basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

GEC PILOT STUDY
MARKING GUIDELINES 2024
MATHEMATICS PAPER 1
GRADE 9

SECTION A

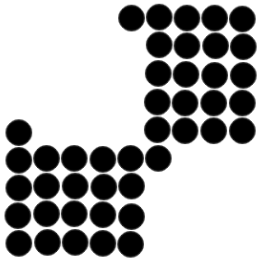
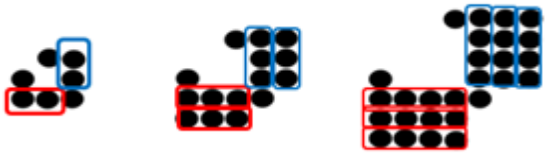
- *One mark per answer.*
- *No half marks may be allocated.*
- *Tick* (✓) only the correct answer and underline the incorrect answer.

No.		Expected answer	Key (✓)	Rational/Clarification
1.	D	$\frac{8}{0}$	✓	A number divided by zero is undefined.
2.	B	5	✓	$125 = 5 \times 5 \times 5$ $200 = 2 \times 2 \times 2 \times 5 \times 5$ $510 = 2 \times 3 \times 5 \times 17$ HCF $= 5$
3.	A	1 800	✓	$75 = 3 \times 5 \times 5$ $450 = 2 \times 3 \times 3 \times 5 \times 5$ $1800 = 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$ LCM $= 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$
4.	C	Indirect proportion.	✓	As time decreases, the speed increases with the product of time and speed remaining constant.

No.		Expected answer	Key (✓)	Rational/Clarification
5.	C	$\frac{2}{3}$ hour	✓	Speed $= \frac{d}{t}$ $= \frac{6}{24}$ $= 0{,}25$ km/h Time $= \frac{d}{s}$ $= \frac{10}{0{,}25}$ $= 40$ min $= \frac{2}{3}$ h **OR** Speed $= \frac{d}{t}$ $= \frac{6}{24 \div 60}$ $= 15$ km/h Time $= \frac{d}{s}$ $= \frac{10}{15}$ $= \frac{2}{3}$ h
6.	A	$4{,}5\ \%$	✓	$2023 - 2006 = 17$ years $A = P(1+i)^n$ $R11\,291{,}45 = R5300\left(1+\frac{i}{100}\right)^{17}$ $\left(\sqrt[17]{\frac{11291{,}45}{5300}} - 1\right) \times 100 = i$ $4{,}5\ \% = i$
7.	C	$(-a \times e)(b \times -g)$	✓	Changing the order of factors does not change the product.
8.	B	$-\frac{1}{5}$ and 5	✓	The sum of additive inverses is zero. The product of multiplicative inverses is 1.
9.	A	22	✓	$6 - (3-5) + 9 - (-15) \div 3$ $= 6 - (-2) + 9 - (-5)$ $= 22$
10.	A	-21	✓	$\frac{5(3)(4) - 5(3-(4)\times 3)}{-3-2}$ $= \frac{60 - 5(-9)}{-5}$ $= \frac{60+45}{-5}$ $= -21$

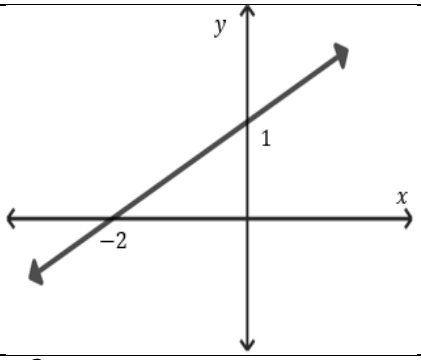
No.		Expected answer	Key (✓)	Rational/Clarification
11.	D	-1	✓	$\frac{\sqrt[3]{125}-3^2+0+1}{-4+\sqrt{121}-\sqrt[3]{64}}$ $=\frac{5-9+0+1}{-4+11-4}$ $=\frac{-3}{3}$ $=-1$
12.	A	16	✓	$\left(\frac{\sqrt[3]{27}+\sqrt{\frac{50}{2}}}{\frac{4^2-\sqrt[3]{8}}{\sqrt{49}}}\right)^2$ $=\left(\frac{3+5}{\frac{16-2}{7}}\right)^2$ $=\left(8\times\frac{7}{14}\right)^2$ $=16$
13.	A	$6n^5$	✓	$3n^3\times 2n^2$ $=3\times 2\times n^{3+2}$ $=6n^5$
14.	B	$-8x^6y^3$	✓	$(-2x^2y)^3$ $=(-2)^3(x^2)^3y^3$ $=-8x^6y^3$
15.	A	6	✓	$2^{-2}\times 6^3\times 3^{-2}$ $=2^{-2}\times(2\times 3)^3\times 3^{-2}$ $=2^{-2}\times 2^3\times 3^3\times 3^{-2}$ $=2^{-2+3}\times 3^{3-2}$ $=2^1\times 3^1$ $=6$ **OR** $\frac{1}{\cancel{4}}\times\frac{\overset{6}{\cancel{216}}}{1}\times\frac{1}{\cancel{9}}$ $=6$
16.	C	$\frac{-3}{x^2y^{11}}$	✓	$-3(x^{-1}y^2)^{-3}\times(xy)^{-5}$ $=-3x^3y^{-6}\times x^{-5}y^{-5}$ $=-3x^{3-5}y^{-6-5}$ $=-3x^{-2}y^{-11}$ $=\frac{-3}{x^2y^{11}}$

No.		Expected answer	Key (✓)	Rational/Clarification
17.	B	$\frac{y^4}{4}$	✓	$\left(\frac{y^2+\frac{1}{y^{-2}}}{y^2\times y^2}\right)^{-2}$ $\left(\frac{y^2+y^2}{y^2\times y^2}\right)^{-2}$ $=\left(\frac{2y^2}{y^{2+2}}\right)^{-2}$ $=\left(\frac{2^{-2}\times y^{-4}}{y^{-8}}\right)$ $=\frac{4^{-1}\times y^{-4}}{y^{-8}}$ $=4^{-1}\times y^{-4+8}$ $=\frac{y^4}{4}$ **OR** $\left(\frac{y^2+\frac{1}{y^{-2}}}{y^2\times y^2}\right)^{-2}$ $\left(\frac{y^2+y^2}{y^2\times y^2}\right)^{-2}$ $=\left(\frac{2y^2}{y^{2+2}}\right)^{-2}$ $=\left(\frac{y^4}{2y^2}\right)^{2}$ $=\frac{y^8}{4y^4}$ $=\frac{y^4}{4}$
18.	D	$\frac{2y^2}{x}$	✓	$\frac{\sqrt{4x^6y^{-2}}\times(x^2)^{-2}}{(2x)^0y^{-3}}$

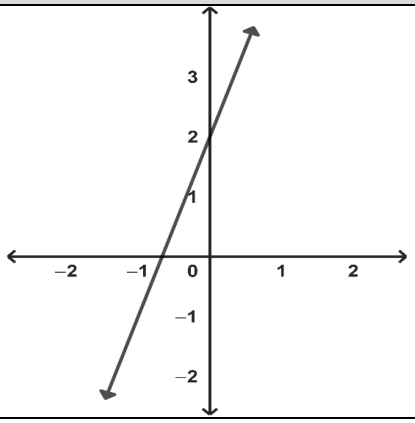
No.		Expected answer	Key (✓)	Rational/Clarification
				$= 2x^{3-4}y^{-1+3}$ $= 2x^{-1}y^2$ $= \frac{2y^2}{x}$
19.	B	Add 1 to the previous term to get the next term.	✓	$\frac{1}{2}; \frac{3}{2}; \frac{5}{2}; \frac{7}{2}; \ldots$ $+1 \quad +1 \quad +1$
20.	A	8; 13	✓	0; 1; 1; 2; 3; 5; 8; 13 Add the previous two terms to determine the next term. (Fibonacci)
21.	C		✓	 Pattern 1: 2 dots, 1 row, 1 column Pattern 2: 3 dots, 2 rows, 2 columns Pattern 3: 4 dots, 3 rows, 3 columns 3 anchor dots in each pattern
22.	A	$324\ \text{cm}^2$	✓	9th square's side $= 18$ cm Area $= s^2$ $= (18\ \text{cm})^2$ $= 324\ \text{cm}^2$
23.	D	$-3\text{p}q^2\text{r}$ and $5\text{p}q^2r$	✓	Like terms have the same variables with the same exponents.
24.	D	3	✓	The term with the smallest coefficient is $-2x^3$ and the exponent of x is 3.
25.	D	3	✓	Only plus and minus signs separate terms.
26.	A	$-6y^3 + 12y^2 - 1$	✓	$-3y(2y^2 - 4y) - 1$ $= -6y^3 + 12y^2 - 1$
27.	D	$5\text{y}^2 + 3\text{y} - 2$	✓	$\frac{15y^3 - 3y(-y+2) + 6y^2}{3y}$ $= \frac{15y^3 + 3y^2 - 6y + 6y^2}{3y}$ $= \frac{15y^3 + 9y^2 - 6y}{3y}$ $= 5\text{y}^2 + 3\text{y} - 2$
28.	C	$\frac{5y^4}{4}$	✓	$\sqrt{\text{y}^8 + \frac{9}{16}\text{y}^8}$

No.		Expected answer	Key (✓)	Rational/Clarification
				$= \sqrt{\frac{16y^8 + 9y^8}{16}}$ $= \sqrt{\frac{25y^8}{16}}$ $= \frac{5y^4}{4}$
29.	B	$16x^2 - 4x + \frac{1}{4}$	✓	$\left(4x - \frac{1}{2}\right)^2$ $= \left(4x - \frac{1}{2}\right)\left(4x - \frac{1}{2}\right)$ $= 16x^2 - 2x - 2x + \frac{1}{4}$ $= 16x^2 - 4x + \frac{1}{4}$
30.	C	16	✓	$\frac{9p^2 - 8q}{r}$ $= \frac{9(-1)^2 - 8\left(\frac{1}{8}\right)}{\frac{1}{2}}$ $= \frac{9 - 1}{\frac{1}{2}}$ $= 8 \times 2$ $= 16$
31.	A	$(5a - 4b)(5a + 4b)$	✓	$25a^2 - 16b^2$ $= (5a - 4b)(5a + 4b)$
32.	C	$(y - 7)(y - 4)$	✓	$y^2 - 11y + 28$ $= (y - 7)(y - 4)$
33.	B	$9(p - 2)(p + 5)$	✓	$9p^2 + 27p - 90$ $= 9(p^2 + 3p - 10)$ $= 9(p - 2)(p + 5)$
34.	C	$\frac{2(a - 2)}{a + 2}$	✓	$\frac{2a^2 - 10a + 12}{a(a + 2) - 3(a + 2)}$ $= \frac{2(a^2 - 5a + 6)}{(a + 2)(a - 3)}$ $= \frac{2(a - 2)(a - 3)}{(a + 2)(a - 3)}$ $= \frac{2(a - 2)}{a + 2}$
35.	C	$4 - p - q$	✓	$\frac{48r - 3r(p + q)^2}{12r + 3pr + 3qr}$ $= \frac{3r[16 - (p + q)^2]}{12r + 3pr + 3qr}$

No.		Expected answer	Key (✓)	Rational/Clarification
				$= \frac{3r[4-(p+q)][4+(p+q)]}{3r(4+p+q)}$ $= \frac{3r[4-p-q][4+p+q]}{3r(4+p+q)}$ $= 4-p-q$
36.	D	$\frac{1}{2}$	✓	$-2 = -4m$ $\frac{-2}{-4} = m$ $m = \frac{1}{2}$
37.	B	-14	✓	$\frac{a}{7} = -2$ $a = -14$
38.	A	$x = 4$	✓	$(x-4)^2 = 0$ $x - 4 = 0$ $x = 4$
39.	C	$x = 3$ or $x = 1$	✓	$(x-3)(1-x) = 0$ $x - 3 = 0$ or $1 - x = 0$ $x = 3$ or $-x = -1$ $x = 1$
40.	D	$y = 2x - 3$	✓	y is the selling price, x is the cost price. Selling price = double cost price minus three.
41.	A	5	✓	$4(x-1) = 16$ $x - 1 = 4$ $x = 5$
42.	C	$(1;1)$	✓	$y = x^2 - 1$ $1 \neq (1)^2 - 1$ Does NOT satisfy the equation.
43.	B	$x = 6$ or $x = -3$	✓	$x^2 - 3x - 18 = 0$ $(x-6)(x+3) = 0$ $x = 6$ or $x = -3$
44.	B	-1	✓	$2^m + 0{,}5 = 1$ $2^m = 1 - \frac{1}{2}$ $2^m = 2^{-1}$ $m = -1$
45.	A	0 or $\frac{1}{4}$	✓	$\frac{6x}{3} - x = 4x^2$ $6x - 3x = 12x^2$ $12x^2 - 3x = 0$ $3x(4x-1) = 0$ $x = 0$ or $x = \frac{1}{4}$

No.		Expected answer	Key (✓)	Rational/Clarification
46.	C	10 and 12 or -10 and -12	✓	Let the first even number be $2x$. $2x(2x+2)=120$ $4x^2+4x-120=0$ $4(x^2+x-30)=0$ $4(x+6)(x-5)=0$ $x=-6$ or $x=5$ Even numbers: 10 and 12 of -12 and -10
47.	B	-4	✓	<table><tr><td>Input</td><td>-1</td><td>2</td><td>5</td><td>8</td></tr><tr><td>Output</td><td>b</td><td>-1</td><td>2</td><td>5</td></tr></table> Output = Input -3 $b=-1-3$ $b=-4$
48.	C	7	✓	$y=-2x-3$ $=-2(-5)-3$ $=10-3$ $=7$
49.	D	Multiply by -3	✓	$-2(-3)=6$ $-1(-3)=3$ $2(-3)=6$ ∴ multiply by -3
50.	C		✓	The table clearly indicates the x-intercept, $(-2;\ 0)$ and the y-intercept, $(0;1)$.
51.	D	$\frac{-3}{22}$	✓	$-\frac{2a}{3}+1=-8a$ $-2a+3=-24a$ $-2a+24a=-3$ $22a=-3$ $a=\frac{-3}{22}$
52.	B	$y=-2x+4$	✓	$A(3;-2)\rightarrow A'(2;0)$ Join the points. y-intercept $=4$ Gradient $=\frac{\text{vertical change}}{\text{horizontal change}}$ $=\frac{-2-0}{3-2}$ $=-2$

No.		Expected answer	Key (✓)	Rational/Clarification
				The equation is $y = -2x + 4$.
53.	C	$(0; 3)$	✓	$y = -2x + 3$ If $x = 0$ then $y = 3$.
54.	B	$y = 3$	✓	Gradient of a horizontal line equal to zero. y-intercept of f is 3, therefore $y = 3$.
55.	D	$\frac{-3}{2}$	✓	The gradient of a line is equal to the coefficient of x in $y = mx + c$.
56.	A	$y = -x - 2$	✓	$m = \frac{y_1 - y_2}{x_1 - x_2}$ $= \frac{-3 - (-2)}{1 - 0}$ $= \frac{-1}{1}$ $= -1$ y-intercept: $(0; -2)$ c $= -2$ Substitute in $y = mx + c$ $y = -x - 2$
57.	D	$(2; 0)$ and $(0; 4)$	✓	x –intercept: $y = 0$ $4x + 2(0) = 8$ $x = 2$ $(2; 0)$ y-intercept: $x = 0$ $4(0) + 2y = 8$ $y = 4$ $(0; 4)$
58.	C	$c < 0; m > 0$	✓	The y-intercept is negative and the gradient is positive.
59.	D	$-\frac{2}{3}$	✓	Use any two of $(-2;3)$; $(4; -1)$ or $(1; 1)$. m $= \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-1 - 3}{4 + 2}$ $= -\frac{4}{6}$ $= -\frac{2}{3}$

No.		Expected answer	Key (✓)	Rational/Clarification
60.	C		✓	$2y - 6x - 4 = 0$ $y = 3x + 2$ Standard form ∴ gradient $= 3$ and y-intercept $= 2$
				SECTION A TOTAL **[60]**

SECTION B

Marking guideline for Section B		
• Do not penalise the learner for the same mistake more than once. • *There are no half marks.* • Underline errors committed by learners do not place a cross (X). • In instances where learners have used different but mathematically sound strategies to solve problems, they (learners) must be credited. • Consistent accuracy must be applied.		
M	key	a mark for a correct method
A		a mark for accurate calculation
CA		a mark for consistent accuracy

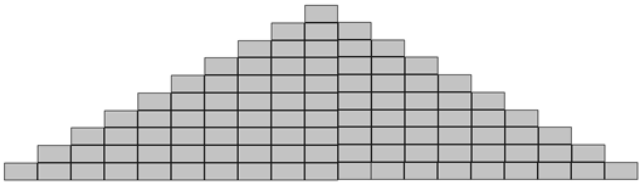
No.	Expected answer	Rational/Clarification	Mark
61.	$\frac{-5x(2x-4x^2)+x^2(1+16x)}{-3x}$ $=\frac{-10x^2+20x^3+x^2+16x^3}{-3x}$ ✓**M** $=\frac{-9x^2+36x^3}{-3x}$ ✓**CA** $=3x-12x^2$ ✓**CA** **OR** $\frac{-5x(2x-4x^2)+x^2(1+16x)}{-3x}$ $=\frac{-5x(2x-4x^2)}{-3x}+\frac{x^2(1+16x)}{-3x}$ $=\frac{-10x^2+20x^3}{-3x}+\frac{x^2+16x^3}{-3x}$ ✓**M** $=\frac{10}{3}x-\frac{20}{3}x^2-\frac{1}{3}x-\frac{16}{3}x^2$ ✓**CA** $=3x-12x^2$ ✓**CA**	Simplification: 1 mark $-9x^2+36x^3$: 1 mark Answer: 1 mark **OR** Simplification: 1 mark $\frac{10}{3}x-\frac{20}{3}x^2-\frac{1}{3}x-\frac{16}{3}x^2$: 1 mark Answer: 1 mark	(3)
62.	$2x^2-6x=(x-3)(x+3)$ $2x^2-6x=x^2-9$ ✓**M** $x^2-6x+9=0$ ✓**CA** $(x-3)^2=0$ $x=3$ ✓**CA**	x^2-9: 1 mark Standard form**:** 1 mark Answer: 1 mark	(3)

No.	Expected answer	Rational/Clarification	Mark
63.	Used $(-1;2)$ and $(5;-1)$. Any 2 applicable points may be used. ✓**M** Gradient $= \frac{2-(-1)}{-1-5}$ $= \frac{2+1}{-1-5}$ $= \frac{3}{-6}$ $= -\frac{1}{2}$ ✓**CA** $y = -\frac{1}{2}x + c$ y-intercept: Substitute any applicable point. $0 = -\frac{1}{2}(3) + c$ ✓**M** $c = 0 + \frac{3}{2}$ $= \frac{3}{2}$ *or* $1\frac{1}{2}$ ✓ **CA** $y = -\frac{1}{2}x + 1\frac{1}{2}$ ✓ **CA**	Identification of 2 points: 1 Mark Gradient calculation: 1 Mark **OR** **2 marks for the correct gradient** Substitution of gradient and point: 1 Mark Calculation of y-intercept: : 1 Mark Equation: 1 Mark	(5)

64.

Number of layers in stack	Blocks per layer	Total number of blocks.
1	1	1
2	$1+2=3$	4
3	$3+2=5$	9
4	$5+2=7$	16
5	$7+2=9$	25
6	$9+2=11$	36
7	$11+2=13$	49
8	$13+2=15$	64
9	$15+2=17$	81
10	$17+2=19$	100

OR



OR

Number of layers in stack	Total number of blocks used.
1	1
2	$1+3=4$
3	$1+3+5=9$
4	$1+3+5+7=16$
5	$1+3+5+7+9=25$
6	$1+3+5+7+9+11=36$
7	$1+3+5+7+9+11+13=49$
8	$1+3+5+7+9+11+13+15=64$
9	$1+3+5+7+9+11+13+15+17=81$
10	$1+3+5+7+9+11+13+15+17+19=100$

Number of blocks is equal to number of layers multiplied by itself. ✓**M**
Number of blocks $= y$. Number of layers $= x$
$y = x \times x$ ✓**M**
$y = 10 \times 10$ ✓**M**
$y = 100$✓**CA**

Correct number of blocks for 3 stacks: 1 mark

Correct number of blocks for next 3 stacks: 1 mark

Correct number of blocks for next 3 stacks: 1 mark

Answer: 1 mark

Maths sentence: 1 mark
Formula: 1 mark
Substitution: 1 mark
Answer: 1 mark
Full marks for correct answer only.

(4)

No.	Expected answer	Rational/Clarification	Mark
		SECTION B TOTAL	**[15]**
		TOTAL	**[75]**