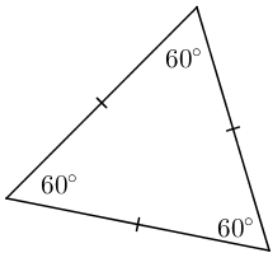
basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

GEC PILOT STUDY
MARKING GUIDELINE 2023
MATHEMATICS PAPER 2
GRADE 9

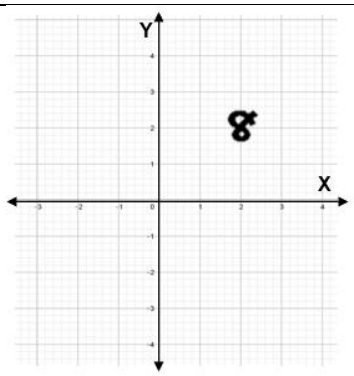
SECTION A

- *One mark per answer.*
- *There are no half marks.*

No.		Expected answer		Clarification
1.	C	It is vertically opposite to 88°.	✓	
2.	D	90°	✓	Lines are perpendicular.
3.	C	Corresponding angles.	✓	
4.	B	$55°$	✓	
5.	A	$54°$	✓	$3x + 2x = 90°$ …compl $\angle s$ $5x = 90°$ $\frac{5x}{5} = \frac{90°}{5}$ $x = 18°$ $E\hat{O}B = 3x = 3(18°)$ $E\hat{O}B = 54°$
6.	B	$66°$	✓	$68^\circ + \hat{E} + 46^\circ = 180^\circ$ …sum of $\angle s$ of a Δ $\hat{E} = 180^\circ - 68^\circ - 46^\circ$ $\hat{E} = 66^\circ$ $\hat{E} = f$ …alt $\angle s$; EB‖DC $\therefore f = 66°$ **OR** $\hat{B} + \hat{C} = 180^\circ$…co-int $\angle s$; EB‖DC $68^\circ + 46^\circ + f = 180^\circ$ $f = 180^\circ - 114^\circ$ $\therefore f = 66°$
7.	A	$10°$	✓	$20° + 55° + 2a - 15° = 180°$ …co-int ∠s ; MO‖PQ $2a + 60° = 180°$ $2a = 120°$ $a = 60°$

No.		Expected answer		Clarification
				$2b + 2a + 20° + a - 40° = 180°$ …sum of ∠s of a Δ $2b + 2(60°) + 20° + 60° - 40° = 180°$ $2b + 120° + 20° + 60° - 40° = 180°$ $2b = 180° - 160°$ $2b = 20°$ $\frac{2b}{2} = \frac{20°}{2}$ $b = 10°$
8.	A	one right angle and two acute angles.	✓	
9.	A		✓	
10.	A	The diagonals are perpendicular, one diagonal bisects the other and one diagonal bisects the angles at the vertices.	✓	
11.	D	A square is a rectangle.	✓	
12.	B	$95°$	✓	$\hat{A} + \hat{B} + \hat{C} = 180°$ …sum of ∠s of a Δ = $180°$ $\hat{A} + 47° + 38° = 180°$ $\hat{A} = 180° - 47° - 38°$ $= 95°$
13.	A	$162°$	✓	$\hat{N}_1 = \hat{P}_1 = 35°$ …alt ∠s ; MN∥PQ $N\hat{O}Q = \hat{P}_1 + P\hat{N}O$ …ext. ∠ = sum of 2 opp int ∠s $= 35° + 127°$ $\therefore \quad y = 162°$ **OR** $y = M\hat{N}O$ …alt ∠s ; MN∥PQ $y = 35° + 127°$ $y = 162°$
14.	A	4 cm	✓	$\Delta ABC \parallel\parallel \Delta EFG$ …corr. ∠s = $\frac{AB}{EF} = \frac{BC}{FG} = \frac{AC}{EG}$ …corr. sides are proportional $\frac{y}{8} = \frac{6}{12}$

No.		Expected answer		Clarification
				$y = \frac{6 \times 8}{12}$ $\therefore AB = 4$ cm
15.	A	$115°$	✓	$E\hat{C}D = D\hat{E}C = y + 15°$ ...∠s opp = sides $y + 15° + y + 65° = 180°$ …∠s on a straight line $2y + 80° = 180°$ $2y = 100°$ $y = 50°$ $\hat{E}_1 = y + 65°$ $= 50° + 65°$ $= 115°$ **OR** $\hat{B} = \hat{D} = y$ …opp.∠s of a rhombus = $\hat{E}_1 = \hat{C}_1 + \hat{D}$ …ext. ∠ = sum of 2 opp int ∠s $y + 65° = y + 15° + y$ $y = 50°$ $\hat{E}_1 = y + 65°$ $= 50° + 65°$ $= 115°$ **OR** $\hat{B} = \hat{D} = y$ …opp.∠s of a rhombus = $E\hat{C}D = D\hat{E}C = y + 15°$ ...∠s opp = sides $E\hat{C}D + D\hat{E}C + \hat{D} = 180°$… sum of ∠s of Δ $y + 15° + y + 15° + y = 180°$ $3y = 150°$ $y = 50°$ $\hat{E}_1 = y + 65°$ $= 50° + 65°$ $= 115°$
16.	A	80°	✓	$\Delta RMS \equiv \Delta TMS$ …given $\therefore R\hat{M}S = T\hat{M}S$ …Δs congruent $x - 20° = 60°$ $x = 80°$
17.	D	16 cm	✓	In ΔNRQ and ΔNOM: $\hat{Q}_1 = \hat{M}_2$ …corr..∠s; QR ∥ MO $\hat{R}_1 = \hat{O}_1$ … corr..∠s; QR ∥ MO $\hat{N} = \hat{N}$ …common. ∠ or sum ∠s of Δ ΔNRQ|||ΔNOM ∠∠∠ $\frac{NR}{NO} = \frac{RQ}{MO} = \frac{NQ}{NM}$ … corr. sides are proportional $\frac{9}{18} = \frac{8}{MO} = \frac{6}{12}$ $\therefore MO = 16$ cm **OR**

No.		Expected answer		Clarification
				$\widehat{M}_1 = \widehat{O}_1$ …alt.∠s ; $NO \parallel MP$ $\widehat{R}_1 = \widehat{O}_1$ …corr.∠s; $MO \parallel QR$ $\therefore\ \widehat{M}_1 = \hat{R}_1$ $\widehat{P} = \widehat{N}$ …opp. ∠s of a parm $\widehat{M}_2 = \widehat{O}_2$ …alt.∠s ; $NO \parallel MP$ $\widehat{M}_2 = \widehat{Q}_1$ …corr∠s $MO \parallel QR$ $\therefore\ \widehat{O}_2 = \widehat{Q}_1$ $\Delta NRQ \parallel\!| \Delta PMO$ ∠∠∠ $PO = QN + QM = 12$ cm …opp.sides of a parm $NR = RO = 9$ cm …given In ΔPMO and ΔNRQ $\frac{MO}{RQ} = \frac{PM}{NR}$ …corr. sides are proportional $\frac{MO}{8} = \frac{18}{9}$ $MO = 2 \times 8$ $MO = 16$ cm
18.	C		✓	
19.	D	Q and R	✓	
20.	C	Translated 2 units to the left and 4 units up.	✓	
21.	A	$P(-2\ ;\ 7)$	✓	
22.	C	$Q'(1\ ;\ 5)$	✓	
23.	B	$(x; y) \rightarrow (-x\ ;\ y-1)$	✓	
24.	D	$A'(9\ ;\ -5)$ and $B'(2\ ;\ 1)$	✓	
25.	D	ΔKLM	✓	
26.	B	15 cm	✓	$5 \times 3 = 15$ cm
27.	B	$A = lb$	✓	

No.		Expected answer		Clarification
28.	B	the perimeter of a circle.	✓	
29.	D	$A = \pi r^2$	✓	
30.	B	15,88 cm	✓	$A = \pi r^2$ $198 = \pi r^2$ $r^2 = \frac{198}{\pi}$ $r = \sqrt{\frac{198}{\pi}}$ Diameter $= \sqrt{\frac{198}{\pi}} \times 2 =$ 15,88
31.	D	90	✓	$\text{AB} + \text{BC} + (\text{FE} + \text{DC}) + (\text{AF} + \text{ED})$ $= 20 + 25 + 20 + 25$ $= 90$
32.	C	48 cm^2	✓	TS $= (30 \div 10) = 3$ cm QS = 6 cm ... PR bisects QS Area of PQRS $= \frac{1}{2}(\text{PR} \times \text{QS})$ $= \frac{1}{2}(16 \times 6) = 48$ cm^2 $= 48$ cm^2
33.	B	530 cm^2	✓	Radius $= 30 \div 2 = 15$ cm $A = \frac{3}{4}\pi r^2$ $A = \frac{3}{4}\pi(15)^2$ $A =$ 530 cm^2
34.	B	$20x$ cm	✓	$0{,}08x$ m $= 8x$ cm $\frac{8x}{2} = 4x$ and $\frac{6x}{2} = 3x$ …diagonals bisect at right angles $\therefore\ \text{EF}^2 = (3x)^2 + (4x)^2$...Pyth theorem $\text{EF}^2 = 9x^2 + 16x^2$ $\text{EF}^2 = 25x^2$ $\text{EF} = \sqrt{25x^2}$ $\text{EF} = 5x$ Perimeter $= (5x \times 4)$ Perimeter $= 20x$ cm
35.	D	13 times	✓	$r = 5 \div 2 = 2{,}5$ cm Perimeter of wheel $= 2\pi r$ $= 2\pi(2{,}5)$ $= 15{,}71$ cm 2 m = 200 cm Number of times the wheel turns $= 200 \div 15{,}71$ $= 12{,}73074475 \approx 13$ times

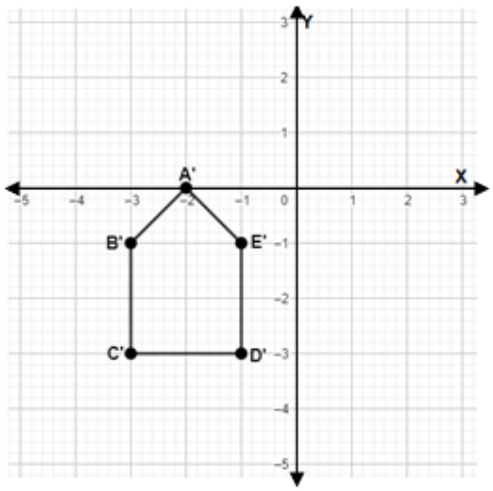
No.		Expected answer		Clarification
36.	C	40 mm	✓	$V = s^3$ $64 = s^3$ $s = 4$ cm $= 40$ mm
37.	D	248 cm^2	✓	$SA = 2[(6 \times 4) + (10 \times 4) + (10 \times 6)]$ $= 248$ cm^2
38.	A	1120 cm^2	✓	$SA = 2\left(\frac{1}{2} \times 8 \times 15\right) + (25 \times 15) + (17 \times 25) + (25 \times 8)$ $= 120 + 375 + 425 + 200$ $= 1120$ cm^2
39.	B	$\text{SA} = 2\pi r^2 + 2\pi rH$	✓	
40.	C	250 cm^3	✓	0,05 m = 5 cm $V = 5 \times 5 \times 10$ $= 250$ cm^3
41.	B	216 l	✓	400 mm = 40 cm and 600 mm = 60 cm $V = 90 \times 40 \times 60$ $= 216\ 000$ cm^3 $= 216\ l$
42.	B	1,242 m^3	✓	90 cm = 0,9 m H of triangular prism = 1,4 – 0,9 = 0,5 $V = (0{,}9 \times 0{,}9 \times 1{,}2) + \left(\frac{1}{2} \times 0{,}9 \times 0{,}5 \times 1{,}2\right)$ $= 0{,}972 + 0{,}27$ $= 1{,}242$ m^3
43.	A	3,28 m^2	✓	Radius = 25 cm = 0,25 m Diameter = 25 x 2 = 50 cm = 0,5 m $SA = (0{,}5)(2{,}4) + [\pi(0{,}25)^2 + \pi(0{,}25)(2{,}4)]$ $= 1{,}2 + [0{,}20 + 1{,}88]$ $= 3{,}28$ m^2
44.	B	8,98%	✓	$V = \pi(90)^2(197)$ $V = 5\ 013\ 039{,}4$ cm^3 5 013 039,4 cm^3 = 5 013 l Percentage of water in tank: $\frac{450}{5\ 013} \times 100 = 8{,}98\%$
45.	B	150 mm	✓	h^2 of triangle $= \left(\sqrt{4100}\right)^2 - (40)^2$ $= 4100 - 1600$ $= 2500$ $h = 50$ mm Area of base $= \frac{1}{2} \times 80 \times 50$

No.		Expected answer		Clarification
				$= 2000\text{ mm}^2 = 20\text{ cm}^2$ $300\text{ ml} = 300\text{ cm}^3$ $20\text{ cm}^2 \times H = 300\text{ cm}^3$ $H = 15\text{ cm} = 150\text{ mm}$ **OR** h^2 of triangle $= \left(\sqrt{4100}\right)^2 - (40)^2$ $= 4100 - 1600$ $= 2500$ $h = 50\text{ mm} = 5\text{ cm}$ Area of base $= \frac{1}{2} \times 8 \times 5$ $= 20\text{ cm}^2$ $300\text{ ml} = 300\text{ cm}^3$ $(1\text{ ml} = 1\text{ cm}^3)$ $20\text{ cm}^2 \times H = 300\text{ cm}^3$ $H = 15\text{ cm} = 150\text{ mm}$
				Section A total **45**

SECTION B

- <u>Do not penalise the learner for the same mistake twice.</u>
- <u>*There are no half marks.*</u>

MARKING CODES	
M	Method mark
A	Accuracy mark
CA	Consistent Accuracy mark

No.	Expected answer	Clarification	Mark
46.	 ✓✓✓**M**	Translating 5 units to the left: 1 mark Translating 1 unit up: 1 mark Correct quadrant: 1 mark	3
47.	$\hat{O}_1 = x$ …vert opp ∠s ✓**M** $\hat{O}_3 = 3x$ $\hat{O}_5 = x$ $3x + 3x + x + x + x + x = 360°$ …angles around point ✓**M** $10x = 360°$ ✓**M** $\frac{10x}{10} = \frac{360°}{10}$ $x = 36°$ ✓**A** **OR** $\hat{O}_3 = 3x$ …vert opp ∠s ✓**M** $3x + x + x = 180°$ …∠s on a str line AD✓**M** $5x = 180°$ ✓**M** $\frac{5x}{5} = \frac{180°}{5}$ $x = 36°$ ✓**A**	Statement and reason:1 mark Statement and reason:1 mark Simplification:1 mark Answer:1 mark **OR** Statement and reason:1 mark Statement and reason:1 mark Simplification:1 mark Answer:1 mark **Accept any other straight line used.**	4
48.	40 mm = 4 cm ✓**A** $A = \frac{1}{2}bh$ $100 = \frac{1}{2} \times 4 \times h$ ✓**M** $100 = 2h$ $h = 50$ cm ✓**A**	Correct conversion: 1 mark Substitution into the correct formula: 1 mark Answer: 1 mark	3

No.	Expected answer	Clarification	Mark
49.	$\hat{P} + 38° + 75° = 180°$…sum of ∠s of Δ ✓**M** $\hat{P} = 180° - 113°$ $\hat{P} = 67°$ ✓**CA** $\hat{T}_1 + 67° = 180°$…co-int ∠s PQ∥ST ✓**M** $\hat{T}_1 = 180° - 67°$ $\hat{T}_1 = 113°$ ✓✓**CA** **OR** $\hat{R}_1 = 75°$ …vert opp ∠s ✓**M** $\hat{S} = \hat{Q}$ …alt ∠s; PQ∥ST ✓**M** $\hat{S} = 38°$ ✓**A** $\hat{T}_1 = \hat{R}_1 + \hat{S}$ …ext ∠ = sum of 2 opp int ∠s ✓**M** $\hat{T}_1 = 75° + 38°$ $\hat{T}_1 = 113°$ ✓**CA** **OR** $\hat{P} + \hat{Q} + \hat{R}_2 = 180°$ …sum of ∠s of Δ ✓**M** $\hat{P} + 38° + 75° = 180°$ $\hat{P} = 180° - 113°$ $\hat{P} = 67°$ ✓**CA** $\hat{T}_2 = \hat{P}$ …alt ∠s; PQ∥ST ✓**M** $\hat{T}_2 = 67°$ $\hat{T}_1 + \hat{T}_2 = 180°$ …∠s on a str line ✓**M** $\hat{T}_1 + 67° = 180°$ $\hat{T}_1 = 180° - 67°$ $\hat{T}_1 = 113°$ ✓**CA**	Statement and reason: 1 mark Answer: 1 mark Statement and reason: 1 mark Answer: 2 marks Statement and reason: 1 mark Statement and reason: 1 mark Answer: 1 mark Statement and reason: 1 mark Answer: 1 mark **OR** Statement and reason: 1 mark Answer: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark Answer: 1 mark **Accept any other correct responses.**	5

No.	Expected answer	Clarification	Mark
50.	OU = TO = 5 cm …diagonals of a parm bisect each other ✓**M/A** In ΔTON $\mathrm{ON}^2 = \mathrm{TO}^2 - \mathrm{TN}^2$…Pyth theorem ✓**M** $= (5)^2 - (4)^2$ ✓**M** $= 25 - 16$ ✓**M** $= 9\ \mathrm{cm}^2$ $\mathrm{ON} = 3$ cm ✓**CA**	Statement and reason: 1 mark Statement and reason: 1 mark Substitution: 1 mark Simplification: 1 mark Answer: 1 mark	5
51.	Volume of the room $V = l \times b \times h$ $V = 5 \times 3 \times 2$ $V = 30\ \mathrm{m}^3$ ✓**A** Volume of the box $V = l \times b \times h$ $V = 10 \times 6 \times 4$ $V = 240\ \mathrm{cm}^3$ ✓**A** $V = 0{,}00024\ \mathrm{m}^3$ ✓**A** Number of boxes $= \frac{30}{0{,}00024}$ Number of boxes = 125 000 ✓**CA** **OR** Volume of the room $V = l \times b \times h$ $V = 5 \times 3 \times 2$ $V = 30\ \mathrm{m}^3$ ✓**A** $V = 3000000\ \mathrm{cm}^3$ ✓**A** Volume of the box $V = l \times b \times h$ $V = 10 \times 6 \times 4$ $V = 240\ \mathrm{cm}^3$ ✓**A** Number of boxes $= \frac{3000000}{240}$ Number of boxes = 125 000 ✓**CA**	Answer: 1 mark Answer: 1 mark Conversion: 1 mark Answer: 1 mark **OR** Answer: 1 mark Conversion: 1 mark Answer: 1 mark Answer: 1 mark **Accept any other correct responses.**	4

No.	Expected answer	Clarification	Mark
52.	Angle formed by the ray of light to the top of the flag pole and the horizontal line from the light source to the pole, is common. ✓**M**	Identifying the common angle: 1 mark	6
	Angle between the wooden beam and the horizontal line from the light source to the pole = angle formed by the flag pole and the horizontal line from the light source = 90^0. ✓**M**	Identifying the angles = 90^0: 1 mark	
	∴ Angle formed by the ray of light and wooden beam = angle formed by the ray of light and the flag pole. ✓**M**	Concluding 3rd angles =: 1 mark	
	The triangles formed by the light source, wooden beam and flag pole are similar.		
	$\frac{10}{110} = \frac{18}{x}$ ✓**M** $10x = 1980$ $\frac{10x}{10} = \frac{1980}{10}$	Proportion: 1 mark	
	$x = 198$ from the height of the light source ✓**M**	Answer: 1 mark	
	$h = 198 + 2$ $h = 200$ m ✓**A**	Answer: 1 mark	
		Section B total	**30**