KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS

COMMON TEST

MARCH 2023

Stanmorephysics

MARKS: 75

TIME: 1½ hours

This question paper consists of 6 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 4 questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
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 correct to TWO decimal places, unless stated otherwise.
8. Write neatly and legibly.

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QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 2x = 8$ (3)

1.1.2 $4x^2 - x - 2 = 0$ (answer correct to TWO decimal places) (3)

1.1.3 $x(x-1) \geq 6$ (4)

1.1.4 $2x + \sqrt{x+1} = 1$ (5)

1.2 Solve simultaneously for x and y:

$x - y - 3 = 0$ and $x^2 - 3y^2 = 13$ (6)

1.3 Given a quadratic equation $3x^2 + 7x + \frac{11h}{12} = 0$.

1.3.1 For which value(s) of h will the roots be real? (3)

1.3.2 Determine the largest integral value of h for which the roots will be rational. (2)

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QUESTION 2

2.1 **Simplify without using a calculator:**

2.1.1 $\left(\frac{1}{16}\right)^{-\frac{3}{4}}$ (3)

2.1.2 $\frac{54^n.6^{-2n+1}}{12^{n-1}.8^{-n}}$ (5)

2.1.3 $\sqrt{b\sqrt{a}-b}.\sqrt{b\sqrt{a}+b}$ (4)

2.2 Solve for x:

2.2.1 $7^x = \frac{1}{343}$ (2)

2.2.2 $3^{2x+1} + 26.3^x - 9 = 0$ (4)

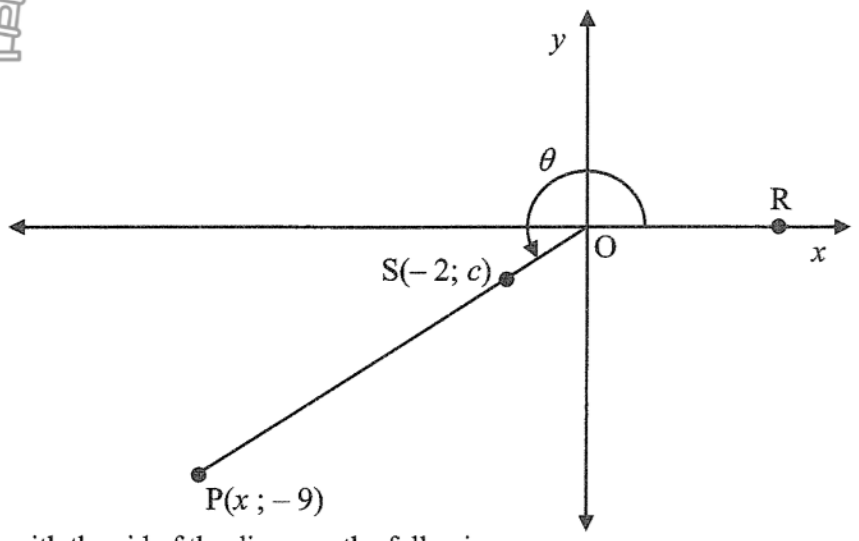
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QUESTION 3

DO NOT USE A CALCULATOR WHEN ANSWERING QUESTION 3.

3.1 In the diagram below, $P(x;-9)$ is a point in the Cartesian plane such that OP = 15 units. $S(-2\ ;\ c)$ lies on OP. R is a point on the positive x-axis and $R\hat{O}P = \theta$.



Determine, with the aid of the diagram, the following:

3.1.1 The value of x. (2)

3.1.2 $\tan\theta$ (1)

3.1.3 The value of c. (3)

3.2 **Without using a calculator,** determine the value of each of the following expressions:

3.2.1 $$\frac{\sin(180^\circ - x)}{\cos(90^\circ + x) + \sin(360^\circ - x)}$$ (4)

3.2.2 $$\frac{\cos 295^\circ . \cos 752^\circ}{\sin 238^\circ . \cos 65^\circ}$$ (5)

[15]

QUESTION 4

4.1 Prove the following identity:

$$\frac{\sin^2(180^\circ+\theta)+\cos(-\theta).\sin(90^\circ-\theta)}{\sin\theta}+\frac{1}{\tan\theta}=\frac{1+\cos\theta}{\sin\theta}$$ (5)

4.2 Solve for x, where $x\in[0^\circ;360^\circ]$:

$\sin x=-0,4$. (3)

4.3 Consider the equation: $\sqrt{3}\cos^2\alpha-\sin\alpha\cos\alpha=0$.

4.3.1 **Without using a calculator**, determine the general solution of this equation. (6)

4.3.2 Hence, determine the values of α for which $\sqrt{3}\cos^2\alpha-\sin\alpha\cos\alpha=0$ in the interval $\alpha\in[-270^\circ;90^\circ]$. (2)

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TOTAL: 75

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