95 Copies Form E

EXAMINATIONS COUNCIL OF LESOTHO
Lesotho General Certificate of Secondary Education

CANDIDATE NAME														
CENTRE NUMBER						CANDIDATE NUMBER								

MATHEMATICS **0178/02**

Paper 2 (Extended) **October/November 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 marks for this paper is 70.

1 Mpho's bank account is overdrawn by M485.

(a) She deposits M230 into the account.

How much does she now owe the bank?

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

(b) What further deposit should she make to give her account a balance of M150?

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

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2 When written as a product of their prime factors, $a = n \times 3 \times 7$ and $b = n^2 \times 7$.

(a) Express, in terms of n,

(i) the LCM of a and b,

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

(ii) the HCF of a and b.

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

(b) Given that the LCM of a and b is 84.

Find the values of n, a and b.

Answer (b) $n =$ ..... $a =$ ..... $b =$ ..... [3]

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3 On average, the mass of each egg in a tray is 57.2 grams to the nearest tenth of a gram.

(a) Write down the lower bound for the mass.

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

(b) There are 30 eggs in the tray.

Calculate an estimated upper bound for the mass of all eggs in the tray.

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

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4 **(a)** Show that $\frac{a^{-2}+b^{-2}}{(ab)^{-2}}$ can be simplified to $a^2 + b^2$.

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

(b) Find the value of n in the following expression.

$$\left(\frac{2}{3}\right)^{-3} \times \left(\frac{3}{2}\right)^{n} = 1$$

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

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5 A serving of 100 g of powdered milk A provides 2120 KJ of energy.

(a) Express this amount of energy in standard form.

Give your answer in Joules.

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

(b) Calculate the amount of energy, in Joules, that can be obtained from 2 kg of powdered milk A.

Give your answer in standard form.

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

(c) A serving of 100 g of powdered milk B provides 9.78×10^2 kJ of energy.

Calculate the difference, in Joules, between the amount of energy obtained from powdered milk A and B in serving of 300 g.
Leave your answer in standard form.

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

6 The temperature of a substance rises from −3 °C to 12 °C.

Calculate the increase in temperature of the substance.

Answer ..... °C [1]

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7 Given that $180 = 5 \times p^2 \times q^2$ and that both p and q are both prime.

Find the values of p and q.

Answer $p =$ ..... $q =$ ..... [2]

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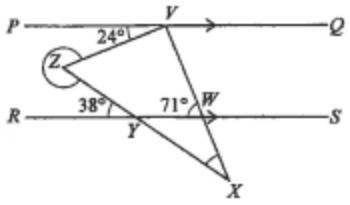
8 In the diagram PQ is parallel to RS.

VW and ZY are produced to meet at X.



NOT TO SCALE

Find the value of angle $W\hat{X}Y$ and the value of **reflex** angle $V\hat{Z}Y$.

Answer $W\hat{X}Y =$ ..... [2]

$V\hat{Z}Y =$ ..... [2]

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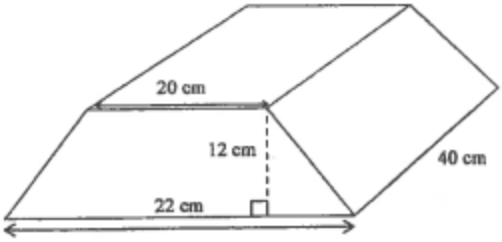
9 The diagram shows a gold bar, which is a prism of length 40 cm.



NOT TO SCALE

(a) Find the area of the cross-section.

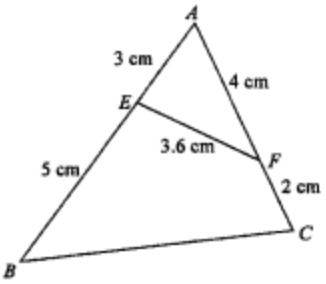
Answer (a) ..... cm^2 [2]

(b) Find the volume of the gold bar.

Answer (b) ..... cm^3 [1]

10 In the figure, AEB and AFC are straight lines.

$AE = 3$ cm, $EB = 5$ cm, $AF = 4$ cm, $EF = 3.6$ cm and $FC = 2$ cm.



NOT TO SCALE

(a) Stating your reasons clearly, show that triangle ABC and triangle AFE are similar.

Answer (a) .....

.....

..... [3]

(b) Calculate the length of BC.

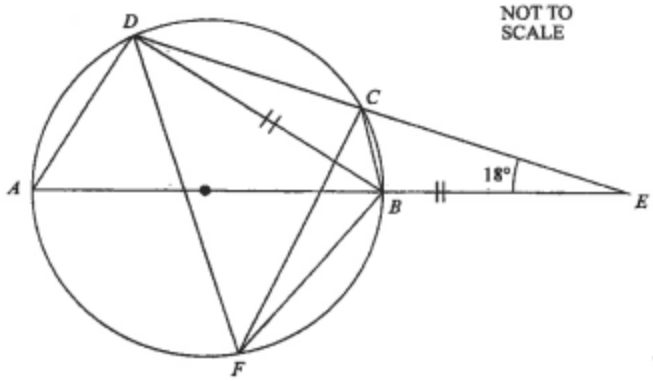
Answer (b) ..... [2]

(c) Find the value of $\frac{\text{Area of quadrilateral } BCFE}{\text{area of } \triangle ABC}$

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

11 In the diagram, A, B, C and F lie on the circumference of the circle.
AB is a diameter of the circle.
AB and DC produced meet at E.

$DB = BE$ and $A\hat{E}D = 18°$.



(a) Find the value of angle ABC.

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

(b) Show that BD bisects angle ABC.
Give reasons for each stage of your working.

Answer (b) .....

.....

..... [3]

12 $A = \begin{pmatrix} -1 & 5 \\ 2 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 2 \\ 2 & -1 \end{pmatrix}$, and $C = \begin{pmatrix} 6 & 8 \\ 3 & t \end{pmatrix}$.

Find

(a) AB,

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

(b) the value of t for which C has no inverse.

Answer (b) $t =$ ..... [2]

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13 In 2014, a street vendor made a profit of M2160.
This was 8% more than the profit made in 2013.

Find the profit made in 2013.

Answer M ..... [2]

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14 Factorise fully

(a) $3p(a - 8b) - 7q(8b - a)$.

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

(b) $2u^2 + 5u - 3$.

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

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15 **(a)** Evaluate $\frac{(5\frac{1}{2})^2}{(1-\frac{1}{3})^3}$.

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

(b) Simplify $12(-pt)^2 \times \frac{\sqrt{p^4t^2}}{3} \times \left(\frac{p}{2t}\right)^3$.

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

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16 Given that $S = \frac{v^2 - u^2}{2a}$,

(a) find the value of S when $v = 4$, $u = 3$ and $a = 7$.

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

(b) make v the subject of the formula.

Answer (b) $v =$ ..... [2]

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17 By rounding each of the values to 1 significant figure, estimate

$$\frac{5.112 \times 39.997}{0.199}.$$

Answer ..... [2]

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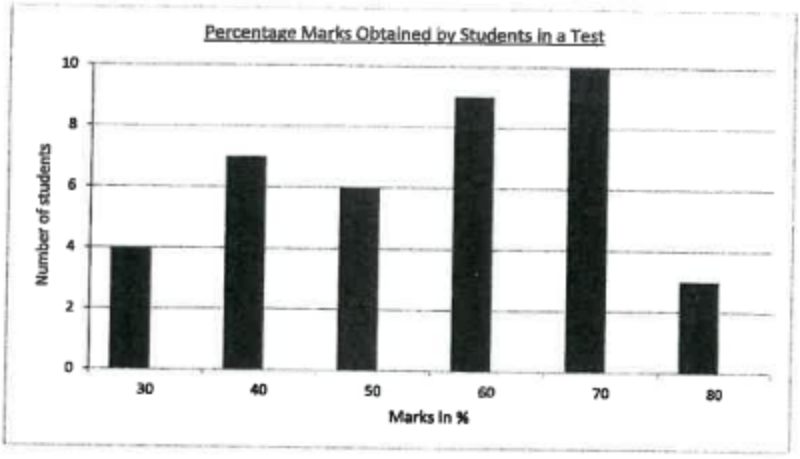
18 The bar chart shows the marks (%) obtained by some students in a test.



(a) Find the modal mark

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

(b) Find the probability that a student scores

(i) more than 60%,

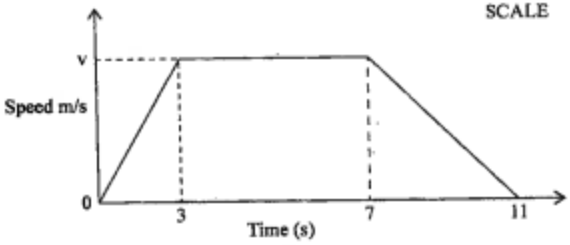
Answer (b)(i) ..... [1]

(ii) 40% or 70%.

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

19 The diagram illustrates the journey of a particle.

NOT TO SCALE



Given that the total distance travelled is 45 m, find the acceleration.

Answer ..... m/s^2 [3]