# Education Bureau <br> Territory-wide System Assessment 2015 <br> Secondary 3 Mathematics <br> Marking Scheme 

Note (for Section B and C of each sub-paper):
*Mark for Answer:
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(2) If the work shown is incorrect, the Mark for Answer will not be given.
(3) If the work shown is poorly presented but there is a correct answer, the Mark for Answer may be given.
**Mark for Presentation:
(1) If the work shown is correct but the answer is incorrect, the Mark for Presentation may be given.
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(4) The Mark for Presentation may include overall work such as mathematical expressions, units, written explanations, use of symbols, etc.
r.t. $x x x$ means "accept answers which can be rounded to $x x x$ " .

Steps that may be skipped are shown in shade.

Alternative suggested answers are shown in boxes.

Section A - Sub-paper 1 (9ME1) (1 mark each)

1. A (9ME2-1)
2. B (9ME4-2)
3. D
4. C
5. B
6. A
7. D
8. A (9ME3-8)
9. C
10. D (9ME2-10)
11. D
12. B
13. A (9ME4-13)
14. D (9ME3-14)
15. C
16. C
17. B (9ME4-17)
18. С (9МЕЗ-18)
19. A
20. B (9ME2-20)

Section B - Sub-paper 1 (9ME1)

| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 21. <br> (9ME2-21) | (i) $\underline{+68 / \underline{68}}$ <br> (ii) -95 | 1 | Must be all correct |
| 22. |  | 1 | (Acceptable range: $\left.-4<-\frac{7}{2}<-3\right)$ |
| 23. | $S=\underline{1830}$ | 1 |  |
| 24. | $n^{2}$ | 1 |  |
| 25. | $-3 a^{2}+a^{4} / a^{4}-3 a^{2}$ | 1 |  |
| 26. <br> (9ME4-26) | $(x+y)(k+1) /(k+1)(x+y)$ | 1 |  |
| 27. <br> (9ME3-27) | $(x-1)(x+6) /(x+6)(x-1)$ | 1 |  |
| 28. (9ME3-28) | $x=7$ | 1 |  |
| 29. (9ME2-29) | $\frac{2 x}{3 y}$ | 1 |  |
| 30. <br> (9ME2-30) | $-\frac{5}{3} \quad \square \quad-\frac{5}{4}$ | 1 |  |
| 31. | The total surface area of the cuboid is $386 \mathrm{~cm}^{2}$. | 1 |  |
| 32. |  | 1 | The figure has 5 axes of symmetry |
| 33. <br> (9ME4-33) | (a) $x=55$ <br> (b) $y=6$ | 1 | Unit may not be considered |


| Question Number | Suggested Answers |  |  |  |  |  |  | Marks | Notes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 34. | $x=108$ |  |  |  |  |  |  | 1 | Unit may not be considered |
| 35. (9ME3-35) | $\angle B E D / \angle D E B$ |  |  |  |  |  |  | 1 |  |
| $36 .$ <br> (9ME4-37) | B, C |  |  |  |  |  |  | 1 | Must be all correct |
| 37. (9ME2-37) | The polar coordinates of point $\boldsymbol{D}$ are ( $\left.\underline{2}, \underline{120^{\circ}}\right)$. |  |  |  |  |  |  | 1 | Must be all correct and in order |
| 38. | $\theta=78.5^{\circ}$ |  |  |  |  |  |  | 1 | r.t. $78.5^{\circ}$ <br> Unit may not be considered |
| 39. | (i) Discrete data <br> (ii) Continuous data |  |  |  |  |  |  | 1 | Must be all correct |
| 40. | (a) <br> (b) $\quad 15$ <br> online prob <br> (c) The time ta | A <br> 11-15 <br> 3 <br> studen <br> blem. <br> aken by | B <br> 16-20 <br> 12 <br> ts took <br> Jacky | C <br> 21-25 <br> 23 <br> less th <br> should | D <br> $26-30$ <br> 21 <br> an 20.5 <br> belong t | $E$ <br> $31-35$ <br> 15 <br> 5 s to s <br> to group | $F$ <br> $36-40$ <br> 6 <br> olve the <br> B . | $\begin{aligned} & 1(40 a) \\ & 1(40 b) \\ & 1(40 c) \end{aligned}$ | Must be all correct |
| 41. | The required em | npiric | proba | ility = | $\underline{\frac{41}{100}}$ |  |  | 1 | Or 0.41 |

Section C - Sub-paper 1 (9ME1)

| Question <br> Number | Suggested Answers <br> (9ME4-42) | Cost price $=\$ 330 \div 55 \%$ <br> $=\$ 600$ | Marks |
| :--- | :--- | :---: | :--- | Notes


| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 46. <br> (9ME4-46) | The area of the sector $\begin{aligned} & =\pi\left(6^{2}\right)\left(\frac{50^{\circ}}{360^{\circ}}\right) \\ & \approx 15.70796327 \\ & =15.7 \mathrm{~cm}^{2}\left(\text { corr. to the nearest } 0.1 \mathrm{~cm}^{2}\right) \end{aligned}$ | $\begin{gathered} 1(46-1) \\ 1^{*}(46-2) \\ 1^{* *}(46-3) \end{gathered}$ | r.t. $15.7 \mathrm{~cm}^{2}$ |
| 47. | The curved surface area of the cone $\begin{aligned} & =\pi \times 20 \times 29 \\ & =580 \pi \mathrm{~cm}^{2} \end{aligned}$ | $\begin{gathered} 1(47-1) \\ 1^{*}(47-2) \\ 1^{* *}(47-3) \end{gathered}$ |  |
| 48. <br> (9ME3-48) | (Students must find the approximation for the weight of each machine) <br> The maximum number of machines to be carried $\begin{aligned} & =\frac{1800}{58.8} \\ & \approx \frac{1800}{60} \\ & =30 \end{aligned}$ <br> $\therefore$ The lorry can carry at most 30 machines each time. | $0 \quad 0 \quad$ No evidence of using estimation strategies nor giving reasonable justification | - Exact calculation <br> - The estimate is given only after exact <br> - Use rounding down to estimate |
|  |  | $1 \quad 0 \quad$ Partial evidence of using estimation strategies, but the solution is incomplete or contains errors | - Give an approximation of the weight of the machine correctly <br> - Approximate the weight correctly, but the required maximum number of machines is omitted or wrongly estimated <br> - Correct method used, but minor errors occurred |
|  |  | 1 1 Estimate <br> with reasonable  <br> justification   | - No need to consider unit/presentation <br> - The conclusion must be correct and aligned with a reasonable explanation |
|  |  |  | - For reference only: $\frac{1800}{58.8} \approx 30.61$ |


| Question <br> Number | Suggested Answers |  | Marks | Notes |
| :---: | :---: | :---: | :---: | :---: |
| 49. | The area of the pentagon $A B C D E$$\begin{aligned} & =4 \times 6+\frac{4 \times 2}{2} \\ & =28 \text { sq. units } \end{aligned}$ |  | $\begin{gathered} 1(49-1) \\ 1^{*}(49-2) \\ 1^{* *}(49-3) \end{gathered}$ |  |
| 50. | Table 1 |  | 1* (50-1) | Must be all correct |
|  | Waiting time (min) | Frequency |  |  |
|  | 0-9 | 5 |  |  |
|  | 10-19 | 8 |  |  |
|  | 20-29 | 7 |  |  |
|  | Table |  |  |  |
|  | Waiting time (min) | Frequency |  |  |
|  | 0-5 | 5 |  |  |
|  | 6-11 | 3 | 1* (50-2) | Must be all correct |
|  | 12-17 | 4 |  |  |
|  | 18-23 | 5 |  |  |
|  | 24-29 | 3 |  |  |

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r.t. $x x x$ means "accept answers which can be rounded to $x x x$ " .

Steps that may be skipped are shown in shade.

Alternative suggested answers are shown in boxes.

Section A - Sub-paper 2 (9ME2) (1 mark each)

1. A (9MEl-1)
2. $\mathrm{C}^{\text {(9ME3-2) }}$
3. A
4. B (9ME4-4)
5. C
6. C (9ME4-6)
7. D
8. D
9. D
10. D (9ME1-10)
11. C
12. B (9ME3-12)
13. B
14. A (9ME3-13)
15. D
16. C
17. B
18. A
19. A
20. B (9ME1-20)

Section B - Sub-paper 2 (9ME2)


| Question <br> Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 34. (9ME4-34) | $x=\underline{22.5}{ }^{\circ}$ | 1 | Unit may not be considered |
| 35. | GHIJ or its correct permutation | 1 |  |
| 36. | $x=6$ | 1 |  |
| 37. (9ME1-37) | The polar coordinates of point $\boldsymbol{D}$ are ( $\left.2, \underline{120^{\circ}}\right)$. | 1 | Must be all correct and in order |
| 38. | The slope of $L=\frac{2}{5}$ | 1 |  |
| 39. (9ME3-39) | $(1) \rightarrow(4) \rightarrow(3) \rightarrow(2)$ | 1 |  |
| 40. | $\begin{aligned} & \text { Median }=\frac{80}{78} \text { marks } \\ & \text { Mean }=\$ 2 \end{aligned}$ | $\begin{aligned} & 1(40-1) \\ & 1(40-2) \end{aligned}$ |  |
| 41. (9ME3-41) | The modal class of the travelling distances is $\underline{381} \mathrm{~km}-\underline{400} \mathrm{~km} .$ | 1 | Must be all correct |

Section C - Sub-paper 2 (9ME2)

| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 42. | Let the amount of money borrowed by Vivian be $\$ P$. $\begin{aligned} & P \times 5 \% \times 3=789 \\ & P=5260 \end{aligned}$ <br> $\therefore$ The amount of money Vivian borrows is $\$ 5260$. | $\begin{gathered} 1(42-1) \\ 1^{*}(42-2) \\ 1^{* *}(42-3) \end{gathered}$ |  |
| 43. | $\begin{aligned} & \frac{12}{x}=\frac{1}{63+1} \\ & x=768 \end{aligned}$ | $\begin{gathered} 1(43-1) \\ 1^{*}(43-2) \\ 1^{* *}(43-3) \end{gathered}$ | $\begin{aligned} & \text { Accept } \frac{12}{x}=\frac{1}{64} / \frac{12}{x-12}=\frac{1}{63} / \\ & \frac{x-12}{x}=\frac{63}{64} / \\ & x=12 \times 64 / x=12 \times 63+12 \end{aligned}$ |
| 44. <br> (9ME1-44) | $\left\{\begin{array}{l} 5 x+2 y=31  \tag{1}\\ 3 x+2 y=25 \end{array}\right.$ $\begin{align*} & (1)-(2):  \tag{2}\\ & 2 x=6 \\ & x=3 \end{align*}$ <br> Substitute $x=3$ into (2) $\begin{aligned} & 3(3)+2 y=25 \\ & y=8 \end{aligned}$ | $\begin{gathered} 1(44-1) \\ 1^{*}(44-2) \\ 1(44-3) \\ 1^{*}(44-4) \end{gathered}$ | Correct method (eliminate one of the variables) Correct value of $x$ (or $y$ ) <br> Correct method <br> Both values are correct |
| 45. <br> (9ME4-45) | $A D=C D$ (given) <br> $\angle A D B=\angle C D B$ (given) <br> $B D=B D$ (common side) <br> $\therefore \triangle A B D \cong \triangle C B D$ (SAS) |  | Or other correct proofs |
|  | Marking Scheme: |  |  |
|  | (1) Any correct proof with correct reasons | 3 |  |
|  | (2) Any correct proof with poor presentation or without reasons | 2 |  |
|  | (3) Incomplete proof with any one correct | 1 |  |
|  | (4) Incomplete proof | 0 |  |
|  |  |  |  |


| Question <br> Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 46. | $\begin{aligned} & \text { The length of } \overparen{A B} \\ = & 2 \pi(5)\left(\frac{140^{\circ}}{360^{\circ}}\right) \\ \approx & 12.21730476 \\ = & 12.2 \mathrm{~cm} \text { (corr. to } 3 \text { sig. fig.) } \end{aligned}$ | $\begin{gathered} 1(46-1) \\ \\ 1^{*}(46-2) \\ 1^{* *}(46-3) \end{gathered}$ | r.t. 12.2 cm |
| 47. | The volume of the sphere $\begin{aligned} & =\frac{4}{3} \pi\left(3^{3}\right) \\ & =36 \pi \mathrm{~cm}^{3} \end{aligned}$ | $\begin{gathered} 1(47-1) \\ 1^{*}(47-2) \\ 1^{* *}(47-3) \end{gathered}$ |  |
| 48. <br> (9ME4-48) | The length of 2 computer rooms is approximately equal to the length of 3 classrooms. <br> The length of each classroom $\begin{aligned} & \approx 12 \times 2 \div 3 \\ & =8 \mathrm{~m} \end{aligned}$ <br> The length of the corridor $\begin{aligned} & \approx(8 \times 7) \mathrm{m} \\ & =56 \mathrm{~m} \end{aligned}$ <br> ( Acceptable range: 54 m to 63 m ) | $0 \quad 0 \quad$ No evidence of using estimation strategies nor giving reasonable justification | - Answer only, without any working steps or written explanation <br> - The explanation is irrelevant or unreasonable |
|  |  | 10 Partial evidence of using estimation strategies, but the solution is incomplete or contains errors | - Using reasonable estimation strategies, but the solution is incomplete, for instance: - estimate the length of a classroom only <br> - state the length of the corridor is approximately equal to the length of 4.5 computer rooms only <br> - The explanation is reasonable, but the answer is outside the acceptable range <br> - The explanation is reasonable, but minor errors occurred |
|  |  | 11 Estimate with reasonable justification | The answer must be supported by reasonable explanation and within the acceptable range |


| Question Number | Suggested Answers |  | Marks | Notes |
| :---: | :---: | :---: | :---: | :---: |
| 49. <br> (9ME3-49) | The marks of 15 students in a dictation |  | 1 (49-1) | Correct data on the stem and leaf in any one of the rows (no need to consider ordering) |
|  | Stem (10 marks) | Leaf (1 mark) |  |  |
|  | 1 | 125 |  |  |
|  | 2 | $4 \quad 4 \quad 9$ |  |  |
|  | 3 | 78 | 1 (49-2) | Correct data on the stem and leaf in all rows ( no need to consider ordering) |
|  | 4 | 258 |  |  |
|  | 5 | 00 |  |  |
|  |  |  | 1*(49-3) | Correct stem-and-leaf diagram (include: the correct ordering of the data on the stem and leaf, the length of the leaf is proportional to the frequency of the corresponding row of data, and without commas between the data) |
| 50. <br> (9ME4-50) | Mean weight |  | 1 (50-1) |  |
|  | $=\frac{18 \times 8+23 \times 32+28 \times 14+33 \times 6}{60}$ |  |  |  |
|  |  |  |  |  |
|  | $=\frac{144+736+392+198}{60}$ |  |  |  |
|  |  |  |  |  |
|  | $=24.5 \mathrm{~kg}$ |  |  | $\begin{gathered} 1^{*}(50-2) \\ 1^{* *}(50-3) \end{gathered}$ |  |
|  |  |  |  |  |  |

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r.t. $x x x$ means "accept answers which can be rounded to $x x x$ " .

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Section A - Sub-paper 3 (9ME3) (1 mark each)

1. C (9ME4-1)
2. C (9ME2-2)
3. B
4. B
5. D (9ME4-5)
6. A
7. C
8. A (9ME1-8)
9. C
10. A
11. A (9ME4-11)
12. B (9ME2-12)
13. A (9ME2-14)
14. D (9ME1-14)
15. D
16. D (9ME4-16)
17. B
18. C (9ME1-18)
19. B
20. D

Section B - Sub-paper 3 (9ME3)

| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 21. | $\begin{aligned} & A=-2 \\ & B=-8 \\ & C=6 /+6 \end{aligned}$ | 1 | Must be all correct |
| 22. | The number of students is 105 . | 1 |  |
| 23. (9ME4-23) | $\begin{aligned} & x=10 \\ & y=25 \\ & \hline \end{aligned}$ | 1 | Must be all correct |
| 24. (9ME4-24) | $\begin{aligned} & -2 x^{2}+9 x / 9 x-2 x^{2} / x(-2 x+9) \\ & x(9-2 x) \end{aligned}$ | 1 |  |
| 25. (9ME2-25) | $4 x^{2}+x^{2} y-x y$ | 1 |  |
| 26. | 4.09 | 1 |  |
| 27. (9ME1-27) | $(x-1)(x+6) /(x+6)(x-1)$ | 1 |  |
| 28. (9ME1-28) | $x=7$ | 1 |  |
| 29. (9ME4-28) | $4-4 x+x^{2} / x^{2}-4 x+4$ | 1 |  |
| 30. (9ME2-28) | $P=4(N-1) \quad / \quad P=4 N-4$ | 1 |  |
| 31. (9ME2-31) | $x>-3$ | 1 |  |
| 32. | P, S | 1 | Must be all correct |
| 33. | (a) $x=70$ <br> (b) $y=80$ | 1 | Must be all correct Unit may not be considered |
| 34. | $\begin{aligned} & a=46 \\ & b=40 \end{aligned}$ | $\begin{aligned} & 1(34-1) \\ & 1(34-2) \end{aligned}$ | Unit may not be considered |
| 35. (9ME1-35) | $\angle B E D / \angle D E B$ | 1 |  |
| 36. | $O A=\underline{3.6} \mathrm{~km}$ | 1 |  |
| 37. | The coordinates of point $\boldsymbol{P}$ are ( $\underline{-1}, \underline{3}$ ). | 1 | Must be all correct |
| 38. | $x=\underline{23.6}$ | 1 | r.t. 23.6 |
| 39. (9ME2-39) | (1) $\rightarrow$ (4) $\rightarrow$ (3) $\rightarrow$ (2) | 1 |  |
| 40. (9ME4-40) | 6 students have a body temperature of $37.5^{\circ} \mathrm{C}$ or above. | 1 |  |
| 41. (9ME2-41) | The modal class of the travelling distances is $381 \mathrm{~km}-400 \mathrm{~km} .$ | 1 | Must be all correct |

Section C - Sub-paper 3 (9ME3)

| Question <br> Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 42. | $\begin{aligned} \text { Selling price } & =\$ 840 \times 80 \% \\ & =\$ 672 \end{aligned}$ | $\begin{gathered} 1(42-1) \\ 1^{*}(42-2) \\ 1^{* *}(42-3) \end{gathered}$ |  |
| 43. <br> (9ME4-43) | The present value of the smartphone $\begin{aligned} & =4400 \times(1-35 \%)^{2} \\ & =\$ 1859 \end{aligned}$ <br> OR $\begin{array}{\|l\|} \hline 4400 \times 0.65=2860 \\ \hline 2860 \times 0.65=1859 \\ \hline \end{array}$ <br> The present value of the smartphone is $\$ 1859$. | $\begin{gathered} 1(43-1) \\ 1^{*}(43-2) \\ 1^{* *}(43-3) \\ 1(43-1 \\ 1^{*}(43-2) \\ 1^{* *}(43-3) \end{gathered}$ | Correct method (multiply 0.65 two times) |
| 44. | $x$ -2 1 2 <br> $y$ 4 1 0 | $\begin{aligned} & 1 *(44-1) \\ & 1(44-2) \\ & \\ & 1 *(44-3) \end{aligned}$ | Must be all correct <br> In case the data in the above table is incorrect, students can still use the ordered pairs to draw a straight line. The line must pass through $(1,1)$ and the range of $x$ must include the values from -2 to 2 . <br> Correct straight line (include: correct position, use ruler to draw the line, pass through the 3 points and extend two ends of the line) <br> If the data in the table is correct but not complete and the graph is correct, $(0,1,1)$ can be given. |


| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 45. <br> (9ME1-45) | $\begin{array}{ll} \angle B C F+113^{\circ}=180^{\circ} & \text { (adj. } \angle \mathrm{s} \text { on a st. line) } \\ \angle B C F=67^{\circ} & \\ \angle A B E=67^{\circ} & \text { (given) } \\ \therefore \angle B C F=\angle A B E=67^{\circ} & \\ \therefore B E / / C F & \text { (corr. } \angle \text { s equal) } \\ \hline \end{array}$ |  |  |
|  | $\begin{array}{ll} \hline \angle E B C+67^{\circ}=180^{\circ} & \text { (adj. } \angle \mathrm{s} \text { on a st. line) } \\ \angle E B C=113^{\circ} & \\ \angle F C D=113^{\circ} & \text { (given) } \\ \therefore \angle E B C=\angle F C D=113^{\circ} & \\ \therefore B E / / C F & \text { (corr. } \angle \text { s equal) } \end{array}$ |  | Or other correct proofs |
|  | Marking Scheme: |  |  |
|  | (1) Any correct proof with correct reasons | 3 |  |
|  | (2) Any correct proof with poor presentation or without reasons | 2 |  |
|  | (3) Incomplete proof with any one correct statement and one corresponding reason | 1 |  |
|  | (4) Incomplete proof | 0 |  |
| 46. | (a) $2 \pi r=34 \pi$ $r=17$ <br> (b) The area of the circle $\begin{aligned} & =\pi(17)^{2} \\ & =289 \pi \mathrm{~cm}^{2} \end{aligned}$ | 1 (46-1) |  |
|  |  | 1* (46-2) |  |
|  |  |  |  |
|  |  | 1 (46-3) | Correct method |
|  |  | 1* (46-4) |  |
|  |  | 1** (46-5) |  |
| 47. | $\because \triangle B C D$ is an equilateral triangle,$\begin{aligned} & \angle B C D=60^{\circ} \\ & 74^{\circ}+60^{\circ}+x=180^{\circ} \\ & x=180^{\circ}-74^{\circ}-60^{\circ} \\ & x=46^{\circ} \end{aligned}$ |  |  |
|  |  |  |  |
|  |  | 1 (47-1) |  |
|  |  |  |  |
|  |  | 1* (47-2) |  |
|  |  | 1** (47-3) |  |

9ME3

| Question Number | Suggeste | Answers | Marks | Notes |
| :---: | :---: | :---: | :---: | :---: |
| 48. <br> (9ME1-48) | (Students must find the approximation for the weight of each machine) <br> The maximum number of machines to be carried $\begin{aligned} & =\frac{1800}{58.8} \\ & \approx \frac{1800}{60} \\ & =30 \end{aligned}$ <br> $\therefore$ The lorry can carry at most 30 machines each time. |  | $\begin{aligned} & \hline 0 \quad 0 \quad \text { No } \\ & \text { evidence of using } \\ & \text { estimation } \\ & \text { strategies nor } \\ & \text { giving reasonable } \\ & \text { justification } \end{aligned}$ | - Exact calculation <br> - The estimate is given only after exact <br> - Use rounding down to estimate |
|  |  |  | 100 Partial evidence of using estimation strategies, but the solution incomplete or contains errors | - Give an approximation of the weight of the machine correctly <br> - Approximate the weight correctly, but the required maximum number of machines is omitted or wrongly estimated <br> - Correct method used, but minor errors occurred |
|  |  |  | 11 Estimate with reasonable justification | - No need to consider unit/presentation <br> - The conclusion must be correct and aligned with a reasonable explanation |
|  |  |  |  | - For reference only: $\frac{1800}{58.8} \approx 30.61$ |
| 49. <br> (9ME2-49) | The marks of 15 students in a dictation |  | $1(49-1)$$1(49-2)$$1 *(49-3)$ | Correct data on the stem and leaf in any one of the rows (no need to consider ordering) <br> Correct data on the stem and leaf in all rows (no need to consider ordering) <br> Correct stem-and-leaf diagram (include: the correct ordering of the data on the stem and leaf, the length of the leaf is proportional to the frequency of the corresponding row of data, and without commas between the data) |
|  | Stem (10 marks) | Leaf (1 mark) |  |  |
|  | 1 | $\begin{array}{lllll}1 & 2 & 5 & 8\end{array}$ |  |  |
|  | 2 | $4 \quad 4 \quad 9$ |  |  |
|  | 3 | 78 |  |  |
|  | 4 | $\begin{array}{lllll}2 & 5 & 8 & 8\end{array}$ |  |  |
|  | 5 | 00 |  |  |
|  |  |  |  |  |



# Education Bureau <br> Territory-wide System Assessment 2015 <br> Secondary 3 Mathematics <br> Marking Scheme 

Note (for Section B and C of each sub-paper):
*Mark for Answer:
(1) The Mark for Answer may be given when there is a correct answer without any work shown.
(2) If the work shown is incorrect, the Mark for Answer will not be given.
(3) If the work shown is poorly presented but there is a correct answer, the Mark for Answer may be given.
**Mark for Presentation:
(1) If the work shown is correct but the answer is incorrect, the Mark for Presentation may be given.
(2) If the work shown is incorrect, the Mark for Presentation will not be given.
(3) If the numerical value of the answer is correct but not the approximate value as required by the question, the Mark for Presentation will not be given.
(4) The Mark for Presentation may include overall work such as mathematical expressions, units, written explanations, use of symbols, etc.
r.t. $x x x$ means "accept answers which can be rounded to $x x x$ " .

Steps that may be skipped are shown in shade.

Alternative suggested answers are shown in boxes.

Section A - Sub-paper 4 (9ME4) (1 mark each)

1. C (9ME3-1)
2. B (9ME1-2)
3. D
4. B (9ME2-4)
5. D (9ME3-5)
6. C (9ME2-6)
7. D
8. C
9. A
10. C
11. A (9ME3-11)
12. A
13. A (9ME1-13)
14. A
15. B
16. D (9ME3-16)
17. B (9MEl-17)
18. C
19. B
20. D

$$
\text { Section B - Sub-paper } 4 \text { (9ME4) }
$$

| Question Number | Suggested Answers |  |  |  |  |  |  |  |  | Marks | Notes |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 21. | (a) -15 <br> (b) 2 |  |  |  |  |  |  |  |  | 1 | Must be all correct |
| 22. | No. of red balls : no. of yellow balls : no. of green balls $=\underline{10}: \underline{13}: \underline{17}$ |  |  |  |  |  |  |  |  | 1 |  |
| 23. <br> (9ME3-23) | $\begin{aligned} & x=-10 \\ & y=25 \end{aligned}$ |  |  |  |  |  |  |  |  | 1 | Must be all correct |
| 24. (9ME3-24) | $-2 x^{2}+9 x / 9 x-2 x^{2} / x(-2 x+9) / x(9-2 x)$ |  |  |  |  |  |  |  |  | 1 |  |
| 25. | $3 x^{2}+2 x-1$ |  |  |  |  |  |  |  |  | 1 |  |
| 26. <br> (9ME1-26) | $(x+y)(k+1) /(k+1)(x+y)$ |  |  |  |  |  |  |  |  | 1 |  |
| 27. <br> (9ME2-27) |  |  |  |  |  |  |  |  |  | 1 | Correct straight correct position and the range of $x$ includes the values from - 2 to 2 ) |
| 28. <br> (9ME3-29) | $4-4 x+x^{2} / x^{2}-4 x+4$ |  |  |  |  |  |  |  |  | 1 |  |
| 29. | 8 |  |  |  |  |  |  |  |  | 1 |  |
| 30. | $P=4(N-1) \quad / \quad P=4 N-4$ |  |  |  |  |  |  |  |  | 1 |  |
| 31. | $x>-4$ |  |  |  |  |  |  |  |  | 1 |  |


| Question <br> Number |  | Marks | Notes |
| :--- | :--- | :--- | :--- |
| 32. |  |  |  |

Section C - Sub-paper 4 (9ME4)

| Question <br> Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 42. <br> (9ME1-42) | $\begin{aligned} \text { Cost price } & =\$ 330 \div 55 \% \\ & =\$ 600 \end{aligned}$ | $\begin{gathered} 1(42-1) \\ 1 *(42-2) \\ 1^{* *}(42-3) \end{gathered}$ |  |
| 43. <br> (9ME3-43) | The present value of the smartphone $\begin{aligned} & =4400 \times(1-35 \%)^{2} \\ & =\$ 1859 \end{aligned}$ <br> OR $\begin{array}{\|l\|} \hline 4400 \times 0.65=2860 \\ \hline 2860 \times 0.65=1859 \\ \hline \end{array}$ <br> The present value of the smartphone is $\$ 1859$. | $\begin{gathered} 1(43-1) \\ 1^{*}(43-2) \\ 1^{* *}(43-3) \\ 1(43-1) \\ 1^{*}(43-2) \\ 1^{* *}(43-3) \end{gathered}$ | Correct method (multiply 0.65 two times) |
| 44. |  | $1^{*}(44-1)$ <br> 1 (44-2) $1 *(44-3)$ | Using $\frac{y^{n}}{y^{m}}=\frac{1}{y^{m-n}}$ or $\frac{y^{n}}{y^{m}}=y^{n-m}$ <br> Correct answer (getting marks 1 1) |
|  | $A D=E D$ (given) <br> $\angle A D B=\angle E D B$ (given) <br> $B D=B D$ (common side) <br> $\therefore \triangle A B D \cong \triangle E B D$ (SAS) |  | Or other correct proofs |
|  | Marking Scheme: |  |  |
|  | (1) Any correct proof with correct reasons | 3 |  |
|  | (2) Any correct proof with poor presentation or without reasons | 2 |  |
|  | (3) Incomplete proof with any one correct statement and one corresponding reason | 1 |  |
|  | (4) Incomplete proof | 0 |  |
|  |  |  |  |


| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 46. <br> (9ME1-46) | The area of the sector $\begin{aligned} & =\pi\left(6^{2}\right)\left(\frac{50^{\circ}}{360^{\circ}}\right) \\ & \approx 15.70796327 \\ & =15.7 \mathrm{~cm}^{2}\left(\text { corr. to the nearest } 0.1 \mathrm{~cm}^{2}\right) \end{aligned}$ | $\begin{gathered} 1(46-1) \\ \\ 1^{*}(46-2) \\ 1^{* *}(46-3) \end{gathered}$ | r.t. $15.7 \mathrm{~cm}^{2}$ |
| 47. | The volume of the cylinder $\begin{aligned} & =\left(\frac{8}{2}\right)^{2} \pi \times 9 \\ & =144 \pi \mathrm{~cm}^{3} \end{aligned}$ | $\begin{gathered} 1(47-1) \\ 1^{*}(47-2) \\ 1^{* *}(47-3) \end{gathered}$ |  |
| 48. <br> (9ME2-48) | The length of 2 computer rooms is approximately equal to the length of 3 classrooms. <br> The length of each classroom $\begin{aligned} & \approx 12 \times 2 \div 3 \\ & =8 \mathrm{~m} \end{aligned}$ <br> The length of the corridor $\begin{aligned} & \approx(8 \times 7) \mathrm{m} \\ & =56 \mathrm{~m} \\ & (\text { Acceptable range: } 54 \mathrm{~m} \text { to } 63 \mathrm{~m}) \end{aligned}$ | $\begin{array}{\|l\|l\|} \hline 0 & 0 \quad \text { No } \\ \text { evidence of using } \\ \text { estimation } \\ \text { strategies nor } \\ \text { giving reasonable } \\ \text { justification } \\ \hline \end{array}$ | - Answer only, without any working steps or written explanation <br> - The explanation is irrelevant or unreasonable |
|  |  | 10 Partial evidence of using estimation strategies, but the solution is incomplete or contains errors | - Using reasonable estimation strategies, but the solution is incomplete, for instance: - estimate the length of a classroom only <br> - state the length of the corridor is approximately equal to the length of 4.5 computer rooms only <br> - The explanation is reasonable, but the answer is outside the acceptable range <br> - The explanation is reasonable, but minor errors occurred |
|  |  | 11 Estimate with reasonable justification | The answer must be supported by reasonable explanation and within the acceptable range |


| Question Number | Suggested Answers | Marks | Notes |
| :---: | :---: | :---: | :---: |
| 49. | $\begin{aligned} & \cos \theta=\frac{B C}{A C} \\ & \cos \theta=\frac{12}{22} \\ & \theta \approx 56.94426885^{\circ} \\ & \left.\theta=56.9^{\circ} \text { (Cor. to } 3 \text { sig. fig. }\right) \end{aligned}$ | $1(49-1)$ $\begin{gathered} 1^{*}(49-2) \\ 1^{* *}(49-3) \end{gathered}$ | r.t. $56.9^{\circ}$ |
| 50. <br> (9ME2-50) | $\begin{aligned} \text { Mean weight } & =\frac{18 \times 8+23 \times 32+28 \times 14+33 \times 6}{60} \\ & =\frac{144+736+392+198}{60} \\ & =24.5 \mathrm{~kg} \end{aligned}$ | $1(50-1)$ $\begin{aligned} & 1 *(50-2) \\ & 1^{* *}(50-3) \end{aligned}$ |  |

