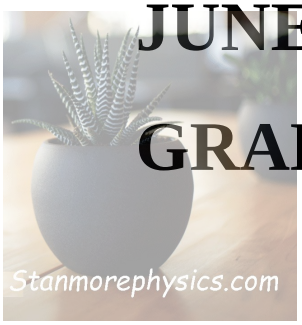
GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2024

GRADE 10



MATHEMATICS

(PAPER 1)

TIME: **1 hour**

MARKS: **50**

This question paper consists of 6 pages

P.T.O.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. This question paper consists of FIVE questions.
3. Present your answers according to the instructions of each question.
4. Clearly show ALL calculations, diagrams, graphs et cetera, which were used in determining the answers.
5. Answers only will NOT necessarily be awarded full marks.
6. Use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. Where necessary, answers should be rounded-off to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Number the questions correctly according to the numbering system used in the question paper.
10. Write neatly and legibly.

QUESTION 1

If $x \in \{0;1;2;3;4\}$, write down a value of x such that $K = \sqrt{\frac{9}{4-x}}$ is:

1.1 Undefined (1)

1.2 Rational (1)

1.3 Irrational (1)

[3]

QUESTION 2

2.1 Simplify the following:

2.1.1 $2b(b - 5c)^2$ (2)

2.1.2 $\frac{3x - 2.3^{x-1}}{3^{x+2} + 2.3^{x+1}}$ (3)

2.2 Factorise completely:

$a^2 - ax - 1 + x$ (3)

[8]

QUESTION 3

3.1 Solve for x:

3.1.1 $3x^2 = 2x$ (2)

3.1.2 $\frac{7}{3-x} = \frac{5}{x+3} + \frac{4}{x^2-9}$ (4)

3.1.3 $16{,}2^{x-1} = (0{,}5)^{x-4}$ (4)

3.2 Given: $2 - \frac{3x}{4} < 14$

3.2.1 Solve the inequality. (2)

3.2.2 Write down the first natural number that will satisfy the inequality. (1)

3.3 Solve simultaneously:

$2x + y = 8$ and $2y + 3x = -2$ (4)

[17]

P.T.O.

QUESTION 4

Consider the functions $f(x) = ax^2 + c$ and $g(x) = bx + q$. f ang g intersect at points A(–1 ;–3) and B (2; 0).

4.1 Calculate the values of a and c. (4)

4.2 Calculate the values of b and q. (3)

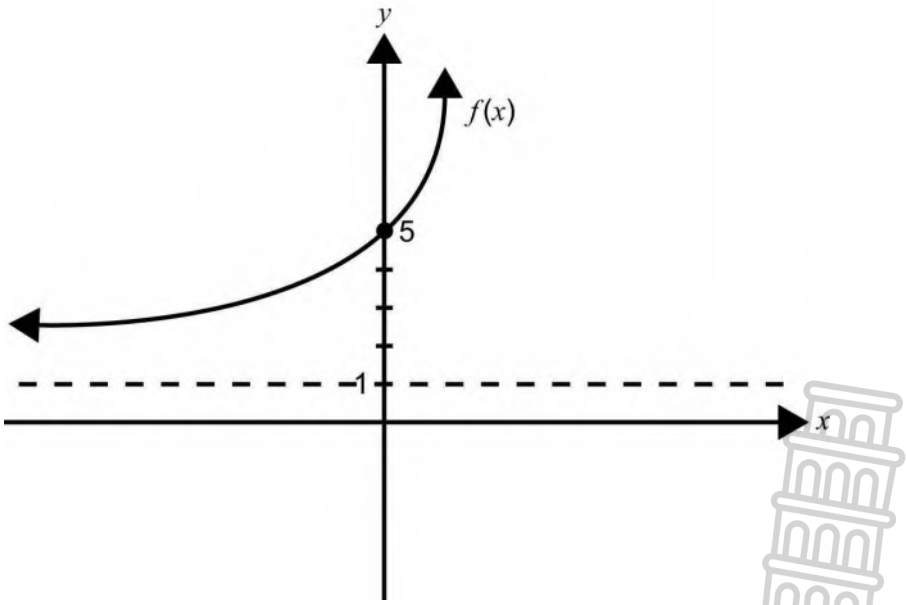
4.3 Use the ANSWER SHEET provided to sketch the graphs f *and* g on the same set of axis. (6)

4.4 Determine the value of $g(x) - f(x)$. (2)

4.5 For which values of x is $g(x) \geq f(x)$. (2)
[17]

QUESTION 5

The graph of $f(x) = 2^{x+2} + k$ is drawn below.



5.1 Use the laws of indices to show that $2^{x+2} + k$ is the same as $4.2^x + k$. (2)

5.2 Determine the value of k. (2)

5.3 Write down the equation of the asymptote of f. (1)
[5]

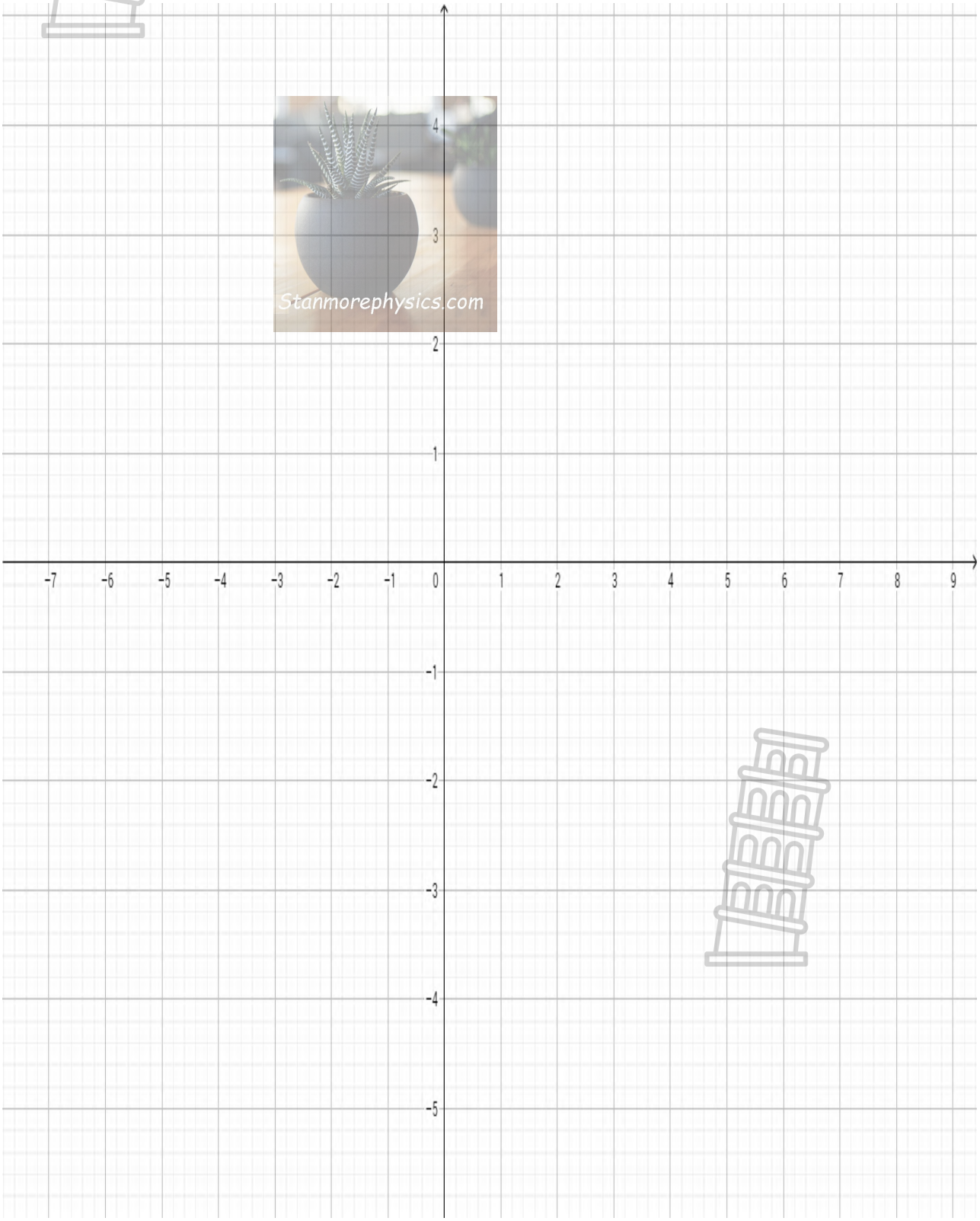
TOTAL: 50

END

NAME: _____

ANSWER SHEET

QUESTION 4.3



INFORMATION SHEET

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a\left(r^n - 1\right)}{r-1} \; ; r \neq 1 \qquad S_\infty = \frac{a}{1-r} \; ; \; -1 < r < 1$$

$$F = \frac{x\left[(1+i)^n - 1\right]}{i} \qquad P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $\qquad a^2 = b^2 + c^2 - 2bc.\cos A$

$$\text{area } \Delta ABC = \frac{1}{2}ab.\sin C$$

$$\sin(\alpha+\beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha-\beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha+\beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta \qquad \cos(\alpha-\beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases} \qquad \sin 2\alpha = 2\sin\alpha.\cos\alpha$$

$$\bar{x} = \frac{\sum fx}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sum(x-\bar{x})^2}$$

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

PROVINSIALE EKSAMEN

JUNE/*JUNIE* 2024

GRADE/*GRAAD* 10

MARKING GUIDELINES/ *NASIENRIGLYNE*

MATHEMATICS/*WISKUNDE* (PAPER/*VRAESTEL* 1)

6 pages/*bladsye*

NOTE/*LET WEL*:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
  As 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- If a candidate crossed OUT an answer and did not redo it, mark the crossed-out answer.
  Indien 'n kandidaat 'n antwoord DOODTREK en dit nie OORDOEN nie, sien die deurgehaalde antwoord na.
- Consistent accuracy (CA) applies to ALL aspects of the marking guidelines.
  Konsekwente akkuraatheid (CA) is van toepassing op ALLE aspekte van die nasienriglyne.
- Assuming values/answers in order to solve a problem is UNACCEPTABLE.
  Aannames van waardes/antwoorde om 'n probleem op te los, is ONAANVAARBAAR.

QUESTION/*VRAAG* 1			
1.1	$x = 4$	✓ answer/*antwoord*	(1)
1.2	$x = 0$ or/*of* $x = 3$	✓ any one/*enigeen*	(1)
1.3	$x = 1$ or/*of* $x = 2$	✓ any one/*enigeen*	(1)
			[3]

QUESTION/*VRAAG* 2

2.1	2.1.1	$2b(b-5c)^2$ $= 2b(b^2 - 10bc + 25c^2)$ $= 2b^3 - 20b^2c + 50bc^2$	✓square the binomial/*kwadreer binoom* ✓distribute 2b/*versprei* 2b	(2)
	2.1.2	$\frac{3^x - 2.3^{x-1}}{3^{x+2} + 2.3^{x+1}}$ $= \frac{3^x(1-2.3^{-1})}{3^x(3^2+2.3)}$ $= \frac{\frac{1}{3}}{15}$ $= \frac{1}{45}$	✓ factorise numerator/ *faktoriseer teller* ✓ factorise denominator/ *faktoriseer noemer* ✓final answer/*finale antwoord*	(3)
2.2	$a^2 - ax - 1 + x$ $= a^2 - 1 - ax + x$ $= (a+1)(a-1) - x(a-1)$ $= (a-1)(a+1-x)$		✓sum and difference/ *som en verskil* ✓factorise/*faktoriseer* ✓factorise/*faktoriseer*	(3)
				[8]

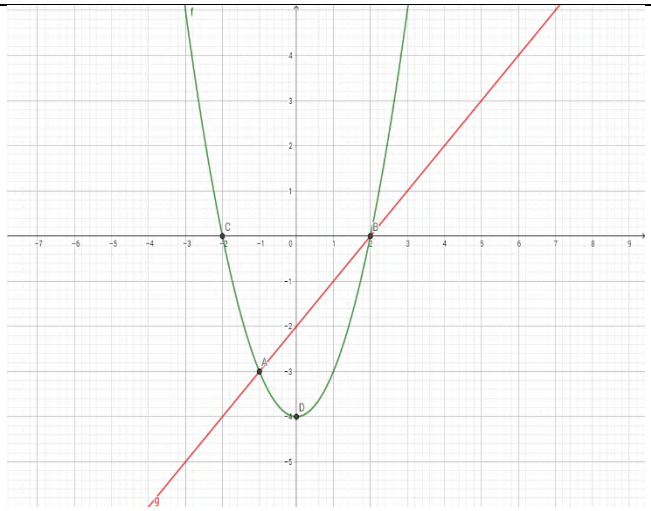
QUESTION/*VRAAG* 3

3.1	3.1.1	$3x^2 - 2x = 0$ $x(3x - 2) = 0$ $x = 0$ or/*of* $x = \frac{2}{3}$	✓factorise/*faktoriseer* ✓both x values/ *beide x waardes*	(2)
	3.1.2	$\frac{7}{3-x} = \frac{5}{x+3} + \frac{4}{x^2-9}$ $\frac{-7}{x-3} = \frac{5}{x+3} + \frac{4}{(x+3)(x-3)}$ LCD/*KGV* $(x+3)(x-3)$; $x \neq \pm 3$ $-7(x+3) = 5(x-3) + 4$ $-7x - 21 = 5x - 15 + 4$ $-12x = 10$ $x = -\frac{5}{6}$	✓factorise/*faktoriseer* ✓change of sign/ *verander teken* ✓ $-7(x+3) = 5(x-3) + 4$ ✓answer/*antwoord*	(4)
	3.1.3	$16.2^{x-1} = (0,5)^{x-4}$ $2^4.2^{x-1} = (2^{-1})^{x-4}$ $2^{x+3} = 2^{-x+4}$ $x+3 = 4-x$ $2x = 1$ $x = \frac{1}{2}$	✓ $2^4.2^{x-1}$ ✓ $(2^{-1})^{x-4}$ ✓ $x+3 = 4-x$ ✓*answer* / antwoord	(4)
3.2	3.2.1	$2 - \frac{3x}{4} < 14$ $\frac{-3x}{4} < 12$ $x > -16$	✓subtract 2/*trek 2 af* ✓multiply $\frac{-4}{3}$/ *vermenigvuldig met* $\frac{-4}{3}$	(2)
	3.2.2	$x = 1$	answer/*antwoord*	(1)

3.3	$2x+y=8$ and/*en* $2y+3x=-2$.....(2) $y=8-2x$.....(1) subst (1) into (2)/*vervang (1) in (2)* $2(8-2x)+3x=-2$ $16-4x+3x=-2$ $-x=-18$ $x=18$ subst $x=18$ into (1)/*vervang x = 18 in (1)* $y=8-2(18)$ $y=-28$	✓equation (1)/ *vergelyking (1)* ✓subst (1) into (2) *vervang (1) in (2)* ✓x value/$x-waarde$ ✓y value/$y-waarde$	(4)
			[17]

QUESTION/*VRAAG* 4

4.1	Sub point A (–1;–3)/*Vervangpunt* A(–1;–3) –3 = a + c ….. eq 1/*vgl* 1 Sub point B(2; 0)/*vervangpunt B(2;0)* 0 = 4a + c ….. eq 2/*vgl* 2 eq 1 – eq 2/$vgl\ 1-vgl\ 2$ –3 = –3 a a = 1 sub in eq 1/$verv\ in\ vgl\ 1$ –3 = 1 + c c = –4 or sub in eq 2/*of vervang in vgl* 2 0 = 4 + c c = – 4	✓✓ correct sub of both points $korrekte\ verv\ van\ beide\ punte$ ✓ a = 1 ✓ c = –4	(4)

4.2	b= $\frac{y_1-y_2}{x_1-x_2}$ b = $\frac{-3-0}{-1-2}$ b = 1 $g(x) = x + q$ sub/*vervang* (-1;-3) $-3 = -1 + q$ $q = -2$ **OR/*OF*** sub (2;0)/*vervang* (2;0) $0 = 2 + q$ $q = -2$ Method 2/*Metode 2* Sub (2;0) into g/*Vervang (2;0) in g* $0 = 2b + q$ …… eq 1/*vgl 1* Sub (-1;-3) into g/*verv (-1;-3) in g* $-3 = -b + q$ ….. eq 2/*vgl 2* eq 1 – eq 2/$vgl\ 1 - vgl\ 2$ $3b = 3$ $b = 1$ Sub/*vervang* (2;0) into/in $g(x) = x + q$ $0 = 2 + q$ $q = -2$ **OR/OF** Sub/*vervang* (-1;-3) into/*in g* $-3 = -1 + q$ $q = -2$	✓ correct answer for b/*korrekte antwoord vir b* ✓ sub (-1;-3) or (2;0)/ *vervang (-1;-3) of (2;0)* ✓ correct answer for q/*korrekte antwoord vir q* ✓ correct answer for b/ *korrekte antwoord vir b* ✓ sub/*verv* (-1;-3) OR/*OF* (2;0) ✓ correct answer for q/ *korrekte antwoord vir q*	(3)
4.3		✓✓✓ *x* and y intercepts for *f*/*x en y-afsnitte van f* ✓✓✓ *x* and y intercepts for *g*/x en y-afsnitte van g.	(6)
4.4	–2 – (–4) = 2	✓ –2 – (– 4) ✓ answer/*antwoord*	(2)

4.5	$-1 \leq x \leq 2$ Or $x \in [-1; 2]$	✓ mark for values *punt vir waardes* ✓ mark for correct notation ONLY if values were correct./*punt vir notasie SLEGS as waardes korrek was.*	(2)
			[17]

QUESTION/*VRAAG* 5

5.1	$2^{x+2} + k = 2^x.2^2 + k$ $= 4.2^x + k$	✓ mark for splitting exponent/*punt vir opbreek van eksponente* ✓ answer/*antwoord*	(2)
5.2	Sub point (0;5)/*vervangpunt (0;5)* $5 = 4.2^0 + k$ $k = 1$	✓ sub point correctly/*vervang punt korrek* ✓ correct answer/*korrekte antwoord*	(2)
5.3	$y = 1$	✓ answer/*antwoord*	(1)
			[5]

TOTAL/*TOTAAL* [50]