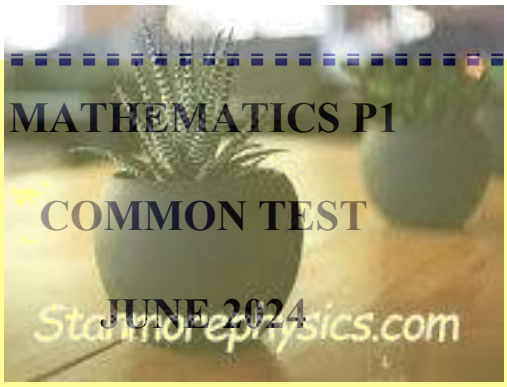
KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10



MATHEMATICS P1

COMMON TEST

JUNE 2024

MARKS: 50

TIME: 1 hour

This question paper consists of 5 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 3 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. Diagrams are NOT necessarily drawn to scale.
9. Write neatly and legibly.

QUESTION 1

1.1 Simplify fully:

1.1.1 $(3x-2)(2x^2-4x+1)$ (2)

1.1.2 $\dfrac{4^x.8^{x+1}}{32^{x+1}}$ (3)

1.1.3 $\dfrac{x+7}{x^2-x-6}-\dfrac{3}{x-3}+\dfrac{2}{2x+4}$ (5)

1.2 Factorise fully:

1.2.1 $5x^2-2x-3$ (2)

1.2.2 $x^3+\dfrac{1}{125}$ (2)

[14]

QUESTION 2

2.1 Solve for x:

2.1.1 $x(x-1)=6$ (3)

2.1.2 $3^x+3^{x-1}=36$ (3)

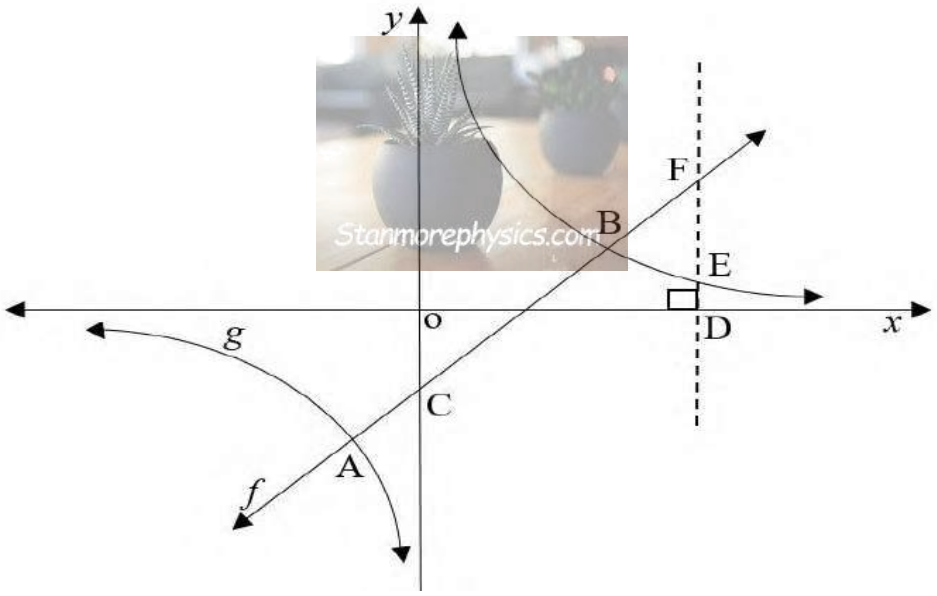
2.1.3 $-2<\dfrac{x}{3}-1\leq 1$ (3)

2.2 A shop sells bicycles and tricycles. In total there are 7 cycles (cycles include both bicycles and tricycles) and 19 wheels. Determine how many of each there are, if a bicycle has two wheels and a tricycle has three wheels. (5)

[14]

QUESTION 3

3.1 Given: $f(x)=x-2$ and $g(x)=\frac{3}{x}$, which are not drawn to scale. A and B are points of intersection of the graphs. DF is perpendicular to the x-axis, with points E and F on the graphs of g and f respectively.



Determine:

3.1.1 The coordinates of point C. (1)

3.1.2 The x-coordinates of A and B. (4)

3.1.3 The length of EF if $OD = 6$ units. (3)

3.1.4 The equation of j if $j(x)=g(x)+2$. (1)

3.1.5 The value(s) of x for which $f(x)\geq g(x)$ where $x\leq 0$. (2)

3.2 Sketch the graph of $h(x) = ax^2 + q$ if it is given that:

- The range of h is $[-4; \infty)$
- $a \neq 0$; $a > 0$
- $q < 0$
- One root of h is positive and one root of h is negative. (3)

3.3 Given: $g(x) = 3.2^x - 12$

3.3.1 Write down the equation of the asymptote of g. (1)

3.3.2 Determine the y intercept of g. (2)

3.3.3 Determine the x intercept of g. (2)

3.3.4 Sketch the graph of g, clearly showing the asymptote and the intercepts with the axes. (3)

[22]

TOTAL: [50]

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MARKING GUIDELINE

MARKS: **50**

This marking guideline consists of 5 pages.

QUESTION 1

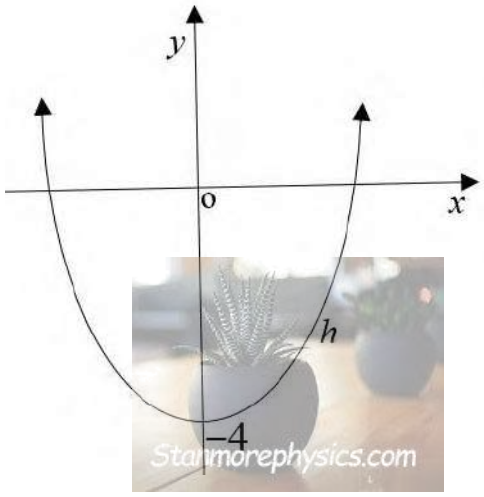
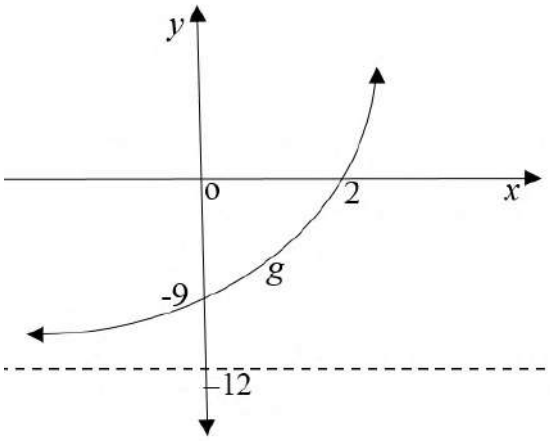
1.1.1	$=6x^3-12x^2+3x-4x^2+8x-2$ $=6x^3-16x^2+11x-2$	**A**✓simplification **CA**✓answer	(2)
1.1.2	$=\frac{2^{2x}.2^{3x+3}}{2^{5x+5}}$ $=2^{-2}$ $=\frac{1}{4}$	**A**✓$\frac{2^{2x}.2^{3x+3}}{2^{5x+5}}$ **CA**✓2^{-2} **CA**✓$\frac{1}{4}$	(3)
1.1.3	$=\frac{x+7}{(x-3)(x+2)}-\frac{3}{x-3}+\frac{2}{2(x+2)}$ $=\frac{x+7-3(x+2)+x-3}{(x-3)(x+2)}$ $=\frac{x+7-3x-6+x-3}{(x-3)(x+2)}$ $=\frac{-x-2}{(x-3)(x+2)}$ $=\frac{-(x+2)}{(x-3)(x+2)}$ $=\frac{-1}{x+3}$	**A**✓$(x-3)(x+2)$ and $2(x+2)$ **CA**✓$\frac{x+7-3(x+2)+x-3}{(x-3)(x+2)}$ **CA**✓$-x-2$ **CA**✓$-(x+2)$ **CA**✓$\frac{-1}{x+3}$	(5)
1.2.1	$=(5x+3)(x-1)$	**A**✓$(5x+3)$ **A**✓$(x-1)$	(2)
1.2.2	$=\left(x+\frac{1}{5}\right)\left(x^2-\frac{1}{5}x+\frac{1}{25}\right)$	**A**✓$\left(x+\frac{1}{5}\right)$ **A**✓$\left(x^2-\frac{1}{5}x+\frac{1}{25}\right)$	(2)
			[14]

QUESTION 2

2.1.1	$x^2 - x - 6 = 0$ $(x-3)(x+2) = 0$ $x = 3$ or $x = -2$	**A**✓standard form **CA**✓factors **CA**✓both answers	(3)
2.1.2	$3^x\left(1+\frac{1}{3}\right) = 36$ $3^x = 27$ $x = 3$	**A**✓ $3^x\left(1+\frac{1}{3}\right) = 36$ **CA**✓ $3^x = 27$ **CA**✓ $x = 3$	(3)
2.1.3	$-2+1 < \frac{x}{3} \le 1+1$ $-1 < \frac{x}{3} \le 2$ $-3 < x \le 6$	**A**✓ $-2+1 < \frac{x}{3} \le 1+1$ **CA**✓ $-1 < \frac{x}{3} \le 2$ **CA**✓ $-3 < x \le 6$	(3)
2.2	Let bicycles $= x$ tricycles $= y$ $x + y = 7 \ldots\ldots\ldots\ldots \rightarrow (1)$ $2x + 3y = 19 \ldots\ldots\ldots \rightarrow (2)$ $-2x - 2y = -14 \ldots\ldots \rightarrow (3)$ Add (2) and (3) $y = 5$ $x = 2$ **OR** $x + y = 7 \ldots\ldots\ldots\ldots \rightarrow (1)$ $2x + 3y = 19 \ldots\ldots\ldots \rightarrow (2)$ $x = 7 - y \ldots\ldots\ldots\ldots \rightarrow (3)$ subst. (3) into (2) $2(7-y) + 3y = 19$ $14 - 2y + 3y = 19$ $y = 5$ $x = 2$	**A**✓ $x + y = 7$ **A**✓ $2x + 3y = 19$ **CA**✓ $-2x - 2y = -14$ **CA**✓ $y = 5$ **CA**✓ $x = 2$ **OR** **A**✓ $x + y = 7$ **A**✓ $2x + 3y = 19$ **CA**✓ $x = 7 - y$ **CA**✓ $y = 5$ **CA**✓ $x = 2$	(5)
			[14]

QUESTION 3

3.1.1	$f(0)=-2$ $C(0;-2)$	**A**✓ $C(0;-2)$	(1)
3.1.2	$x-2=\frac{3}{x}$ $x^2-2x-3=0$ $(x-3)(x+1)=0$ $x=3$ or $x=-1$ $A(-1;0)$ $B(3;0)$	**A**✓ $x-2=\frac{3}{x}$ **A**✓ $x^2-2x-3=0$ **CA**✓ $(x-3)(x+1)=0$ **CA**✓ $x=3$ or $x=-1$	(4)
3.1.3	$f(6)=6-2$ $=4$ $g(6)=\frac{3}{6}$ $=\frac{1}{2}$ $\therefore$ EF=3,5 or $\frac{7}{2}$ units	**A**✓ y – value of F **A**✓ y – value of E **CA**✓ EF=3,5 or $\frac{7}{2}$ units	(3)
3.1.4	$j(x)=\frac{3}{x}+2$	**A**✓ $j(x)=\frac{3}{x}+2$	(1)
3.1.5	$-1\le x<0$ **OR** $x\in[-1;0)$	**CA**✓ $-1\le x<0$ **A**✓	(2)

3.2		**A**✓shape **A**✓x-intercepts on either sides of the y-axis **A**✓turning point /y-intercept at $y=-4$	(3)
3.3.1	$y=-12$	**A**✓answer	(1)
3.3.2	$g(0)=-9$	**A**✓ $g(0)=3.2^0-12$ **A**✓ -9	(2)
3.3.3	$3.2^x=12$ $2^x=4$ $x=2$	**A**✓ $2^x=4$ **A**✓ $x=2$	(2)
3.3.4		**A**✓shape **CA**✓both intercepts **A**✓asymptotes	(3)
			[22]
		TOTAL:	**[50]**