RESUME OF THE MATHEMATICS SECTION

1. STANDARD OF THE PAPERS

The Chief Examiners for Mathematics (Core) 2 and Mathematics (Elective) 2 agreed that the standard of their respective papers compared favourably with those of previous years.

2. PERFORMANCE OF CANDIDATES

The Chief Examiner for Mathematics (Core) 2 stated that the performance of candidates was average whilst the Chief Examiner for Mathematics (Elective) 2 stated that the performance of candidates was not encouraging.

3. CANDIDATES' STRENGTHS

(1) The Chief Examiner for Mathematics (Core) 2 listed some of the strengths of candidates as:

(i) simplifying fractions and surds, following order of operations i.e. BODMAS;
(ii) completing table of values of a quadratic relation and drawing the graph of the relation using given scale and interval;
(iii) interpreting a bar chart;
(iv) solving problems involving vectors and trigonometric ratios.

(2) The Chief Examiner for Mathematics (Elective) 2 listed some of the strengths of candidates as follows:

(i) solving quadratic equations;
(ii) differentiation of implicit functions;
(iii) finding the mean and the mean deviation of a data;
(iv) drawing a scatter diagram.

4. CANDIDATES' WEAKNESSES

(1) The Chief Examiner for Mathematics (Core) 2 listed the following as weaknesses of the candidates:

(i) lack of ability to translate word problem into mathematical statement;
(ii) lack of understanding of the following topics;
- application of the Laws of Logarithm,
- business-related mathematics,
- logical reasoning,
- similar triangles.
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(2) The Chief Examiner for Mathematics (Elective) 2 on his part listed the

Lack of knowledge and understanding of Irrational equations, Factorization of cubic expressions, Finding the position vector of a point dividing a line segment as the weaknesses of candidates.

5. SUGGESTED REMEDIES

The Chief Examiners for Mathematics (Core) 2 and Mathematics (Elective) 2 suggested that teachers should give equal attention to all the topics in the syllabus and stop specializing in teaching some topics.

MATHEMATICS (CORE) 2

1. GENERAL COMMENTS

The standard of the paper on the whole compared favourably with that of the previous years. The candidates' performance was average.

2. SUMMARY OF CANDIDATES' STRENGTHS

Most of the candidates performed very well in

(1) simplifying fractions, following order of operations i.e. BODMAS;

(2) completing tables of values of a quadratic relation and drawing the graph of the relation using given scale and interval;

(3) constructing a multiplication table in modulo 7 on a given set and solving problems using the table;

(4) simplifying surds;

(5) interpreting a bar chart;

(6) solving problems involving vectors and trigonometric ratios;

3. SUMMARY OF CANDIDATES' WEAKNESSES

Candidates showed weaknesses clearly in;

(1) inability to form relevant equations from word problems;

(2) solving business related mathematical problems;

(3) applying the laws of logarithm;

(4) problems involving logical reasoning;

(5) constructing a group frequency distribution table using a discrete frequency table;

(6) determining the gradient of a curve at a given point;

(7) lack of knowledge of the concept of similar triangles.

4. **SUGGESTED REMEDY**

(1) Candidates should be given adequate exercises in solving word problems.

(2) Teachers should give equal attention to all the topics in the syllabus and stop specialising in teaching some topics.

5. **DETAILED COMMENTS**

Question 1

(a) Simplify:

$$\frac{\frac{3}{4}-\frac{7}{8}+\frac{1}{2}}{\frac{3}{4} of \left(\frac{7}{8}-\frac{1}{2}\right)}$$

(b) Using $\log_{10}2 = 0.3010$ and $\log_{10}3 = 0.4771$, evaluate $\log_{10}0.24$.

Part (a) of the question was well answered by most of the candidates. They were able to simplify the expression using relevant concepts. However some of them failed to express the final answer in a simplified form as a mixed fraction. They left the final answer in the form $\frac{4}{3}$ instead of $1\frac{1}{3}$.

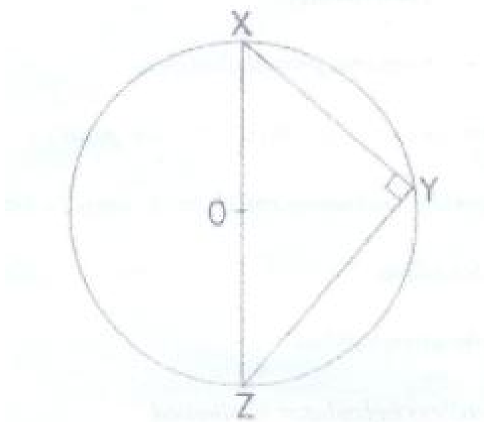
In part (b), most of the candidates were unable to express log 0.24 as $\log \frac{24}{100}$ and therefore could not proceed to use the given values to evaluate the expression.

Question 2

The sum of the ages of two brothers is 38 years. Four years ago, the age of the elder brother was the square of the younger brother's age. Find their ages.

Candidates were required to write down two equations from the given scenario and solve them simultaneously. Most of the candidates were able to write down the first equation as $x + y = 38$. However most of them could not write the second equation as $x - 4 = (y - 4)^2$. Those who were able to write down the two equations correctly managed to solve them simultaneously to obtain the ages of the two brothers.

Question 3



In the diagram, triangle XYZ is cut off from the circle, centre O. If |XZ| = 35 cm and |YZ|= 28cm, find the area of the remaining part of the circle. **[Take = $\frac{22}{7}$]**

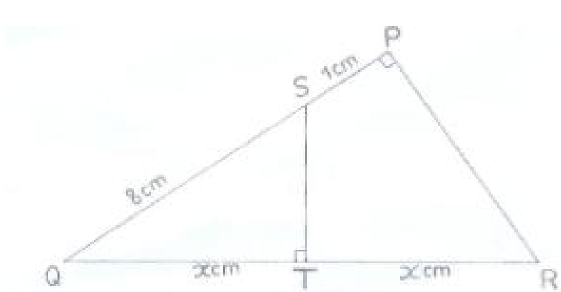
Most of the candidates were able to find the area of the circle very easily. Even though triangle XYZ is a right-angled triangle, most of the candidates failed to recognised that |XY| is the height of the triangle and therefore did not find |XY| but rather used |YZ| as the height and |XZ| as the base of the triangle to find the area of triangle XYZ.

Since the approach was wrong, most of the candidates got the area of the right-angled triangle wrong, hence the area of the remaining part of the circle was also wrong. However, few candidates were able to find the areas of the two figures so easily and finally obtained the area of the remaining part of the circle.

Question 4

(a) **If sin x = $\frac{5}{15}$ and $O^{o} \leq x \leq 90^{o}$, find without using tables or calculator,** $$\frac{\cos x - 2\sin x}{2\tan x}$$

(b)



In the diagram, / PS / = 1 cm, / SQ / = 8 cm, / QT / = / TR / = x cm and $\angle$ STQ = $\angle$ QPR = 90°.

(i) Name the triangle that is similar to triangle PQR,

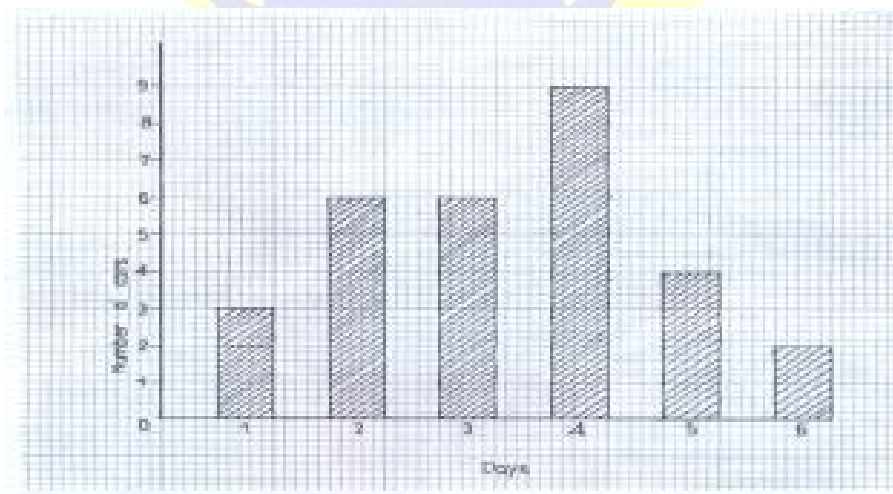
(ii) Hence, calculate the value of x.

The part (a) of the question was quite easy. Candidates found $\cos x = \frac{12}{13}$, $\tan x = \frac{5}{12}$ given $\sin x = \frac{5}{13}$ and proceeded to simplify the given expression. Their performance was good.

In part (b) it was obvious that candidates lacked knowledge of similar triangles. They were unable to state from the diagram the triangle similar to triangle PQR, let alone use the relationship that exists between similar triangles to find the value of x as indicated in the diagram. Their performance was below average.

<u>Question 5</u>

(a)



The bar chart shows the number of cars sold by a dealer in the first six days of a month. Find the average number of cars sold per day.

(b) A man spent $\frac{2}{5}$ of a certain amount on food and shared the remainder between two brothers in the ratio 2: 3. If the brother with the smaller share has GH¢ 6,000.00, what is the value of the amount initially?

Part (a) posed little or no challenge to the candidates as most of them interpreted the graph to find the average number of cars sold per day. In part (b), though candidates showed some knowledge in sharing using the concept of ratio, they did not fully grasp the demand of the question and for that matter could not answer this part of the question.

Question 6

A company buys a car for GH¢27,000.00 and sells it to Mr. Fosu for GH¢36,000.00 after a discount of 10% on the marked price.

(a) Calculate the:

(i) marked price of the car;

(ii) percentage profit made by the company.

(b) If Mr. Fosu sells the car after covering a mileage of 128,000 km, find the:

(i) value of the car if the rate of depreciation is GH¢0.03 per km;

(ii) range of values for which Mr. Fosu could sell the car so that he does not lose more than GH¢2,000.00 or gain more than GH¢3,000.00 on the depreciated value.

Parts (a) and (b) of the question were not properly answered. Candidates showed that they did not understand the concept of 'marked price' of an item. They also misapplied the principles of depreciation hence their inability to solve the question.

Question 7

(a) Copy and complete the following table of values for the relation $y = 2x^2 - 7x - 3$.

x	-2	-1	0	1	2	3	4	5
y	19		-3		-9			

(b) Using scales of 2 cm to 1 unit on the x - axis and 2 cm to 5 units on the y - axis, draw the graph of $y = 2x^2 - 7x - 3$ for $-2 \leq x \leq 5$.

(c) From the graph, find the:

(i) minimum value of y;

(ii) gradient of the curve at $x = 1$, correct to the nearest whole number;

(iii) values of x for which $2x^2 - 5x + 1 = 2x + 4$.

Candidates completed the table of values for the relation and drew the graph with the given scale and the intervals for x and y.

Their major problem was reading values from the graph. In view of this most of them could not use the graph to find the minimum value of the curve.

Again, since most of them could not draw a line tangent to the curve at x = 1, they were unable to find the gradient at that point.

<u>Question 8</u>

(a) **The points M(2,3), N(5,-2) and T(3,-5) are in the *x - y* rectangular plane.**

If $k\overrightarrow{OM} + l\overrightarrow{ON} = \overrightarrow{MT}$ **, where *k* and *l* are real numbers, calculate the value of:**

(i) ***k*;**
(ii) ***l***

(b) **Given that** $\overrightarrow{AC} = \begin{pmatrix} -7 \\ 12 \end{pmatrix}$**, calculate the:**

(i) **length of** $\overrightarrow{AC}$**, correct to three significant figures;**
(ii) **bearing of C from A, correct to the nearest degree.**

This was well answered by most of the candidates who attempted it.

In part (a), candidates were able to find the vector $\overrightarrow{MT}$, write the two simultaneous equations and solve for the correct values of k and *l*.
Part (b) was satisfactorily done, except for some few candidates who could not find the bearing correctly.

<u>Question 9</u>

(a) **Using ruler and a pair of compasses only, construct a quadrilateral PQRS such that** **/ PQ / = 8 cm,** $\angle$**QPS = 105°,** $\angle$**PQS = 30°, /PR / = 9 cm and / RS / = / RQ /.**

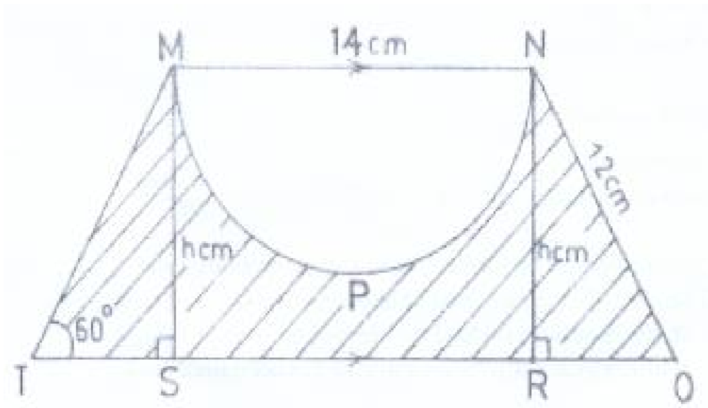
(b) **Measure:**
(i) **/ RS /**
(ii) **/ PS /**
(iii) **angle QRS**

In part (a) most of the candidates were able to construct line segment PQ, angles PQS and QPS so easily. Unfortunately they were not able to construct the perpendicular bisector of line segment SQ in order to locate R and then complete quadrilateral PQRS. Since most of them were not able to construct quadrilateral PQRS they could not answer the part (b). Their performance was far below average. However, few candidates were able to construct quadrilateral PQRS and measure |RS|, |PS| and angle QRS correctly.

Question 10

(a) **Simplify**: $\frac{3}{4}\sqrt{128} - \sqrt{50}$ **leaving the answer in surd form.**

(b)



shows a trapezium MNOT in which MN // TO, /MN/ = 14cm, MTD **= 60°**

The diagram shows a trapezium MNOT in which MN // TO, /MN/ = 14cm, $\angle MTD$ **= 60° and / MT / = / NO / = 12 cm. If the semi-circle MPN is removed from the trapezium, calculate, correct to the nearest cm², the area of the remaining portion.**

[Take $\pi = \frac{22}{7}$]

In part (a), most of the candidates were able to simplify the expression and leave the answer in surd form. Their performance was excellent.

Also in part (b) candidates used appropriate trigonometric relation to find *h*. They identified the diagram as a trapezium and a semi circle cut off from the trapezium, and applied the relevant area formulae to find the area of the remaining portion.

Question 11

A pole 25 m long is placed against a vertical wall such that its lower end is 7 m from the foot of the wall on the same horizontal ground. If the upper end of the pole is pushed down by 2 m, calculate correct to 2 significant figures:

(a) **how much further away from the wall the lower end will move;**

(b) **the angle the pole now makes with the horizontal.**

This question was poorly answered by most of the candidates. They were unable to visualise the question and sketch the correct diagram which will help them solve the problem. However few candidates who made a good sketch were able to solve the question with ease.

Question 12

The number of road accidents recorded in a given period was as follows:

No. of accidents	0	1	2	3	4	5	6	8	10	11	13	15	17	18	19
No. of days	20	10	8	7	5	3	3	5	4	4	3	2	2	3	1

(a) Using the group intervals 0 – 2, 3 – 5, 6 - 8, ... prepare a group frequency distribution table for the data.

(b) Construct a cumulative frequency table.
(c) Draw a cumulative frequency curve.
(d) Use the cumulative frequency curve to estimate the:
(i) median;
(ii) upper quartile.

Most of the candidates who answered this question were unable to prepare the group frequency distribution table from the data given. Even though they were able to write the class intervals, they did not add up the frequencies within the respective class intervals to obtain the actual frequency for each class interval. This resulted in drawing crooked cumulative frequency curve which could not be used to estimate the median and the upper quartile values correctly.

However, few candidates were able to construct the cumulative frequency distribution table and used it to draw a cumulative frequency curve, which they used to estimate the median and the upper quartile values correctly.

Question 13

(a) A translation T takes the point P(1,2) to P' (5,3). What is the image of Q (3,4) under T?

(b) Construct a table for multiplication in modulo 7 on the set {2,3,5,6}. Use the table to solve the following equations:

(i) $m \otimes m = 2$;
(ii) $n \otimes (n \otimes 6) = 3$.

(c) Consider the statements:

***p* : Martin trains hard;**
***q* : Martin wins the race.**

If $p \Rightarrow q$, state whether or not the following statements are valid:

(i) If Martin wins the race, then he has trained hard;

(ii) If Martin does not train hard then he will not win the race;

(iii) If Martin does not win the race then he has not trained hard.

Part (a) and (b) were done correctly by the candidates. They showed knowledge of vectors and modular arithmetic. Reading values from the table of multiplication modulo 7 was a challenge to some of them.

Part (c) was poorly answered by most of the candidates who attempted it. It seemed this area of logical reasoning was neglected by the candidates, or probably was not taught by the teachers.

MATHEMATICS (ELECTIVE) 2

1. **GENERAL COMMENTS**

The standard of the paper compared favourably with those of the previous years. Candidates' performance was not encouraging.

2. **SUMMARY OF CANDIDATES' STRENGTHS**

Candidates strengths were evident in:

(1) writing down the value of trigonometric ratios of special angles in surd form.

(2) solving quadratic equations.

(3) writing down binomial expansions.

(4) differentiation of implicit functions.

(5) finding the mean and the mean deviation of a set of numbers.

(6) drawing the graph of a trigonometric function.

(7) drawing a scatter diagram.

(8) solving problems in kinematics.

3. **SUMMARY OF CANDIDATES' WEAKNESSES**

Candidates weaknesses were observed in:

(1) rationalization of surds.

(2) finding the square root of a proper fraction.

(3) sketching appropriate and relevant diagrams to help in the solution of problems in mechanics.

(4) finding the position vector of a point that divides a line segment in a given ratio.

(5) using a wrong formula for Trapezium Rule.

(6) premature approximations.

(7) factorizing cubic expressions.

(8) finding the area between two curves.

(9) addition rule involving non-mutually exclusive events.

<u>SUGGESTED REMEDIES</u>

(1) Teachers are advised to guide students do a lot of exercises on the weaknesses listed above.

(2) Candidates are advised to read questions very carefully and understand them well before attempting to solve them.

<u>DETAILED COMMENTS</u>

<u>Question 1</u>

If $\frac{\mathbf{tan}\,\bar{} + \tan 30°}{\mathbf{1} - \tan\bar{}\,\tan 30°} = -1,$ **find tan , leaving the answer in surd form.**

Candidates' performance in this question was quite good. However most of the candidates read tan 30° = 0.5774 and substituted into the find equation to find ¯ . Those who used tan ¯ $= \frac{1}{\sqrt{3}}$ failed to rationalize their final answer.

<u>Question 2</u>

Solve the simultaneous equations

log (*x*- 2) + log 2 = 2log *y*

log(*x* - 3*y* + 3) = 0.

The theory of logarithm and its applications remain a problem to many of the candidates. Most of them could not derive the two linear equations in two variables as they failed to apply the Laws of logarithms.

<u>Question 3</u>

The third terms of the expansions of $\left(1+\frac{1}{3}x\right)^6$ **and** $(1+px)^4$ **in ascending powers of *x* are equal. Find, correct to two decimal places, the value of *p*.**

The question was popular and candidates' performance was good. Most of the candidates who attempted it were able to write down the expansion of the two binomials. Others too were able to write down the correct third terms without going through the expansions. Most of them equated the third terms and solved for the value of *p*.

However some students equated all the three terms of $(1+\frac{1}{3}x)^6$ to those of $(1+px)^4$ which was unacceptable.

There were also few candidates who could not carry out the expansions at all, let alone equate the required terms.

Question 4

Find the equation of the normal to the curve $(x^2+xy+2y^2)=8$ at the point (-3, 1).

Most candidates who attempted the question were able to differentiate the function to obtain the gradient function of the curve. After substituting the coordinates into the gradient function to obtain the actual gradient of the curve at the given point, a lot of them used it in that state to form the equation of the normal, instead of negating it, and finding the reciprocal.

Question 5

A uniform beam PQ of mass 2.5 kg is 100 cm long. It rests on a support placed at a point 35 cm from P. A weight of 40 N is attached to the beam at P. Find the weight which should be placed at Q in order for the system to be in equilibrium (Take g = 10ms $^{-2}$)

Most of the candidates could not sketch the diagram to determine the moments. Only few candidates were able to sketch and take the moments correctly to get the required weight.

Question 6

Find the mean deviation of 6, 12, 10, 4, 8, 18 and 12.

Most of the candidates were able to find the mean, but not the mean deviation. After obtaining the mean, most of the candidates got struck. Some of those who continued after that stage ended up finding the deviations instead of finding the absolute values of the deviations (1x - $\bar{x}$ 1) and then summing them before finding the mean deviation, ie $\frac{\sum(1x-\bar{x}1)}{\sum f}$

Question 7

A bag contains 5 red and 4 white identical balls and a second bag contains 3 red and 6 white identical balls. If one ball is selected at random from each of the bags, find the probability that the two balls selected will be of

(a) different colours
(b) same colour.

Most of the candidates answered this question and their performance was excellent. However few candidates did not seem to know how to go about the various selections in part (a)

In part (b), candidates failed to use the axiom P(A1) = 1 - P(A) as the easier and shorter option in solving the question.

<u>Question 8</u>

Points *A* and *B* have position vectors a = 2i - 3j and b = -i + 2j. find the position vector of the point *M* on *AB* such that |*AM*|:|*MB*| = 3:2.

The question was popular, however candidates performance was average.

Only few of candidates who attempted the question were able to solve it properly. The majority did not seem to know how to solve problems involving the position vectors of two points on a line segment.

<u>Question 9</u>

(a) **Solve** $\sqrt{3x+1}$ **-** $\sqrt{2x-1}$ **= 1.**

(b) **Using the trapezium rule with seven ordinates, calculate, correct to two decimal places, an approximate value for** $\int_1^4 \frac{dx}{x+3}$ **.**

Most of the candidates who attempted part (a) seemed to recognize that the second term of the LHS should be sent to the R.H before squaring and with careful working they got the correct answer. Some candidates squared the terms separately which was unacceptable.

In part (b) most of the candidates quoted the trapezium rule wrongly and therefore could not obtain the required answers. Some of them prematurely approximated the values for the completion of the table and this affected the final answer.

<u>Question 10</u>

(a) **Using a scale of 2 cm to 20^o on the *x* -axis and 2 cm to 0.5 unit on y-axis, draw the graph of : *x* 3 sin *x* + 2 cos x for $0 \leq$ ¯ $\leq 180^o$ at intervals of 20^o.**

(b) **Use the graph in (a) to find, correct to the nearest degree, the truth set of**

(i) **3 sin *x* + 2 cos *x* + 1 = 0.**

(ii) **6 sin *x* + 4 cos *x* - 2 = 0.**

Since part (a) and (b) of the question were inter-dependent, the candidates were able to complete the table of values for x and y, and used it to draw the graph. Instead of candidates using free hand to join the plotted points to obtain a smooth curve, some of them used straight edges to join the plotted points which is highly unacceptable.

Most of the candidates were able to use the graph to find the values of x but unfortunately some of them did not write the final answer in a set notation form. The performance was encouraging.

Question 11.

If

$$\begin{vmatrix} 2x-1 & x+7 & x+4 \\ x & 6 & 2 \\ x-1 & x+1 & 3 \end{vmatrix}$$ **= 0, find the values of *x*.**

Few of the candidates who attempted the question were able to apply the rule for finding the determinant of 3 x 3 matrix properly. Most of them did not seem to know about the alternate changes in algebraic sign as the determinant is reduced to 2 x 2 matrices. They also mixed up the co-efficient and therefore could not obtain correct algebraic expansion to find the value of x. The performance was far below average.

Again, only few of them worked patiently to obtain the correct expansion, but were unable to solve the resulting cubic expansion.

Question 12.

(a) Find the equation of the line passing through the midpoint of the line joining P(5, 1) and perpendicular to PQ.

(b) Find the area enclosed by the curves $y = x^2 - 3x + 2$ and $y = -x^2 + 3x + 2$.

The Part (a) was satisfactorily handled by most of the candidates who attempted it. However, some of them were unable to find the gradient of the line passing through the given point hence their inability to find the equation of the line passing through the mid point. Part (b) was not properly handled by the candidates. Few candidates were able to find the points of intersection of the two curves properly, and use it to find the area enclosed by the curves.

Question 13.

The table shows the number of hours (y) spent by some workers (x) on similar jobs.

Workers (x)	5	8	4	10	6	3	5	9	10	7
No. of hours (y)	10	7	10	1	4	7	8	3	2	5

(a) Draw a scatter diagram for the information.
(b) Find $\bar{\bar{x}}$, the mean of x and $\bar{y}$, the mean of y a plot ($\bar{x}$, $\bar{y}$) on the diagram.
(c) Draw the line of best fit to pass through ($\bar{x}$, $\bar{y}$) and (4, 6, 7, 8).

(d) **From the graph, find**

   (i) **the equation of the line of best fit,**

   (ii) **the number of hours a team of 2 workers would take to do a similar job.**

The questions were interrelated and candidates performance was very good.

In part (a), most of the candidates who attempted the question were able to draw the scatter diagram ($\bar{x}$, $\bar{y}$) which helped in drawing the line of best fit. This enable them to find the gradient of the line.

Unfortunately some of the candidates used other values, which could not be found on the line to calculate the gradient, which was unacceptable.

<u>Question 14.</u>

Two fair dice are thrown once. find the probability of obtaining a difference of 2 or a product greater than 8.

Most of the candidates were able to construct table for the sample space but they were unable to find the union of the two events in the problem.

<u>Question 15.</u>

(a) **At the end of a full time, a football match between teams A and B was goalless. The winning team had to be decided through penalty kicks. Each team had to take five kicks. The probability that a kick by team A will result in a goal was 0.8 and for Team B, the probability was 0.3. Find, correct to three decimal places, the probability that the final scores would be**

   (i) **4 - 2 in favour of Team B,**

   (ii) **5 - 0 in favour of Team A.**

(b) **Three students are to be selected from 4 boys and 5 girls to represent their school in a Science quiz.**

   (i) **In how many ways can the three students be selected?**

   (ii) **What is the probability that more boys will be selected than girls?**

The question was not popular at all and the performance of few candidates who attempted it was very poor. Apart from answering part b(i) satisfactorily, almost every candidate who attempted the question did not seem to know the demand of the question.

Suggested Solution To The Question

(a) (i)

Pr (Team B scores 4 goals) = $^5C_4 \times 0.3^4 \times 0.7^1$

= 0.02835

Pr(Team A scores 2 goals) = $^5C_2 \times 0.8^2 \times 0.2^3$

= 0.0512

Probability of 4-2 scores for B= 0.02835 x 0.0512

= 0.001451

= 0.001

a(ii). Pr (A scores 5 goals) = $^5C_5 \times 0.8^5 \times 0.2^o$

= 0.32768

Pr (B scores 0) = $^5C_0 \times 0.3^0 \times 0.7^5$

Probability of (5-0) score for Team A

= 0.32768 x 0.16807

= 0.05507

= 0.055

b(i) No. of ways of selecting the 3 students = $^9C_3$

= 84

b (ii) Pr (more boys than girls) = $\dfrac{^4C_2 \times {^5C_1}}{^9C_3} + \dfrac{^4C_3 \times {^5C_0}}{^9C_3}$

= $\frac{17}{42}$ or 0.4048

Question 16.

(a) **Forces F_1, F_2 and F_3 act on a particle of mass 5 kg at the origin *O*.**
F1 has magnitude 15 N and acts in the direction 3i + 4j.
F_2 has magnitude 3 $\sqrt{2}$ N and acts inthe direction i - j.
F_3 has magnitude 4 $\sqrt{5}$ N and acts in the direction 2i + j.

(i) **Express each force in the form ai + bj.**
(ii) **Find the resultant force F of the three forces.**
(iii) **Find the magnitude of the acceleration of the particle.**

(b) **A particle increases its velocity from 15 m s^{-1} to 25 m s^{-1}. If the distance covered is 100 m,**
(i) **how long did it take?**
(ii) **calculate its constant acceleration.**

Most of the candidates attempted this question and they showed mastery in solving vectors questions. Their performance was excellent.

Question 17.

(a) **A metal sphere of mass 2 kg is placed on a smooth plane inclined at 30^o to the horizontal. When the sphere is released from rest it moves down the plane. Calculate the**

(i) **force that moves the sphere down the plane;**
(ii) **acceleration of the sphere down the plane**
(*Take* g = 10 m s^{-2})

(b) **Forces F_1 (50 N, 030^o) and F_2(80 N, 080^o) act on a body of mass 25 kg, causing it to move. Calculate the acceleration of the body.**

In part (a), most of the candidates were able to find the force that moves the sphere down the plane. Newton's 2nd Law of Motion was properly applied to find the acceleration of the sphere down the plane.

Question of such nature demands sketching a diagram to serve as a guide but unfortunately most of the candidates who attempted it failed to sketch, and this affected their performance. In part (b), most of the candidates were able to resolve the forces into component form and calculated the acceleration of the body with ease.

<u>Question 18</u>.

(a) **A body is thrown vertically upwards. Its height *h* metres at time *t* seconds is given by $h = (12t - \frac{2}{5}t^2)$ m.**

(b) **A stone is dropped from a height of 32 m. At the same time another is thrown vertically upwards at a speed of 42 m s^{-2}.**

(i) **At what height will the stones pass each other?**

(ii) **After what time will the stones pass each other?**

(*Take* g = 10 m s^{-2})

The part (a) was satisfactorily handled by most of the candidates who attempted it. Some of them did not seem to know that they have to differentiate the equation to enable them answer the question properly.

In part (b) most of the candidates could not analyse the question, let alone solve to obtain the required answer. Below is a suggested solution for

For the dropped stone

$S = ut + at^2$

$32 - h = 0xt + 10t^2$

$32 - h = 5t^2$

For the stone thrown upwards

$h = 42t + 1/2\,(-10)t^2$

$h = 42t - 5t^2$

$32 - (42t - 5t^2) = 5t^2$

$32 - 42t = 0$

$t = 32/42$

$t = 0.76s$

18b (i) $h = 42 \times 0.76 - 5 \times 0.76^2$

$= 29.032m$