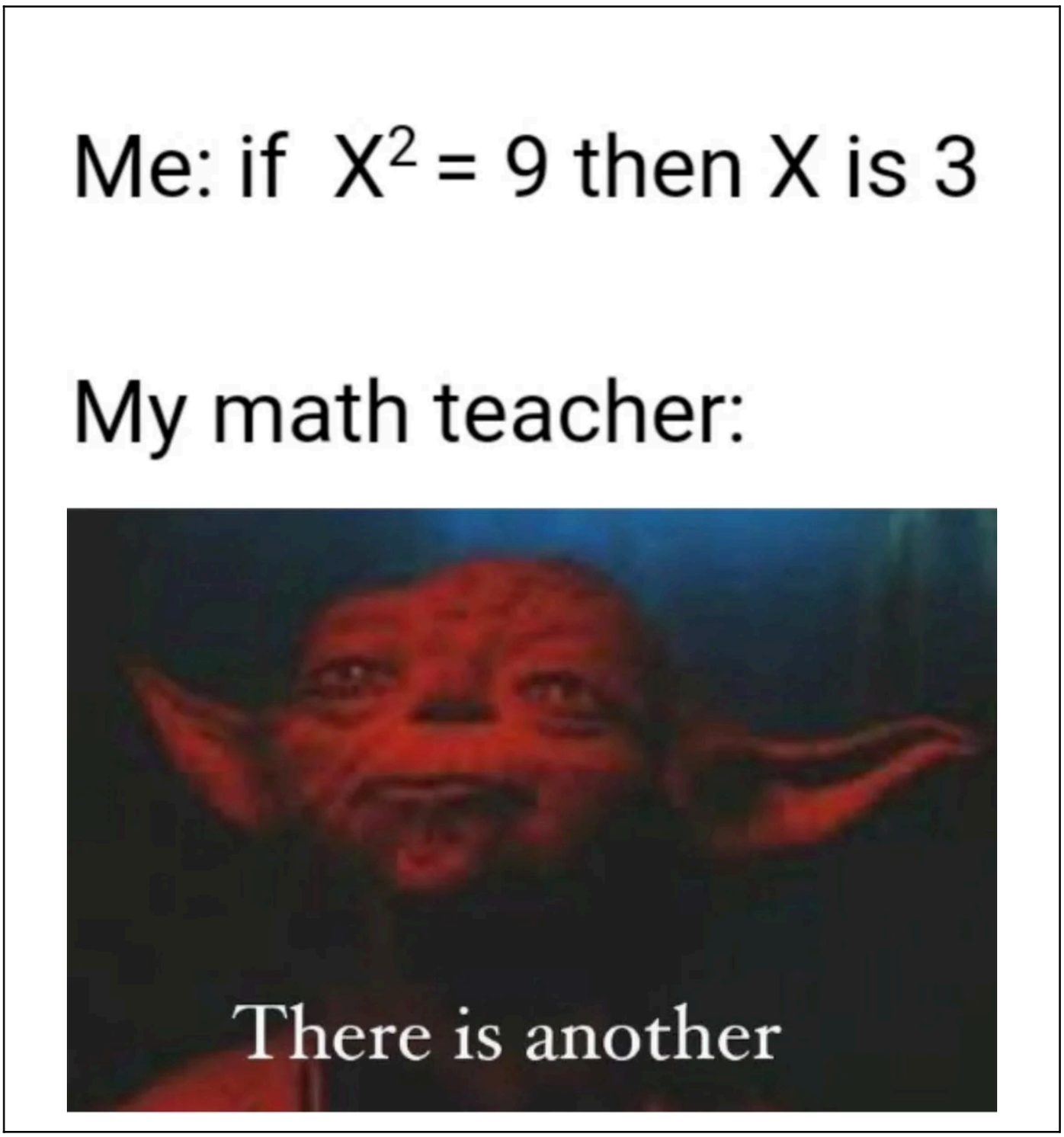
ALGEBRA



"Mathematics is not about numbers; it’s about understanding patterns and solving puzzles.
Every problem you solve sharpens your mind and opens new doors."

https://mashigovincent01.github.io/wethinkandwork-grade-12-maths/

GAUTENG JUNE 2024

QUESTION 1

1.1 Solve for x:

1.1.1 $2x(3x+4)=0$ (2)

1.1.2 $2x^2-4x=-1$ (Correct to TWO decimal places) (4)

1.1.3 $(x-2)^2 \geq 1$ (4)

1.2 Given: The equation $\sqrt{x-2}=4-x$

1.2.1 Without solving for x, show that the solution lies in the interval $2 \leq x \leq 4$. (2)

1.2.2 Solve the equation. (4)

1.3 Solve for x and y simultaneously:

$3x+y=2$ and $y^2=2x^2-1$ (6)

1.4 If $r+2s=a$ and $r-2s=b$, prove that $rs=\dfrac{a^2-b^2}{8}$ (4)

[26]

KZN JUNE 2024

QUESTION 1

1.1 Solve for x:

1.1.1 $5x(2x+7)(8-x)=0$ (3)

1.1.2 $x^2+13x+12=0$ (3)

1.1.3 $5x^2-7x+8=0$ (2)

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

1.1.5 $x(x-1)<20$ (4)

1.1.6 $2^{1-2x}+7.2^{-x}-4=0$ (5)

1.2 The roots of a quadratic equation are $x=\frac{5\pm\sqrt{22-3m}}{2}$.

If m is an integer, determine the largest value of m for which these roots will be rational. (3)

1.3 Evaluate: $\frac{\sqrt{9^{2024}}}{\sqrt{9^{2023}}-\sqrt{9^{2025}}}$ (3)

1.4 Solve simultaneously for x and y:

$3+y-2x=0$ and $4x^2+y^2-2xy-7=0$ (6)

[34]

KZN JUNE 2024 PRACTICE PAPER

QUESTION 1

1.1 Solve for x:

1.1.1 $(x-2)(5+x)=0$ (2)

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

1.1.3 $2\sqrt{x+6}+2=x$ (4)

1.1.4 $x^2<-2x+15$ (4)

1.1.5 $2^{x+2}-3.2^{x-1}=80$ (5)

1.2 Solve for x and y simultaneously:

$3^{x+y}=27$ and $x^2+y^2=17$ (6)

1.3 Show that $2.5^n-5^{n+1}+5^{n+2}$ is even for all integer values of n. (3)

1.4 Determine the values of x and y if: $\frac{3^{y+1}}{32}=\sqrt{96^x}$ (4)

[32]

MPUMALANGA 2024 PAPER 1

QUESTION 1

1.1 Given : $f(x)=(x+4)(3-x)$ and
$g(x)=x^2-49$

Solve for x if:

1.1.1 $g(x)=0$ (2)

1.1.2 $f(x)>0$ (3)

1.1.3 $f(x)=5$, rounded off to THREE decimal places. (4)

1.2 Solve x:

1.2.1 $\sqrt{x+2}=x-4$ (4)

1.2.2 $2x^{-\frac{5}{3}}=64$ (3)

1.3 Solve for x and y simultaneously:
$-2y+x=-1$ and $x^2-7-y^2=-y$ (6)

1.4 Determine the values of p, for which the equation $2^x=1-2p$ will have real solutions. (2)

1.5 Given $M=\sqrt{\frac{9-3p}{p+1}}$

Determine the value(s) of p for which M will be:

1.5.1 Undefined. (1)

1.5.2 Rational (give only ONE integer). (1)

[26]

EASTERN CAPE JUNE 2024

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 8(x-2) = 25$ (3)

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

1.1.3 $(x+3)(5-x) \leq 0$ (3)

1.1.4 Given: $\frac{x+3}{\sqrt{x+5}} = 1; x \in \mathbb{R}$

(a) For which value(s) of x will $\frac{x+3}{\sqrt{x+5}}$ be undefined? (2)

(b) Solve for x. (4)

1.2 Solve simultaneously for x and y:

$$y + 2x = 5$$
$$2x^2 - xy - 4y^2 = 8$$ (6)

1.3 Given that: $M = \frac{108}{x^2 - 4x + 8}; x \in \mathbb{R}$, determine the maximum value of M. (4)

[25]

FREE STATE JUNE 2024

QUESTION 1

1.1 Solve for x:

1.1.1 $(x+2)(x-5)=0$ (2)

1.1.2 $x(2x+3)=3$ (correct to TWO decimal places) (5)

1.1.3 $(x-1)(2-x)\geq 0$ (3)

1.1.4 $3\sqrt{x-1}=1-x$ (5)

1.2 Consider: $\left(\frac{1}{81}\right)^{-x}=9^{y+3}$ and $y^2+x^2-3x=-1$

1.2.1 Show that $y=2x-3$ (2)

1.2.2 Solve for x and y simultaneously (5)

1.3 Show that the quadratic equation $x^2+px^2+2px+p=1$ has two distinct real roots for all real values of the constant p, except for one value which must be stated. (3)

[25]

LIMPOPO JUNE 2024

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2-3x+2=0$ (3)

1.1.2 $3x^2=-2-6x$ (Round off to **TWO** decimal digits) (4)

1.1.3 $2x-1=\sqrt{1-x}$ (4)

1.1.4 $(x+3)(3-x)<0$ (3)

1.2 Solve for x and y simultaneously:

$2x=y+2$

$y-2=x^2-3x$ (6)

1.3 An athlete calculated that if he increases his current speed of x km/h by 5 km/h, he can reduce his time (t) by 12 minutes. He will be participating in the City Marathon in Polokwane which is 72 km long.

Determine the value of x. (5)

[25]

LIMPOPO JUNE 2024 PRE-EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2-5x-6=0$ (2)

1.1.2 $(3x-1)(x-4)=16$ (correct to TWO decimal places) (4)

1.1.3 $4x-x^2\geq 0$ (3)

1.1.4 $\dfrac{5^{2x}-1}{5^x+1}=4$ (3)

1.2 Solve simultaneously for x and y:

$x+3y=2$ and $x^2+4xy-5=0$ (5)

EASTERN CAPE 2024 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(2x-4)(x-1)=0$ (2)

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

1.1.3 $x^2+4x-21\leq 0$ (3)

1.1.4 $-\sqrt{x-1}=3-2x$ (4)

1.2 Solve simultaneously for x and y:

$2x=1-y$ and $xy-x^2+y^2=5$ (6)

1.3 Given that:

- $f(x)=x^2+3x$
- $2x-[t(x)]^{\frac{1}{2}}=0$

For which values of k will the equation $f(-x)+\frac{t(2k)}{4}=0$ have equal roots? (5)

[24]

FREE STATE 2024 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(7-x)(10+x)=0$ (2)

1.1.2 $3x(2x+1)=1$ (correct to TWO decimal places) (4)

1.1.3 $6x^2+7x+2\geq 0$ (3)

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

1.2 Solve simultaneously for x and y:

$-2y+x=4$ and $x^2+xy-2y^2=0$ (5)

1.3 Given: $4^m=p\left(2^{2m-1}\right)+p$.

Show that for $p\neq 2$ the above equation can be written in the form

$m=\frac{1}{2}\log_2\left(\frac{2p}{2-p}\right)$. (4)

[23]

GAUTENG 2024 PREPARATORY EXAM

QUESTION 1

1.1 Given: $2k=(x-5)(x-k)$, determine:

1.1.1 k if $x=2$ (2)

1.1.2 x if $k=2$ (4)

1.2 Solve for x:

1.2.1 $2x^2+3=8x$ (correct to TWO decimal places) (4)

1.2.2 $\sqrt{2(x+10)}-10=x-12$ (4)

1.2.3 $3^x(x-5)<0$ (2)

1.3 Solve the following equations simultaneously:

$\sqrt{3^x}.9^y = 27$ and $x + 4y^2 = 6$ (6)

1.4 The solutions of a quadratic equation are given by

$$x = \frac{-2 \pm \sqrt{2p+5}}{7}.$$

State the value(s) of p for which this equation will have:

1.4.1 Two equal solutions (1)

1.4.2 No real solutions (1)

[24]

LIMPOPO 2024 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 3x + 2 = 0$ (3)

1.1.2 $3x^2 = -2 - 6x$ (Round off to **TWO** decimal digits) (4)

1.1.3 $2x - 1 = \sqrt{1-x}$ (4)

1.1.4 $(x+3)(3-x) < 0$ (3)

1.2 Solve for x and y simultaneously:

$2x = y + 2$

$y - 2 = x^2 - 3x$ (6)

1.3 An athlete calculated that if he increases his current speed of x km/h by 5 km/h, he can reduce his time (t) by 12 minutes. He will be participating in the City Marathon in Polokwane which is 72 km long.

Determine the value of x. (5)

[25]

MPULANGA 2024 PREPARATORY

QUESTION 1

1.1 Solve for x:

1.1.1 $(2-x)(x+3)=0$ (2)

1.1.2 $3x^2-4x=5$ (4)

1.1.3 $\sqrt{5-x}-x=1$ (5)

1.1.4 $x(x-5)<0$ (2)

1.2 Solve for x and y simultaneously:

$$-2y+x=-1$$
$$x^2-7-y^2=-y$$ (6)

1.3 Prove that the roots of the following equation are non-real for all real values of a *and* b, $a\neq 0$ *and* $b\neq 0$.

$$a^2x^2+abx+b^2=0$$ (3)

[22]

NORTH WEST 2024 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(2x-6)(x+5)=0$ (2)

1.1.2 $7x^2-11x+3=0$ (correct to TWO decimal places) (3)

1.1.3 $x^2\geq 5x$ (4)

1.1.4 $3\sqrt{x+12}-x=8$ (5)

1.2 Solve for x and y simultaneously:

$2y=5+x$ and $y^2+3xy=2x^2+50$ (6)

1.3 Determine the value of: $\dfrac{\left(2^{2p-1}\right)^3}{\sqrt{7^k}}$ if $2^{6p}=81$ and $7^k=729$ (4)

[24]

WESTERN CAPE 2024 PREPARATORY

QUESTION 1

1.1 Solve for x:

1.1.1 $(x-1)(2x-6)=0$ (2)

1.1.2 $x^2-7x-7=0$ (answers correct to TWO decimal places) (3)

1.1.3 $6x^2+7x>5$ (4)

1.1.4 $1=\frac{-6}{\sqrt{x+2}}+\sqrt{x+2}$ (5)

1.2 Solve for x and y simultaneously:

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

1.3 Simplify, without the use of a calculator:

$$\sqrt{3}.\sqrt{48}-\frac{4^{x+1}}{2^{2x}}$$ (3)

1.4 Given: $f(x)=3(x-1)^2+5$ and $g(x)=3$

1.4.1 Is it possible for the graphs of f and g to intersect? Give a reason for your answer. (2)

1.4.2 Determine the value(s) of k for which $f(x)=g(x)-k$ has TWO unequal real roots. (4)

[29]

GAUTENG 2023 JUNE EXAM

QUESTION 1

1.1 Given: $12x=x^2$

1.1.1 Solve for x. (3)

1.1.2 Hence, or otherwise, determine the value(s) of p if $\left(p^2-1\right)^2=12\left(p^2-1\right)$. (Leave your answer in surd form, where necessary). (4)

1.2 Solve for x if $5x^2+7x-2=0$. (Round-off the answer to TWO decimal places.) (4)

1.3 Solve for x if $\sqrt{x+6}=x$. (5)

1.4 Use the solution for x in QUESTION 1.3 to determine the value of y for which $\sqrt{y+1}=y-5$. (2)

1.5 A race requires an athlete to run 10 km and cycle 50 km. Tendani runs at a speed of x km/h and cycles at $(x+31)$ km/h. He takes $\frac{10}{x}$ hours for the 10 km run.

1.5.1 Express the time he takes for the 50 km cycle in terms of x. (1)

1.5.2 Calculate the speed (correct to TWO decimal places) at which he must run to complete the entire race in 2 hours. (6)

[25]

KZN JUNE 2023

QUESTION 1

1.1 Solve the following equations.

1.1.1 $x^2-2x=0$ (3)

1.1.2 $5x^2=-11x+3$ (give your answer to 2 decimal places) (3)

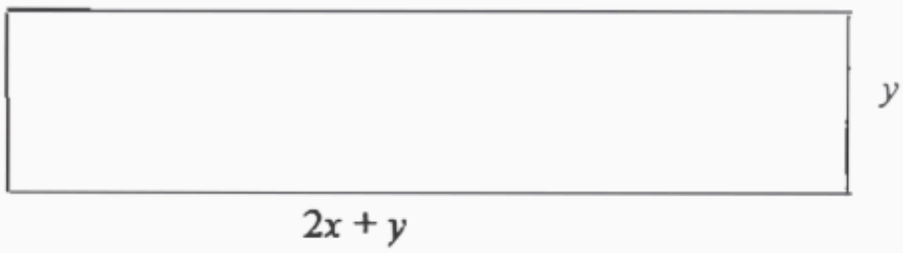
1.1.3 $x^2-2x\leq 8$ (4)

1.1.4 $\sqrt{\frac{2^{2023}+2^{2022}}{2^{2022}}+x^2-x}=x$ (4)

1.2 The roots of a quadratic equation are:

$x=\frac{10\pm\sqrt{-m-8}}{2}$, for which values of m are the roots non real? (2)

1.3 A rectangle has a length of $(2x+y)$ metres and a width of y metres as shown in the diagram. The perimeter of the rectangle is 24 metres and the area is 32m^2.



1.3.1 Show that the expression for the perimeter is: $24=4x+4y$ (1)

1.3.2 Show that the expression for the area is : $32=y^2+2xy$ (1)

1.3.3 Determine the dimensions of the rectangle if $x>0$. (6)

[24]

MPUMALANGA 2023 JUNE EXAM

QUESTION 1

1.1 Solve for x.

1.1.1 $(2+x)(-x+4)=0$ (2)

1.1.2 $3x^2=2x+4$ (Correct to 2 decimal places) (4)

1.1.3 $x-2\sqrt{x-1}=4$ (6)

1.1.4 $-x-12>-x^2$ (4)

1.2 Solve the following equations simultaneously:

$x^2-xy-5y^2=-5$ and $x+2y=1$ (6)

1.3 Determine the values of t for which the equation

$5^x=2-t$ will have real solutions. (3)

[25]

EASTERN CAPE JUNE 2023

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 9 = 0$ (2)

1.1.2 $x - 5 + \frac{2}{x} = 0$ (correct to TWO decimal places) (4)

1.1.3 $x = 1 + \sqrt{7 - x}$ (5)

1.1.4 $x^2 + 2x - 15 \geq 0$ (3)

1.2 Solve simultaneously for x and y in:

$$y + 2x = 3$$
$$y^2 - y = 3x^2 - 5x$$ (6)

1.3 Simplify completely, WITHOUT the use of a calculator: $\sqrt[n]{\frac{10^n + 2^{n+2}}{5^{2n} + 4(5^n)}}$ (4)

[24]

NATIONAL 2023 JUNE EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 7x + 12 = 0$ (3)

1.1.2 $x(3x + 5) = 1$ (correct to TWO decimal places) (4)

1.1.3 $x^2 < -2x + 15$ (4)

1.1.4 $\sqrt{2(1 - x)} = x - 1$ (4)

1.2 Solve for x and y simultaneously:

$3^{x+y} = 27$ and $x^2 + y^2 = 17$ (6)

1.3 Determine, **without the use of a calculator**, the value of:

$$\frac{1}{\sqrt{1} + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \frac{1}{\sqrt{3} + \sqrt{4}} + \ldots + \frac{1}{\sqrt{99} + \sqrt{100}}$$ (3)

[24]

KZN 2023 PREPARATORY PRACTICE EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $3x^2+10x+6=0$ (correct to TWO decimal places) (3)

1.1.2 $\sqrt{6x^2-15}=x+1$ (5)

1.1.3 $x^2+2x-24\geq 0$ (3)

1.2 Solve simultaneously for x and y:

$5x+y=3$ and $3x^2-2xy=y^2-105$ (6)

1.3 1.3.1 Solve for p if $p^2-48p-49=0$ (3)

1.3.2 Hence, or otherwise, solve for x if $7^{2x}-48(7^x)-49=0$ (3)

[23]

LIMPOPO 2023 PREPARATORY PRACTICE EXAM

QUESTION 1

1.1. Solve for x (round to 2 decimals if necessary)

1.1.1. $(x-1)(2x+5)=0$ (2)

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

1.1.3. $x^2\geq x+20$ (4)

1.1.4. $96=3x^{\frac{5}{4}}$ (3)

1.2. Solve for x and y simultaneously

$2^{x+y}=4$

$x^2=52-y^2$ (7)

1.3. Calculate, without using a calculator, the value of a and b if a and b are integers and:

$$\frac{14}{\sqrt{63}-\sqrt{28}}=a\sqrt{b}$$ (4)

[24]

EASTERN CAPE 2023 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2+x-30=0$ (3)

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

1.1.3 $x^2-2x+1>0$ (3)

1.1.4 $2x-1=\sqrt{4-5x}$ (4)

1.2 Solve simultaneously for x and y:

$y-2x=-1$ and $2y^2+4xy=6x^2$ (6)

1.3 Given the quadratic equation: $2x^2-px+1=0, x\in\mathbb{R}$.

Determine the possible value(s) of p, such that the equation has two **unequal** real roots. (5)

[25]

FREE STATE 2023 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(x-1)(2x+1)=0$. (2)

1.1.2 $(x-1)(2x+1)=4$ (correct to two decimal places) (4)

1.1.3 $x+\sqrt{x-2}=4$ (5)

1.1.4 $3x^2+x\leq 0$ (3)

1.2 Solve for x and y in the following simultaneous equations:

$xy=8$ and $2x+y=17$ (6)

1.3 Simplify the following WITHOUT USING A CALCULATOR:

$\sqrt{\sqrt{21x^2}-\sqrt{5x^2}}\times\sqrt{\sqrt{21x^2}+\sqrt{5x^2}}$ (3)

[23]

GAUTENG 2023 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(2x+1)^2-4=0$ (3)

1.1.2 $4x^2-11=-12x$ (Correct to TWO decimal places) (3)

1.1.3 $15x-4<9x^2$ (4)

1.1.4 $\sqrt{2x-2}-\sqrt{7-2x}=1$ (5)

1.2 Solve the following equations simultaneously:

$a^2b^2-2ab-8=0$ and $\log_2(a+5)=3$ (5)

1.3 If $p=\dfrac{\sqrt{x+2}}{\sqrt{16-x^2}}$, for which values of x will p be real? (4)

[24]

KZN 2024 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x(x-4)=0$ (2)

1.1.2 $2x^2+3x=7$ (write your answer to two decimal places). (4)

1.1.3 $x^2-5x+4>0$ (3)

1.1.4 $3^{2x}-10.3^x+21=0$ (5)

1.2 Solve simultaneously for x and y: (6)

$x+y=2$; $x^2+y^2+6x=4y-4$

1.3 The roots of a quadratic equation are $x=\dfrac{-4\pm\sqrt{25-n^2}}{6}$.

For which values of n will the roots be equal? (3)

[23]

NSC 2023 NOV EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2+x-12=0$ (3)

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

1.1.3 $\sqrt{2x+1}=x-1$ (4)

1.1.4 $x^2-3>2x$ (4)

1.2 Solve for x and y simultaneously:

$x+2=2y$ and $\frac{1}{x}+\frac{1}{y}=1$ (5)

1.3 Given: $2^{m+1}+2^m=3^{n+2}-3^n$ where m and n are integers.

Determine the value of $m+n$. (4)

[24]

GAUTENG/EC JUNE 2022

QUESTION 1

1.1 Solve for x, in each of the following:

1.1.1 $x^2=-4x$ (3)

1.1.2 $x^2+x-1=0$ (Correct to TWO decimal places) (3)

1.1.3 $\sqrt{x+4}-\frac{4}{\sqrt{x-2}}=0$ (5)

1.1.4 $(x+2)(-3x+1)>0$ (3)

1.2 Solve for x and y simultaneously:

$3-y+2x=0$

$6x+4y^2=3+5xy$ (6)

1.3 Given that $9x^2-12px=-4p^2$. For which value(s) of p will the equation have equal roots? (4)

[24]

NATIONAL 2022 JUNE

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2+2x-15=0$ (3)

1.1.2 $5x^2-x-9=0$ (Leave your answer correct to TWO decimal places.) (3)

1.1.3 $x^2 \le 3x$ (4)

1.2 Given: $a+\frac{64}{a}=16$

1.2.1 Solve for a. (3)

1.2.2 Hence, solve for x: $2^x+2^{6-x}=16$ (3)

1.3 **Without using a calculator**, calculate the value of $\sqrt{\frac{2^{1002}+2^{1006}}{17(2)^{998}}}$ (4)

1.4 Solve for x and y simultaneously:

$2x-y=2$ and $\frac{1}{x}-3y=1$ (6)

[26]

GAUTENG 2022 MOCK EXAM (SEPTEMBER)

QUESTION 1

1.1 Solve for x in the following:

1.1.1 $4x^2 = 25$ (2)

1.1.2 (a) $x^2 - 5x = 2$ (4)

(b) Hence, or otherwise, solve $(x-2)^2 - 5x + 8 = 0$. (3)

1.1.3 $(2-x)(x+4) \geq 0$ (3)

1.1.4 $3^{x+1} - 4 + \frac{1}{3^x} = 0$ (5)

1.2 Solve for x and y simultaneously:

$2x - y + 1 = 0$

$x^2 - 3x - 4 - y = y^2$ (6)

1.3 Given: $x = \frac{\pm\sqrt{b^2-9}}{-2}$

Determine the value(s) of b for which x is a real number. (3)

[26]

EC 2022 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2+4x-21=0$ (2)

1.1.2 $x(2x-7)=3$ (correct to TWO decimal places) (4)

1.1.3 $(2x+3)(x+1)<6$ (4)

1.1.4 $2\sqrt{x}+x=3$ (5)

1.2 Solve simultaneously for x and y:

$2y+x+3=0$ and $x^2+y^2+2xy=1$ (6)

1.3 It is given that $K^{\frac{1}{x}}=3$, $K^{\frac{1}{y}}=4$ and $K^{\frac{1}{w}}=12$.

Prove that $w=\dfrac{xy}{x+y}$. (4)

[25]

FREE STATE 2022 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $3x^2 - 5x - 2 = 0$ (2)

1.1.2 $3x - 4 = \frac{2}{x} \quad (x \neq 0)$ (correct to TWO decimal places) (4)

1.1.3 $x^2 - 8x + 16 > 0$ (3)

1.1.4 $\sqrt{5x - 1} = 2x - 1$ (4)

1.1.5 $3^{x+1} + m.3^x = 2m + 6$ (correct to TWO decimal places) (4)

1.2 Solve simultaneously for x and y in:

$2x + y = -1$ and $y^2 + 3xy + 2 = 0$ (6)

[23]

GAUTENG 2022 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $2x(x^2 - 1) = 0$ (2)

1.1.2 $x - 6 + \frac{2}{x} = 0 \; ; \; x \neq 0$ (correct to TWO decimal places) (4)

1.1.3 $(x-1)(x+4) \geq 6$ (3)

1.1.4 $\sqrt{x-2} + 3 = \frac{10}{\sqrt{x-2}}$ (5)

1.2 Solve for x and y:

$x - 2y = 1$ and $2x^2 - xy - 5y - 3y^2 - 2 = 0$ (4)

1.3 Given: $2^{x+1} + 2^x = 3^{y+2} - 3^y$, where x and y are integers.
Determine the value of x and y. (3)

1.4 The equations $x^2 + rx + m = 0$ and $x^2 + mx + r = 0$ have real and EQUAL roots.
Solve for the values of r and m if $r > 0$ and $m > 0$. (6)
[27]

KZN 2022 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(x+5)(2x-1)=0$ (2)

1.1.2 $-3x^2-7x=-8$ (correct to TWO decimal places) (4)

1.1.3 $\sqrt{x+5}+1=x$ (5)

1.1.4 $(2x-3)(x+5)\leq 0$ (3)

1.2 Solve for x and y simultaneously if: (6)

$x+3y=5$ and $xy+y^2-3=0$

1.3 Simplify fully, without the use of a calculator:

$$\sqrt[n]{\frac{10^n+2^{n+2}}{5^{2n}+4.(5^n)}} \quad \text{where} \quad n\neq 0$$ (4)

[24]

LIMPOPO 2023 EXAM

QUESTION 1

1.1 Solve for x

1.1.1 $(x-2)(x-7)=0$ (2)

1.1.2 $4x+\frac{4}{x}+11=0; x\neq 0$ (Correct to TWO decimal places.) (4)

1.1.3 $6x<3x^2$ (3)

1.1.4 $\sqrt{x-1}=x-3$ (4)

1.2 Solve for x and y simultaneously:

$2x-y+1=0$

and

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

1.3 Determine the sum of the digits of $5^{2009}2^{2010}.24$ (4)

[23]

NORTH WEST 2022 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $(3x - 1)(x + 2) = 0$ (2)

1.1.2 $x^2 - 7x - 11 = 0$ (correct to TWO decimal places) (3)

1.1.3 $x^2 + 2x - 15 \geq 0$ (4)

1.2 Solve simultaneously for x and y:

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

1.3 Given: $f(x) = \dfrac{3x - x^2}{2^x - 4}$. Determine the values of x for which:

1.3.1 $f(x) = 0$ (3)

1.3.2 $f(x)$ undefined (2)

1.3.3 $f(x) \leq 0$ (3)

[23]

NSC NOV 2022

QUESTION 1

1.1 Solve for x:

1.1.1 $(3x-6)(x+2)=0$ (2)

1.1.2 $2x^2-6x+1=0$ (correct to TWO decimal places) (3)

1.1.3 $x^2-90>x$ (4)

1.1.4 $x-7\sqrt{x}=-12$ (4)

1.2 Solve for x and y simultaneously:

$$2x-y=2$$
$$xy=4$$ (5)

1.3 Show that $2.5^n-5^{n+1}+5^{n+2}$ is even for all positive integer values of n. (3)

1.4 Determine the values of x and y if: $\frac{3^{y+1}}{32}=\sqrt{96^x}$ (4)

[25]

EASTERN CAPE 2021 JUNE EXAM

QUESTION 1

1.1 Solve for x, in each of the following:

1.1.1 $2x(x+1)=0$ (2)

1.1.2 $2x(x-3)=1$ (correct to TWO decimal places) (4)

1.1.3 $x^2-2x-15\leq 0$ (3)

1.1.4 $x=\left(\sqrt{3+a-2\sqrt{a}}\right)^2-\left(\sqrt{a}-1\right)^2$ (3)

1.2 Solve simultaneously for x and y in the following equations:

$$x-2y=3$$
$$4x^2-5xy=3-6y$$ (6)

1.3 The equation $3mx^2-px+5=0$; $m\neq 0$ and $p\neq 0$, has equal roots.

1.3.1 Show that $f(x)=3mx^2-px+5$ has a minimum value. (4)

1.3.2 If it is further given that $p<0$, draw a sketch graph of $f(x)=3mx^2-px+5$. (2)

[24]

NATION 2021 JUNE EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - x - 20 = 0$ (3)

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

1.1.3 $(x-1)^2 > 9$ (4)

1.1.4 $2\sqrt{x+6} + 2 = x$ (4)

1.2 Solve simultaneously for x and y:

$4x + y = 2$ and $4x + y^2 = 8$ (5)

1.3 If it is given that $2^x \times 3^y = 24^6$, determine the numerical value of $x - y$. (4)

[24]

GAUTENG 2021 PRE-TRIAL EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $4x^2 - 25 = 0$ (3)

1.1.2 $3x^2 + 5x = 4$ (correct to TWO decimal places) (4)

1.1.3 $2^x - 5 \cdot 2^{x+1} = -144$ (3)

1.1.4 $2x^2 + x - 3 > 0$ (3)

1.2 Given: (i) $4^{x+2} \cdot 8^{y+1} = 2^{1-x}$

(ii) $x^2 + y^2 + xy = 7$

1.2.1 Show that for equation (i) above $y = -x - 2$. (3)

1.2.2 Hence solve for x and y simultaneously. (5)

EC 2021 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2+2x-15=0$ (3)

1.1.2 $3x^2+x-1=0$ (correct to TWO decimal places) (3)

1.1.3 $x(x-3)\geq -2$ (4)

1.1.4 $\sqrt{43-x}-x+1=0$ (5)

1.2 Solve simultaneously for x and y:

$2y-x=3$ and $y^2+3x=2xy$ (5)

1.3 The roots of a quadratic equation are given as follows:

$$x=\frac{5\pm\sqrt{p(6-p)-9}}{2}$$

Determine the value(s) of p for which the equation will have non-real roots. (4)

[24]

FREE STATE 2021 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2-4x-21=0$ (3)

1.1.2 $x(5x-1)=3$ (correct to TWO decimal places) (4)

1.1.3 $2x^2-9x+4\geq 0$ (3)

1.1.4 $3^{x+1}-3^{x-1}-24=0$ (4)

1.2 Solve simultaneously for x and y:

$y+2x=2$ and $y^2-3yx=-2x^2$ (5)

1.3 Simplify, **without using a calculator**:

$$\left(\sqrt[4]{\sqrt{20}-\sqrt{D_x(4x)}}\right)\left(\sqrt[4]{\sqrt{20}+\sqrt{D_x(4x)}}\right)$$ (4)

[23]

GAUTENG 2021 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $3x^2 - 4x = 0$ (2)

1.1.2 $3x^2 + 10x - 4 = 0$ (Correct to TWO decimal places) (3)

1.1.3 $15x - 4 < 9x^2$ (3)

1.1.4 $\sqrt{x^2 - 5} = 2\sqrt{x}$ (4)

1.2 Given: $(3x - y)^2 + (x - 5)^2 = 0$
Solve for x and y. (3)

1.3 Given: $x - 2 = \frac{-4}{x-2} - 4$

If $y = x - 2$:

1.3.1 Show that the given equation can be expressed as: $y^2 + 4y + 4 = 0$. (2)

1.3.2 Hence, show that the equation has real and equal roots. (2)

1.4 Calculate the maximum value of S if: $S = \frac{6}{x^2 + 2}$ (2)

[21]

KZN 2021 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $2x(3-x)=0$ (2)

1.1.2 $5x^2-4x=2$ (Rounded off to 2 decimal places) (4)

1.1.3 $\sqrt{7+3x}+2x=0$ (5)

1.1.4 $3^{x+2}+3^{2-x}=82$ (5)

1.2 For which values of x will $\sqrt{x^2-5x+4}$ be real? (4)

1.3 Solve for x and y simultaneously if:

$$xy=12 \quad \text{and} \quad x-4=y$$ (5)

[25]

NORTHERN CAPE 2021 PREPARATORY EXAM

QUESTION 1

1.1 Solve for x.

1.1.1 $x^2-x-6=0$ (3)

1.1.2 $x(x+6)+1=0$ (correct to TWO decimal places) (4)

1.1.3 $6x-2x^2\leq 0$ (3)

1.1.4 $\left(\sqrt{\sqrt{2}-x}\right)\left(\sqrt{\sqrt{2}+x}\right)=x$ (5)

1.2 Solve simultaneously for x and y:

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

1.3 If $x^2=7$ and $x>0$, determine the value of x^5 without using a calculator. (3)

[24]

NSC NOV 2021 EXAM

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 2x - 24 = 0$ (3)

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

1.1.3 $x^2 + 5x \leq -4$ (4)

1.1.4 $\sqrt{x+28} = 2 - x$ (4)

1.2 Solve simultaneously for x and y in:

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

1.3 The roots of an equation are $x = \dfrac{-n \pm \sqrt{n^2 - 4mp}}{2m}$ where m, n and p are positive real numbers. The numbers m, n and p, in that order, form a geometric sequence. Prove that x is a non-real number. (4)

[24]