EXAMINATIONS COUNCIL OF LESOTHO
Lesotho General Certificate of Secondary Education

CANDIDATE NAME											
CENTRE NUMBER						CANDIDATE NUMBER					

MATHEMATICS **0178/02**

Paper 2 (Extended) **May/June 2017**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: 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 **MUST NOT** BE USED IN THIS PAPER.

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 70.

1 (a) Work out.

(i) $1\frac{2}{3} \div 1\frac{3}{4}$

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

(ii) 0.5×0.007

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

(b) Work out.

(i) $2\sqrt{8} \times 4\sqrt{8} + 2$

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

(ii) $\left(\frac{5}{4^{-1}-9^{-1}}\right)^{\frac{1}{2}}$

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

(c) By making suitable approximations, estimate

$$\frac{23.566 \times (5.367)^2}{14.788}.$$

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

2 $198 = 2 \times 3^2 \times 11$ and $360 = 2^3 \times 3^2 \times 5$.

(a) Find

(i) the highest common factor of 198 and 360,

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

(ii) the lowest common multiple of 198 and 360.

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

(b) Find the smallest value of k such that $\sqrt{360 \times 198 \times k}$ is an integer.

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

3 (a) Expand and collect like terms.

(i) $4(k - 1) - (3k + 2) + 14$

Answer *(a)*(i) ..... [2]

(ii) $(7x - 2y)(3x + y)$

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

(b) (i) Solve the simultaneous equations.

$2x + 2y = 3$
$4x - 5y = 24$

Answer *(b)*(i) $x =$ ..... $y =$ ..... [3]

(ii) Solve.

$3^{x-2} + 3^x = 10$

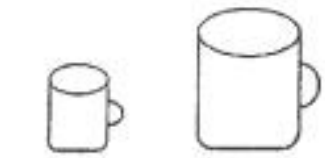
Answer *(b)*(ii) $x =$ ..... [3]

(c) Factorise.

$6x^2 + 5x - 6$

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

4 The diagram shows two similar coffee mugs.
The large mug holds $500\,cm^3$ of coffee.



NOT TO SCALE

Small mug Large mug

(a) How many full large mugs would be required to fill a $1\,m^3$ container?

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

(b) The small mug holds $32\,cm^3$ of coffee.

(i) Find the scale factor for the length between the small and large mug.
Give your answer as an exact fraction.

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

(ii) The height of the large mug is 15 cm.
Work out the height of the small mug.

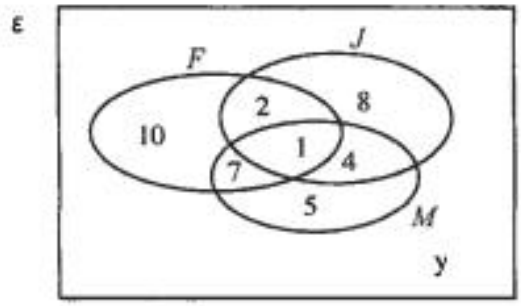
Answer *(b)*(ii) .....cm [2]

(iii) The surface area of the large mug is $350\,cm^2$.
Work out the surface area of the small mug.

Answer *(b)*(iii) ..... cm^2 [2]

5 A teacher asks 45 students which drink they enjoy.
F = {students who enjoy fizzy drinks}
J = {students who enjoy juice}
M = {students who enjoy milk}

The Venn diagram shows the results.



(a) Use the Venn diagram to find

(i) the number of students who enjoy juice,

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

(ii) $n(M' \cap F)$,

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

(iii) the number of students who enjoy fizzy drinks and juice but not milk.

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

(b) Find the value of y.

Answer *(b)* $y =$ ..... [2]

(c) A student is chosen at random.
Find the probability that this student enjoys

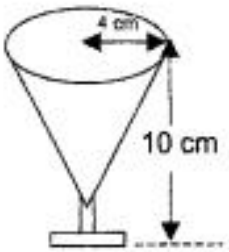
(i) fizzy drinks and juice,

Answer *(c)*(i) ..... [1]

(ii) either milk or juice.

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

6 Puleng uses the conically shaped container, as shown in the diagram, to measure morvite (lepoopo).



NOT TO SCALE

The cone has a radius 4 cm and height 10 cm.

The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.

The curved surface area, C, of a cone with radius r and slant height l is $C = \pi r l$.

(a) Work out

the volume of lepoopo that can fill up the container.
Give your answer as a multiple of π.

Answer *(a)* ..... cm^3 [2]

(b) [illegible]
Find the value of k.

Answer *(b)* k = ... cm^2 [4]

(c) The container holds 30g of lepoopo when it is full.
Work out how much lepoopo 100 full containers can hold.
Give your answer in kg.

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

7 (a) The determinant of the matrix $\begin{pmatrix} x & x+1 \\ 3x & 4x \end{pmatrix}$ is -2.

(i) Use this information to form an equation and show that it can be reduced to

$x^2 - 3x + 2 = 0$.

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

(ii) Solve $x^2 - 3x + 2 = 0$.

Answer *(a)*(ii) x = ... or x = ... [3]

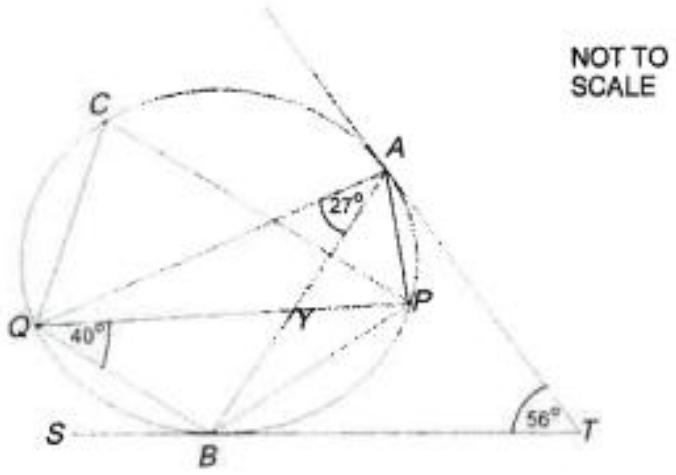
(b) Find the values of x and y.

$$\begin{pmatrix} x \\ 2 \end{pmatrix} + \begin{pmatrix} -3 \\ 5 \end{pmatrix} = \begin{pmatrix} 2 \\ y \end{pmatrix}$$

Answer *(b)* x = ... y = ... [2]

8 In the diagram, TA and TB are tangents to the circle at the points A and B.

TBS is a straight line.
The straight lines AB and QP intersect at Y.
The angle $QAB = 27°$, angle $PQB = 40°$ and angle $ATB = 56°$.



(a) State with the reasons the values of the angles

PAY,

..... because .....

..... [2]

(b) *QBP*,

..... because .....

..... [2]

(c) *TAP*,

..... because .....

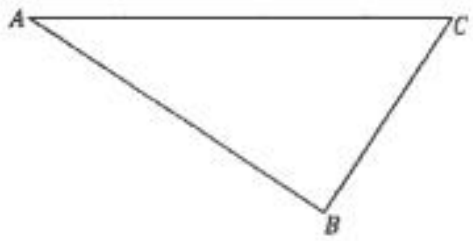
..... [2]

(d) *AYP*,

..... because .....

..... [2]

9 The diagram shows a triangle ABC.



(a) Measure angle ACB.

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

(b) The point D is above AC, such that AD is 5 cm and CD is 4 cm.
By construction, complete the triangle ADC. [2]

(c) The region, R, lies within the quadrilateral $ABCD$.
The points in R are

- nearer to C than A and
- more than 4 cm from B.

By accurate construction, shade the region R. [4]