EXAMINATIONS COUNCIL OF ESWATINI

Junior Certificate Examination

Mathematics (309)

Examination Report for 2024

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Paper 309/01

INTRODUCTION

There were 16 528 candidates who sat for the 2024 Junior Certificate Mathematics Paper 1 examination. The paper consisted of 28 short-answer questions and the total marks for the paper was 100. Most of the marks were independent-of-method marks while a few of the questions required candidates to show the method leading to their answers. In the event a candidate failed to present a required mathematically correct method, they lost all the marks even when the answer space had the anticipated correct response.

GENERAL COMMENTS

The lowest raw score obtained in this year's examination was 0 and the highest score was 99. Questions that generally seemed challenging to most of the candidates included **Question 1(d); Question 3 (a) and (c); Question 7; Question 8; Question 13; Question 15; Question 19(a)(ii); Question 21 Question 25** and **Question 27**. On the other hand, most candidates were able to get full credit in the following questions: **Question 1(a), (b) and (c); Question 4(a); Question 6; Question 18(b)(i);** and **Question 18(b)**.

Some candidates continued to use the left-hand margin and the examiner's column to present their working instead of the working space. There was an improvement in terms of candidates effectively answering the paper even though there were some who would leave some questions unanswered.

COMMENTS ON SPECIFIC QUESTIONS

1. Write down the mathematical name for

(a) A triangle with 2 equal sides, **[1]**

(b) A polygon with 7 sides, **[1]**

(c) An angle that is equal to 90°, **[1]**

(d) Describing two polygons with the same shape and size. **[1]**

Answers

(a) Isosceles

(b) Heptagon

(c) Right angle

(d) Congruent

Comments

Performance in Question 1 was generally good. Most of the candidates were getting part (a), part (b) and part (c) correct but failed part (d).

A commonly dominant error in part (a) was an incorrect spelling of the word '**isosceles**'. In part (b), some candidates had incorrect responses like: hectagon, pentagon, hexagon and others. A

commonly wrong response to part (c), an angle that is equal to 90°, was '**right-angled triangle**.' A huge number of the candidates failed to describe polygons with the same shape and size – a requirement for part (d) of this first question. A number of candidates were giving names of polygons in response to this part question (i.e. trapezium, quadrilateral, square, etc).

2. (a) Write 2.5 metres in millimetres. [1]

(b) Find the number of seconds in 1 hour. [1]

Answers

(a) 2500

(b) 3600

Comments

Question 2 part (a) was fairly performed by this year's candidature. A fairly good number of the candidates were able to convert 2.5 metres to millimetres. However, there were other candidates who used an incorrect conversion factor (i.e. 10 or 100 or 10 000). Some candidates were dividing by the conversion factor instead of multiplying. In part (b), most learners could not realize that they were supposed to multiply 60 by 60 to find the number of seconds in an hour. Instead, they were multiplying 1 by 60 or add 60 to 60. Hence, a majority of the candidates were failing this part question. Common errors included: 60, 120, 1200, 36 000.

3. (a) Round off 78 to the nearest 50. [1]

(b) Express $\frac{7}{8}$ as a decimal. [1]

(c) The length, *l* km, of a straight road is 20 km, correct to the nearest km.

Find the limits of accuracy for the length of the straight road. [2]

Answers

(a) 100

(b) 0.875

(c) $19.5 \leq l < 20.5$

Comments

Performance in Question 3 was unsatisfactory overall. Very few candidates were able to round off 78 to the nearest 50 and the same was with finding the limits of accuracy for 20 km (correct to the nearest km). For part (a), commonly wrong answers included: 50, 80 and 78. Commonly wrong responses for part (c) included: lower limit = 19.05 and upper limit 20.05 km; swapping the correct lower and upper limits. A considerable number of candidates were able to express $\frac{7}{8}$ as a decimal in part (b), except that some would then attempt rounding off the answer – something which was uncalled for. Commonly wrong responses included: 0.8, 0.87, 0.88 and 0.9.

4. Work out.

(a) 35.125 – 11.83 **[1]**

(b) $\sqrt{91 - 3^3}$ **[2]**

(c) $\frac{3}{5} \div \frac{2}{5}$ **[2]**

Answers

(a) 23.295

(b) 8

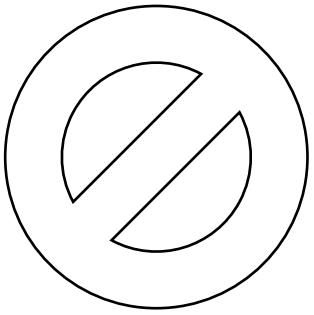
(c) $1\frac{1}{2}$

Comments

This question was fairly performed by this year's cohort of candidates. Most of the candidates correctly subtracted the decimals in part (a). Some of those who missed it were failing to align place values in the numbers being subtracted and hence their answers were incorrect. In part (b), common errors included failure to compute 3^3 (i.e. $3^3 = 9$) and failure to find the square root of 64. Some candidates would leave their answer as $\sqrt{64}$ or $\sqrt{82}$. For part (c), most of the candidates realized that they were to multiply by the reciprocal of $\frac{2}{5}$. Some of them would however, leave their answers as an improper fraction $\left(\frac{3}{2}\right)$ yet the acceptable answer was either the mixed number or the decimal equivalent (i.e. $1\frac{1}{2}$ or 1.5). Common errors in part (c) included reciprocating even the dividend and retaining the division sign while having reciprocated the divisor (i.e. $\frac{5}{3} \times \frac{5}{2}$ and $\frac{3}{5} \div \frac{5}{2}$ respectively).

5. (a) Estimate the value of $\frac{17.625 \times 4.937}{9.6804}$ to one significant figure. **[3]**

(b) The diagram shows a shape.



(i) On the diagram, draw all the lines of symmetry. **[1]**

(ii) Write down the order of rotational symmetry of the shape. **[1]**

Answers

(a) 10

(b) (i) two correct lines of symmetry (drawn)

(ii) 2

Comments

Question 5 part (a) was very challenging to the candidates. Most of the candidates did not notice that they were supposed to round off each of the numbers in the numerical expression to one significant figure. These candidates would attempt working out the value of the expression using the numbers as they were. For a number of candidates, who were rounding off the numbers to one significant figure, 17.625 was incorrectly rounded as 2 or 18.

Part (b) of this question was on symmetry. Most of the candidates did not have problems with drawing the two lines of symmetry for the figure in part (b)(i). However, there were some candidates who would identify only one line of symmetry while others were drawing more than two lines some of which were not correct lines of symmetry. In part (b)(ii), most candidates were giving incorrect answers regarding the order of rotational symmetry of the given figure. Commonly incorrect responses to part (b)(ii) included: 4; 2 lines (of symmetry) and clockwise.

6. (a) List all factors of 36. **[2]**

(b) You are given the sequence of numbers.

3 7 11 15 19 …

(i) Find the next two terms of the sequence. **[1]**

(ii) State the rule of the sequence. **[1]**

Answers

(a) {1, 2, 3, 4, 6, 9, 12, 18, 36}

(b) (i) 23, 27

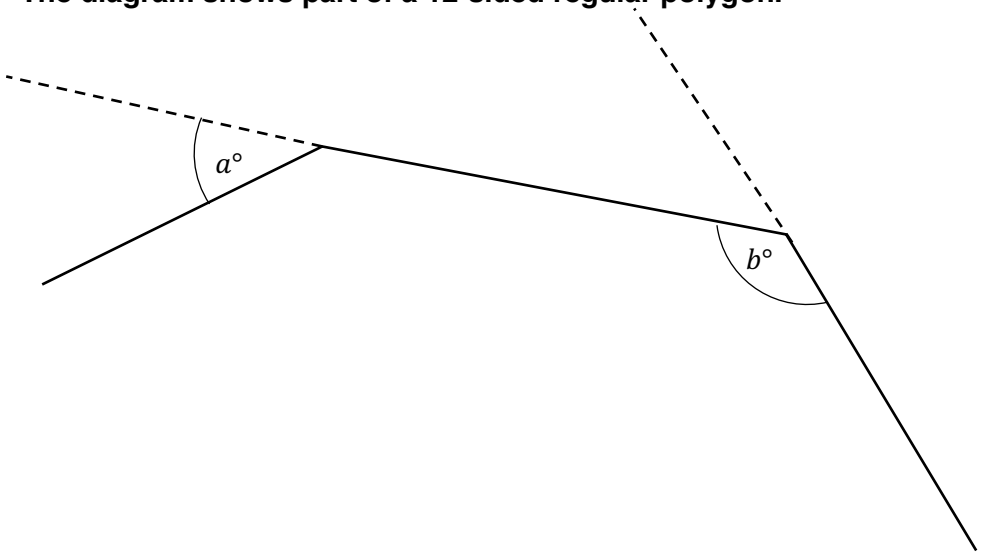
(ii) add 4

Comments

Question 6 was well performed by this year's cohort of candidates. Most candidates were able to list all the factors of 36. Nevertheless, some candidates would omit one or two of the factors. Most commonly missed factors in the list included; 1, 6, 9 and 18. Such error of omission could be a result of candidates not viewing factors of numbers as going in pairs.

Common errors in writing the next two terms in the given sequence of numbers in part (b)(i) included writing only one term or including a third term alluding to the failure to adhere to instructions by the candidates. Part (b)(ii) was well performed by most of the candidates. Commonly incorrect responses to this part question included: $x + 4$ or $n + 4$.

7. The diagram shows part of a 12-sided regular polygon.



Find

(a) a, **[2]**

(b) b. **[1]**

Answers

(a) 30°

(b) 150°

Comments

Performance in this question was average. A moderate number of candidates was able to find the size of the exterior angle marked a in the 12 sided regular polygon. Commonly unacceptable responses to this part question included: 150°, 60° , (360 – *b*) and (180 – *b*). Most of those who would get the correct size of the exterior angle were also getting the size of the interior angle in part (b) correct. Common incorrect responses included: 30°, (180 – *a*) and (360 – *a*).

8. A cross boarder bus transports people from Manzini to Cape Town.

The bus departs Manzini at 0530 hrs on Monday.

It takes 28 hours on the road.

Along the way it makes 5 stops of 30 minutes each.

Find the time when the bus arrives in Cape Town. **[3]**

Answers

1200 hrs

Comments

This question was one of the most challenging questions to the candidates. Very few candidates would arrive to the correct answer. Common errors included adding 30 hours 30 minutes to 0530 and failing to convert the result to the required time (i.e. 0530 + 28 + 0230 = 3600). Some candidates

would erroneously add 150 minutes (from 5 × 30 minutes) to the 28 hours ignoring the fact that the units for time are not metric units (based on the decimal system).

9. Complete the chart using some of the symbols and numbers below.

$<$, 0.020, 2.5×10^{-1}, $=$, $>$, 0.2, 2.5×10^{1}, $\leq$ **[3]**

……..	=	20 %
0.66	……..	$\frac{2}{3}$
25	=	……

Answers

0.2, $<$, 2.5×10^{1}

Comments

Performance in Question 9 was not satisfactory. There were few candidates who obtained all the three marks in this question. The question required candidates to compare numbers given in different formats. Most candidates were failing to identify an equivalent of 20 % from the list of numbers. For this particular number, candidates were expected to convert 20 % to a decimal number and some of the candidates were wrongfully choosing 0.020 from the given list of numbers. Perhaps, candidates were not computing but guessing the responses.

The second part of the question required candidates to put in the correct sign comparing 0.66 to $\frac{2}{3}$. Most candidates were erroneously putting an equal sign claiming that 0.66 is an exact equivalent of $\frac{2}{3}$.

Lastly, candidates were required to choose from the given list of numbers an equivalent of 25. A large number of candidates were 'randomly' choosing 2.5×10^{-1} which was not the correct response.

10. Tickets are numbered from 1 to 20.

The tickets are mixed up and one ticket is drawn at random.

Find the probability that the ticket drawn has a number which is

(a) Prime, **[1]**

(b) A multiple of 3 or 5. **[2]**

Answers

(a) $\frac{8}{20}$

(b) $\frac{9}{20}$

Comments

This question was also not well done by the candidates. Part (a) required candidates to identify prime numbers from counting numbers from 1 to 20 and then write the number of prime numbers as a fraction of all the 20 numbers (probability). A fair number of candidates was able to find the correct probability. On the other hand, there were candidates who got incorrect answers probably due to limited command of prime numbers. Other candidates would only write the number of prime numbers in the given interval and did not express that as probability (i.e. 8). In part (b), a majority of the candidates were not obtaining the correct answer. Perhaps, the challenge in this particular sub-question was that there is an intersection between the multiples of 3 and the multiples of 5. Hence, a common error was adding the probability of getting a multiple of 3 $\left(\frac{6}{20}\right)$ to that of getting a multiple of 5 $\left(\frac{4}{20}\right)$ yielding $\frac{10}{20}$, without noticing that there is a repeated element.

11. A pencil costs Ex and a pen costs E5 more than a pencil.

(a) Find the cost of a pen in terms of x. **[1]**

(b) A pen and 2 pencils cost E17 in total.

Find the cost of one pencil. **[3]**

Answers

(a) $x + 5$

(b) $x = 4$

Comments

Question 11 was not performed. Most candidates were failing to present the correct expression, in terms of x, for the cost of the pen. Common errors included candidates writing equations instead of just an expression (i.e. $x = x + 5$). Some other candidates erroneously expressed the cost of a pen as $5x$. In part (b), the challenge for most of the candidates was with forming the correct equation to show that a pen and 2 pencils cost E17. A commonly incorrect equation was $2x + 5 = 17$ instead of $2x + (x + 5) = 17$. However, there were other candidates who avoided the equation and used common sense with clear evidence of their line of thinking. For example, they subtracted 5 from 17 which was the additional amount to the cost of a pencil to make that of the pen. After that they divided the resultant 12 by 3 thus obtaining the correct answer which is 4.

12. (a) Factorise $3x + 12y$**.** **[1]**

(b) Expand and simplify $8a - 3(b - c + 2a)$. **[2]**

Answers

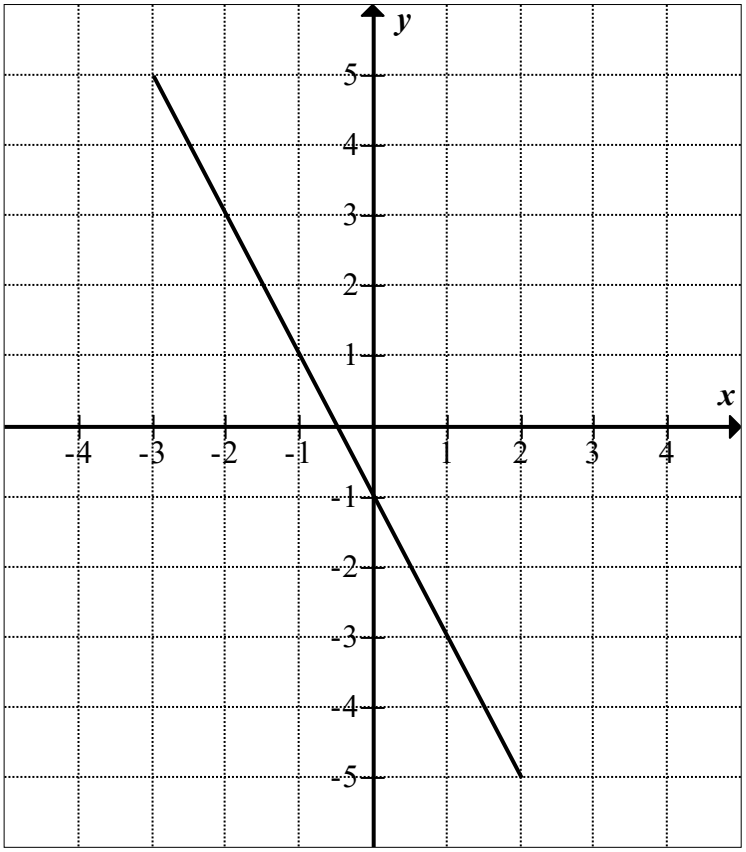
(a) $3(x + 4y)$

(b) $2a - 3b + 3c$

Comments

A fair number of candidates was able to factorise a simple linear expression with common factors – a skill that was required in part (a) of this question. Common incorrect responses included: x + 4y (from dividing both terms by 3); 3(x + 12y) (factoring out 3 from only one term). For part (b), most candidates were able to expand an expression and simplify by collecting like terms. However, some candidates were making a common error of not changing the signs inside the brackets when removing the brackets (i.e. $8a - 3b - 3c + 6a$). There were other candidates who erroneously multiplied only the b inside the brackets by the -3 and never multiplied the other two terms (i.e. $8a - 3b - c + 2a$).

13. The diagram shows a straight line.



Find the equation of the line. **[3]**

Answer

$y = -2x - 1$

Comments

A majority of the candidates were failing to find the correct equation for the given line. The main requirement for this question was finding the gradient of the line and then writing the equation since

the y-intercept was evident from the graph. Most candidates were failing to calculate the gradient. Some were inverting the formula for the gradient of a straight line while others were substituting incorrectly in the correct formula. Noteworthy was the failure of some of the candidates to identify the y-intercept from the linear graph.

On another note, there were candidates who seemed not to have an idea of how the equation of a straight line looks like. Such candidates would perhaps give coordinates of points or sometimes give a mapping instead of an equation.

14. (**a**) **Work out** $0.005724 \times 10\,000$. **[1]**

(b) Simplify $\frac{1}{2} : 3$ **[1]**

Answers

(a) 57.24

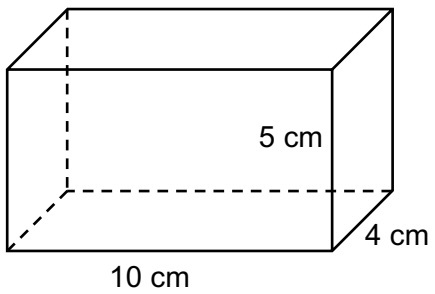
(b) 1 : 6

Comments

Part (a) of Question 14 was well performed by most of the candidates. Common errors included moving the decimal point to the left instead of right and including the insignificant zeros even after having moved the decimal point to the position between 7 and 2 (i.e. 0.0000005724 or 00057.24). There were also some candidates who wrongly placed the decimal point in their answer (i.e. 5.724 or 572.4).

In part (b), candidates were required to simplify a ratio in which one entry was a common fraction and the other was a whole number. Instead of multiplying both entries by the denominator, most candidates were erroneously multiplying the fraction by the whole number. Hence, their incorrect response was $\frac{3}{2}$. Some other candidates would omit the 1 in the ratio and end up having 6 as their answer.

15. The diagram shows a solid cuboid.



Calculate the surface area of the cuboid. **[3]**

Answers

220 cm^2

Comments

Question 15 was generally not well performed by the candidates. Some candidates were calculating volume for the cuboid instead of surface area (i.e. $10 \times 4 \times 5 = 200$). Some candidates worked out the sum of the areas of only three of the faces leaving out the other respective congruent faces.

16. (a) Express 5^{-3} as a fraction in its simplest form. **[2]**

(b) Simplify

(i) $(m^2)^3$, **[1]**

(ii) $5p^2q \times pq^3$. **[2]**

Answers

(a) $\frac{1}{125}$

(b) (i) m^6

(ii) $5p^3q^4$

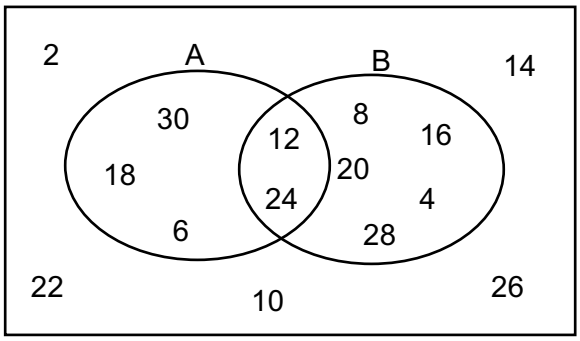
Comments

In part (a), candidates were required to demonstrate understanding of the meaning of a negative index and also expand an expression given in index notation. Most of the candidates failed to demonstrate mastery of both competencies. On another note, some candidates demonstrated mastery of either of the two competencies while a few others were doing it right. Commonly incorrect responses included: 125, $\frac{1}{5^{-3}}$ and 75.

In part (b)(i), candidates were required to simplify an expression in which a term in index notation is raised to some other index. A majority of the candidates were able to do it correct. Common errors for those who failed it included adding instead of multiplying the indices (i.e. $(m^2)^3 = m^5$).

Part (b)(ii) required candidates to multiply powers of the same base. Most candidates were getting this one correct. Common errors included including the multiplication sign in the answer (i.e. $5p^3 \times q^4$).

17. The Venn diagram shows sets A and B.



(a) List the members of the following sets

(i) B, **[1]**

(ii) $A \cap B'$, **[1]**

(b) Find $n(A \cap B)'$. **[1]**

Answers

(a) (i) {4, 8, 12, 16, 20, 24, 28}

(ii) {6, 18, 30}

(b) 13

Comments

In part (a)(i), candidates were required to list the elements of a set from a Venn diagram. Most candidates were able to list the elements correctly. A common error was leaving out the elements of set B that are also elements of A. Part (a)(ii) was fairly performed by the candidates. Here candidates were expected to list elements of the universal set that were in A but not in B. Some of the candidates who failed this sub-question would erroneously list the elements of the intersection of A and B.
In part (b) the expectation was that candidates write the number of elements outside the intersection of A and B. a majority of the candidates failed to notice that only the number of elements was required not the individual elements. Most of them would list elements which indicated lack of command in as far as the requirements of the question was concerned.

18. You are given the distribution of numbers.

7 6 5 9 3 4 7 4 6 8 7

(a) Find the range. **[1]**

(b) Write down the mode. **[1]**

(c) Calculate the mean. **[2]**

Answers

(a) 6

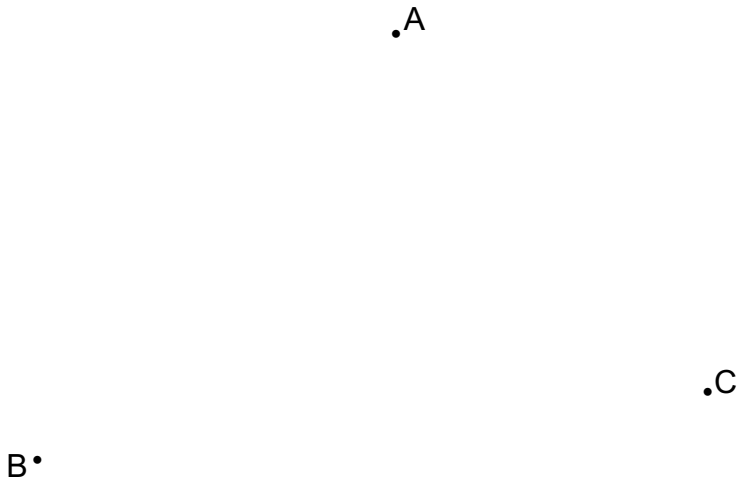
(b) 7

(c) 6

Comments

Performance in Question 18 was average in general. A relatively moderate number of candidates were responding correctly to this question. There were some not so many candidates who confused the range, mode, median and mean which was evident from attribution of a wrong method in any of the cases. For instance, candidates would show working for the median when they were required to calculate the mean. In part (c), some candidates were adding all the numbers and either not dividing the sum or erroneously dividing by 2 instead of 11. There were a number of candidates who were failing to get the correct answer when adding the 11 numbers.

19. The positions of three points A, B and C are shown.



(a) Using a ruler and a compass, construct the locus of points which are

(i) Equidistant from A and B, **[2]**

(ii) 3 cm from C. **[2]**

(b) Mark a point X, which is 3 cm from C and equidistant from A and B. **[1]**

Answers

(a) (i) perpendicular bisector of line AB with two pars of correct arcs

(ii) circle with radius 3 cm, centre C.

(b) X marked in the intersection of the bisector and the circle.

Comments

Performance in Question 19 was generally not good. A fairly good number of candidates was able to construct a perpendicular bisector of AB as per the requirement of part (a)(i). However, a relatively small proportion of the candidature was able to construct the locus of points 3 cm from C as it was required in part (a)(ii). Hence, a few candidates were able to properly mark the position of X.

20. (a) Given that $p = 3 - 2q$,

Find the value of p, when $q = -3$. **[2]**

(b) Linda invested E500 in a bank at 5 % simple interest per annum.

Find the amount of interest after 4 years. **[2]**

Answers

(a) $p = 9$

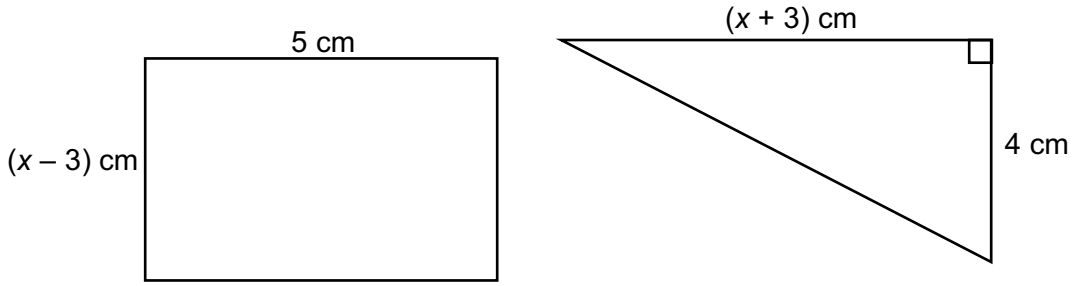
(b) 100

Comments

Part (a) in this question was fairly done. Most candidates were able to substitute the given value of q in the expression of p. However, a number of them were failing to work out the answer properly (i.e. $3 - 2(-3) = -6$). There were other candidates who could not substitute the value of q and thus obtained

an incorrect answer (i.e. 3 – 2 – 3 = −2). Common errors in part (b) included cases where candidates worked out 5% of E500 and never multiplied the outcome by 4. For some candidates even the 5% of E500 would be incorrect.

21. The diagram shows a rectangle and a triangle.



(a) Find an expression in terms of x, for the area of the triangle. **[1]**

(b) The area of the rectangle is equal to the area of the triangle.

Form an equation and solve for x. **[3]**

Answers

(a) $\frac{1}{2} \times 4(x + 3)$

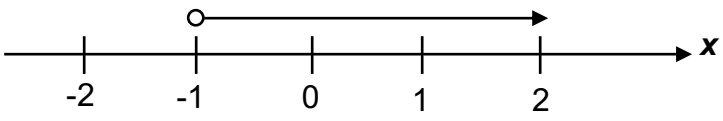
(b) $x = 7$

Comments

Performance in this question was not good. Most candidates were failing to properly present the expression for the area of the triangle in part (a). For some candidates, the expressions would be short of the brackets in x +3 which made the whole of the expression mathematically incorrect (i.e. $\frac{1}{2} \times 4 \times x + 3$). In part (b), there were candidates who did not notice they were supposed to equate the expressions for the areas of the rectangle and the triangle. Other candidates did notice that they were to equate the expressions for the areas but their expressions were incorrect which yielded incorrect responses as well.

22. (a) Solve 3 = 5 + *y*. **[1]**

(b) Write an inequality describing the values of *x* represented by the number line. **[1]**



(c) Simplify $\frac{2}{x} - \frac{1}{2x}$ **[2]**

Answers

(a) $y = -2$

(b) $x > -1$

(c) $\frac{3}{2x}$

Comments

Part (a) of this question was well done. A common incorrect answer was $y = 2$ instead of $y = -2$.

Performance in part (b) was unsatisfactory as the majority of the candidates were presenting incorrect answers. The most prevalent wrong responses were $-1 < 2$, $x < -1$ and $-1 < x < 2$.

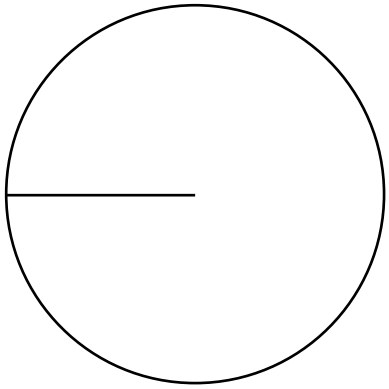
In part (c), most candidates failed to determine the LCM of x and $2x$. Some candidates would fail to come up with correct equivalent forms of the original algebraic fractions even when their LCD was correct. There were also some other candidates who presented the common denominator as a product of the two denominators and never simplified their final answer. Common incorrect responses included: $\frac{3x}{2x^2}$, $\frac{3x}{(2x)(x)}$, $\frac{3x}{2x-x}$.

23. The table shows fruit trees that a gardener has.

Fruit	Mango	Peach	Orange
Number of trees	15	6	9
Pie chart sector angle	180°	72°	

(a) Complete the table. **[1]**

(b) Complete the pie chart to show this information. **[2]**



Answers

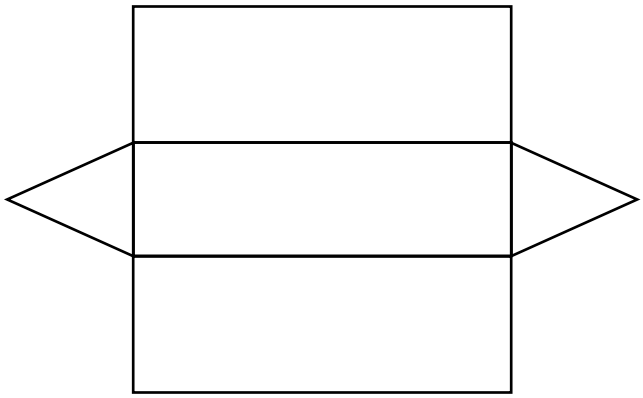
(a) 108°

(b) Three correct sectors

Comments

This question was well performed by most of the candidates. However, there were instances where candidates had sectors not matching any of the given angles and it was very difficult to ascertain how they came up with those sectors. A common incorrect answer to part (a) was 107°.

24. The diagram shows the net of a solid.



(a) State the mathematical name of the solid. **[1]**

(b) Write down the number of edges of the solid. **[1]**

Answers

(a) Triangular prism

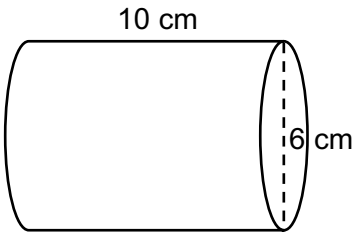
(b) 9

Comments

Most candidates were failing to give the correct name for the solid (part (a)) whose net was given in the question. Common incorrect responses included: net, cuboid, triangular, triangular pyramid and rectangular solid (or prism). In addition, a majority of the candidates were unable to count the number of edges in the solid whose net was given.

25. The diagram shows a cylinder of diameter 6 cm and length 10 cm.

Calculate the volume of the cylinder. (Use π = 3.14) **[2]**



Answers

282.6 cm^3

Comments

Performance in Question 25 was generally unsatisfactory. Very few candidates were able to arrive at the correct answer. The problem for most of the candidates was with the formula for the volume of a cylinder. Others did have the correct formula for the volume of the cylinder but substituted incorrectly in that formula. More often than not, candidates were using 6 cm in the place of radius yet the 6 cm

was the diameter of the circular cross-section (i.e. $3.14 \times 6^2 \times 10$). There were other candidates who were only calculating the area of the circular cross-section and did not multiply the result by the length of the cylinder (i.e. $3.14 \times 3 \times 3$).

26. (a) Construct parallelogram PQRS with PQ = 9 cm, QR = 5.5 cm and angle PQR = 120°. [3]

(b) Using your diagram in (a),

(i) Find angle SPQ. [1]

(ii) Measure the shortest distance from S to line PQ. [1]

Answers

(a) Correct parallelogram

(b) (i) 60°

(ii) 4.7 cm

Comments

In this question, most candidates were failing to locate accurately the position of S in the parallelogram. The majority of the candidates did not notice that they were supposed to use compasses to easily locate S in the parallelogram. Very few candidates had construction arcs at S. On another note, it was observed that some candidates did not have knowledge of how a parallelogram looks like. This was evidenced by the kind of shapes some candidates had in the place of the parallelogram. Some had triangles, some had trapeziums and others had random irregular quadrilaterals. For part (b)(i), most candidates were measuring their angle SPQ which was often times not matching the mark scheme due to the inaccuracies in the parallelogram. The most common incorrect answer in part (b)(i) was 120°. A major challenge in part (b)(ii) was in identifying the shortest distance from S to line PQ. Some candidates did not recognize that they were required to measure the perpendicular distance from S to the line PQ.

27. The scale of a map is 1 : 1 000 000.

Two towns are 155 km apart.

Find the distance between the towns on the map. [3]

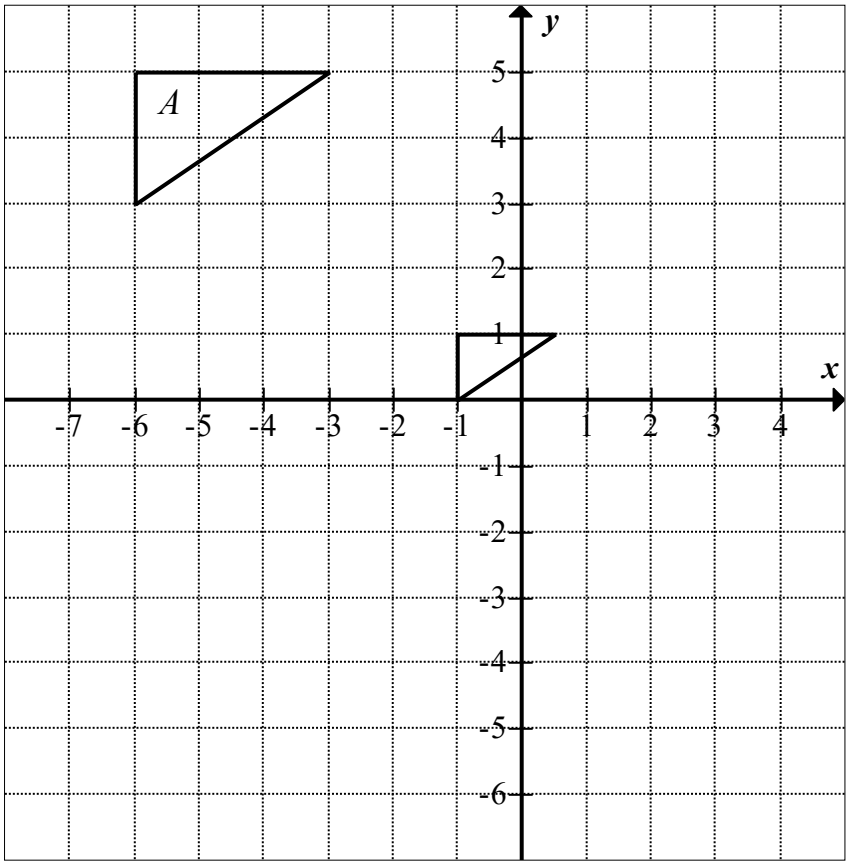
Answer

11.5 cm

Comments

In Question 27, it was very rare for a candidate to obtain the correct answer. Most candidates did not realise they were supposed to convert 155 km to cm if they used the scale as it was given. Alternatively, they were to convert 1 000 000 cm to km in order to use 155 km in their working. Common incorrect answers to this question included: 115, 115 000 and 115 000 000.

28. The grid shows triangle A and triangle B.



(a) Triangle A is mapped onto triangle B.

Describe the single transformation that maps triangle A onto triangle B. **[3]**

(b) Draw triangle C, the image of triangle A after a translation, vector $\begin{pmatrix} 0 \\ -8 \end{pmatrix}$. **[2]**

Answers

(a) Enlargement, centre (4, −3), scale factor 0.5.

(b) Correct image with points (−6, −3); (−3, −3) and (−6, −5).

Comments

A majority of the candidates were unable to describe fully the transformation that maps triangle A onto triangle B as per the requirement of part (a) of Question 28. A major challenge here was to find the centre and the scale factor of enlargement for the many candidates who were able to identify the kind of transformation it is. A common error was in the scale factor and candidates were either expressing it as $-\frac{1}{2}$ or 2.

For part (b), translating triangle A by the given vector was not a challenge for most of the candidates. Other candidates would have one out of the three vertices of the triangle wrongly placed.

CONCLUSION

In a nutshell, this year's cohort of candidates demonstrated a deficiency with respect to such topics as: rounding off and limits of accuracy, indices, angle properties of polygons, probability, equations of straight line, volume and surface area, construction and transformations. Moreover, most of the candidates generally had difficulty in application and synthesis questions such as word problems.

Paper 309/02

General Comments

A majority of candidates were able to attempt most of the questions in the paper compared to previous year's cohort, even though no candidate scored the maximum marks. Marks scored by candidates in this paper ranged from 0 to 99. The number of candidates who scored the zero mark decreased significantly. There were very few candidates who were leaving questions unanswered. Most candidates were showing their working. There were a few cases where candidates would write correct answers without working, or with cancelled or erased working.

The paper had three questions on algebraic fractions which required cross multiplication. It was observed that most candidates were not cross multiplying, instead they were multiplying the numerator of the first fraction by a constant that was supposed to be used for the second fraction and likewise in the second fraction. This kind of working was common and it affected the performance of most candidates.

One of the questions in the paper required candidates to draw their own scale of which that was a challenge to some candidates. They were drawing very small diagrams which were challenging to read and interpret. Still on scale, some candidates had challenges in reading given scales in question **2(b)** to the extent that they also could not read their own scales in question **10 (b)**. In question **6(c)**, some candidates came up with their own scales which eventually gave them limitations when drawing the required graphs.

Even this year most candidates were failing to score marks in questions with "Show that". This was evident in question **9 (a)**. Candidates had a lot of inaccurate responses. The candidates did not understand that they should apply a mathematical concept on the given information in the question to come up with the required solution.

Question 1

(a) This question was generally well done by the candidates even though some candidates were including curly brackets in their answers in fact they were giving their answers as sets. Some were giving answers outside the given range for each question.

(i) Fairly done

Some candidates could not differentiate between square numbers and cube numbers. The most common wrong answer for this question was 27 which was an answer for part (a)(ii). Some candidates gave answers not between 26 and 45 inclusive, for example, answers like 11. 4, 9, 16, 25, 49 and 64 were common.

Expected Answer: 36

(ii) Fairly done

Like in part (a)(i) above some candidates could not differentiate between cube numbers and square numbers. The most common wrong answer for this question was 36 which was an answer for part (a)(i). Some candidates gave answers not between 26 and 45 inclusive, like 8 was also common in this question.

Expected Answer: 27

(iii) Well done

Candidates could give the correct answer in this question. Those who failed this question were either giving any of the factors of 62 or listing all the factors of 62.

Expected Answer: 31

(iv) Well done

Most candidates did well in this question. Those who missed this question were giving 1 as the LCM of 6 and 7.

Expected Answer: 42

(b) Fairly done

Most candidates were showing proper working to come up with the prime factors of 180 but could not present these as a product. The multiplication sign was missing to most candidates who lost marks in this question. Answers like $2^2\,3^2\,5$ were seen. Some candidates were including 1 (like $2^2 \times 3^2 \times 5 \times 1$) in their answers. Another common wrong answer was $2^2 \times 5 \times 9$.

Expected Answer: $2^2 \times 3^2 \times 5$

(c) Generally this question was poorly done. It was common for candidates to put brackets for a number together with the sign before it, for example (- 5). Most candidates could not understand the meaning of 'a pair' in the question hence two pairs of brackets were seen in the candidates' responses. Some candidates re-wrote the sentence before inserting the brackets and, for some, while doing this they didn't write the equal sign and the number after the equal sign. These candidates, even if they could place the correct brackets, their sentences became meaningless.

(i) Poorly done

Common wrong answers were $(4 + 20) - (5 \div 3) = 9$ $4 + 20 - (5 \div 3) = 9$, $4 + 20(-5) \div 3 = 9$ and those who re-wrote the question some ended up with $4 + (20 - 5) \div 3$

Expected Answer: $4 + (20 - 5) \div 3 = 9$

(ii) Poorly done but was better than part (i)

Common wrong answers were $(25 - 2) \times (4 - 8) = 33$, $(25 - 2) \times 4 - 8 = 33$, $25 - (2 \times 4) - 8 = 33$ and those who re-wrote the question some ended up with $25 - 2 \times (4 - 8)$.

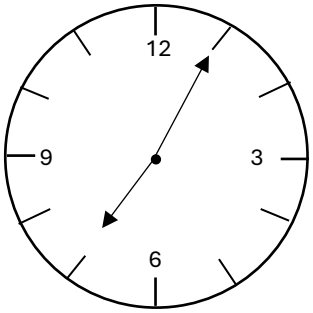
Expected Answer: $25 - 2 \times (4 - 8) = 33$

Question 2

(a) (i) Poorly done

Most candidates failed to add 30 minutes on 0635 hours to get 0705 hours. Those who were able to get the correct time after addition could not complete the clock diagram correctly. In some candidates' drawings it was difficult to differentiate the hour hand and the minute hand as they were of the same length. Some had the minute hand at 5 shorter than the hour hand at 7. Some candidates included the second hand on wrong positions.

Expected Answer:



(ii) Poorly done

Most candidates had an idea of what was required by this question but failed to convert 30 minutes to hours. Most candidates had $\frac{4}{30}$ which gave 1.33 to some while some candidates got 7.5 from the calculation $\frac{4}{30}$. These candidates would round of the 7.5 to get 8 which was a correct answer for the question but from a wrong working. Some candidates who had $\frac{4}{1/2}$ were unable to divide fractions such that their answer was 2.

There were candidates who had $\frac{4}{0705}$ and were stuck along the way.

Expected Answer: 8 **km/h**

(b) (i) Poorly done

Most candidates we unable to read the scale in the vertical axis correctly. The most common wrong answers in this question were 10 km, 10.2 km, 11 km

Expected Answer: 10.5 **km/h**

(ii) Well done

Most candidates were getting this question correct. Those who failed this question were giving their answers as 55 minutes.

Expected Answer: 45 **min**

(iii) Poorly done

Most candidates proved to have some difficulty in reading the scale in this question. Several wrong answers were seen like 1 hour 20 minutes, 11 hours 20 minutes, 1 hour 5 minutes, 3 hours 30 minutes.

Expected Answer: 1 hour 30 minutes

Question 3

(a) (i) Fairly done

There were some candidates who got the correct answer of 32 from a wrong working of $\frac{4}{7} \times 72$. Some candidates did not understand how to perform calculations using ratios. This was evident in that they just divide 72 by 4 to get 18 as the most common wrong answer. It was also common to see 72 – 4 = 68.

Expected Answer: 32 **men**

(ii) Well done

Most candidates did well in this question but it was common for the candidates not to simplify the fraction $\frac{16}{72}$ or partially simplify it to get $\frac{8}{36}$ or $\frac{4}{18}$ as their final answers.

Expected Answer: $\frac{2}{9}$

(b) Fairly done

A vast number of candidates had $\frac{70}{20}$ but failed to present their answers in the correct format of writing currencies. Most candidates had 3.5 as their final answer. Some candidates left their answers as $3\frac{1}{2}$. Those who completely failed to execute $\frac{70}{20}$ were getting 3.10. There were some candidates who presented their answers as € 3.50 : E 70.

Expected Answer: € **3.50**

(c) (i) Poorly done

Very few candidates were getting this question. The most common wrong answer was 1:3. Some candidates left their answers as $\frac{1}{2} : 3$.

Expected Answer: 1 : 6

(ii) Poorly done

Very few candidates were getting this question. The most common wrong answer was $\frac{3}{4} \times 72 = 54$. Some candidates had $\frac{72}{3} = 24$.

Expected Answer: 48

Question 4

(a) Fairly done

Partial factorisation was common in this question, such that common wrong answers were $y(4x^2 - xy)$ and $x(4xy - y^2)$. Some candidates were factoring out 4 such that the following answer was also common $4xy(x - y)$. There were candidates who factored out xy but got wrong factor in the bracket.

Expected Answer: $xy(4x - y)$

(b) (i) Fairly done

Most candidates failed to work out the indices. Some of those who correctly dealt with the indices did not simplify the numbers resulting in most common wrong answers like $\frac{12}{4} f^{-4} g^2$. Some candidates were getting $3g^2 f^4$

Expected Answer: $\frac{3g^2}{f^4}$

(ii) Poorly done

It was still a common error, even with this year's cohort, to get rid of the denominator and to fail to deal with the second bracket with a negative sign before it. Common wrong answers were $4x + 7$, $4x - 23$ and $\frac{4x - 23}{6}$. It was also common for the candidates not to cross multiply the denominators and the following calculation was common.

$$\frac{3(5x - 4) - 2(2x - 5)}{6} = \frac{11x - 2}{6}$$

Expected Answer: $\frac{4x + 7}{6}$

(c) Fairly done

Most candidates did well in this question but they were failing to present their answers correctly. They were getting the $y = \frac{12}{7}$ but when trying to simplify this they were getting wrong answers like $y = 1.71$ and $1\frac{5}{12}$. Like in question (b)(ii) above, some candidates were not cross multiplying the denominators instead they were performing the following calculations

$4y = 3(3 - y) \Rightarrow 7y = 9 \Rightarrow y = \frac{9}{7}$. Other candidates failed to open the bracket on the right

hand side of the equation. They were getting $3y = 4(3 - y) \Rightarrow 3y = 12 - y$, which led to the answer $y = 3$.

Some candidates were retaining the common denominator and in most cases they were drawing one division line from left to the right of the equation. They had $\frac{3y = 12 - 4y}{12} \Rightarrow \frac{7y = 12}{12}$ and got stuck there after.

Expected Answer: $y = \frac{12}{7}$

(d) Fairly done

Most candidates had an idea of what was required by this question but failed to manipulate the brackets. Most of them were not multiplying the second term of each bracket by the scalar outside the bracket such that they were getting $6x + 1 + 12x - 2 = 18x - 1$. This was the most common wrong answer.

It was also common for the candidates to present their responses as $18x + -6$.

Expected Answer: $18x - 6$

(e) Poorly done

Most candidates were changing the numbers to ordinary numbers then took the sum to get 261000. Most of these candidates failed to give this number in standard form. Some were leaving it as an ordinary number while some were writing the number to 2 significant figures like 2.6×10^4. Some candidates got $0.00023 + 0.0031 = 0.00333$ while others just added 2.3 and 3.1 to get 5.4 and presented their answers as 5.4×10^4. There were those candidates who multiplied 2.3 and 3.1 and their answer was 7.13×10^7.

Expected Answer: 2.61×10^4

Question 5

(a) This question proved to be accessible but candidates were having a problem with writing probabilities. Some did not have the denominators while some had the denominator of 25. There were those who changed their answers to decimal numbers.

(i) Fairly done

Common wrong answers were 8, 17, $\frac{17}{30}$, $\frac{8}{25}$ and 0.266.

Expected Answer: $\frac{8}{30}$

(ii) Common wrong answers were 8, 17, $\frac{8}{30}$, $\frac{17}{25}$ and 0.566.

Expected Answer: $\frac{17}{30}$

(iii) Fairly done

Most candidates got this question but there were those who could not understand the question such that their answers were either 'Maths' or 'Science' . Other common wrong answers were 5, $\frac{5}{25}$, $\frac{1}{30}$and 0.166.

Expected Answer: $\frac{5}{30}$

(b) (i) Poorly done

The concert tested by this question was well done by the candidates. Most candidates who could not score all the marks in this question were failing to manipulate directed numbers. Some common wrong answers were $3\begin{pmatrix}-3\\-5\end{pmatrix}-\begin{pmatrix}6\\2\end{pmatrix}=\begin{pmatrix}9\\15\end{pmatrix}-\begin{pmatrix}6\\2\end{pmatrix}=\begin{pmatrix}3\\13\end{pmatrix}$,

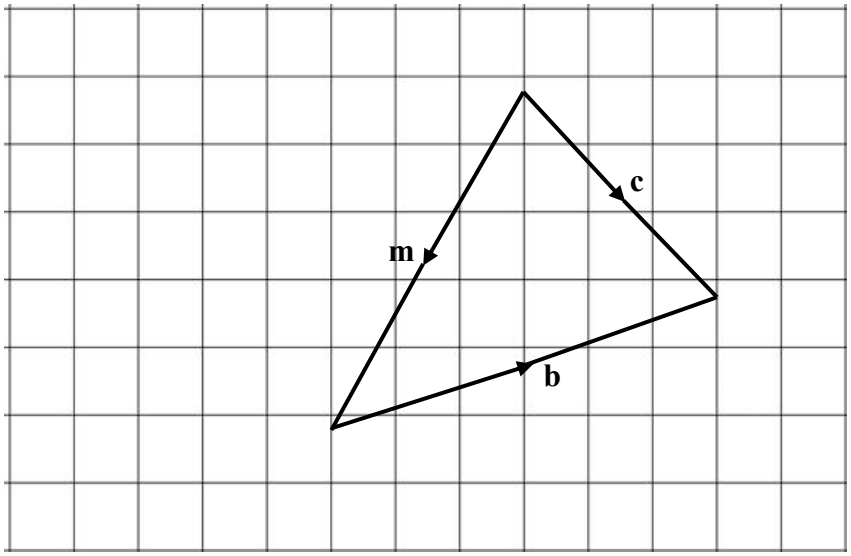
$3\begin{pmatrix}-3\\-5\end{pmatrix}-\begin{pmatrix}6\\2\end{pmatrix}=\begin{pmatrix}-9\\-15\end{pmatrix}-\begin{pmatrix}6\\2\end{pmatrix}=\begin{pmatrix}3\\13\end{pmatrix} or \begin{pmatrix}15\\17\end{pmatrix} or \begin{pmatrix}-3\\-13\end{pmatrix}$

Expected Answer: $\begin{pmatrix}-15\\-17\end{pmatrix}$

(ii) Poorly done

Some candidates drew the three vectors separately, While sum added the column vectors $\begin{pmatrix}-3\\-5\end{pmatrix}+\begin{pmatrix}6\\2\end{pmatrix}=\begin{pmatrix}3\\-3\end{pmatrix}$. Some candidates drew the coordinate axes and show the position vectors of these three vectors. Some of the candidates who had the correct triangle were either not labelling their vectors or not having arrows or both.

Expected Answer:



Question 6

(a) Most candidates were swapping the answers for part **(i)** and part **(ii)**. This showed that they were confusing gradient and y-intercept.

(i) **Poorly done**

Some candidates wrote the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ and some were confused how to use it while some used the table in part **(b)**. Common wrong answers were $\frac{2}{3}$, $6 - \frac{2}{3}$, $-\frac{2}{3}x$, 6 and undefined.

Expected Answer: $-\frac{2}{3}$

(ii) **Poorly done**

Common wrong answers were $y = 6$, $-\frac{2}{3}$

Expected Answer: 6

(b) **Fairly done**

Most candidates were getting either of the two solutions expected in this question, while some were getting this question correct.

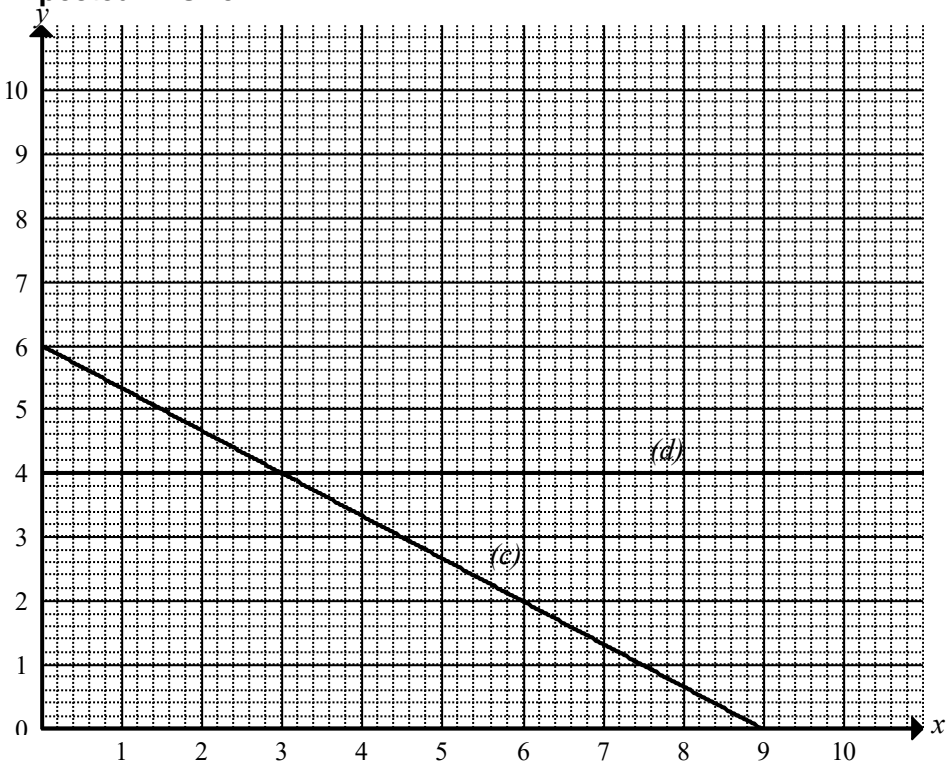
Expected Answer:

x	0	6	9
y	6	**2**	**0**

(c) Fairly done

Candidates failed this question because of the coordinates in their table which were not forming a straight line. Some candidates drew their own coordinate axes and that resulted to confusing diagrams.

Expected Answer:



(d) Poorly done

Some candidates drew a vertical line through (6,0) while others drew a horizontal line through (0,6) with others drawing a vertical line through (4,0) or any two combinations of these.

(e) Fairly done

A number of candidates got this question. It was common for candidates to write coordinates without brackets.

Expected Answer: (3, 4)

Question 7

(a) Fairly done

Some candidates divided by 5 before collecting like terms and then got confused. Some candidates got to the stage $\frac{10}{5} = \frac{5x}{5}$ but in some cases the answer was $x = 5$.

Expected Answer: $x = 2$

(b) Poorly done

Some candidates were changing the sign in the first step and again change it when dividing by -4 and this led to the answer of $x \leq -5$. Some candidates had $-4x \leq 46$ after collecting like terms

which led them to a wrong answer. Others were dividing by the -4 before collecting like terms. Other common wrong answers were $x = -5$ and $x > -5$ or $x < -5$.

Expected Answer: $x \geq -5$

(c) Poorly done

Most learners were not multiplying by the LCM on the right hand side of the equation such that they had $2(2x + 4) + 5(x - 1) = 3$

Expected Answer: $x = 3$

(d) (i) Expected Answer: $30 + x + 30 + 2x + 3x = 180$

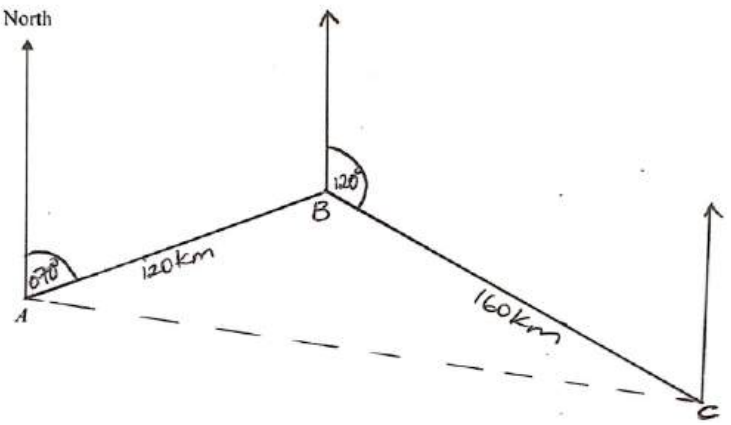
(ii) Expected Answer: $x = 20$

Question 8

(a) Fairly done

Some candidates were not drawing the north lines, more especially at the point B, while some had non-parallel north lines. Some diagrams had arrows at the point C. Most candidates were able to use the given scale of 1cm to represent 20 km. Some candidates could not draw accurate angles due to the use of wrong scale on the protractor.

Expected Answer:



(b) Fairly done

Most candidates understood what was required by this question but some were failing this question due to reading a wrong scale on the protractor. The acute angle between the North line at C and the line AC was around 82° but some candidates were reading this one as 98° if not 102°, hence the common wrong answers for this question were 262° or 258°.

Expected Answer: 278°

(c) Fairly done

Some candidates did not convert their measurements in centimetres to kilometres. Some of those who tried to covert to kilometres were multiplying by a wrong scalar.

Expected Answer: 254 km

Question 9

(a) Poorly done

Most candidates did not know what was required by this question. Some candidates were drawing a line that is 8cm and labelled it YZ. Answers like 10 – 2 = 8 and 6 + 2 = 8 were common. Some candidates wrote the given dimensions on the diagram.

Expected Answer: $\sqrt{10^2 - 6^2}$
$= \sqrt{64}$
$= 8$

(b) Poorly done

Some candidates measured the angle $Y\hat{X}Z$ on the given diagram and hence the most common wrong answer was 55°. Some candidates left their answers as $\sin^{-1}\left(\frac{8}{10}\right)$ or $\cos^{-1}\left(\frac{6}{10}\right)$. Other common wrong answers were 0.8°, 0.6° and 0.3°.

Expected Answer: 53.1°

(c) Poorly done

Most candidates just calculated the area of the circle hence their final answer was 78.5. Some candidates gave the area of the triangle as length X breadth which resulted to the area of 48. Other common wrong answers were 78.5 – 48 = 30.5 cm^2.

Expected Answer: 15.25 cm^2

Question 10

(a) (i) Poorly done

Most candidates were struggling to find the mode. Some candidates found the mode to be 10 which was appearing more frequently in the frequency column, while others were giving the mode as 50. Some candidates were giving 4 & 5 as the mode. There were those candidates who stated that the mode was 14.

Expected Answer: 6

(ii) Fairly done

Some candidates were finding the correct median position and gave that as the final answer. Those who could not interpret the frequency table correctly were giving the median as $\frac{5+6}{2} = 5.5$. There were candidates who were arranging the frequencies like 3, 5, 8, 10, 10, 14 then find the middle frequency as 9 which eventually became their median.

Expected Answer: 5

(iii) Poorly done

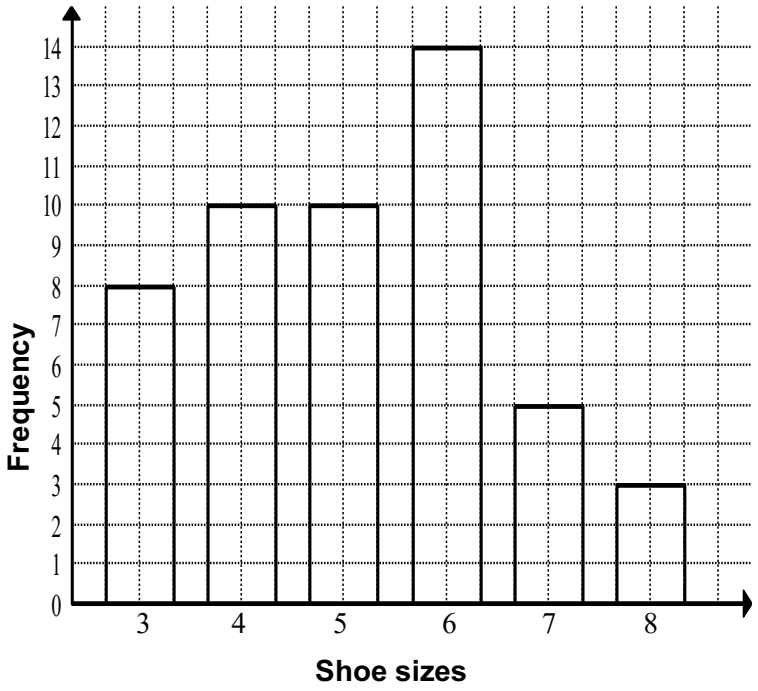
Candidates were giving a variety of solutions in this question. Some candidates added the six variables and divided by 6 to get $\frac{33}{6} = 5.5$. Some found the mean to be $\frac{50}{6}$ or $\frac{50}{7}$ of which 50 was the total frequency. Some candidates had $\frac{50+1}{2} = 25.5$. Some of the candidates who were finding the correct sum of frequency X variable but they divided this by 6 instead of 50.

Expected Answer: 5.14

(b) Poorly done

Some candidates were drawing a pie chart in this question. Some were plotting points like (3,8) and draw vertical lines from the horizontal axis to each of those points. Some of those who had correct diagrams were swapping the variables with the frequencies while others were not labelling their axes. Some candidates were writing the numerical variables as graduations of a scale such that after drawing the bars it was not clear which bar was for which variable. Some were rearranging the variables in order of increasing frequencies. It was positive that most candidates were drawing bar charts with equal spaces between bars and their bars had equal widths.

Expected Answer:



(c) Fairly done

Common wrong answers in this question were $\frac{0}{6}$, $\frac{0}{8}$, $\frac{9}{50}$, none and impossible.

Expected Answer: 0

Question 11

(a) (i) Expected Answer: DC and AB

(ii) Fairly done

Most of the good candidates were failing this question. Some used alternate angles while some wrote 55° and 55°. There were those who had x and k as their corresponding angles.

Expected Answer: $E\hat{D}C$ **and** $D\hat{A}B$ **or** $E\hat{C}D$ **and** $C\hat{B}A$

(b) (i) Well done

The few candidates who missed this question were either leaving it unattended or writing 125° or $\frac{125}{2} = 62.5°$.

Expected Answer: 55°

(ii) Fairly done

Common wrong answers for this question were $\frac{125}{2} = 62.5°$, 55°.

Expected Answer: 27.5°

(c) Fairly done

Different spellings of the word 'trapezium' were observed in this question. Some even went to the extent of writing 'triprism' which brought a different concept altogether.

Other common wrong answers were parallelogram, square, triangular prism while rhombus was most common.

Expected Answer: trapezium