MATHEMATICS

SUBJECT 4008/4028

PAPER 2

GENERAL COMMENTS

General performance of candidates was poor with the majority in the 0-10 marks group. This shows that candidates were not prepared thoroughly for the examination. Some never attempted questions from Section B.

Many candidates continue dividing pages which makes it difficult to allocate marks. Presentation of work was not neat with some work very difficult to follow. Teachers should emphasize on neat and orderly presentation of work.

Cases of cheating on the part of candidates and centres continue to cause concern. Centres are encouraged to make their invigilators supervise their classes thoroughly to avoid copying and collusion. ZIMSEC examiners are professionally trained to detect any cases of cheating. Stiffer penalties should be given to all found cheating and banning of centres found.

Irritating and bad comments still appear in the candidates' scripts some of them insulting the examiners. Centres must check that candidates do to write these provocative comments.

Some centres do not thoroughly do their marking of registered as some candidates are indicated as present when their scripts are missing or some indicated as absent but scripts are present. Counting of scripts should be accurate and tally with register. The labeling should also be accurate on the subject code and paper.

Some centres mixed 4008 and 4028 papers in one envelope. These are separate papers. Worse still, some indicate paper 1 when it is paper 2 or mix the scripts in one envelope. Splitting of large centres should be done accurately so that examiners do not end you marking scripts not allocated to them.

Centres to make sure that candidate are up to date with rules and regulations governing examinations.

QUESTION BY QUESTION ANALYSIS

QUESTION 1

(a) The examiner expected candidates to follow the rules of precedence starting with division and then addition. Some candidates book the ÷ sign as a +. This was not considered since the + sign was there in the question. Some also inverted $\frac{16}{9}$ instead of $\frac{8}{3}$ resulting in wrong solution.

Solution: Many first added $\frac{1}{3}$ to $\frac{16}{9}$ then dividing which was wrong. However the question was fairly done.

(b) Candidates were expected to subtract \$148,80 from \$160, and then express the difference as a percentage of \$160. Some got \$148,80 as a percentage of \$160 but forgot to subtract from 100%. No marks were given for this method which was not complete. Accuracy was poor with changing from dollars to cents the problems. Question was done well by the majority of candidates.

Solution: 7%

(c) Candidates had to equate the function to zero and solve for x by factorization. Others used the method of quadratic formula or completing the square which was time consuming. Some trial and error methods were seen where they subtitled in the function to get zero, however, most had one answer. There was lack of knowledge of functional notation. Question was not done well.

Solution: x = 1 or 3

QUESTION 2

(a) Candidates were expected to find the L.C.M. of denominators and express the expression with this denominator simplified. Then equate this to $\frac{3}{x}$ and then solve the equation. This was done very well but some candidates left the division sign resulting in loss of marks.

Solution: $\frac{3x-1}{(x-1)(x+1)}$ and x =3.

(b) They were to separate the inequality then solve the two separately. Then combine the two solutions to come up with integral values of y. This was done poorly by many candidates where separation was the problem.

Solution: -3< $y \leq 1$ and {-2; -1; 0; 1}

(c) The examiner expected candidates to either form two equations $x + y$=26 and $8x$-$5y$=0. Solving would give the number of questions got correct. A lot of trial and error methods were used that gave correct solutions. These got full marks. Common answer were 0 and 13 got from guess work. This was done fairly well.

Solution: 10 correct answers.

QUESTION 3

(a) (i) Candidates had to substitute and simplify correctly. Most did well but accuracy let down some especially ½ x 9,8 x 2^2 which was simplified wrongly.

Solution: 20,4

(ii) Candidates were to remove fractions first, then isolate the term in q, then divide both sides by t^2. This was done poorly by many students. They changed sights and some left it not simplified i.e. $\frac{ut-s}{½t^2}$.

Solution: $g = \frac{2(ut-s)}{t^2}$ or equivalent forms.

(b) (i) The naming of the triangle was to be in correct order. This was poorly done by majority of candidates. Some gave names of types of triangles.

Solution: Δ AED

(ii) Candidates were supposed to use similar triangles to answer this question, i.e. $\frac{BC}{4} = \frac{8}{10}$. This was done poorly with the majority using Pythagoras theorem or trigonometry.

Solution: BC = 3,2 cm

This part of the syllabus is very unpopular with candidates showing lack of preparation by teachers. Teachers must do more for this topic. [Similar Triangles].

QUESTION 4

(a) (i) Candidates were to write an equation connecting P, V, T and K. Many left it in the form of $P \propto \frac{KT}{V}$ which did not score.

Solution: $P = \frac{KT}{V}$ or other correct forms.

(ii) Candidates had to substitute on the equation and solve for k. Conversion of standard form to ordinary form or manipulation in standard form was the thrust of the question. A variety of answers were got showing misinterpretation of standard form, e.g. 0,06; 66,6 and others. These did not score as they showed lack of standard form manipulations. This part of the question was done poorly by the majority of candidates.

Solution: $k = \frac{2}{3}$

(iii) The candidates had to use their k correctly in the substitution to get the value of P in ordinary or standard form. Those with the correct equation did well.

Solution: P = 80 000

(b) (i) Candidates were expelled to show ability to multiply matrices correct and give answer in required form with brackets. Omission of brackets resulted in loss of marks. This was done very well by the majority of candidates.

Solution: $\begin{pmatrix} 1 \\ 23 \end{pmatrix}$

(ii) Candidates had to find the inverse of matrix M. The notation used was not familiar with some candidates who found reciprocals of M. This question was done very well.

Solution: $\frac{1}{10}\begin{pmatrix} 4 & 2 \\ 1 & 3 \end{pmatrix}$

(iii) Candidates had to show ability to multiply matrices getting in a single number which was to be in brackets. Most left out the brackets or left it was (15-7). This question was done very well.

Solution: (8).

Work o matrices showed that most candidates had been prepared in this topic. Teachers are to be commended for the good work in this topic.

QUESTION 5

(a) Candidates had to use the appropriate circle theorems to find the angles. Parts (i) and (ii) were done well but (iii) and (iv) were done poorly. Some just copied numbers in the question like 36° and 66°.

Solution: (i) $C\hat{B}O = 54°$ (ii) $B\hat{T}C = 54°$
(iii) $D\hat{E}F = 76°$ (iv) $\widehat{ACB} = 14°$

(b) (i) Candidates had to find $\frac{6}{4}$ of 500g. This was done very well with most candidates getting all marks.

Solution: $150g$

QUESTION 6

(a) Candidates were expected to use ruler and compasses only and leave the construction arcs on the diagram. They had to use the scale given to change lengths from metres to centimeters. Some did not construct the angle of 60° but measured. This part was done well.

(b) Candidates were expected to draw the following lines:

(i) A pair of parallel lines to AB on either side of AB, 3cm away.

(ii) A perpendicular bisector of side AB using ruler and compasses only.

(iii) Draw an arc of a circle centre B radius 6cm inside the quadrilateral.

Teachers are to be commended for effectively teaching this topic as candidates got high marks in this question. Emphasis should now be on making sure diagrams are neat with all arcs visible.

(c) Candidates had to shade the region above the 3cm parallel line inside the quadrilateral and on the left of perpendicular bisector towards A. This was done poorly.

QUESTION 7

(a) (i) Candidate had to find the relationship height and radius which was h=25, then express volume in terms of π and r only. This was done poorly as most left it in terms of π, r and h.

Solution: $V = \frac{2}{3}\pi r^3$

(ii) There was to be equating of volume formula to 20ml and solve for r. Emphasis was on finding the cube-root. This was poorly done.

Solution: r = 2,121 cm

(iii) Candidates were expected to find full glasses by dividing 750ml by 20ml getting 37,5. Full glasses not to be approximated upwards. Common wrong answers were 37,5 and 38.

Solution: 37 glasses

(b) (i) Candidates were expected to calculate the area of a triangle using the given information. Some left it not simplified loosing marks.

Solution: Area = $\frac{1}{2}x(x-7)$

(ii) The area expression had to be equated to 6, i.e. $\frac{1}{2}x(x-7)=6$ and then reduced correctly to x^2-7x-12=0. Some worked from the answer losing marks.

(c) Candidates had to solve the equation using the quadratic formula correctly. Some continue to use the wrong formula with some leaving the division line or making it too short to cover all terms in the numerator. Those with the correct formula did well although some could not give the solutions to two decimal places.

Solution: x = -1,42 or 8,42

QUESTION 8

(a) Candidates had to use the correct scale to draw the x and y axis. Plot the 10 given points and join them with a smooth curve. The plotting was done well but graphs were not fairly smooth especially at the turning point that was flat.

(b) Candidates had to use the graph to answer the questions showing evidence of use of graph as seen in lines or marks.

(i) Turning point was the maximum of the curve.

Solution: $13,\begin{matrix}50\\05\end{matrix}$

(ii) Candidates had to read the values of π where the graph crossed the x-axis. No credit was given for solving using the formula.

Solution: x = +1, $\begin{matrix}2\\1\end{matrix}$ or $-6,\begin{matrix}2\\1\end{matrix}$

(iii) Candidates had to draw a line y=9 to cut the curve at two points then read the values of x at these points. This was done poorly as many could not compute the graph well.

Solution: x = -4, $\begin{matrix}7\\3\end{matrix}$ or $-0,\begin{matrix}7\\3\end{matrix}$

(iv) Candidates had to draw a tangent to the curve at x=0 and then find the gradient of the line. Many drew the tangents but could not accurately calculate the gradient which was negative.

Solution: Gradient = -5±0,2

QUESTION 9

(a) Candidates were expected to use the graph to answer the questions.

(i) Had to find the gradient of the correct part of graph. This was not done well since the time was 50 minutes, they could not change it to hours. However, some gave the correct speed in other units like km/m, m/m or m/s, these scored full marks.

Solution: 6 km/h

(ii) Candidates were reading from the graph and this was done very well. Many scored full marks.

Solution:

1.	10.00 am	2.	8.40 am
3.	2 km	4.	20 minutes
5.	1 km		

(b) Candidates were expected to be familiar with a deck of cards and the different types of cards. Many did not do well showing that probability as a topic is not being covered well by leaders.

Solution: $\frac{6}{169}$

QUESTION 10

(i) Candidates were expected to use the cosine rule to calculate BC using angle $B\hat{A}C$ which was 158° – 62°. Some used 158° and these did not score anything because it was not the correct triangle.

Solution: BC = 20,16 km

(ii) There was use of sine formula to find the angle. Candidates who used 158° also did not score marks. Many did not follow instructions to give the answer to the nearest degree. They gave 36,30 using the instructions on the front of question paper instead of the question.

Solution: $A\hat{C}B$ = 36°

(iii) Candidate had to calculate the angle that BC makes wit the south at B and then add it to 180° or use the cardinal points. This was done poorly by the majority of candidates.

Solution: 194° or S14°N

QUESTION 11

(a) Candidates had to be familiar with formation of inequalities given some information. This was done poorly showing lack of proper preparation on the part of teachers.

Solution: $x>6$ and $y>x$

(b) Formation of equality and then reducing it to the required form. First $400x + 300y \leq 6000$ had to be seen and correct reduction with no wrong working been to $4x + 3y \leq 60$. This was done poorly with some working from the answer and losing marks.

(c) Using the correct scale and shading the candidates had to define the region and use the region to answer the questions asked. This was done poorly.

(d) *(i)* $y = 10$ *(correct order that gave a tot al of 17* *(ii)* $x = 8$ *(iii)* $x = 7$ *or* 8 $y = 10$ *or* 9

This paper was not attempted by many candidates who choose the question. This shows that teachers are not concentrating on this topic or they give it very little time.

QUESTION 12

(a) Candidates had to draw triangle PQR from axis with correct scale. Many did this part very well.

(b) (i) Plotting and drawing of $\Delta P_1Q_1R_1$ on the same axis was done well. Description of the transformation was also done well but many left the minus sign on the vector.

(ii) Solution: Translation Vector = $\begin{pmatrix}-5\\-4\end{pmatrix}$

(c) Candidates were expected to draw the line y=x and then reflect ΔPQR in the line to get $\Delta P_2Q_2R_2$ or use the matrix for reflection in the line y=x which is $\begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}$ to get the candidates. This was done well.

Solution: $\Delta P_2Q_2R_2$ with coordinates P_2 (1;3), Q_2(1;4) and R_2 (3;4).

(d) Candidates had to enlarge correctly ΔPQR to $\Delta P_3Q_3R_3$. Many did not do well for they used the wrong centre and missed the minus sign in the scale factor.

Solution: $\Delta P_3Q_3R_3$ with coordinates P_3 (-1½). Q_3 (-2;1) and R_3 (-2;0)

(e) Candidates had to use the matrix to find the coordinates of $\Delta P_4Q_4R_4$ plot them and join. This was done very well by many candidates who chose this question.

Solution: $\Delta P_4Q_4R_4$ drawn with vertices at P_4 (3;-2) Q_4 (4;-2) and R_4 (4;-6)