Western Mathematics Exams

School Name

Half Yearly Examination

2016

Year 10

Mathematics Course

Solutions

Year 10

WME Solutions Mathematics Half Yearly

Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$(15 - 7) \times 4 = 8 \times 4 = 32$	32
2.	$\frac{19}{20} - \frac{3}{4} = \frac{19}{20} - \frac{15}{20}$ $= \frac{4}{20}$ $= \frac{1}{5}$	$\frac{1}{5}$
3.	$0.64 = \frac{64}{100}$ $= \frac{32}{50}$ $= \frac{16}{25}$	$\frac{16}{25}$
4.	From 4 pm to 11 pm is 7 hours. In 7 hours, the temp falls $7 \times 2 = 14°$ C Temp at 11 pm = $-3 - 14 = -17°$ C.	$-17°$ C.
5.	Discount = 30% of \$120.00 = 0.3×120 = \$36 Price paid = $120 - 36$ = \$84.00	\$84.00
6.	$4 : 15 = x : 600$ $600 \div 15 = 40$ $x : 600 = 40 \times 4 : 40 \times 15$ $x = 40 \times 4 = 160$ There were 160 tourists	160 tourists

7.	$\theta + 48 + 55 = 180$ (angles on a straight line) $\theta = 180 - 103$ $= 77$	$\theta = 77$
8.	$\angle BDC = 70°$ (supplementary angles) $\angle CBD + 70° + 60° = 180°$(angle sum ΔCBD) $\therefore \angle CBD = 50°$ OR $\angle ABD + 40 + 110 = 180$ (angle sum ΔABD) $\angle ABD = 180 - 150$ $\angle ABD = 30$ $\angle ABC + 40 + 60 = 180$ (angle sum ΔABC) $\angle ABC = 180 - 100$ $\angle ABC = 80$ $\angle CBD = \angle ABC - \angle ABD$ $= 80 - 30$ $= 50°$ OTHER POSSIBLE METHODS	$\angle CBD = 50°$
9.	Perimeter $= 2.4 + 1.8 + 1.6 \times 2 + 1.5 \times 2$ $= 2.4 + 1.8 + 3.2 + 3.0$ $= 10.4$ m	10.4 m
10.	Area $= \frac{1}{2} \times$ Base $\times$ Perp Height $= \frac{1}{2} \times 16 \times 9$ $= 72$ cm^2	72 cm^2
11.	Area Trapezium $= \frac{1.4}{2} \times (0.8 + 1.2)$ $= 0.7 \times 2.0$ $= 1.4$ m^2 Volume of Prism $= 1.4 \times 2.0$ $= 2.8$ m^3	2.8 m^3
12.	$2xy + 3x \times 4y = 2xy + 12xy = 14xy$	$14xy$
13.	$\frac{24x^3y^4}{4x^3y} = 6y^3$	$6y^3$
14.	$10x^2 - 3x(2x - 4y) = 10x^2 - 6x^2 + 12xy$ $= 4x^2 + 12xy$	$4x^2 + 12xy$

15.	$MP = \left(\frac{-6-10}{2}, \frac{7-5}{2}\right)$ $= \left(\frac{-16}{2}, \frac{2}{2}\right)$ $= (-8, 1)$	(-8, 1)
16.	$5.5 \times 10^{-7} = 0.00000055$	0.00000055 metres
17.	$7w + 1 = 2w - 16$ $7w = 2w - 17$ $5w = -17$ $w = -\frac{17}{5}$ $w = -3.4$	$w = -3.4 = -3\frac{2}{5}$
18.	Number of Blue balls $= 50 - 12 - 11 - 7 = 20$ Probability (Blue ball) $= \frac{20}{50} = \frac{2}{5} = 0.4 = 40\%$	Any of $\frac{2}{5} = 0.4 = 40\%$
19.	There are 7 scores out of 20 which are less than 20. Percentage $= \frac{7}{20} \times 100$ $= 35\%$	35%
20.	Sum of the scores = 12 + 61 + 122 + 69 + 167 + 107 = 538 Mean $= \frac{538}{20} = 26\frac{18}{20} = 26\frac{9}{10} = 26.9$	$26\frac{9}{10}$ or 26.9

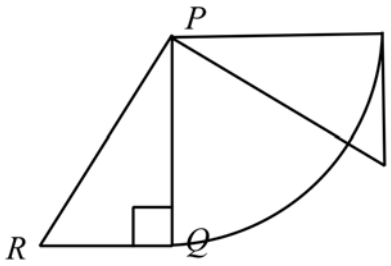
Year 10

WME Solutions Mathematics Half Yearly

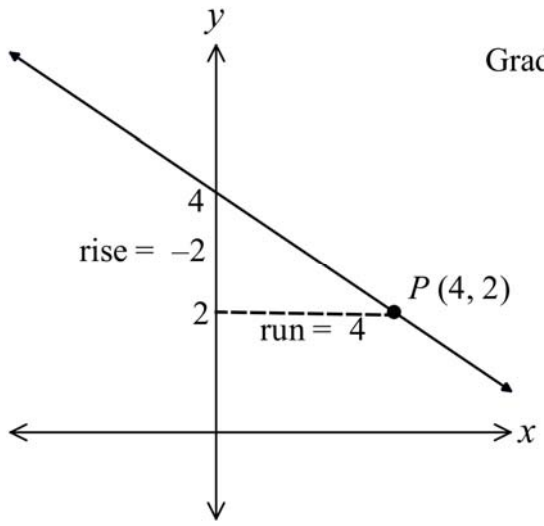
Calculator Allowed

Section 2 **Part A** Multiple Choice Section

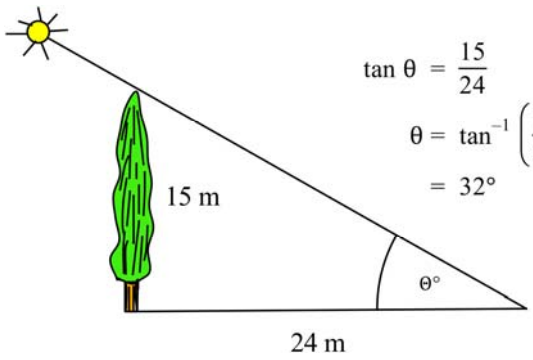
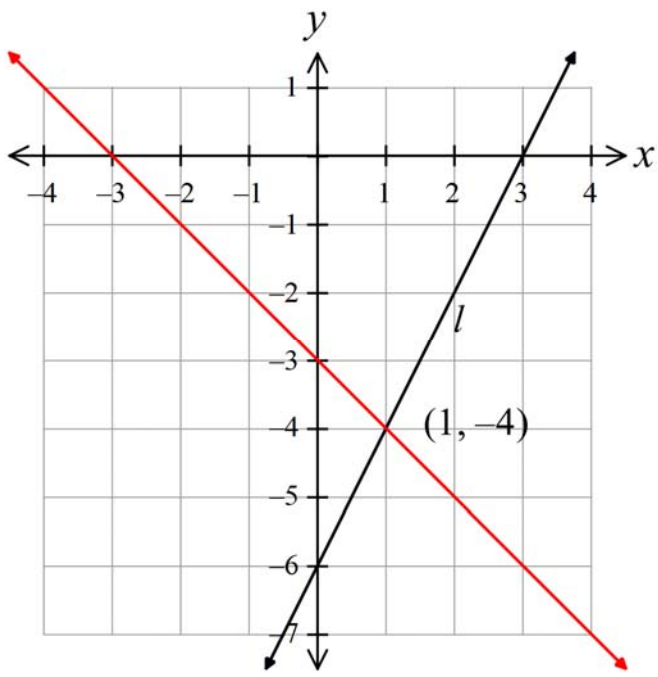
ANSWERS

No.	WORKING	ANSWER
21.	$\frac{2}{5} = 0.4$ and $\frac{5}{8} = 0.625$ so only 0.475 is between these two values.	C
22.	24 faulty out of 250 Percentage faulty $= \frac{24}{250} \times 100 = 9.6\%$	B
23.	$25:35 = \frac{25}{5}:\frac{35}{5} = 5:7$	A
24.	$I = PRN$ $= 1200 \times 0.055 \times 3$ $= \$198.00$	D
25.	$AB \parallel CD$ (Cointerior angles are supplementary) EF is not parallel to GH (Corresponding angles are unequal)	A
26.	$\angle Z + 80 + 120 + 90 = 360$ (angle sum quadrilateral) $\angle Z + 290 = 360$ $\angle Z = 360 - 290$ $\angle Z = 70$	C
27.		D

28.	$\text{Area Trapezium} = \frac{60}{2}(50 + 90)$ $= 4200\ \text{m}^2$ $\text{Area Semicircle} = \frac{1}{2}(\pi \times 30^2)$ $= 1413.7\ \text{m}^2$ $\text{Area of field} = 4200 + 1413.7$ $= 5613.7\ \text{m}^2$ $= 5\,614\ \text{m}^2\ (\text{nearest } m^2)$	B
29.	$\text{Surface Area} = 12^2 + \frac{1}{2} \times 12 \times 18 \times 4$ $= 144 + 432$ $= 576\ \text{cm}^2$	A
30.	$\text{Area of one equilateral triangle} = \frac{1}{2} \times 3 \times 2.6 = 3.9\ m^2$ $\text{Area of Hexagon} = 6 \times 3.9 = 23.4\ m^2$ $\text{Volume of prism} = 23.4 \times 0.4 = 9.36\ m^3 = 9.4\ m^3\ (\text{rounded})$	C
31.	$XZ^2 = 26^2 - 18^2$ $= 676 - 324$ $= 352$ $XZ = \sqrt{352} = 18.7616630$ $= 18.8\ (1\ dp)$	B
32.	$\cos Q = \frac{A}{H} = \frac{9}{15} = 0.6$	A
33.	$K = \frac{m(n-6)}{4}$ $= \frac{3.2 \times (21-6)}{4}$ $= \frac{3.2 \times 15}{4}$ $= 12$	D
34.	$2ab^2 - 4a^2b = 2ab(b-2a)$ so a^2b^2 is not a factor.	D

35.	 Gradient $= \frac{rise}{run}$ $= -\frac{2}{4}$ $= -\frac{1}{2}$	C
36.	Line 1 has an error In expanding $2(x-4)$ he should have got $2x-8$, not $2x-6$.	A
37.	Splendid Snips distribution has more scores toward the lower values, so it is skewed (positively), while Cute cuts is evenly distributed about the centre, so is symmetrical.	D
38.	Both distributions have 22 data points, so the middle scores are the 11th and 12th scores. Median Splendid Snips $= \frac{30+32}{2} = 31$ Median Cute Cuts $= \frac{45+49}{2} = \frac{94}{2} = 47$ Difference = 47 – 31 = 16	C
39.	Total number of people = 4 + 14 + 9 + 24 + 30 + 24 = 105 Number of dwellings = 4 + 7 + 3 + 6 + 6 + 4 = 30 Average $= \frac{105}{30} = 3.5$	B
40.	It was 6° C at around 1:30 am, 6:00 am and at about 6:30 pm.	B
41.	Pay = 48 × 36 + 48 × 4 × 1.5 = \$1728 + \$288 = \$2016	C

42.	Amount Paid $= \$120 + \$45 \times 24$ $= \$120 + \$1080$ $= \$1200$ Interest $= 1200 - 960$ $= \$240.00$	B
43.	$S = \frac{D}{T}$ $T = \frac{D}{S}$ $= \frac{2400}{640}$ $= 3.75$ $=$ 3 hours and 45 min	D
44.	In ΔABC and ΔABD AB is common $\angle ABC = \angle BAD = 90°$ (angles in a rectangle) $BC = AD$ (opposite sides of rectangle) $\Delta ABC \equiv \Delta ABD$ (SAS)	C
45.	$\angle PNM = \angle KPN = 40°$ (alt angles on $\parallel$ lines) $\angle NPM = \angle NMP$ (base $\angle$ isosceles Δ) $2 \times \angle NMP + 40 = 180$ (angle sum Δ) $2 \times \angle NMP = 140$ $\angle NMP = 70$ $\angle P\text{ML} + 70 = 90$ (adjacent angles in rectangle) $\angle P\text{ML} = x = 20$	A
46.	The sum of the exterior angles of a convex polygon $= 360°$ Since the polygon is regular, the exterior angles are all equal. $\therefore 10 \times \angle HFG = 360°$ $\angle HFG = \frac{360°}{10} = 36°$	C
47.	Cylinder: radius $= 4$ cm, height $= 12$ cm Volume $= \pi r^2 h$ $= \pi \times 4^2 \times 12$ $= 603.1858\ \text{cm}^3$ ≈ 600 ml	B
48.	Area $= \frac{1}{2} \times 120 \times 104 \times 2 + 120 \times 200 \times 3$ $= 12\,480 + 72\,000$ $= 84\,480\ \text{cm}^2$ $= 8.4\ \text{m}^2$	D

49.	$\sin 26° = \frac{b}{12.4}$ $b = 12.4 \times \sin 26°$ $= 5.4$ km	A
50.	 $\tan\theta = \frac{15}{24}$ $\theta = \tan^{-1}\left(\frac{15}{24}\right)$ $= 32°$	A
51.	There are 80 books altogether Total Crime and Thriller = $17 + 23 = 40$ Probability (Crime or Thriller) = $\frac{40}{80} = \frac{1}{2}$	C
52.	$12m^2n^3 - 16m^2n = 4m^2n(3n^2 - 4)$.	B
53.	 Find the gradient of l $m = \frac{6}{3} = 2$ Find the y intercept $b = -6$ Equation is $y = mx + b$ $y = 2x - 6$	D

54.	Draw the graph of $y = -x - 3$ y-intercept = -3, so mark -3 on y axis Gradient = -1, so go across 1 and down 1 to obtain a second point, and draw the line as shown on graph above. Point of intersection is (1, -4)	B
55.	$(2x^3y^{-2})^3 = 2^3 \times x^{3\times 3} \times y^{-2\times 3}$ $= 8x^9y^{-6}$ $= \frac{8x^9}{y^6}$	B
56.	Open circle on -3 indicate $<$ and closed on 2 indicates $\leq$ $-3 < x \leq 2$	A
57.	It is bimodal as two scores occurred four times which is more than any other score.	A
58.	Median = average of 9th and 10th scores = $\frac{5+6}{2} = 5.5$ Mean = $\frac{6+3+16+18+28+16}{18} = \frac{87}{18} = 4.8\dot{3}$ Mode = 4 and 7 Range is from 2 to 8, ie 6 Statement D is inaccurate as the most common (mode) is both 4 and 7, not just 7.	D
59.	There are 18 data scores altogether, and 4 of these represent groups of four. Sector size = $\frac{4}{18} \times 360 = 80°$	D

60.	Mean : Since two scores greater than the mean are added, the mean will change. Median: Since the mode is 14 with 3 scores, and the median is 11, the most number of 11's possible is 2. Since there were an even number of scores, the median came from two 11's or two other scores with an average of 11. When two scores greater than 11 are added, the median will move to the right, and hence will change. Mode: Mode is 14 which occurs 3 times, and since the highest score is 9 (minimum) + 6 (range) = 15 there were no 16's previously, so now there are two 16's, so 14 remains the mode. Range : The range was 6, going from 9 to 15, so adding 2 16's makes it 7, so it changes. Only the mode doesn't change.	C

School Name

Year 10 Half Yearly Examination

Mathematics Course 2016

Multiple Choice Section Answer Sheet

Name _____ Teacher _____

Completely fill the response oval representing the most correct answer.
Use a black or blue pen or 2B pencil.

21.	A	○	B	○	C	●	D	○	41.	A	○	B	○	C	●	D	○
22.	A	○	B	●	C	○	D	○	42.	A	○	B	●	C	○	D	○
23.	A	●	B	○	C	○	D	○	43.	A	○	B	○	C	○	D	●
24.	A	○	B	○	C	○	D	●	44.	A	○	B	○	C	●	D	○
25.	A	●	B	○	C	○	D	○	45.	A	●	B	○	C	○	D	○
26.	A	○	B	○	C	●	D	○	46.	A	○	B	○	C	●	D	○
27.	A	○	B	○	C	○	D	●	47.	A	○	B	●	C	○	D	○
28.	A	○	B	●	C	○	D	○	48.	A	○	B	○	C	○	D	●
29.	A	●	B	○	C	○	D	○	49.	A	●	B	○	C	○	D	○
30.	A	○	B	○	C	●	D	○	50.	A	●	B	○	C	○	D	○
31.	A	○	B	●	C	○	D	○	51.	A	○	B	○	C	●	D	○
32.	A	●	B	○	C	○	D	○	52.	A	○	B	●	C	○	D	○
33.	A	○	B	○	C	○	D	●	53.	A	○	B	○	C	○	D	●
34.	A	○	B	○	C	○	D	●	54.	A	○	B	●	C	○	D	○
35.	A	○	B	○	C	●	D	○	55.	A	○	B	●	C	○	D	○
36.	A	●	B	○	C	○	D	○	56.	A	●	B	○	C	○	D	○
37.	A	○	B	○	C	○	D	●	57.	A	●	B	○	C	○	D	○
38.	A	○	B	○	C	●	D	○	58.	A	○	B	○	C	○	D	●
39.	A	○	B	●	C	○	D	○	59.	A	○	B	○	C	○	D	●
40.	A	○	B	●	C	○	D	○	60.	A	○	B	○	C	●	D	○

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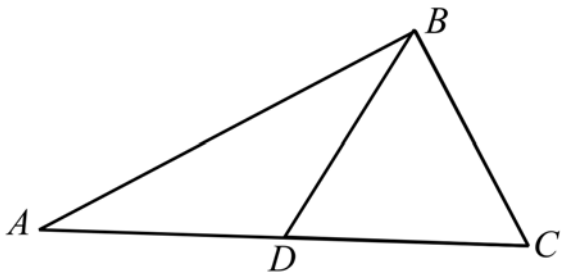
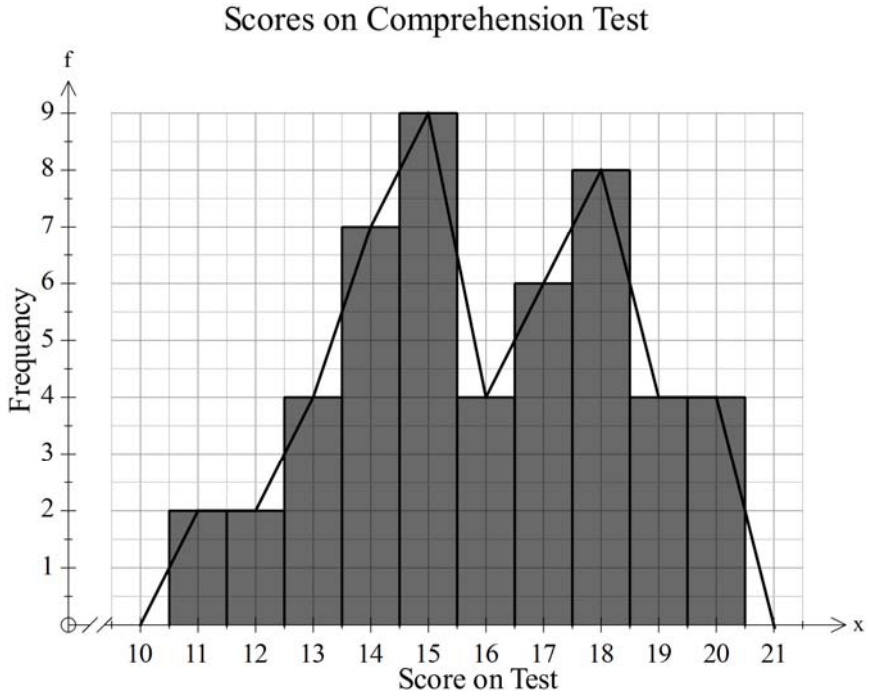
Mathematics Course
2016

Section 2
Part B
Longer Answer Section

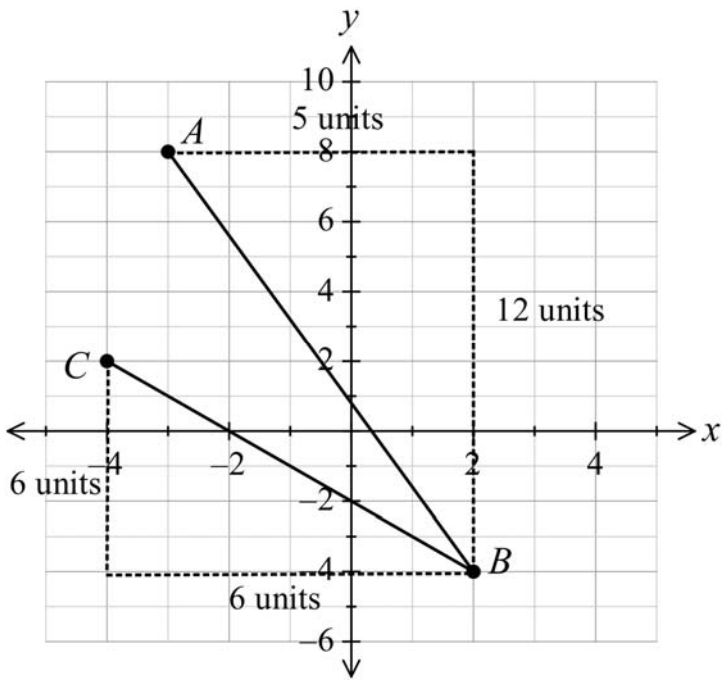
WME Solutions

61.	 $\angle BCD = \angle DBC = \angle BDC = 60°$ (angles in equilateral Δ) $\angle ABC = 90°$ (Given) $\angle ABD = 90 - 60 = 30°$ (adjacent angles forming a right angle) $\angle BAD + 60° + 90° = 180°$ (angle sum right Δ) $\angle BAD = 180° - 150° = 30°$ $\therefore \Delta ABD$ is isosceles (Base angles both equal to 30°)	2 marks for any complete proof or explanation which logically shows that the base angles are equal. 1 mark for any proof or explanation which finds at least two of the relevant angles in the triangles, but is not complete.
62.	a) Area $= \pi \times 0.4^2 + 0.8 \times 2.5$ $= 2.50265482$ $= 2.5\ m^2$ (nearest tenth of a m^2)	1 mark for correct answer.
	b) Volume = Area × height $= 2.50265 \times 1.8$ $= 4.50477868$ Capacity in litres $= 4.50477868 \times 1000$ $= 4505$ litres.	1 mark for correct answer.
63.	a) $\cos 25° = \frac{JN}{200}$ $JN = 200 \cos 25°$ $= 181.3$ m	1 mark for correct answer.

	b) $\tan 25° = \frac{125}{JM}$ $JM \times \tan 25° = 125$ $JM = \frac{125}{\tan 25°}$ $= 268.1$ m *Or* $JM = 125 \times \tan 65°$ $= 268.1$ m $NM = JM - JN$ $= 268.1 - 181.3$ $= 86.8$ m	2 marks for the correct answer, or an answer calculated correctly from part a) 1 mark for an incorrect or incomplete answer which has some correct working
64.	a) 40 people out of 60 would recommend the movie. Probability (recommend) $= \frac{40}{60} = \frac{2}{3}$	1 mark for correct answer
	b) 6 males would not recommend the movie. Probability (makle and not recommend) $= \frac{6}{60} = \frac{1}{10}$	1 mark for correct answer
	c) If person is male Probability (recommend given male) $= \frac{18}{24} = \frac{3}{4}$ If person is female Probability (recommend given female) $= \frac{22}{36} = \frac{11}{18} < \frac{3}{4}$ A male is more likely to recommend the movie.	1 mark for correct explanation
65.	a) $\text{Mean} = \frac{22+24+52+98+135+64+102+144+76+80}{2+2+4+7+9+4+6+8+4+4}$ $= \frac{797}{50}$ $= 15.94$	1 mark for correct answer
	b) Median is the average of the 25th and 26th scores Both of these are 16, so Median = 16.	1 mark for correct answer

	c) 	1 mark for correct line graph added to the diagram.
66.	a) $\frac{2x}{5} + \frac{3x}{10} = \frac{4x}{10} + \frac{3x}{10} = \frac{7x}{10}$	1 mark for correct answer
	b) $\frac{a^2 + 2a}{4a + 8} = \frac{a(a+2)}{4(a+2)}$ $= \frac{a}{4}$	1 mark for correct answer
67.	$\frac{3x}{2} - 5 = 4 - 3(x + 3)$ $\frac{3x}{2} - 5 = 4 - 3x - 9$ $\frac{3x}{2} - 5 = -3x - 5$ $3x - 10 = -6x - 10$ $9x - 10 = -10$ $9x = 0$ $x = 0$	2 marks for correct solution. 1 mark for a solution with a minor error in reasoning or calculation.

68.



a)

$AB^2 = 5^2 + 12^2$
$= 25 + 144$
$= 169$
$AB = \sqrt{169} = 13$ units

OR

$d = \sqrt{(2 - -3)^2 + (-4 - 8)^2}$
$= \sqrt{(5)^2 + (-12)^2}$
$= \sqrt{25 + 144}$
$= \sqrt{169}$
$= 13$ units

1 mark for correct answer

b)

Gradient of $CB = \frac{rise}{run}$
$= -\frac{6}{6}$
$= -1$

OR

Gradient of $CB = \frac{-4-2}{2--4}$
$= -\frac{6}{6}$
$= -1$

Drawing the line, gives a y intercept of -2

OR $y - y_1 = m(x - x_1)$

Equation

$y = mx + b$
$y = -1x - 2$
$y = -x - 2$

$y - 2 = -1(x - -4)$
$y - 2 = -x - 4$
$y = -x - 2$

2 marks for correct equation.

1 mark for a working which has a minor error in reasoning or calculation, or which is incomplete, (e.g., finding the gradient only).