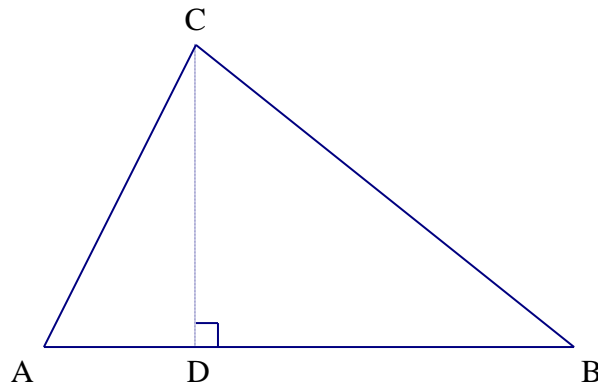
Determine the general solution of:

$$\sqrt{\tan \theta} = x + \frac{1}{x} \quad (5)$$

6.3 If $\tan A + \frac{1}{\cos A} = 2$, find, WITHOUT the use of a calculator, the value of $\cos A$. (7)

[22]

QUESTION 7



In the diagram, all sides have integral length. If $\tan A = \frac{3}{4}$ and $\sin B = \frac{5}{13}$, find, without the use of a calculator, the minimum value for the perimeter of $\triangle ABC$.

[6]

TOTAL MARKS: 100