higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS
(Second Paper)
NQF LEVEL 2

(10501042)

6 November 2018 (X-Paper)
09:00–12:00

Candidates need a nonprogrammable scientific calculator and a protractor.

This question paper consists of 7 pages, a formula sheet of 2 pages and 2 addenda.

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, et cetera which you have used to determine the answers.
5. Answers should be rounded off to THREE decimal places, unless stated otherwise.
6. Diagrams are not drawn to scale.
7. Write neatly and legibly.

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QUESTION 1

1.1 Write down THREE measures of central tendency. (3)

1.2 A group of 30 men took part in the Comrades Marathon. The table below shows the age of each member of the group.

23 53 48 36 14 30 19 55 54 28 29 52 22 34 23 19 46 48 19 33 59 38 19 43 27 57 32 19 26 18

1.2.1 Draw a stem and leaf diagram. (5)

1.2.2 Calculate the median mass of the men. (2)

1.2.3 Calculate the mean of the data. (3)

1.2.4 Write down the modal value of the data. (1)

1.3 The environmental team collected bottles for recycling for 20 days. The numbers of bottles collected each day are as follows:

41 69 80 83 53 70 81 84 52 75 79 90 60 76 78 91 61 75 82 97

1.3.1 Calculate the range of the number of bottles collected.

1.3.2 Determine the lower quartile of the given data.

1.3.3 Determine the upper quartile of the data.

1.3.4 Calculate the interquartile range for the given data.

1.3.5 Determine the semi-interquartile range of the data.

(5 × 2) (10)

1.4 The following are the recorded day temperatures of towns in South Africa:

34 23 37 28 12 27 22 31 6 38 25 12 12 37 22 39 17 16 2 11 25 22 31 8 17 17 23 10 33 30 19 11 20 10 14 14 18 26 11 3

1.4.1 Complete the following distribution table (tally chart) on ADDENDUM A (attached).

TEMPERATURE INTERVAL	TALLY	FREQUENCY
0 °C – 9 °C	llll	4
10 °C – 19 °C		
20 °C – 29 °C		
30 °C – 39 °C		

(6)

1.4.2 Write down the modal class. (1)

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1.4.3 Draw a bar graph on ADDENDUM A (attached), using the information above. (4)

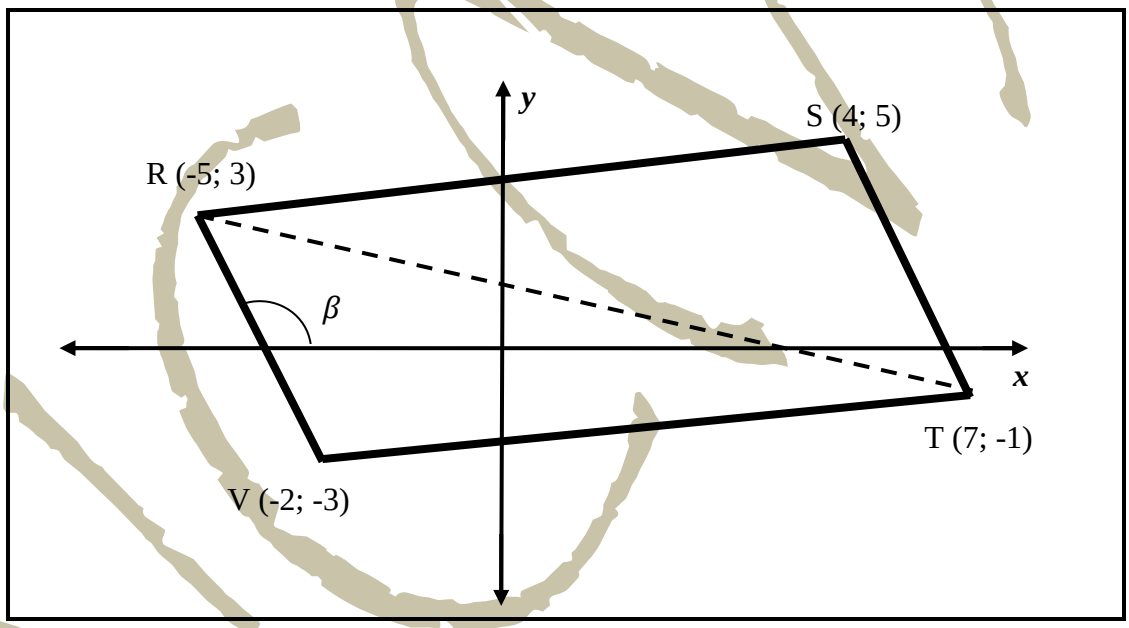
1.4.4 Calculate the midpoints of the temperature intervals, and draw a frequency polygon.

Use the graph on ADDENDUM A (attached) to draw a frequency polygon. Draw the frequency polygon right on the bar graph in QUESTION 1.4.3. (5)

[40]

QUESTION 2

2.1 R(-5;3) , S(4;5), T(7;-1) and V(-2;-3) are the coordinates of the quadrilaterals RSTV.



2.1.1 Determine the coordinates of M, the midpoint of RT. (2)

2.1.2 Calculate the length of line RV. (2)

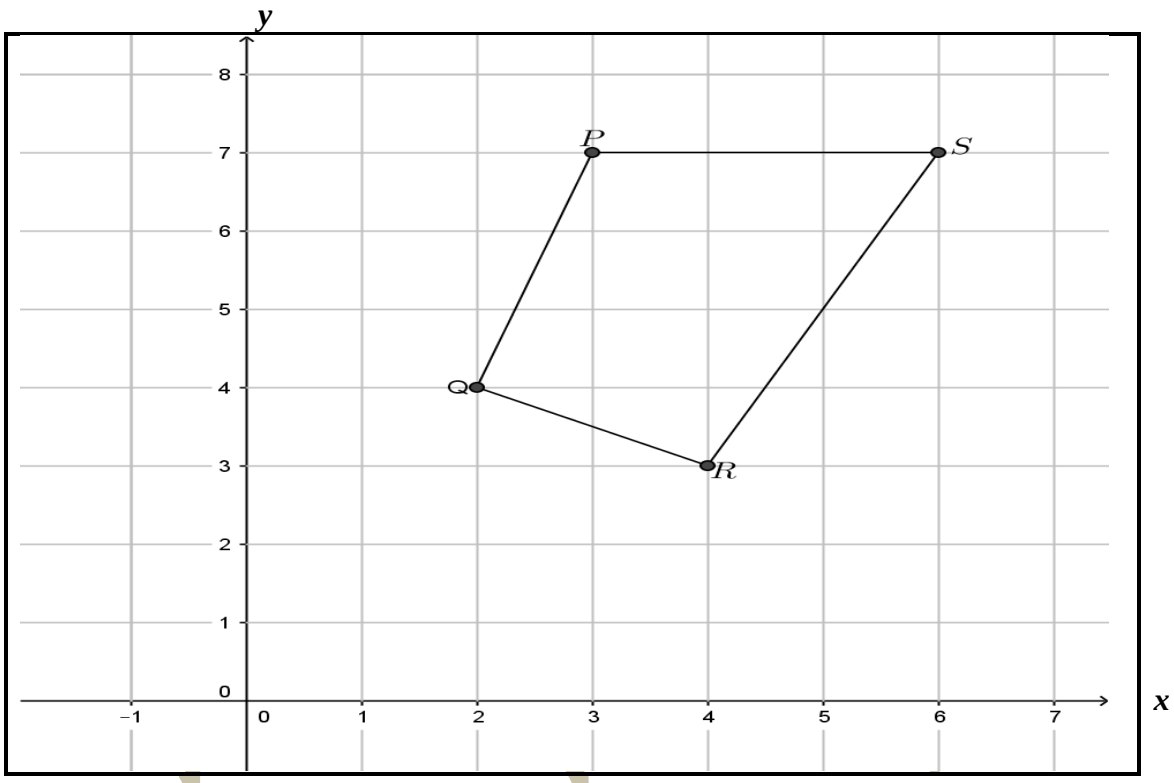
2.1.3 Calculate the gradients of ST and RV. Why are these two lines parallel? (5)

2.1.4 Prove $\overline{RV} = \overline{ST}$ (3)

2.1.5 What type of quadrilateral is RSTV? Give a reason for your answer. (2)

2.1.6 If $\beta = \tan^{-1}(m_{RV})$, find the size of β (2)

2.2 The diagram below shows four points on a cartesian plane.



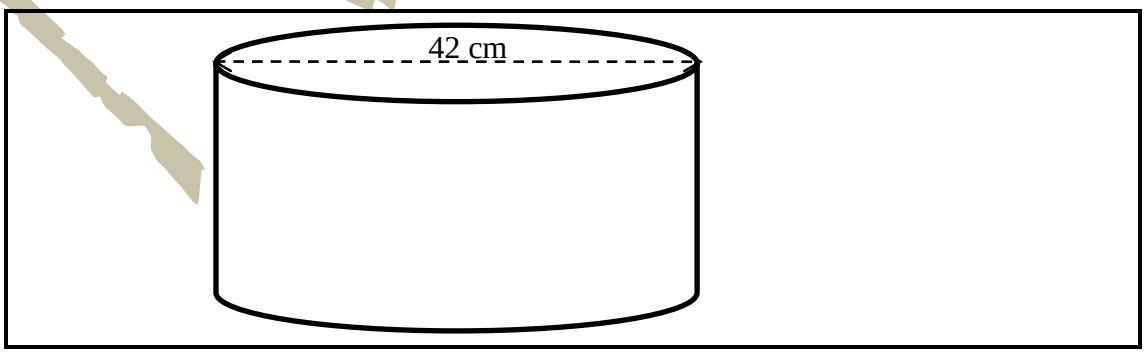
2.2.1 Write down the coordinates of *R*. (1)

2.2.2 *PQRS* is translated 2 units to the left and 1 unit downwards.
Write down the coordinates of R', the image of *R*. (2)

2.2.3 What would the coordinates of *Q* be if it reflected about the *x-axis*? (2)

2.2.4 Write down the coordinates of P', the image of *P* if it is reflected about the *y-axis*. (2)

2.3 The total surface area of a closed cylinder is 8 184 cm^2. The diameter of the cylinder is 42 cm.



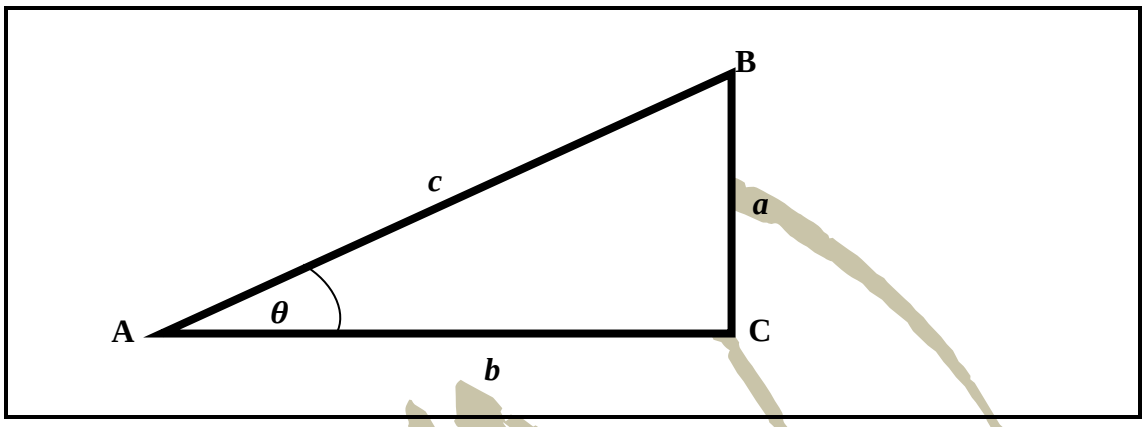
2.3.1 Calculate the height of the cylinder. Convert your answer to millimetres. (4)

2.3.2 Calculate the volume of the cylinder. Give your answer in m^3 (3)

[30]

QUESTION 3

3.1 Given ΔABC with $\angle A = \theta$ and $\angle C = 90°$.



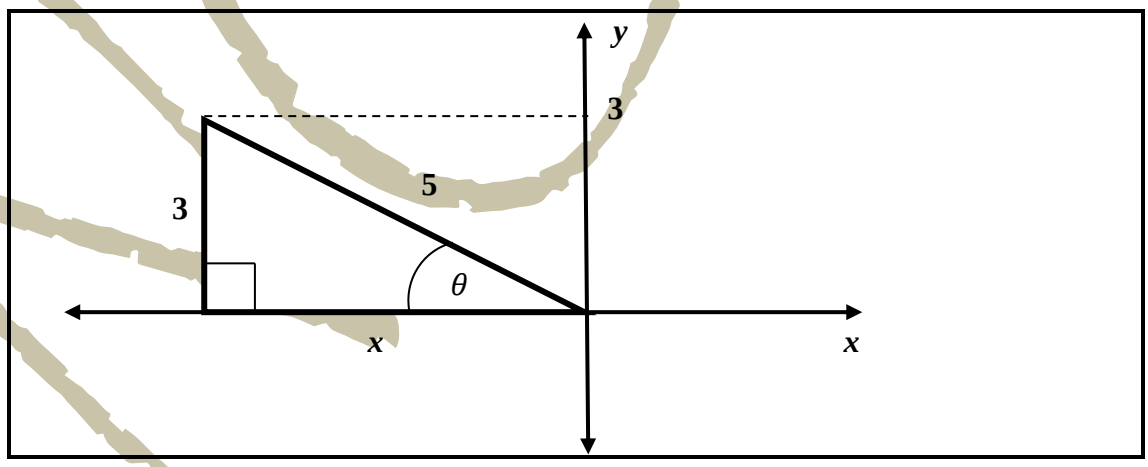
3.1.1 Write $\cos\theta$ in terms of *a*, *b* and *c*. (1)

3.1.2 Determine the size of $\angle B$ in terms of θ. (1)

3.1.3 Write sin (90° - θ) in terms of *a*, *b* and c. (2)

3.1.4 If it is given that *a* = 6 units and θ = 50°, calculate the numerical value of *b*. (3)

3.2 Given that $5\sin\theta - 3 = 0$ and $90° \le \theta \le 180°$:

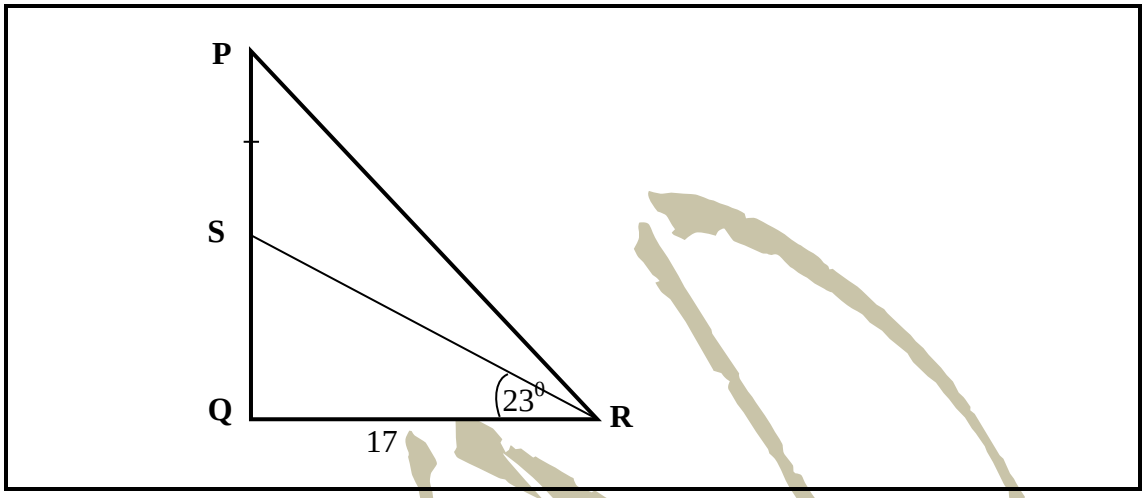


3.2.1 Determine the value of *x*.

3.2.2 Determine the value of $\tan^2\theta \times \cos\theta$.

(2 × 3) (6)

3.3 In the sketch below, ΔPQR is drawn having a right angle at Q and QR = 17 units. S is the midpoint of PQ and $S\hat{R}Q = 23^0$.



3.3.1 Calculate the value SQ.

3.3.2 Calculate $P\hat{R}Q$.

3.3.3 Determine the value of PR.

(3 × 3) (9)

3.4 Given the graphs of $f(x) = 2\sin x$ *and* $g(x) = \cos x + 1$, *for* $x \in [0°; 360°]$.

3.4.1 Using ADDENDUM B (attached), sketch the two graphs on the same system of axes. (6)

3.4.2 Write down the period of f. (1)

3.4.3 Write down the range of g. (1)

[30]

TOTAL: 100

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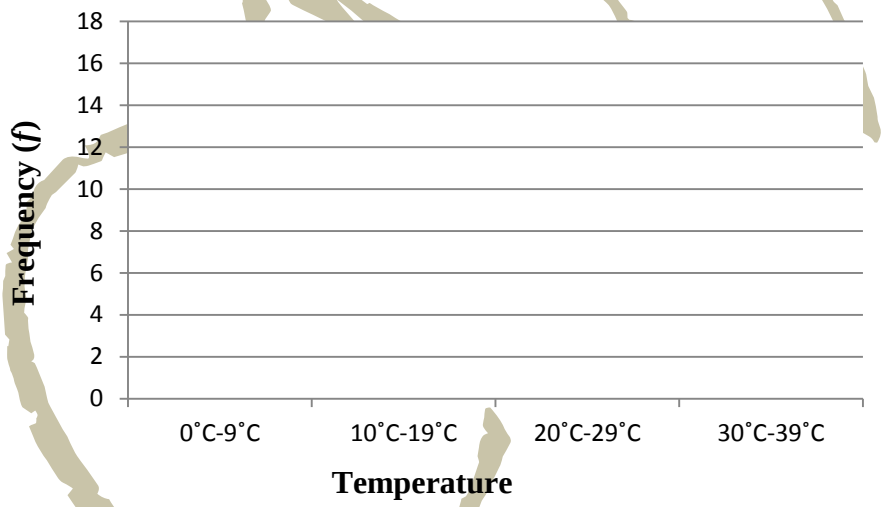
ADDENDUM A **EXAMINATION NUMBER:**

1.4 1.4.1

TEMPERATURE INTERVAL	TALLY	FREQUENCY
0 °C – 9 °C	~~IIII~~	4
10 °C – 19 °C		
20 °C – 29 °C		
30 °C – 39 °C		

(6)

1.4.3



(4)

1.4.4 Draw a frequency polygon right on the bar graph in QUESTION 1.4.3 above (5)

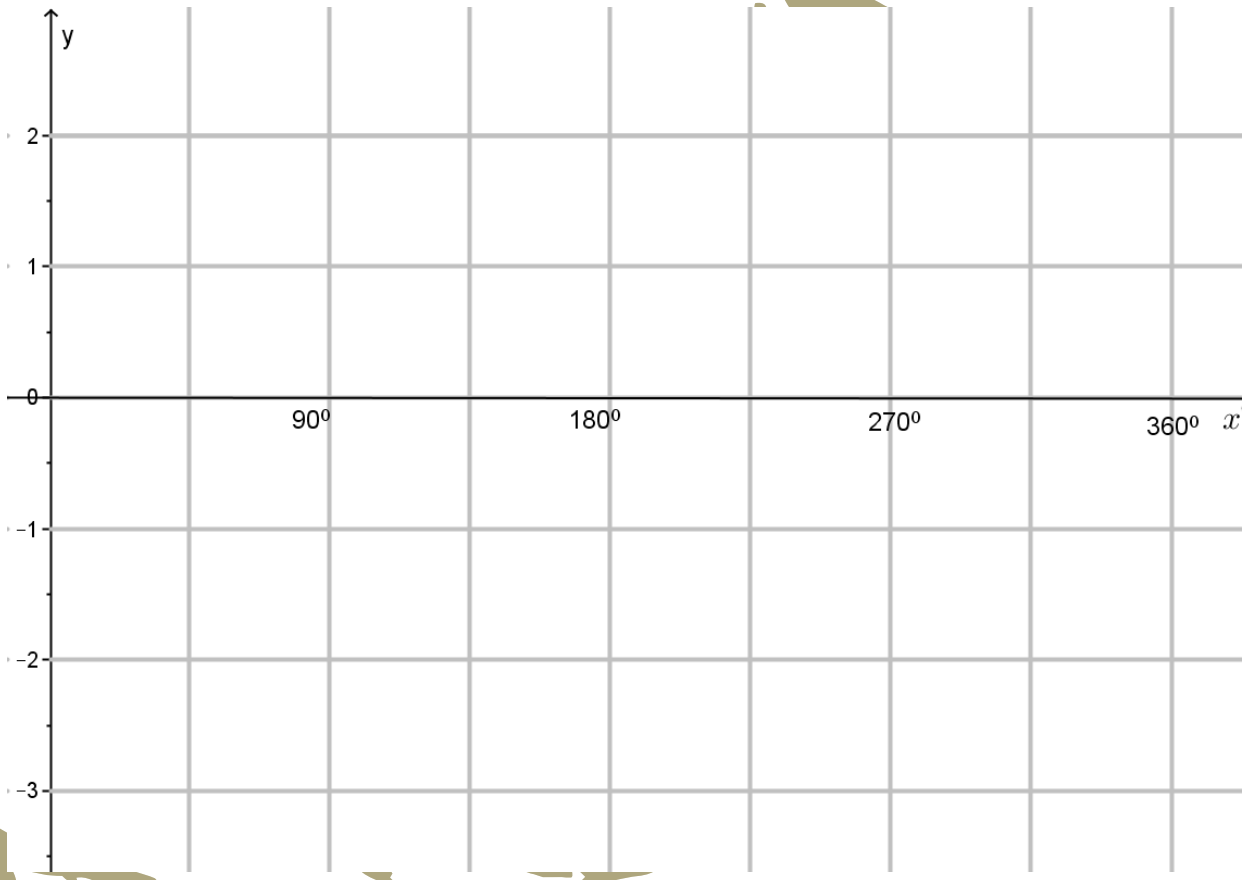
DETACH AND SUBMIT WITH THE ANSWER BOOK

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ADDENDUM B **EXAMINATION NUMBER:**

3.4

3.4.1



(6)

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MATHEMATICS L2

FORMULA SHEET

1. $A_{square} = l \times l = l^2$

2. $A_{rectangle} = l \times w$

3. $A_{triangle} = \frac{1}{2} b \times h$

4. $A_{circke} = \pi r^2$

5. $C = 2\pi r$

6. Area of a parallelogram = base $\times$ perpendicular height

7. $A_{hexagon} = \frac{3\sqrt{3}}{2} L^2$

8. $A_{hexagon} = \frac{\sqrt{3}}{2} W^2$

9. $A_{cylinder} = 2\pi r(h + r)$

10. Volume = area of base $\times$ perpendicular height.

11. Total surface area of a triangular prism = (height of prism $\times$ perimeter of base) + 2(area of base).

12. $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

13. $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

14. $M = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2} \right)$

15. $\theta = \tan^{-1} m$

16. $\bar{x} = \frac{\sum_{i=1}^{n} x_1}{n}$ or Mean$= \frac{Total\ or\ sum\ of\ all\ items}{number\ of\ items}$

17. $R = X_n - X_1$ or *Range = highest value – lowest value.*

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18. $\bar{x} = \dfrac{\sum f_1 x_1}{n}$

19. $Q_{j \ \ position} = \dfrac{j}{4}(n+1)$

20. Interquartile range = upper quartile – lower quartile = $(Q_3 - Q_1)$

21. Semi- interquartile range = $\dfrac{1}{2}$ *(upper quartile – lower quartile) =* $\dfrac{Q_3 - Q_1}{2}$

22. $P_{j \ \ position} = \dfrac{j}{100}(n+1)$

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