



eduresourcza.com



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**GEC PILOT STUDY
MARKING GUIDELINE 2022
MATHEMATICS: ENGLISH
GRADE 9**

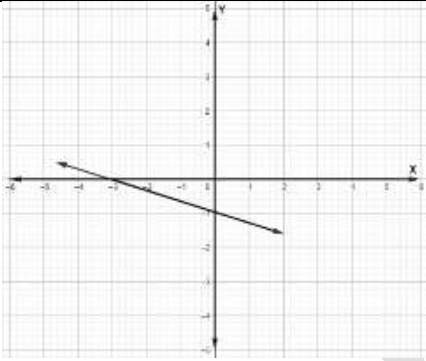
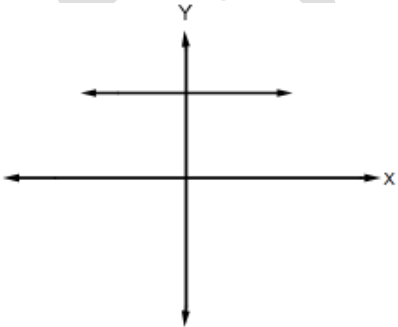
SECTION A

- One mark per answer.
- There are no half marks.
- Tick (✓) only the correct answer and underline the incorrect one.
- No marks should be credited for multiple answers. Underline them all.
- If there is no answer indicated, skip the question

No.	Expected answer	Option
1.	An irrational number	D
2.	$14 = 2 \times 7$ $16 = 2 \times 2 \times 2 \times 2$ $\therefore \text{LCM} = 2 \times 2 \times 2 \times 2 \times 7$ $= 112$	B
3.	$s = \frac{d}{t}$ $s = \frac{180}{2} = 90 \text{ km/h}$ $t = \frac{210}{60} = 3,5 \text{ h}$ $d = s \times t$ $d = 90 \times 3,5 = 315 \text{ km}$	D
4.	$= 3[-(14)] + 4 \times 2$ $= -42 + 8$ $= -34$	D
5.	$= \frac{3(-2(2) \times 3) + 6(2)^2(3)^2}{2 \times 3}$ $= \frac{3(-12) + 216}{6}$ $= \frac{180}{6}$ $= 30$	B

No.	Expected answer	Option																								
6.	$= \frac{-64}{2 \times 2} + \frac{8}{2} - 4$ $= -16 + 4 - 4$ $= -16$	A																								
7.	$= a^{12-3}$ $= a^9$	B																								
8.	$= \frac{1}{5} + \frac{1}{6} = \frac{11}{30} = \frac{11}{30} \times \frac{30}{1} = 11$	D																								
9.	$= 2^3(x^5)^6$ $= 8x^{30}$	D																								
10.	$= 1 - 1 + 5^6 \div 5^6$ $= 1 - 1 + 1 = 1$	A																								
11.	25 <table border="1"><tr><td>Figure</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Dots</td><td>7</td><td>13</td><td>19</td><td>25</td></tr></table>	Figure	1	2	3	4	Dots	7	13	19	25	C														
Figure	1	2	3	4																						
Dots	7	13	19	25																						
12.	$\frac{T_5}{T_4} = \frac{T_4}{T_3} = \frac{T_3}{T_2} = \frac{T_2}{T_1}$ $a = 16 \text{ and } b = \frac{1}{16}$	C																								
13.	<table border="1"><tr><td>Arrangement</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>No of tables</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>No of people</td><td>4</td><td>8</td><td>8</td><td>16</td><td>12</td><td>24</td><td>16</td></tr></table> Sequence 1: Arrangement 1; Arrangement 3 Arrangement 5; ... Sequence 2: Arrangement 2; Arrangement 4; Arrangement 6;... The rule for the 7th arrangement is 4n.	Arrangement	1	2	3	4	5	6	7	No of tables	1	2	3	4	5	6	7	No of people	4	8	8	16	12	24	16	B
Arrangement	1	2	3	4	5	6	7																			
No of tables	1	2	3	4	5	6	7																			
No of people	4	8	8	16	12	24	16																			
14.	10 handshakes	A																								
15.	$-\frac{1}{4}$	C																								
16.	$7xay + 3axy$	D																								
17.	$x^2 + 7xy - 15y^2$	A																								

No.	Expected answer	Option
18.	$= \frac{16x^3 + 8x^2}{-2x^2}$ $= \frac{8x^2(2x + 1)}{-2x^2}$ $= -4(2x + 1)$ $= -8x - 4$	D
19.	$= (1 - 3a)(1 + 3a)$	B
20.	$= 3x(x^2 + 3x - 10)$ $= 3x(x + 5)(x - 2)$	D
21.	$L = (x + 1)$ and $W = (x - 2)$	D
22.	$= \frac{6(x^2 + 3x - 10)}{48x} \times \frac{8x}{x^2 - 4}$ $= \frac{6(x + 5)(x - 2)}{48x} \times \frac{8x}{(x - 2)(x + 2)}$ $= \frac{(x + 5)}{(x + 2)}$	C
23.	$= 15(s^4 - z^4)$ $= 15(s^2 - z^2)(s^2 + z^2)$ $= 15(s - z)(s + z)(s^2 + z^2)$	C
24.	$x - 5 = -7$ $x = -2$	C
25.	$3x + 1 = 10$ $3x = 9$ $x = 3$	D
26.	$x = 0$ or $x = 4$	B
27.	$6^{x-1} = 6^2$ $\therefore x - 1 = 2$ $x = 3$	B
28.	$-6 = 12x - 18$ $12 = 12x$ $x = 1$	B
29.	$y = x^2 + c$ $a = (-1)^2 + 2$ $a = 3$	A
30.	$3x(6x - 8) = 0$ $3x = 0$ or $6x - 8 = 0$ $x = 0$ or $x = \frac{4}{3}$	D
31.	$4x^2 - 4x - 48 = 0 \dots (\div 4)$ $x^2 - x - 12 = 0$ $(x + 3)(x - 4) = 0$ $x = -3$ or $x = 4$	D

No.	Expected answer	Option
32.	$d^2 = l^2 + w^2 \dots \text{Theor. of Pyth.}$ $(w + 9)^2 = (w + 7)^2 + w^2$ $w^2 + 18w + 81 = w^2 + 14w + 49 + w^2$ $w^2 - 4w - 32 = 0$ $(w - 8)(w + 4) = 0$ $w \neq -4 \text{ or } w = 8$ $l = 8 + 7 = 15$ $A = l \times b$ $= 15 \times 8$ $= 120 \text{ cm}^2$	A
33.	$y = -2x - 4$	D
34.	 $y = -\frac{1}{3}x - 1$ $c = -1$ $m = -\frac{1}{3}$	D
35.	Rule: $y = x^2 + 2$ $258 = z^2 + 2$ $z^2 = 256$ $z = 16$	C
36.	 y-values are all equal to 4, which implies that the horizontal line is above the X-axis.	A

No.	Expected answer	Option
37.	$y = mx + c$ $y = mx + 4$ $0 = -3m + 4$ $3m = 4$ $m = \frac{4}{3}$ $\therefore y = \frac{4}{3}x + 4$ $y = \frac{4}{3}(-2) + 4$ $y = \frac{-8}{3} + 4$ $y = \frac{4}{3}$ $\therefore (-2; \frac{4}{3})$ lies on the graph (The learner may test different values to check which points lie on the graph. y -intercept eliminates options B and D)	C
38.	$y = 2x - 8$ (Line AB) $\therefore y = -\frac{1}{2}x + c$ $m \perp AB = -\frac{1}{2}$ $4 = -\frac{1}{2}(-2) + c$ Substitute $(-2; 4)$ $c = 3$ $\therefore y = -\frac{1}{2}x + 3$	D
39.	$A'(-3; -5)$	B
40.	$(x; y) \longrightarrow (-x; y)$	A
41.	Translated 5 units up	A
42.	90°	B
43.	80°	A
44.	Alternate angles $AB \parallel CD$	A
45.	$\widehat{AOC} = \widehat{BOD}$ Vertically Opp. $\angle s =$ $3x - 5^\circ = x + 25^\circ$ $3x - x = 25^\circ + 5^\circ$ $2x = 30^\circ$ $x = 15^\circ$ $\therefore \widehat{AOC} = 3x - 5^\circ$ $= 3(15^\circ) - 5^\circ$ $= 45^\circ - 5^\circ$ $= 40^\circ$	D
46.	$\widehat{BOD} = 90^\circ$ $AD \perp BE$, $x + 5^\circ + 35^\circ = 90^\circ \dots \angle s$ on a str. line $\therefore x = 50^\circ$	D

No.	Expected answer	Option
47.	Two angles opposite equal sides are equal.	D
48.	$\widehat{MGH} = \widehat{GMH} = \widehat{GHM} = 60^\circ$ $\angle s$ of equilat. Δ $\widehat{GHD} + \widehat{GHM} = 180^\circ$ $\angle s$ on a str. line $\widehat{GHD} = 120^\circ$ $\widehat{EGB} = \widehat{GHD}$ Corr. $\angle s$, $AB \parallel CD$ $4y + 20^\circ = 120^\circ$ $4y = 100^\circ$ $\therefore y = \frac{100}{4}$ $= 25^\circ$ OR $\widehat{MGH} = \widehat{GMH} = \widehat{GHM} = 60^\circ$ $\angle s$ of equilat. Δ $\widehat{BGH} = \widehat{GMH} = 60^\circ \dots$ Alt. $\angle s$, $AB \parallel CD$ $4y + 20^\circ + 60^\circ = 180^\circ \dots \angle s$ on a str $4y + 20^\circ = 120^\circ$ $4y = 100^\circ$ $\therefore y = \frac{100}{4}$ $= 25^\circ$ OR $\widehat{AGM} = \widehat{GMH} = 60^\circ$ Alt. $\angle s$, $AB \parallel CD$ $\widehat{AGH} = \widehat{AGM} + \widehat{MGH}^\circ$ $= 60^\circ + 60^\circ$ $= 120^\circ$ $\widehat{AGH} = \widehat{EGB}$ Vert. opp. $\angle s$ $4y + 20^\circ = 120^\circ$ $4y = 100^\circ$ $\therefore y = \frac{100}{4}$ $= 25^\circ$	

No.	Expected answer	Option
49.	In $\triangle EFG$ and $\triangle ABC$ $\frac{EF}{AB} = \frac{FG}{BC} = \frac{EG}{AC}$ $\frac{12 \text{ cm}}{6 \text{ cm}} = \frac{4 \text{ cm}}{2 \text{ cm}} = \frac{8 \text{ cm}}{4 \text{ cm}} = 2$ $\therefore \triangle EFG \parallel \triangle ABC$ Corr. Sides are proportional $\hat{A}\hat{C}B = \hat{E}\hat{G}F = 86^\circ$ $\hat{B}_1 = \hat{F} = 58^\circ$ $\therefore \hat{A} = \hat{E}_2$ corr. $\angle s$ of similar $\triangle =$ $= 36^\circ$ $\hat{E}_1 = \hat{A}$ alter. $\angle s$ $DE \parallel AC$ $= 36^\circ$ OR In $\triangle EFG$ and $\triangle ABC$ $\frac{EF}{AB} = \frac{FG}{BC} = \frac{EG}{AC}$ $\frac{12 \text{ cm}}{6 \text{ cm}} = \frac{4 \text{ cm}}{2 \text{ cm}} = \frac{8 \text{ cm}}{4 \text{ cm}} = 2$ $\therefore \triangle EFG \parallel \triangle ABC$ Corr. Sides are proportional $\hat{B}_1 = \hat{F}$ corr. ... $\angle s$ of similar $\triangle s$ $\hat{B}_1 = 58^\circ$ $\hat{A} + \hat{B}_1 + \hat{C} = 180^\circ$... sum of $\angle s$ of $\triangle$ $\hat{A} + 58^\circ + 86^\circ = 180^\circ$ $\hat{A} = 180^\circ - 144^\circ$ $\hat{A} = 36^\circ$ $\hat{E}_1 = \hat{A}$ alter.... $\angle s = DE \parallel AC$ $\hat{E}_1 = 36^\circ$	A
50.	$\hat{B}_2 = \hat{B}_1 = 42^\circ$ diagonals of rhombus bisect $\angle s$ $\hat{A}\hat{B}\hat{C} = 84^\circ$ $\hat{A}\hat{B}\hat{C} + \hat{B}\hat{C}\hat{D} = 180^\circ$ Co-int $\angle s$ $AB \parallel CD$ $84^\circ + \hat{B}\hat{C}\hat{D} = 180^\circ$ $\hat{B}\hat{C}\hat{D} = 96^\circ$ $\hat{B}\hat{C}\hat{D} = \hat{B}\hat{C}\hat{A} + \hat{A}\hat{C}\hat{D}$ $96^\circ = \hat{B}\hat{C}\hat{A} + \hat{A}\hat{C}\hat{D}$ But $\hat{B}\hat{C}\hat{A} = \hat{A}\hat{C}\hat{D}$ diagonals of rhombus bisect $\angle s$ $\therefore 96^\circ = 2\hat{A}\hat{C}\hat{D}$ $\hat{A}\hat{C}\hat{D} = 48^\circ$	C
51.	$\hat{F}_2 = \hat{B}_1 = 68^\circ$ Alt $\angle s$ $AB \parallel CD$ $\hat{E}_2 + \hat{B}_1 = 180^\circ$ Co-int $\angle s$ $ED \parallel BF$ $\hat{E}_2 + 68^\circ = 180^\circ$ $\hat{E}_2 = 112^\circ$ $\hat{A} + \hat{D}_1 = \hat{E}_2$ Ext $\angle$ of $\triangle$ $\hat{A} + \hat{D}_1 = 112^\circ$ But $\hat{A} = \hat{D}_1$ $\angle s$ opp equal sides $\therefore 2\hat{A} = 112^\circ$ $\hat{A} = 56^\circ$ OR $\hat{B}_1 = \hat{E}_1 = 68^\circ$... Corr. $\angle s$ $ED \parallel BF$ $\hat{A} + \hat{D}_1 + \hat{E}_1 = 180^\circ$ $\angle s$ of $\triangle$ $\hat{A} + \hat{D}_1 + 68^\circ = 180^\circ$ $\hat{A} + \hat{D}_1 = 112^\circ$ But $\hat{A} = \hat{D}_1$... $\angle s$ opp equal sides $\therefore \hat{A} = 56^\circ$	A
52.	$AC^2 = AB^2 + BC^2$... Theor. Of Pyth. $= (15 \text{ cm})^2 + (8 \text{ cm})^2$ $= 225 \text{ cm}^2 + 64 \text{ cm}^2$ $= 289 \text{ cm}^2$ $AC = 17 \text{ cm}$	C

No.	Expected answer	Option
53.	$P = 2(l + b) = 40$ $l + b = 20$ For maximum area: $l = b = 10$ $\therefore A = l^2$ $= 10^2$ $= 100$ Using different combinations other 10 gives smaller area. e.g. $A = 9 \times 11 = 99 \text{ cm}^2$ $A = 8 \times 12 = 96 \text{ cm}^2$	C
54.	For 2 smaller rectangles $AB = (5 \div 10 = \frac{1}{2}) \text{ cm}$ $BC = 4 \text{ cm}$ $\therefore \text{area} = \frac{1}{2} \times 4 = 2 \text{ cm}^2$	B
55.	$A = \pi r^2 = 36\pi$ $\therefore r^2 = 36$ $r = 6$ $C = 2\pi r$ $= 2 \times 6 \times \pi$ $= 12\pi$	A
56.	$C = 2\pi r$ $= 2 \times \pi \times 3$ $= 6\pi$ For 2 out of 3 children: $C = \frac{2}{3} \times 6\pi$ $= 12,57 \text{ cm}$	B
57.	$V = \frac{1}{2} \times b \times h \times l$ $= \left(\frac{1}{2} \times 8 \times 6 \times 14\right) \text{ cm}^3$ $= (4 \times 6 \times 14) \text{ cm}^3$ $= 336 \text{ cm}^3$	A
58.	$SA = 2\pi rh + 2\pi r^2$ $= \left(2 \times \frac{22}{7} \times 7 \times 16 + 2 \times \frac{22}{7} \times 7^2\right) \text{ cm}^2$ $= (2 \times 22 \times 16 + 2 \times 22 \times 7) \text{ cm}^2$ $= (704 + 308) \text{ cm}^2$ $= 1012 \text{ cm}^2$	D

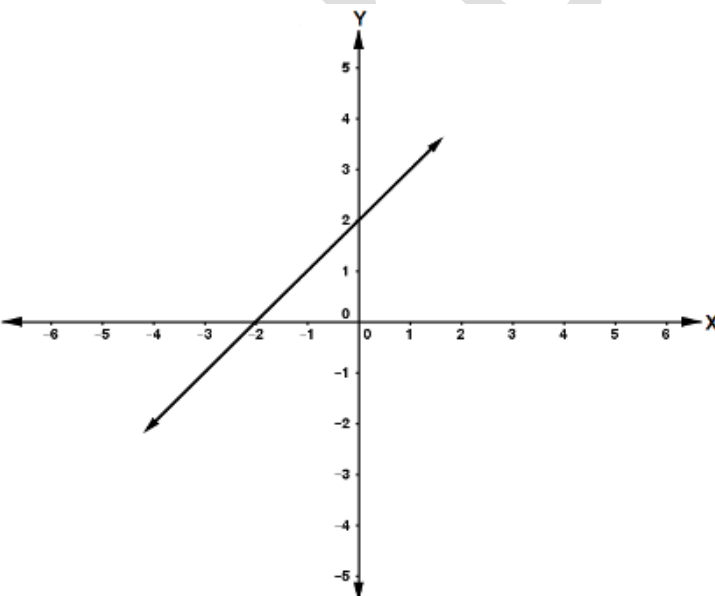
No.	Expected answer	Option
59.	$300 \text{ ml} = 300 \text{ cm}^3$ $V = \pi r^2 h$ $300 \text{ cm}^3 = \frac{22}{7} \times r^2 \times 13 \text{ cm}$ $\frac{300 \text{ cm}^3}{13 \text{ cm}} \times \frac{7}{22} = r^2$ $\frac{1050}{143} \text{ cm}^2 = r^2$ $r = 2,71 \text{ cm}$ $d = 2 \times 2,71 \text{ cm}$ $= 5,42 \text{ cm}$	B
60.	$SA = 2(lb + bh + lh)$ $h = 140 \text{ mm} = 14 \text{ cm}$ $b = 2h$ $b = 2(14) \text{ cm} = 28 \text{ cm}$ $3640 = 2(l(28) + 28(14) + l(14))$ $3640 = 2(28l + 392 + 14l)$ $3640 = 2(42l + 392)$ $3640 = 84l + 784$ $84l = 784$ $l = 34 \text{ cm}$ OR $\frac{3640}{2} = 28l + 392 + 14l$ $1820 - 392 = 42l$ $1428 = 42l$ $\frac{1428}{42} = l$ $34 \text{ cm} = l$	C

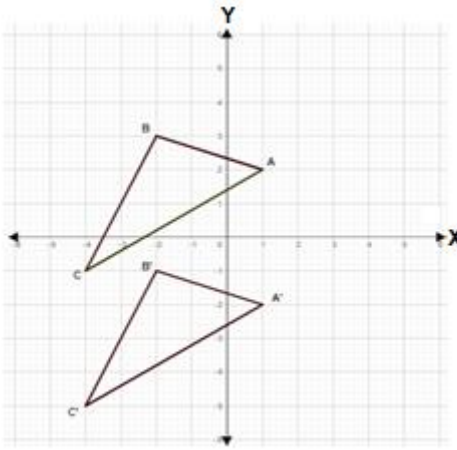
SECTION B

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.
- Credit learners for providing the correct answer without showing calculations.

M	key	a mark for a correct method
A		a mark for accurate calculation
CA		a mark for consistent accuracy

No.	Expected answer	Rationale/Clarification	Mark
61.	$2y = 2x + 4$ $y = x + 2$ ✓A y –intercept if $x = 0$ $y = 0 + 2$ $y = 2$ x –intercept if $y = 0$ $0 = x + 2$ $x = -2$  ✓CA✓CA	1 mark for the standard form 1 mark for plotting both intercepts 1 mark for the shape/gradient Full marks for the correct graph plotted OR 1 mark for plotting x –intercept 1 mark for plotting y –intercept 1 mark for the shape/gradient NB: 1 mark if the learner has plotted incorrect intercepts but the gradient of the graph is positive.	3

No.	Expected answer	Rationale/Clarification	Mark
62.	A (1 ; 2), B (-2 ; 3) and C (-4 ; -1) A' (1 ; -2) B' (-2 ; -1) C' (-4 ; -5)  ✓A✓A✓A	1 mark for correct plotting of A'. 1 mark for correct plotting of B'. 1 mark for correct plotting of C'. Full marks for the correct plotted image	3
63.	$\widehat{MNP} = \widehat{MPN} = 54^\circ$ ✓ M $\angle s$ opp equal sides (MN=MP) $\widehat{M} + 54^\circ + 54^\circ = 180^\circ$ sum of int $\angle s$ of $\triangle$ $\widehat{M} = 72^\circ$ CA $\widehat{M} + \widehat{Q} = 180^\circ$ co-int $\angle s$ (MN RQ) $\therefore \widehat{Q} = 108^\circ$ ✓ CA OR $\widehat{P}_1 = 54^\circ$ $\angle s$ opp equal sides (MN=MP) $\widehat{N}_2 = 54^\circ$ Alt $\angle s$ (NR MQ) $\therefore \widehat{Q} = 108^\circ$ ✓ CA Opp $\angle s$ of gram In $\triangle QPR$ $\therefore \widehat{Q} + \widehat{R}_2 + \widehat{P}_3 = 180^\circ$ sum of int $\angle s$ of $\triangle$ But $\widehat{R}_2 = \widehat{P}_3$ $\angle s$ opp equal sides (PQ=RQ) $108^\circ + 2\widehat{P}_3 = 180^\circ$ $2\widehat{P}_3 = 72^\circ$ $\widehat{P}_3 = 36^\circ$ ✓ CA $\widehat{P}_1 + y + \widehat{P}_3 = 180^\circ$ but $\widehat{P}_1 = 54^\circ$ $\angle s$ opp equal sides (MN=MP) $54^\circ + y + 36^\circ = 180^\circ$ $\angle s$ on a straight line $y = 90^\circ$ ✓ CA OR $\widehat{P}_1 = \widehat{N}_2 = 54^\circ$... alt $\angle s$ (NR MQ) $\widehat{P}_3 = \widehat{R}_1 = 36^\circ$... alt $\angle s$ (NR MQ)	1 mark for statement and reason 1 mark for $\widehat{Q}$ OR 1 mark for $\widehat{Q}$ 1 mark for $\widehat{P}_3$ 1 mark for y 1 mark for $\widehat{N}_2$ 1 mark for $\widehat{R}_1$	

No.	Expected answer	Rationale/Clarification	Mark
	In $\triangle NPR$ $y + \hat{N}_2 + \hat{R}_1 = 180^\circ \quad \dots \text{sum of int } \angle s \text{ of } \triangle$ $y + 54^\circ + 36^\circ = 180^\circ$ $y = 90^\circ \checkmark \text{CA}$	1 mark for y Full marks for answer only.	4

64.	Angle at B + $45^\circ + 45^\circ = 180^\circ$ $\therefore$ Angle at B = $90^\circ \checkmark \text{A}$ $AB^2 = (\text{Home to A})^2 - (\text{Home to B})^2 \dots$ Theorem of Pyth $\checkmark \text{M}$ $= (2 \text{ km})^2 - (1 \text{ km})^2$ $= 4 \text{ km}^2 - 1 \text{ km}^2$ $= 3 \text{ km}^2$ $AB = \sqrt{3 \text{ km}^2}$ $= 1,7 \text{ km}$ Angle at the shop = angle at school given $= 45^\circ$ B to school = B to shop $\dots$ sides opp. equal $\angle s$ $= 3 \text{ km} \checkmark \text{A}$ $(\text{Shop to school})^2 = (\text{B to shop})^2 + (\text{B to school})^2$ $\dots$ Theorem of Pyth $= (3 \text{ km})^2 + (3 \text{ km})^2$ $= 9 \text{ km}^2 + 9 \text{ km}^2$ $= 18 \text{ km}^2$ Shop to school = $\sqrt{18 \text{ km}^2}$ $= 4,2 \text{ km}$ $(\text{School to Home})^2 = (\text{Home to B})^2 + (\text{B to school})^2$ Theorem of Pyth $= (1 \text{ km})^2 + (3 \text{ km})^2$ $= 1 \text{ km}^2 + 9 \text{ km}^2$ $= 10 \text{ km}^2$ School to home = $\sqrt{10 \text{ km}^2}$ $= 3,2 \text{ km} \checkmark \text{CA}$ The total distance = $2 \text{ km} + 1,7 \text{ km} + 3 \text{ km} + 4,2 \text{ km} + 3,2 \text{ km}$ $= 14,1 \text{ km} \checkmark \text{CA}$	1 mark for angle at B 1 mark for statement and reason 1 mark for distance from B to the school 1 mark for distance from school to home 1 mark for the answer Full marks for answer only.	5
-----	--	--	---