

# PRINCIPAL EXAMINER'S REPORT



BOTSWANA  
EXAMINATIONS  
COUNCIL

## BSSE GENERAL MATHEMATICS 2025



## PAPER 1: WRITTEN PAPER

### General Comments

Candidates' performance indicated gaps in foundational mathematical skills across several areas. Weaknesses were noted in basic numeracy, particularly operations involving fractions, directed numbers, indices, surds and algebraic manipulation. Many candidates demonstrated limited understanding of core concepts such as factorisation, probability of combined events, sets, functions, vectors and statistics, especially variance. In geometry, candidates showed poor use of mathematical instruments, incorrect application of theorems, limited knowledge of geometrical terminology and inability to provide valid reasons. Freehand constructions, erased construction lines and failure to attempt some questions were observed. Centres are advised to emphasise mastery of fundamental concepts, correct use of mathematical language and notation, and regular practice without calculators. Greater exposure to problem-solving, interpretation of word problems and application of appropriate formulae is strongly recommended to improve overall performance.

### Comments on Individual Items

- 1 The item was well done. Most of the candidates were able to correctly convert the recurring decimal  $0.2323\dots$  to the fraction  $\frac{23}{99}$ , thereby earning full marks. Some candidates, however, experienced difficulties during the conversion process. Common errors included multiplying the decimal by 10 instead of the appropriate power of 100, resulting in recurring decimals that did not cancel out after subtraction. Other candidates failed to clearly indicate the recurring part of the decimal. A few candidates obtained the correct fraction but incorrectly simplified it by dividing 23 and 99, by numbers that are not common factors, while others expressed the answer as a mixed fraction, which is inappropriate in this context.

**Answer:**  $\frac{23}{99}$

- 2 The item was poorly done. Most candidates failed to obtain the correct answer. A few candidates earned the method mark by applying the correct procedure but lost marks due to numerical and computational errors. The performance suggests weaknesses in accurate manipulation of numbers and careful execution of the chosen method.

**Answer:**  $x \geq 7$

- 3 The question was poorly done, as most of the candidates demonstrated weak understanding of the laws of indices. In particular, candidates failed to correctly interpret negative fractional indices. Many treated negative indices as positive or ignored the effect of the fractional power, leading to incorrect simplification. Common errors included incorrect inversion of fractions, misuse of square roots, and confusion between indices and numerical evaluation. These responses indicate inadequate mastery of index laws and poor manipulation of fractions. A significant number of candidates misinterpreted the expression  $\left(\frac{9}{4}\right)^{-\frac{1}{2}}$  and instead treated it as  $\left(\frac{9}{4}\right)^{\frac{1}{2}}$ .

**Answer:**  $\frac{2}{3}$



- 4 Candidates performed fairly in this question. Some candidates substituted the answer into the given equation instead of simply stating the value. Common wrong responses included  $5^2 = 10$ ,  $2^5 = 32$ ,  $\frac{2}{5} = 0.4$ ,  $\frac{5}{2} = 2.5$  and  $5\sqrt{25} = 5$ , indicating misunderstanding of logarithmic evaluation and basic powers.

**Answer: 25**

- 5 The question, which required candidates to solve a linear equation involving fractions, was poorly done. Many candidates did not attempt the question. Difficulties were observed in removing denominators and collecting like terms. The use of brackets was also a major difficulty, particularly when simplifying the expression after clearing fractions. Common wrong answers included.

$$3x - x - 7 = 40; x = 23.5$$

$$3x - x - 7 = 40; x = 6$$

$$24x - 8x - 56 = 5; x = \frac{61}{16}$$

**Answer: 16.5**

- 6 The item was well done, with most candidates obtaining the correct answer. However, some candidates failed to simplify  $\sqrt{45}$  correctly, resulting in errors. Common incorrect responses included  $5\sqrt{5} + 3\sqrt{5} = 8\sqrt{10}$  and  $\sqrt{45} = \sqrt{3 \times 15} = \sqrt{3} \times \sqrt{15}$ . These errors indicate a misunderstanding of the simplification of surds and addition of like terms.

**Answer:  $8\sqrt{5}$**

- 7 (a) The item was well done, as most candidates correctly calculated the length of the arc by applying the appropriate fraction of the circumference using the arc length formula. However, some candidates lost marks due to incorrect application of the formula. Common errors included treating the radius as the arc length, using incorrect angle fractions, and confusing arc length with area. Typical incorrect responses included  $\frac{\pi}{3} \times 15^2 = 75\pi$  and  $\frac{\pi}{3} \times 15 \times 2 = 75\pi$ , indicating poor understanding of the arc length formula.
- (b) The item was poorly done, as most of the candidates demonstrated limited understanding of the formula for the area of a sector. Weaknesses were observed in stating and applying the correct formula. Common errors included use of the area of a circle, cone, cylinder and triangle formulae.

**Answers: (a)  $5\pi$                       (b)  $37.5\pi$**

- 8 (a) The part question was fairly done, as some candidates correctly stated the angle as  $68^\circ$  but failed to provide the appropriate geometrical reason. Many candidates explained their method instead of stating the required geometrical principle. Limited knowledge of geometrical terminology was evident, with candidates using informal terms such as “top” and “bottom” instead of correct terms



like circumference, chord and arc. Common incorrect responses included  $17^\circ$  and  $34^\circ$  resulting from incorrect halving of the angle, stating “angles in the same segment are equal” in an inappropriate context, describing the angle as “acute” instead of giving its measure and reason, and confusion in the application of circle theorems, particularly the relationship between angles at the centre and at the circumference.

- (b) The item was poorly answered, as most of the candidates showed limited understanding of a cyclic quadrilateral and instead treated the figure as a quadrilateral in a semicircle. Although some candidates recalled correct geometrical facts, these were often applied incorrectly. The use of informal abbreviations such as “quad” was noted and is unacceptable in formal mathematical responses. Common incorrect responses included  $112^\circ$  obtained from  $180^\circ - 68^\circ$  due to incorrect application of the cyclic quadrilateral property; stating that angles in a cyclic quadrilateral are supplementary in an inappropriate context; describing the angle as “obtuse” instead of giving its measure; assuming the angle to be  $68^\circ$  without justification; misapplying the circle theorem relating angles at the Centre and the circumference; and stating that opposite angles in a quadrilateral are supplementary without specifying that the quadrilateral is cyclic.

**Answers: (a)**  $68^\circ$ , angle at the Centre is twice the angle at the circumference

(b)  $146^\circ$ , opposite angles in a cyclic quadrilateral (are supplementary) or angle at the Centre is twice the angle at the circumference or angles in opposite segments (are supplementary/add up to 180).

- 9 The item was extremely poorly done, candidates did not understand the concept of appreciation at all whereas they did extremely good on finding the percentage of the quantity. They were able to calculate the value of shares before appreciation which was  $150 \times 40 = 6000$  and the increase  $\frac{2}{100} \times 6000 = 120$  correctly but failed to add them together. Some other candidates continued to subtract 120 from 6000 instead of adding it which showed lack of knowledge on the concept of appreciation.

**Answer: 6120**

- 10 The performance of candidates was fair. The question required candidates to evaluate a function at a given point. Most of the candidates were able to correctly substitute the given value but obtained incorrect final answer. The errors observed indicated weaknesses in dealing with directed numbers and indices. Common mistakes included incorrect evaluation of powers, wrong handling of negative signs, substitution of an incorrect value, and errors in basic operations. These responses showed confusion in simplifying algebraic expressions involving directed numbers.

**Answer: -14**

- 11 This question was poorly done, as most candidates failed to calculate the probability of combined events. Only a few candidates managed to obtain the correct answer. Candidates’ responses showed an inability to translate word problems into numerical expressions in order to apply the relevant mathematical techniques. There was a general lack of understanding of probability of combined events,



including basic concepts such as the use of “and” and “or”, which represent multiplication and addition respectively.

**Answer:**  $\frac{2k}{5k}$

- 12** The question was poorly done, as most of the candidates did not attempt it and those who did, showed limited understanding of factorisation and algebraic simplification. Common errors included incorrect factorisation of  $3x - 9$ , wrong factorisation of the quadratic expression  $x^2 + 2x - 15$ , incomplete or incorrect cancellation, multiplication of expressions instead of factorisation, and incorrect simplification by subtraction of terms. These responses indicate weak understanding of factorisation of linear and quadratic expressions.

**Answer:**  $\frac{3}{x+5}$

- 13** The question required candidates to solve simultaneous linear equations using the matrix method. Overall performance was below expectation, with many candidates showing limited understanding of the required procedure. Many candidates attempted the question using elimination or substitution methods, contrary to the requirement. Some candidates did not attempt the question, indicating a lack of familiarity with the matrix approach. Many responses lacked clear working steps, making it difficult to award method marks. Specific Weaknesses:

- Failure to correctly form the coefficient matrix and the constant matrix.
- Inability to compute the determinant accurately; common wrong determinants included:
  - $(15 + 4)$  or  $(4 - 15)$  instead of  $ad - bc$ .
- Errors in finding the adjoint (adjugate) matrix.
- Some candidates multiplied by the determinant instead of dividing.

**Answer:**  $x = 3, y = -2$

- 14 (a)** This part of the question was fairly done, as most of the candidates were able to construct the perpendicular bisector of side RQ.
- (b)** This part of the question was poorly done. Some candidates constructed angle bisectors instead, resulting in an incorrect circumcircle. Some used freehand methods, indicating lack of proper instruments, while others did not attempt the question. Candidates should be taught the correct use of mathematical instruments for constructions, starting with lines and angles using a pair of compasses, and progressing to bisectors and geometric shapes. More exposure is required in construction and locus for candidates to correctly interpret and complete given scenarios.

**Answers:** (a) Correct bisector drawn      (b) Correct circumcircle drawn



- 15 This question was poorly done, as most of the candidates showed little or no knowledge of how to calculate the magnitude of a vector. Many candidates left the question unanswered. Most of the candidates were unable to find the squares of 12 and 5, determine the square root of the perfect square 169, or correctly add the whole numbers 144 and 25. This indicated weaknesses in basic number operations.

**Answer:** 13

- 16 The item was poorly done, as most of the candidates showed limited understanding of how to calculate elements of a set. Weaknesses were observed in determining the intersection and finding the number of candidates with laptops only and cell phones only from the given information. Common errors included substituting numbers directly from the question without applying set principles and using the sum of laptops and cell phones as the intersection.

**Answers:** 20, 5, 11

- 17 The question on calculating variance was poorly done, as most of the candidates failed to earn full marks. Although some candidates obtained method marks, they were unable to correctly evaluate  $\frac{206}{4} - 7^2$ . Common errors included adding the data values and calculating the mean only, introducing inappropriate frequencies, recalculating the mean unnecessarily, and applying incorrect formulae. Some candidates divided by the sum of the data (28) instead of the number of scores (4), while others subtracted  $7^2$  before completing the division. A considerable number of candidates either wrote down the variance formula without substitution or did not attempt the question at all. These responses indicated limited understanding of the variance formula and poor procedural accuracy.

**Answer:** 2.5

- 18 The question on the interpretation of the cumulative frequency curve was poorly done. Candidates were required to estimate the number of athletes who took 35 minutes or more. The total number of athletes was 80, and the cumulative frequency at 35 minutes was 59. The correct approach was: Number of athletes taking 35 minutes or more =  $80 - 59 = 21$ .

However, most of the candidates failed to apply this correctly. Instead of subtracting the cumulative frequency at 35 minutes from the total number of athletes, many candidates simply stated 59 as the answer. Others incorrectly subtracted 35 from 80, which shows a misunderstanding of the concept. These responses indicate limited understanding of the interpretation of cumulative frequency curves, particularly the distinction between values less than and greater than a given value.

**Answer:** 21



## PAPER 2: WRITTEN PAPER

### General Comments

There was a challenge in the effective use of the calculator. The candidates had correct working but were unsuccessful in the use of the calculator. There were also a lot of numerical errors in the multiplying out of numbers and premature approximation of numerical answers leading to answers in subsequent questions falling outside acceptable ranges.

There was a significant challenge in the multiplication of the indices which affected the number and algebra modules. The multiplication of algebraic expressions with negative numbers was also a major challenge, affecting both average and weak candidates across the number and algebra modules.

Average candidates had neat diagrams, even when they were not appropriate for the tasks. However, the weak candidate had hand-drawn diagrams. Some candidates did not attempt tasks involving the drawing of diagrams. The tasks on probability had responses such as  $\frac{9}{7}$  (that is numerators that are greater than the denominators), which communicates the lack of basic knowledge in the probability scale. The application of the probability scale was a challenge to both average and weak candidates. As for variance, dismal performance was observed, although the formulae were provided.

### Comments on Individual Items

- 1 This question was answered by a fair proportion of the candidates. Some candidates lost the accuracy mark by writing the amount to one decimal place, while others were not successful in writing 50 thebe as a decimal and had 3187.05. The expectation is that money should be written to two decimal places. Some candidates divided the number of shares by the dividend amount and had 226.7, while others multiplied the dividend by 12 months and had 45.

**Answer: P3187.50**

- 2 Strong candidates were able to access all the marks. A fair proportion of the average and weak candidates were able to evaluate the first term. Some candidates substituted the positions of the terms and went no further. Others evaluated the powers and subtracted the positions had  $2^{5-1} = 32 - 1 = 31$  and  $2^{5-2} = 32 - 2 = 30$ . Some candidates were not successful in interpreting the power and had  $2 \times 5 - 1 = 9$  and  $2 \times 5 - 2 = 8$ .

**Answer: 16, 8**

- 3 A large proportion of the candidates answered this question poorly. Some candidates were not successful in multiplying out the powers of the variables and had  $2x \times 4x^2 = 8x^2$ ,  $8x^3 - 18x + 45$  from  $8x^3 + 12x^2 + 18 - 12x^2 - 18x + 27$  and  $8x^3 + 12x^2 - 12x - 27$  from  $8x^3 + 12x^2 + 18x - 12x - 18x - 27$ , while others were not successful in multiplying out the signs and had  $8x^3 + 12x^2 + 18 - 12x^2 - 18x + 27$ .

**Answer:  $8x^3 - 27$**

- 4 A large proportion of the candidates performed poorly in this question. Most of them had a reflection in the line  $x = 3$  with the vertices (4, 0), (6, 0), (6, 3) and (4, 3), while others had a reflection in the line  $x$



= 4 with vertices (6, 0), (8, 0), (8, 3) and (6, 3). Other candidates had a stretch of factor 2 parallel to the x-axis with vertices (0, 0), (4, 0), (4, 3) and (0, 3). Some candidates had an enlargement, scale factor 2, centre (0, 0) with vertices (0, 0), (4, 0), (4, 6), and (0, 6).

**Answer:** Parallelogram with vertices (0, 0), (2, 0), (6, 3) and (8, 3)

- 5 A large proportion of the candidates were unsuccessful at applying the laws of indices. Few candidates had  $\frac{x^{-3}}{y^{-1}}$  obtained by multiplying the fractional indices by 2 and stopped there. Other candidates also

multiplied the fractional indices by 2 and had  $\frac{x^{-\frac{6}{2}}}{y^{-\frac{2}{2}}}$  and went no further. Some candidates had

$$\frac{x^{-\frac{3}{2} \times \frac{1}{2}}}{y^{-\frac{1}{2} \times \frac{1}{2}}} = \frac{x^{-\frac{3}{4}}}{y^{-\frac{1}{4}}} \text{ while others had } \frac{x^{-\frac{3}{2} \times 2}}{y^{-\frac{1}{2} \times 2}} = \frac{x^{-6}}{y^{-2}} \text{ and } \frac{x^{-\frac{3}{2} \times -\frac{3}{2}}}{y^{-\frac{1}{2} \times -\frac{1}{2}}} = \frac{x^{\frac{9}{4}}}{y^{\frac{1}{4}}}$$

**Answer:**  $\frac{y}{x^3}$

- 6 Save for strong and a few average candidates, the question was poorly done. Some average candidates had  $\frac{6 \times 10}{9} = 6.67$  while others had  $\frac{6 \times 9}{10} = 5.4$ . Some weak candidates had  $10 + 9 - 6 = 13$  while others had  $\frac{10+6+9}{3} = 8.33$ . A few candidates had  $\sqrt{9^2 + 6^2} = 10.8$  and  $10 - 6 = 4, 9 - 6 = 3, \therefore 4 + 3 = 7$ .

**Answer: 15**

- 7 A fair proportion of the candidates were able to access all the method marks. They lost the accuracy mark owing to the premature approximation of  $\left(1 + \frac{0.04}{12}\right)^{36}$  and had P17793.97. Some candidates approximated the amount to the nearest whole number and had P17794, while a significant number of candidates substituted correctly but had P49284.32. A few candidates had P25428.95 obtained from  $15785\left(1 + \frac{0.04}{3}\right)^{36}$ , while other candidates had 17755.98 obtained from  $15785\left(1 + \frac{4}{100}\right)^3$ .

**Answer: P17 793. 99**

- 8 (a) A large proportion of the candidates answered this part of the question poorly. Most of the candidates were able to substitute correctly  $f(x)$  into  $g(x)$  but then had  $-3\left(\frac{5x}{2} + 4\right)$  obtained from  $2 - 5\left(\frac{5x}{2} + 4\right)$ . Others could not multiply out with the negative sign and had  $2 - \frac{5x}{2} + 20$ . A few candidates had  $2 - 5(x + 2)$ , while others had  $2 - \frac{5x}{10} + 4$ .



- (b) A large proportion of the candidates performed poorly in this part of the question. The candidates could not make  $x$  the subject of the formula in  $y = 2 - 5x$ . The tendency was to omit the negative sign and have  $y - 2 = 5x$ . Some candidates had  $\frac{y+2}{5}$ , while others had  $\frac{y+2}{-5}$ .

**Answers: (a)**  $-\frac{5x}{2} - 18$

**(b)**  $(g^{-1}) = \frac{2-x}{5}$

- 9 This question was poorly done, save for the strong candidates. Some candidates calculated the discriminant correctly, but they had a wrong conclusion of distinct roots. The expectation is that the conclusion should be **real distinct roots**. A few average candidates substituted correctly into  $b^2 - 4ac$  but had  $-44$  instead of  $76$ . Some candidates had  $\sqrt{4^2 - 4(5)(-3)} = \sqrt{76}$ , which did not score. Some candidates had  $5^2 - 4(4)(-3) = 73$ .

**Answer:** Real distinct roots

- 10 This question was poorly done by a large proportion of the candidates. Some candidates got the correct equation but then had angles in the first and second quadrants. Some candidates had the equation  $\sin \theta = -\frac{2}{3}$  and got  $-41.81$ , while some candidates had  $\sin \theta = \frac{2}{3}$ , got the primary angle and went no further. Some candidates had  $\theta = \frac{2}{3\sin}$  while others had  $\theta = -\frac{2}{3\sin}$ . Weak candidates gave the angles in the domain, while others did not attempt the question.

**Answer:**  $\theta = 222^\circ$ , or  $\theta = 318^\circ$

- 11 (a) A large proportion of the candidates fairly did this part of the question. They were able to express  $\sqrt{75}$  as a product of a square and some other number but were not successful in simplifying and had  $\sqrt{3 \times 25} = 3\sqrt{25}$ . Some candidates had  $\sqrt{75} = \sqrt{5 \times 15} = 5\sqrt{15}$  while others had  $\sqrt{75} = \sqrt{5 \times 25} = 5\sqrt{5}$ .

- (b) A larger proportion of the candidates performed fairly in this part of the question. Although the candidates substituted correctly their expression from part (a), they multiplied first instead of dividing and had  $6\sqrt{3} \div 6\sqrt{3} - 5\sqrt{3} = -4\sqrt{3}$ , which is fortuitous. Some candidates had  $6\sqrt{3} \div (6\sqrt{3} - 5\sqrt{3}) = 6\sqrt{3} - 5\sqrt{3} = \sqrt{3}$  while others had  $9\sqrt{3} - 5\sqrt{3} = 4\sqrt{3}$ . A few candidates had  $6 \times 3 \div 6\sqrt{3} - 5\sqrt{3} = 18/\sqrt{3}$ .

**Answers: (a).**  $5\sqrt{3}$

**(b).**  $-4\sqrt{3}$

- 12 (a) This part of the question was poorly done. Most of the candidates had answers such as scatter correlation, no correlation, scattered and fluctuating. Some candidates did not attempt this part question as well.



- (b) This part of the question was poorly done. Most of the candidates had answers such as scatter correlation, no correlation, scattered and fluctuating. Some candidates did not attempt this part question as well.
- (c) This part of the question was also poorly done, save for the strong candidates. Some candidates calculated the gradient correctly, substituted it and went no further. Some candidates calculated both the gradient and intercept correctly but did not substitute them. Some candidates calculated the distance between the semi-averages and had 17.9, while others estimated the midpoint between the semi-averages and had (37, 23). The most common wrong equations were  $2x + 14.5 = y$  and  $y = 2x - 9$ , obtained from exchanging the coordinates of the semi-averages in calculating the gradient.

**Answers:** (a). Positive (b). Correct line passing through the points (29, 19) and (45, 27)  
(c).  $M = 0.5v + 4.5$

- 13 (a) (i) Save for the strong and a few average candidates, this part of the question was poorly done. Some candidates had 13, while others had 13.05. A few candidates had 17.5, the upper bound of AB instead of AC.
- (ii) This part of the question was also poorly done by a large proportion of the candidates. Some candidates had 31.5, others had  $31.5 + 0.5 = 32$  and  $31.5 + 0.1 = 31.6$ . The interpretation of one decimal place was a challenge.
- (b) This part of the question was also poorly done by a large proportion of the candidates. Most of the candidates had  $\frac{1}{2} \times 13 \times 17 \sin 31.5 = 57.7$ , while others had  $\frac{1}{2} \times 13 \times 17 \sin 31.5 + 0.5 = 58.2$ . A few candidates had  $\frac{1}{2} \times 13.5 \times 17.5 \sin 32 = 62.6$ , while others had  $\frac{1}{2} \times 13 \times 9 \sin 31.5 = 30.6$

**Answers:** (a) (i). 13.5 (a) (ii). 31.55 (b). 61.8

- 14 (a) A fair proportion of the candidates was able to write down the coordinates of the centre. A few candidates wrote the coordinates without the brackets and had  $-2, 5$ . Some candidates had (2,  $-5$ ) from lifting the numbers in the equation, while others had (4, 25) obtained by squaring the values on the left-hand side.
- (b) A fair proportion of the candidates was able to interpret the equation to find the radius. Some candidates had 9, the value on the right-hand side of the equation, while others had 81, obtained by squaring the value on the right-hand side of the equation, 4.5, obtained by taking half of the value on the right-hand side and  $3^2$  obtained by writing 9 in index form.

**Answer:** (a).  $(-2, 5)$  (b). 3



- 15 A large proportion of the candidates were not able to express one as a logarithm of base 5 and had  $\log_5 \left( \frac{3x+7}{2x} \right) = 1$ . Then they omitted the log of 5 and had the equation  $\frac{3x+7}{2x} = 1$ . Some candidates omitted the log of base 5 in the original equation and had  $(3x + 7) - 2x = 1$ , while other candidates multiplied the expressions and had  $(3x + 7)(2x) = 1$ , which simplified into a quadratic equation. There were unsuccessful attempts to remove log of base 5 such as  $5(3x + 7) - 5(2x) = 1$  and  $5(3x + 7) - 2x = 1$ .

**Answer:**  $x = 1$

- 16 (a) A large proportion of the candidates were able to calculate at least two of the required probabilities. Unsuccessful candidates wrote the probabilities given in the question as their answers. Several candidates had no attempt at the task.
- (b) This part of the question was poorly done, save for the strong candidates. Some candidates had  $\frac{76}{45}$ , obtained by adding the probabilities that Maya was not late for work when travelling by both the train and car. Other candidates had  $\frac{14}{45}$  obtained by adding the probabilities Maya was late when travelling by both the train and car. Some candidates had  $\frac{4}{7} + \frac{1}{9} + \frac{1}{5} = \frac{6}{21}$  obtained from adding all the probabilities given in the question. Some candidates had no attempt at the question.

**Answers:** (a).  $\frac{3}{7}, \frac{8}{9}, \frac{4}{5}$  (b).  $\frac{88k}{105k}$

- 17 A fair proportion of the candidates did not attempt the question. Some of those who did drew a graph that joined the given points. Other candidates calculated the magnitudes of the position vectors and went no further. The expectation was that candidates showed that any pair of points had the same gradient, or that the sum of the distances of AB and BC was equal to AC. These are the most common and simple approaches to the solution.

**Answer:**  $\frac{8-2}{4-1} = \frac{10-8}{5-4} = 2$  OR  $\sqrt{45} + \sqrt{5} = \sqrt{80}$

OR  $\vec{AC} = \frac{4}{3}\vec{AB}$  or  $\vec{AB} = 3\vec{BC}$  or  $\vec{AC} = 4\vec{BC}$

- 18 The performance of candidates in this question was poor. A fair proportion of the candidates did not attempt the question. Some of those who did calculate the  $y$  –values and plotted all the points but were unsuccessful in observing the asymptotes as they joined the points. Some candidates plotted 6 correct points, omitting the point (0, 0). Indeed, very few candidates drew the expected diagram for the tangent function.

**Answer:** Correct graph asymptotic at  $90^\circ$  and  $270^\circ$ .

- 19 A large proportion of the candidates performed poorly in this question. Some candidates estimated the mean and had 14.3, others recalculated the cumulative frequency, found its 7<sup>th</sup> decile and had 353.5.



Some candidates had  $2050 < m \leq 3050$ , the class with the total cumulative frequency. Some candidates calculated the midpoints of the classes and went no further. Some candidates could not calculate the position of the 7<sup>th</sup> decile.

**Answer: 729**