



# Basic Education

KwaZulu-Natal Department of Education  
REPUBLIC OF SOUTH AFRICA

MATHEMATICS PAPER 1

MEMORANDUM

COMMON TEST

JUNE 2015

NATIONAL SENIOR  
CERTIFICATE

GRADE 11

MARKS: 100

N.B. This memorandum consists of 10 pages.

## QUESTION 1

1.1.1	$(3^5)^{23} \cdot (3^4)^{12} \checkmark$ $= 3^2 \cdot 3^2 \checkmark$ $= 9 \cdot 9$ $= 81 \checkmark$	1A for writing as base 3 1A for simplifying 1A for correct answer (3)
1.1.2	$\frac{(2^5)^{2/3} \cdot 2\sqrt{2}}{(2^7)^{1/2} \cdot 7\sqrt{2}} \checkmark \checkmark$ $= \frac{2^{-4} \cdot 2\sqrt{2}}{2 \cdot 7\sqrt{2}} \checkmark$ $= \frac{1}{16 \cdot 7} \checkmark$ $= \frac{1}{112} \checkmark$	2A for writing denominator/ Numerator as base 2 1A for simplifying 1CA for answer (4)
1.1.3	$\frac{3^7(3^4 - 6 \cdot 3)}{3^7(7 \cdot 3^2)} \checkmark \checkmark$ $= \frac{63}{7} \checkmark$ $= 81 \checkmark$	2A for correct factorization 1CA for simplification 1CA for answer (4)
1.2.1	$(\sqrt{x} - \sqrt{y})^2$ $= x + y - 2\sqrt{xy} \checkmark \checkmark$	1A for $x + y$ / 1A for $-2\sqrt{xy}$
1.2.2	$\sqrt{9 - \sqrt{80}}$ $= \sqrt{5 + 4 - 2\sqrt{5 \cdot 4}} \checkmark$ $= \sqrt{(\sqrt{5} - \sqrt{4})^2} \checkmark$ $= \sqrt{5} - 2 \checkmark$	1A for writing 9 as $5+4$ 1A for $\sqrt{80}$ as $2\sqrt{5 \cdot 4}$ 1CA for simplifying 1CA for answer (3)

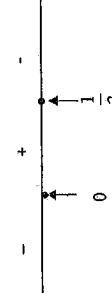
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QUESTION 2

<p>2.1.1 <math>x = \frac{5}{2} \checkmark</math> or <math>x = \pm\sqrt{2} \checkmark \checkmark</math></p> <p>2.1.2 <math>x^2 + 5x - 5 = 0</math>  <math display="block">x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \checkmark</math> <math display="block">= \frac{-5 \pm \sqrt{5^2 - (1)(-5)}}{2 \cdot 1} \checkmark</math> <math display="block">= 5,85 \checkmark \text{ or } 0,85 \checkmark</math></p>	<p>3A for correct values of <math>x</math> (2)</p> <p>1 M for correct formula</p> <p>1 CA for substitution</p> <p>2 CA for correct answer (4)</p>
<p>2.1.3 <math>x^2 + 16 = (-2x+1)^2 \checkmark</math>  <math>x^2 + 16 = 4x^2 - 4x + 1 \checkmark</math>  <math>3x^2 - 4x - 15 = 0 \checkmark</math>  <math>(3x+5)(x-3) = 0</math>  <math>x = \frac{-5}{3} \checkmark</math> or <math>x = 3 \checkmark</math>                  N/A</p>	<p>1A for squaring both sides</p> <p>1CA for simplifying to a trinomial</p> <p>1CA for <math>x</math> values</p> <p>1 CA for selection / rejections (4)</p>
<p>2.2 <math>x^2 &lt; 16</math>  <math>(x-4)(x+4) &lt; 0 \checkmark</math>  <math>-4 &lt; x &lt; 4</math>  <math>0 &lt; x &lt; 4 \checkmark</math></p>	<p>1A for correct <math>x</math> values</p> <p>1A for correct answer (2)</p>
<p>2.3 <math>y = x-1</math> (3) <math>\checkmark</math>  <math>xy = 2y^2 + x^2 + 3x - 10</math> (2)                  Substitute eqn. (3) in eqn.(2)  <math>x(x-1) = 2(x-1)^2 + x^2 + 3x - 10 \checkmark</math>  <math>x^2 - x = 2x^2 - 4x + 2 + x^2 + 3x - 10 \checkmark</math>  <math>-2(x^2 - 4) = 0</math>  <math>-2(x-2)(x+2) = 0 \checkmark</math>  <math>x = 2</math> or <math>x = -2 \checkmark</math>  <math>y = 1</math> or <math>y = -3 \checkmark</math></p>	<p>1A for making <math>x</math> the subject of the formula</p> <p>1A for substitution</p> <p>1CA for simplifying</p> <p>1CA for factorising</p> <p>1CA for correct <math>x</math> values</p> <p>1CA for correct <math>y</math> values (6)</p>

OR

<p><math>x = y + 1</math>                  Substitute eqn. (3) in eqn.(2)  <math>y(y+1) = 2y^2 + (y+1)^2 + 3(y+1) - 10 \checkmark</math>  <math>y^2 + y = 2y^2 + y^2 + 2y + 1 + 3y + 3 - 10 \checkmark</math>  <math>-2y^2 - 4y + 6 = 0</math>  <math>-2(y+3)(y-1) = 0 \checkmark</math>  <math>y = -3</math> or <math>x = 1 \checkmark</math>  <math>x = 2</math> or <math>x = -2 \checkmark</math></p>	<p>1A for making <math>x</math> the subject of the formula</p> <p>1A for substitution</p> <p>1CA for simplifying</p> <p>1CA for factorising</p> <p>1CA for correct <math>x</math> values</p> <p>1CA for correct <math>y</math> values (6)</p>
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<p>2.4.1 Shabangu divided both sides of the inequality by <math>x</math>, hence losing one solution of <math>x \checkmark \checkmark</math></p> <p>2.4.2 steps 3/4 should read as follows:  <math>x(-3x+1) \leq 0</math>  <math>x=0</math> or <math>x = \frac{1}{3}</math></p> <p>C.V <math>x = 0</math> or 3 or <math>-2</math></p>  <p><math>(-\infty; 0) \checkmark \cup [\frac{1}{3}; \infty) \checkmark</math></p>	<p>2A for correct justification</p> <p>1A for correcting steps</p> <p>2A for correct inequality as answer (3)</p>
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<p>2.5.1 <math>y = 2 \checkmark</math> or <math>y = 3 \checkmark</math></p>	<p>2A for correct <math>y</math> values (2)</p>
<p>2.5.2 <math>y \in R \checkmark</math></p>	<p>2A For correct answer (2)</p>

QUESTION 3

<p>3.1.1 <math>19; \checkmark</math> <math>24 \checkmark</math></p>	<p>2A for correct answer (2)</p>
<p>3.1.2 <math>T_n = ar + b</math>  <math>7 = 5(3) + b \checkmark</math>  <math>-8 = b</math></p>	<p>2A for correct answer (2)</p>



4.2.2 tp;  $x = \frac{-b}{2a}$   
 $= \frac{-8}{-4}$   
 $= 2$   
 $y = 18$   
 (2;18)

Plotting of Quadratic;  
 1M for correct shape  
 2A for correct intercepts  
 1A for correct TP  
 Straight Line;  
 2A for correct intercepts (6)

5.2	$y = -1$ ✓✓	2A for correct asymptote	(2)
5.3.1	$y/y \in \mathbb{R}, y \neq 2$ or $[-\infty; \infty] y \neq 2$	2CA for correct range	(2)
5.3.2	$y \in \mathbb{R}, y > -1$ or $(-1; \infty)$ ✓✓	2CA for correct range	(2)

5.4

1M for correct shape; hyperbola  
 2CA for correct intercept/asymptote  
 1M for correct shape; exponential  
 2CA for correct intercept/asymptote (6)

4.2.3  $(-1;0)$  ✓ and  $(6; -14)$  ✓

**QUESTION 5**

5.1  $\frac{3}{x-2}$   
 $\frac{3}{x-2} = -1$   
 $-x+2=3$   
 $x = -1$  ✓  
 $y = \frac{1}{2}$  ✓

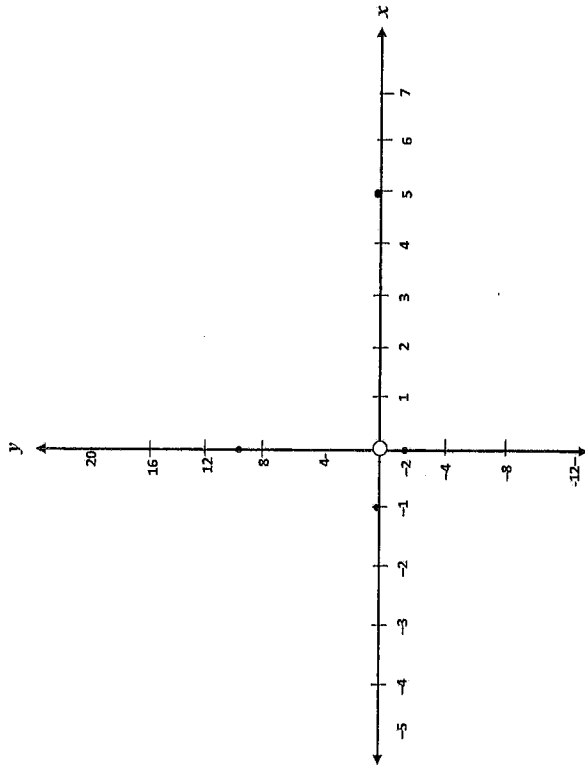
2CA for correct points of intersection (2)  
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1A for correct x intercept  
 1A for correct y intercept (2)

[14]

Question 4.2.2

Name: \_\_\_\_\_



Question 5.4

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