KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS

COMMON TEST

MARCH 2024

Stanmorephysics.com

MARKS: 75

TIME: 1½ hours

This question paper consists of 6 pages.

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 $2x^2 + 5x = 0$ (3)

1.1.2 $-4x^2 + 3x + 6 = 0$ (answer correct to TWO decimal places) (3)

1.1.3 $3\sqrt{x-2} = x$ (4)

1.2 Given: $x^2 - x - 20 < 0$

1.2.1 Solve for x if $x^2 - x - 20 < 0$. (3)

1.2.2 Hence, or otherwise, determine the sum of all the integers satisfying the inequality $x^2 - x - 20 < 0$. (2)

1.3 Solve simultaneously for x and y:

$4x + y = 7$ and $3x^2 + 2xy = y^2$ (6)

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1.4 The roots of a quadratic equation are $x = \dfrac{-3 \pm \sqrt{13 - 2k}}{4}$.

Calculate the value(s) of k for which the roots are equal. (2)

1.5 Given: $(x+5)^2 = 1 - p^2$

Calculate the values of p for which the roots of the equation are non-real. (5)

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QUESTION 2

2.1 **Simplify fully without using a calculator.** Your answer must be free of negative exponents and irrational denominators.

2.1.1 $64^{-\frac{2}{3}}$ (3)

2.1.2 $\dfrac{3^{2n+2}-9^{n-1}}{2.3^{2n+1}}$ (5)

2.1.3 $\dfrac{\left(3-\sqrt{3}\right)^2}{\sqrt{3}.\sqrt{6}}$ (4)

2.2 **Solve for x, without using a calculator:**

2.2.1 $\sqrt[5]{32}=128$ (4)

2.2.2 $x^{\frac{1}{2}}-3x^{\frac{1}{4}}-10=0$ (4)

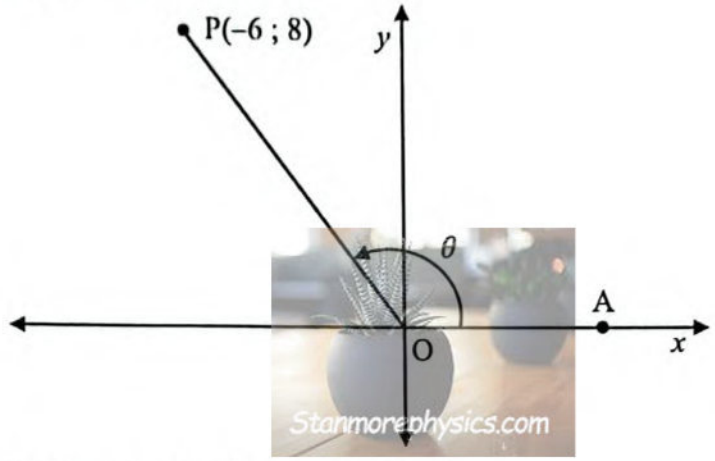
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QUESTION 3

DO NOT USE A CALCULATOR WHEN ANSWERING QUESTION 3.

3.1 In the diagram below, $P(-6\,;\,8)$ is a point in the Cartesian plane. A is a point on the positive x-axis. $A\hat{O}P = \theta$.



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

3.1.1 The length of OP. (2)

3.1.2 $\sin\theta + \cos\theta$ (3)

3.2 If $\sin 25° = \frac{1}{k}$, determine the value of $\tan 25°$ in terms of k. (3)

3.3 Simplify the following expression fully, without the use of a calculator:

$$\frac{\sin 698°.\cos 300°}{\tan 135°.\cos(-248°)}$$ (7)

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QUESTION 4

4.1 Simplify the following expression fully:

$$\frac{\sin(180^\circ + x).\sin(90^\circ + x)}{\tan(-x)} + \sin x.\cos(90^\circ - x) \quad (7)$$

4.2 Given: $\frac{\sin\theta}{1+\cos\theta}$

4.2.1 Prove that $\frac{\sin\theta}{1+\cos\theta} = \frac{1-\cos\theta}{\sin\theta}$ (3)

4.2.2 For which value of θ in the interval $\theta \in [0^\circ ; 360^\circ]$ is $\frac{\sin\theta}{1+\cos\theta}$ undefined? (2)

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TOTAL: 75