



**KWAZULU-NATAL PROVINCE**  
**EDUCATION**  
REPUBLIC OF SOUTH AFRICA

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**MATHEMATICS**  
**COMMON TEST**  
**MARCH 2023**

**MARKS: 75**

**TIME: 1½ hours**

*Stanmorephysics*

**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.



## 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)

[26]



## QUESTION 2

2.1 Simplify without using a calculator:

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

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

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

2.2 Solve for  $x$ :

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

2.2.2  $3^{2x+1} + 26 \cdot 3^x - 9 = 0$  (4)

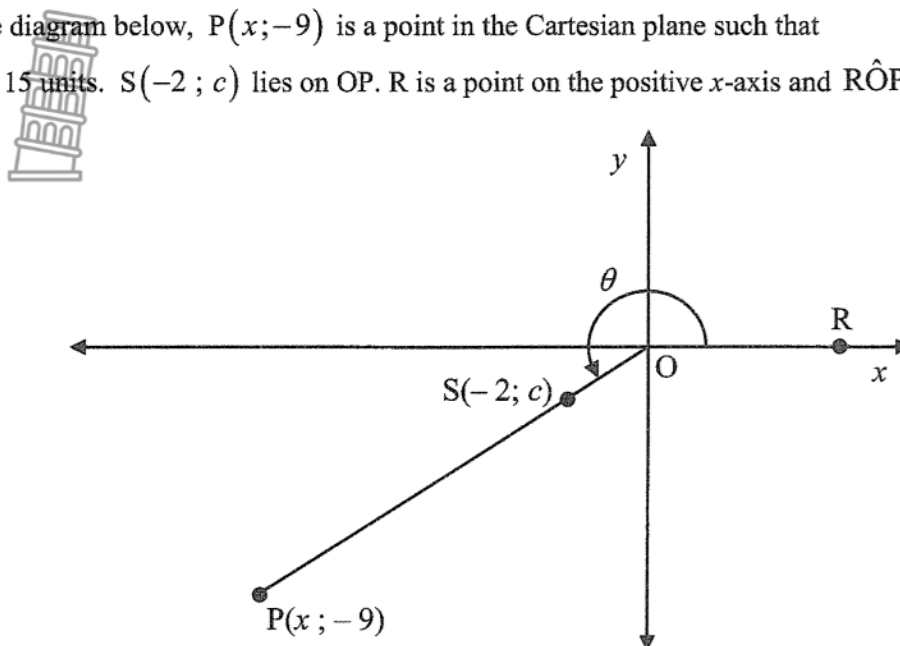
[18]



## 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  $\hat{R}OP = \theta$ .



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

[15]



## QUESTION 4

4.1 Prove the following identity:

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

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

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

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

[16]

TOTAL: 75

