EXAMINATIONS COUNCIL OF LESOTHO
Lesotho General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	CANDIDATE NUMBER

MATHEMATICS **0178/04**

Paper 4 (Extended) **October/November 2015**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic Calculator
Geometrical Instruments
Tracing Paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π use either your calculator value or 3.142.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

1 (a) Solve the equation.

$(3x-2)(6x+1)=0$

Answer (a) $x =$ .... or $x =$ .... [2]

(b) Factorise completely.

$2a^2+6a-ab-3b$

Answer (b) ..... [2]

(c) Express as a single fraction in its simplest form.
Show all your working.

$\frac{1}{p-2}-\frac{2}{4p+3}$

Answer (c) ..... [3]

(d) Lineo runs at a rate of 170 m/min and walks at a rate of 90 m/min.
Lineo leaves home and takes 6 minutes, by running and walking, to reach a bus stop.
Lineo runs for t minutes.

(i) Find, in terms of t, an expression for

(a) the number of minutes she walks,

Answer (d)(i)(a) ..... min [1]

(b) the distance she runs,

Answer (d)(i)(b) ..... m [1]

(c) the distance to the bus stop.

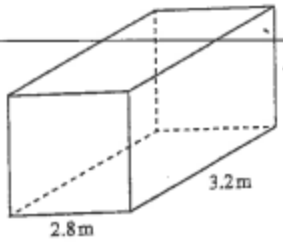
Answer (d)(i)(c) ..... m [2]

(ii) The distance to the bus stop is 740 m.

Find the value of t.

Answer (d)(ii) $t =$ ..... [2]

2 The diagram shows a tank in the shape of a cuboid.



NOT TO SCALE

(a) Calculate the volume of water that can fill up the tank.

Answer (a) ..... m^3 [2]

(b) The outside surface of the tank is to be painted.
(The top and bottom are not included.)

Calculate the area to be painted.

Answer (b) ..... m^2 [3]

(c) 1 litre of paint covers $3\,m^2$.
The cost of a 5 litre container of paint is M90.00.

(i) Find the number of 5 litre containers needed.

Answer (c)(i) ..... [3]

(ii) Calculate the total cost of paint needed.

Answer (c)(ii) M ..... [1]

3 (a) The table below shows the marks scored by a group of students in a test.

Marks	5	6	7	8	9	10
Frequency	2	8	5	6	4	2

Find

(i) the mode,

Answer (a)(i) ..... [1]

(ii) the median,

Answer (a)(ii) ..... [2]

(iii) the mean.

Answer (a)(iii) ..... [3]

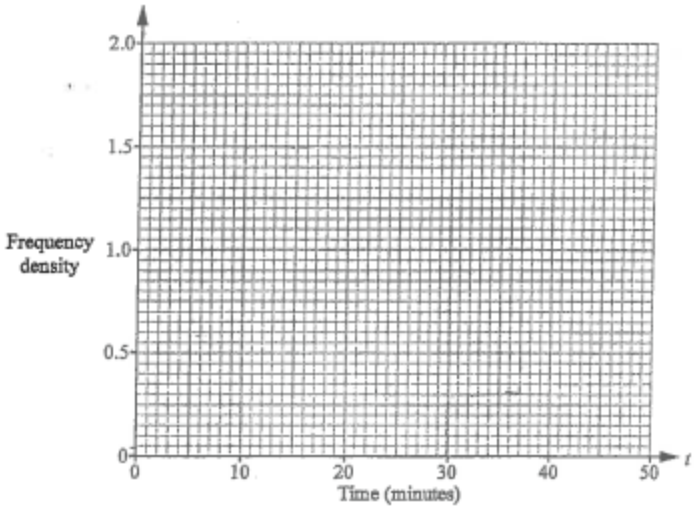
(b) The table below shows the time (t minutes) taken by the students to complete their homework.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 40$
Frequency	2	15	7	3

(i) Calculate an estimate of the mean.

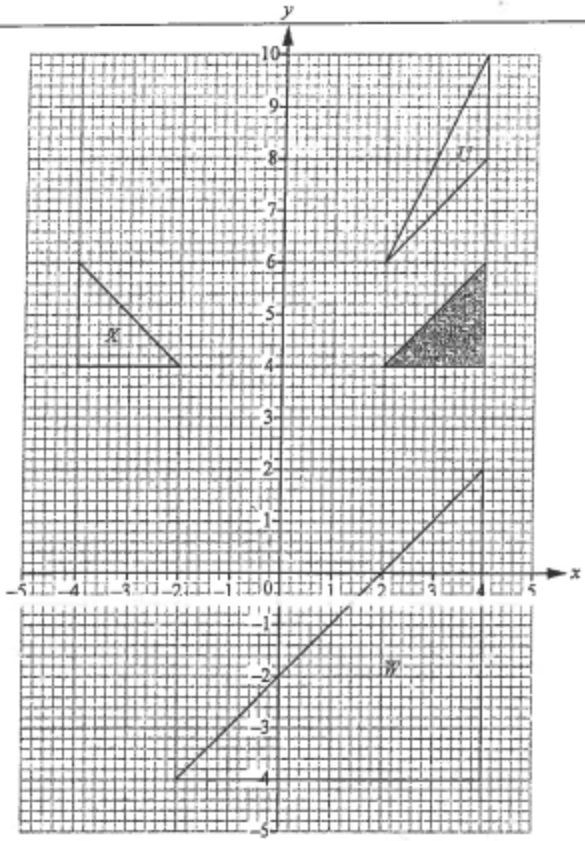
Answer (b)(i) ..... min [4]

(ii) On the grid, draw a histogram to show this information.



[3]

4 The diagram shows triangles *U*, *V*, *W*, *X*.



(a) Describe fully the **single** transformation that maps

(i) triangle V onto triangle X,

Answer(a)(i) .....

..... [2]

(ii) triangle V onto triangle W,

Answer (a)(ii) .....

..... [3]

(iii) triangle V onto triangle U.

Answer (a)(iii) .....

..... [3]

(b) On the same grid,

(i) translate triangle V using the vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ and label the image V_1, [2]

(ii) rotate triangle V through 180° about the point (1, 3) and label the image V_2. [2]

(c) Find the matrix which represents the transformation that maps triangle V onto triangle X.

Answer (c) ..... [2]

5 (a) Factorise $x^2 - 18x + 81$.

Answer (a) ..... [1]

(b) Thabo bought x eggs at y maloti per dozen.
He sold each egg for P maloti.

Write an expression, in terms of x, y and P, for the profit he made.

Answer (b) M ..... [2]

(c) Solve the equation $(2x - 3)(x - 4) = 18$.

Answer (c) $x =$ ..... or $x =$ ..... [5]

(d) $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

(i) Find R when $R_1 = 4$ and $R_2 = 6$.

Answer (d)(i) $R =$ ..... [2]

(ii) Make R_2 the subject of the formula.

Answer (d)(ii) $R_2 =$ ..... [3]

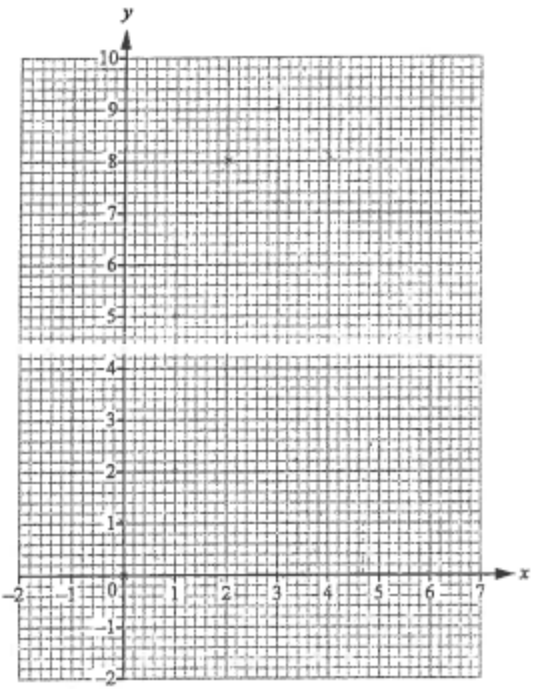
6 (a) $f(x) = 6x - x^2$

(i) Complete the table for $f(x)$.

x	0	1	2	3	4	5	6
$f(x)$	0	.		9		.	0

[2]

(ii) On the grid, draw the graph of $y = f(x)$ for $0 \leqslant x \leqslant 6$.



[3]

(iii) Use your graph to solve the equation $f(x) = 6$.

Answer (a)(iii) $x =$ ..... or $x =$ ..... [2]

(iv) By drawing a tangent at the point where $x = 4$, estimate the gradient of the graph of $y = f(x)$ when $x = 4$.

Answer (a)(iv) ..... [3]

(b) $g(x) = 2^x$

(i) Complete the table for $g(x)$.

x	0	1	2	3	3.3
$g(x)$				8	9.8

[2]

(ii) On the same grid opposite, draw the graph of $y = g(x)$ for $0 \leqslant x \leqslant 3.3$. [3]

(c) Use your graphs to find x when $f(x) = g(x)$.

Answer (c) $x =$ ..... or $x =$ ..... [2]

7 (a) A clearance sale at a clothing shop lasts for four days only.
The sale starts on Thursday and ends on Sunday.
For each day of the sale, prices are reduced by 10% of the price on the previous day.

(i) On Wednesday before the start of the sale, a dress was M199.
Thato bought it on Friday.

How much did Thato pay for the dress?

Answer (a)(i) M..... [3]

(ii) Lineo bought the same dress as that of Thato on Sunday.

How much less did Lineo pay than Thato?

Answer (a)(ii) M..... [3]

(iii) On Thursday, Neo paid M360 for his pair of trousers.

What was the price on Wednesday?

Answer (a)(iii) M..... [3]

(iv) How many days would it take for the original prices to be reduced by more than 25%?

Answer (a)(iv) ..... [3]

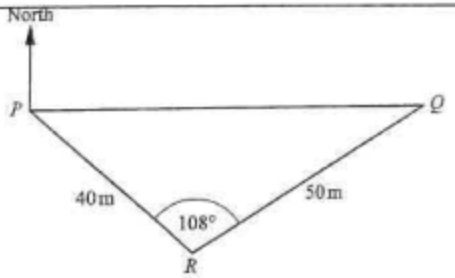
(b) There are two companies from which Neo can borrow money.
Company A: charges 1% compound interest per month.
Company B: charges 12% simple interest per annum.

Neo borrows M800.00 for two years.

Calculate the difference in interest Neo would have to pay if he borrows money in either of the two companies.

Answer (b) M ..... [4]

8 The diagram shows the positions of two houses at P and Q.
The point R represents the position of the electrical pole which is 40 m from P and 50 m from Q.
Angle $PRQ = 108°$.



NOT TO SCALE

(a) Calculate PQ, the distance between the two houses.

Answer (a) ..... m [4]

(b) Calculate the area of triangle PQR.

Answer (b) ..... m^2 [2]

(c) Q is due East of P.

Calculate the bearing of R from P.

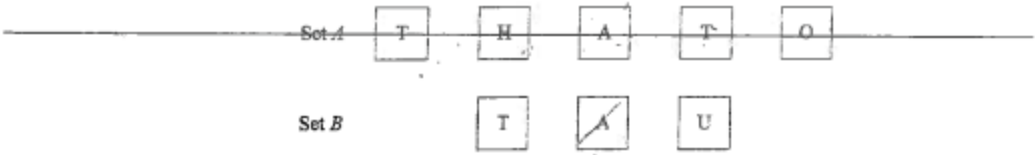
Answer (c) ..... [4]

(d) Another house is constructed along PQ such that it is at the shortest distance from R.

Calculate this shortest distance.

Answer (d) ..... m [2]

9 The diagram shows two sets of cards.



(a) One card is chosen at random from Set A and replaced.

(i) Write down the probability that the card chosen shows the letter A.

Answer (a)(i) ..... [1]

(ii) Write down the probability that the card chosen does not show the letter A.

Answer (a)(ii) ..... [1]

(iii) If this is carried out 200 times, write down the expected number of times the card chosen does not show the letter A.

Answer (a)(iii) ..... [1]

(iv) [illegible]

Answer (a)(iv) ..... [1]

(b) Two cards are chosen at random, **without** replacement, from Set *A*.

(i) Find the probability that both cards show the letter T.

Answer (b)(i) ..... [2]

(ii) Find the probability that one card shows the letter T and one card shows the letter H.

Answer (b)(ii) ..... [3]

(c) One card is chosen at random from Set *A* and one card is chosen at random from Set *B*.

Find the probability that at least one of the two cards shows the letter T.

Answer (c) ..... [3]

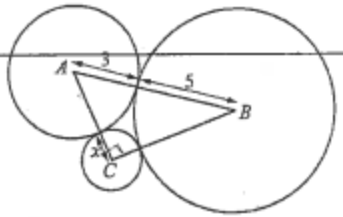
(d) A card is chosen at random, **without** replacement, from Set *B* until the letter shown is T.

Find the probability that this does not happen until the 3rd card is chosen.
Show your working.

Answer (d) ..... [2]

Question 10 is printed on the next page.

10 The diagram shows an arrangement of three circles which are touching.



NOT TO SCALE

The radii of the circles, centre A and centre B, are 3 cm and 5 cm respectively.
The radius of the circle centre C is x cm.

(a) Given that angle $ACB = 90°$, write down an equation in x and show that it reduces to $x^2 + 8x - 15 = 0$.

Answer (a)

[3]

(b) Solve the equation $x^2 + 8x - 15 = 0$.
Show all your working and give each answer correct to 2 decimal places.

Answer (b) $x =$ ..... or $x =$ ..... [4]

(c) Write down the lengths of AC and BC.

Answer (c) $AC =$ ..... cm and $BC =$ ..... cm [2]