



basic education

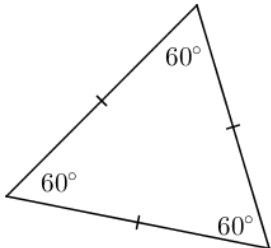
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

GEC PILOT STUDY MARKING GUIDELINE 2023 MATHEMATICS PAPER 2 GRADE 9

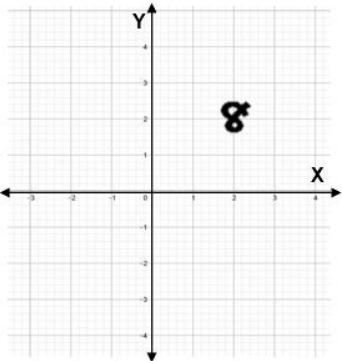
SECTION A

- 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°	✓	$3x + 2x = 90^\circ$...compl $\angle s$ $5x = 90^\circ$ $\frac{5x}{5} = \frac{90^\circ}{5}$ $x = 18^\circ$ $E\hat{O}B = 3x = 3(18^\circ)$ $E\hat{O}B = 54^\circ$
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 $\angle s$; $EB \parallel DC$ $\therefore f = 66^\circ$ OR $\hat{B} + \hat{C} = 180^\circ$...co-int $\angle s$; $EB \parallel DC$ $68^\circ + 46^\circ + f = 180^\circ$ $f = 180^\circ - 114^\circ$ $\therefore f = 66^\circ$
7.	A	10°	✓	$20^\circ + 55^\circ + 2a - 15^\circ = 180^\circ$...co-int $\angle s$; $MO \parallel PQ$ $2a + 60^\circ = 180^\circ$ $2a = 120^\circ$ $a = 60^\circ$

No.		Expected answer		Clarification
				$2b + 2a + 20^\circ + a - 40^\circ = 180^\circ \dots$ sum of \angle s of a Δ $2b + 2(60^\circ) + 20^\circ + 60^\circ - 40^\circ = 180^\circ$ $2b + 120^\circ + 20^\circ + 60^\circ - 40^\circ = 180^\circ$ $2b = 180^\circ - 160^\circ$ $2b = 20^\circ$ $\frac{2b}{2} = \frac{20^\circ}{2}$ $b = 10^\circ$
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°	✓	$\hat{A} + \hat{B} + \hat{C} = 180^\circ \dots$ sum of \angle s of a $\Delta = 180^\circ$ $\hat{A} + 47^\circ + 38^\circ = 180^\circ$ $\hat{A} = 180^\circ - 47^\circ - 38^\circ$ $= 95^\circ$
13.	A	162°	✓	$\hat{N}_1 = \hat{P}_1 = 35^\circ \dots$ alt \angle s ; $MN \parallel PQ$ $\hat{N}\hat{O}Q = \hat{P}_1 + \hat{P}\hat{N}O \dots$ ext. $\angle =$ sum of 2 opp int \angle s $= 35^\circ + 127^\circ$ $\therefore y = 162^\circ$ OR $y = \hat{M}\hat{N}O \dots$ alt \angle s ; $MN \parallel PQ$ $y = 35^\circ + 127^\circ$ $y = 162^\circ$
14.	A	4 cm	✓	$\Delta ABC \parallel \Delta EFG \dots$ corr. \angle s = $\frac{AB}{EF} = \frac{BC}{FG} = \frac{AC}{EG} \dots$ corr. sides are proportional $\frac{y}{8} = \frac{6}{12}$

No.		Expected answer	Clarification
			$y = \frac{6 \times 8}{12}$ $\therefore AB = 4 \text{ cm}$
15.	A	115°	<p>✓</p> $\widehat{E}CD = \widehat{D}EC = y + 15^\circ \dots \angle s \text{ opp} = \text{sides}$ $y + 15^\circ + y + 65^\circ = 180^\circ \dots \angle s \text{ on a straight line}$ $2y + 80^\circ = 180^\circ$ $2y = 100^\circ$ $y = 50^\circ$ $\widehat{E}_1 = y + 65^\circ$ $= 50^\circ + 65^\circ$ $= 115^\circ$ <p>OR</p> $\widehat{B} = \widehat{D} = y \dots \text{opp. } \angle s \text{ of a rhombus} =$ $\widehat{E}_1 = \widehat{C}_1 + \widehat{D} \dots \text{ext. } \angle = \text{sum of 2 opp int } \angle s$ $y + 65^\circ = y + 15^\circ + y$ $y = 50^\circ$ $\widehat{E}_1 = y + 65^\circ$ $= 50^\circ + 65^\circ$ $= 115^\circ$ <p>OR</p> $\widehat{B} = \widehat{D} = y \dots \text{opp. } \angle s \text{ of a rhombus} =$ $\widehat{E}CD = \widehat{D}EC = y + 15^\circ \dots \angle s \text{ opp} = \text{sides}$ $\widehat{E}CD + \widehat{D}EC + \widehat{D} = 180^\circ \dots \text{sum of } \angle s \text{ of } \Delta$ $y + 15^\circ + y + 15^\circ + y = 180^\circ$ $3y = 150^\circ$ $y = 50^\circ$ $\widehat{E}_1 = y + 65^\circ$ $= 50^\circ + 65^\circ$ $= 115^\circ$
16.	A	80°	<p>✓</p> $\Delta RMS \equiv \Delta TMS \dots \text{given}$ $\therefore \widehat{R}MS = \widehat{T}MS \dots \Delta s \text{ congruent}$ $x - 20^\circ = 60^\circ$ $x = 80^\circ$
17.	D	16 cm	<p>✓</p> <p>In ΔNRQ and ΔNOM:</p> $\widehat{Q}_1 = \widehat{M}_2 \dots \text{corr. } \angle s; QR \parallel MO$ $\widehat{R}_1 = \widehat{O}_1 \dots \text{corr. } \angle s; QR \parallel MO$ $\widehat{N} = \widehat{N} \dots \text{common. } \angle \text{ or sum } \angle s \text{ of } \Delta$ $\Delta NRQ \parallel \Delta NOM \quad \angle \angle \angle$ $\frac{NR}{NO} = \frac{RQ}{MO} = \frac{NQ}{NM} \dots \text{corr. sides are proportional}$ $\frac{9}{18} = \frac{8}{MO} = \frac{6}{12} \therefore MO = 16 \text{ cm}$ <p>OR</p>

No.	Expected answer	Clarification
		$\hat{M}_1 = \hat{O}_1 \dots \text{alt. } \angle\text{s} ; NO \parallel MP$ $\hat{R}_1 = \hat{O}_1 \dots \text{corr. } \angle\text{s} ; MO \parallel QR$ $\therefore \hat{M}_1 = \hat{R}_1$ $\hat{P} = \hat{N} \dots \text{opp. } \angle\text{s of a parm}$ $\hat{M}_2 = \hat{O}_2 \dots \text{alt. } \angle\text{s} ; NO \parallel MP$ $\hat{M}_2 = \hat{Q}_1 \dots \text{corr. } \angle\text{s } MO \parallel QR$ $\therefore \hat{O}_2 = \hat{Q}_1$ $\Delta NRQ \parallel \Delta PMO \quad \angle\angle\angle$ $PO = QN + QM = 12 \text{ cm} \dots \text{opp. sides of a parm}$ $NR = RO = 9 \text{ cm} \dots \text{given}$ In ΔPMO and ΔNRQ $\frac{MO}{RQ} = \frac{PM}{NR} \dots \text{corr. sides are proportional}$ $\frac{MO}{8} = \frac{18}{9}$ $MO = 2 \times 8$ $MO = 16 \text{ cm}$
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	✓ $5 \times 3 = 15 \text{ cm}$
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	✓ $AB + BC + (FE + DC) + (AF + ED)$ $= 20 + 25 + 20 + 25$ $= 90$
32.	C	48 cm^2	✓ $TS = (30 \div 10) = 3 \text{ cm}$ $QS = 6 \text{ cm} \dots \text{PR bisects QS}$ Area of PQRS = $\frac{1}{2}(\text{PR} \times \text{QS})$ $= \frac{1}{2}(16 \times 6) = 48 \text{ cm}^2$ $= 48 \text{ cm}^2$
33.	B	530 cm^2	✓ Radius = $30 \div 2 = 15 \text{ cm}$ $A = \frac{3}{4}\pi r^2$ $A = \frac{3}{4}\pi(15)^2$ $A = 530 \text{ cm}^2$
34.	B	$20x \text{ cm}$	✓ $0,08x \text{ m} = 8x \text{ cm}$ $\frac{8x}{2} = 4x$ and $\frac{6x}{2} = 3x \dots \text{diagonals bisect at right angles}$ $\therefore EF^2 = (3x)^2 + (4x)^2 \dots \text{Pyth theorem}$ $EF^2 = 9x^2 + 16x^2$ $EF^2 = 25x^2$ $EF = \sqrt{25x^2}$ $EF = 5x$ Perimeter = $(5x \times 4)$ Perimeter = $20x \text{ cm}$
35.	D	13 times	✓ $r = 5 \div 2 = 2,5 \text{ cm}$ Perimeter of wheel = $2\pi r$ $= 2\pi(2,5)$ $= 15,71 \text{ cm}$ $2 \text{ m} = 200 \text{ cm}$ Number of times the wheel turns $= 200 \div 15,71$ $= 12,73074475 \approx 13 \text{ times}$

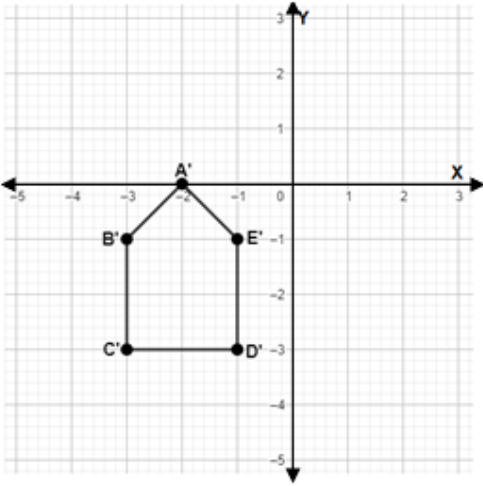
No.		Expected answer	Clarification
36.	C	40 mm	✓ $V = s^3$ $64 = s^3$ $s = 4 \text{ cm} = 40 \text{ mm}$
37.	D	248 cm ²	✓ $SA = 2[(6 \times 4) + (10 \times 4) + (10 \times 6)]$ $= 248 \text{ cm}^2$
38.	A	1120 cm ²	✓ $SA = 2\left(\frac{1}{2} \times 8 \times 15\right) + (25 \times 15) + (17 \times 25)$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

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

SECTION B

- Do not penalise the learner for the same mistake twice.
- There are no half marks.

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

No.	Expected answer	Clarification	Mark
46.	 <p>✓✓✓M</p>	<p>Translating 5 units to the left: 1 mark Translating 1 unit up: 1 mark Correct quadrant: 1 mark</p>	3
47.	<p>$\hat{O}_1 = x$...vert opp \angles ✓M $\hat{O}_3 = 3x$ $\hat{O}_5 = x$ $3x + 3x + x + x + x + x = 360^\circ$...angles around point ✓M $10x = 360^\circ$ ✓M $\frac{10x}{10} = \frac{360^\circ}{10}$ $x = 36^\circ$ ✓A</p> <p>OR</p> <p>$\hat{O}_3 = 3x$...vert opp \angles ✓M $3x + x + x = 180^\circ$...\angles on a str line AD ✓M $5x = 180^\circ$ ✓M $\frac{5x}{5} = \frac{180^\circ}{5}$ $x = 36^\circ$ ✓A</p>	<p>Statement and reason:1 mark</p> <p>Statement and reason:1 mark</p> <p>Simplification:1 mark</p> <p>Answer:1 mark</p> <p>OR</p> <p>Statement and reason:1 mark Statement and reason:1 mark</p> <p>Simplification:1 mark</p> <p>Answer:1 mark Accept any other straight line used.</p>	4
48.	<p>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</p>	<p>Correct conversion: 1 mark</p> <p>Substitution into the correct formula: 1 mark mark Answer: 1 mark</p>	3

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

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

No.	Expected answer	Clarification	Mark
52.	<p>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</p> <p>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°. ✓M</p> <p>∴ Angle formed by the ray of light and wooden beam = angle formed by the ray of light and the flag pole. ✓M</p> <p>The triangles formed by the light source, wooden beam and flag pole are similar.</p> $\frac{10}{110} = \frac{18}{x} \checkmark \mathbf{M}$ $10x = 1980$ $\frac{10x}{10} = \frac{1980}{10}$ $x = 198 \text{ from the height of the light source } \checkmark \mathbf{M}$ $h = 198 + 2$ $h = 200 \text{ m } \checkmark \mathbf{A}$	<p>Identifying the common angle: 1 mark</p> <p>Identifying the angles = 90°: 1 mark</p> <p>Concluding 3rd angles =: 1 mark</p> <p>Proportion: 1 mark</p> <p>Answer: 1 mark</p> <p>Answer: 1 mark</p>	6
Section B total			30