EXAMINATIONS COUNCIL OF SWAZILAND
Swaziland General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **6880/03**

Paper 3 Calculator Structured Questions (Extended) **October/November 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.
Additional Materials: Electronic Calculator
Geometric instruments
Mathematical Tables (optional)
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 in the spaces provided on the Question Paper.
You may use an HB pencil for any diagrams or graphs.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

All working should be clearly shown.
The number of marks is given in brackets [ ] at the end of each question or part question.
Marks will be given for working which shows that you know how to solve the problem even if you get the answer wrong.

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 total of the marks for this paper is 100.

For Examiner's Use	
1	
2	
3	
4	
5	
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7	
8	
9	
10	
Total	

This document consists of **14** printed pages and **2** blank pages.

1 You are given that matrix $\mathbf{A} = \begin{pmatrix} 3x & x \\ 2 & 3 \end{pmatrix}$

(a) Write an expression for the determinant of **A** in terms of x.

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

(b) Given that the determinant of **A** is 21,

(i) work out the value of x,

Answer (b)(i) $x =$ ..... [2]

(ii) hence, write down $\mathbf{A}^{-1}$.

Answer (b)(ii) $\mathbf{A}^{-1} =$ ..... [3]

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2 **(a)** Sipho made a 12.5% loss when he sold a coat for E437.50.

Calculate the original cost of the coat.

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

(b) Tema bought a calculator for E120.
She sold the calculator to Futhi making a 7.2% profit.
Futhi later sold the calculator making a 7.2% loss.

Work out the price at which Futhi sold the calculator.

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

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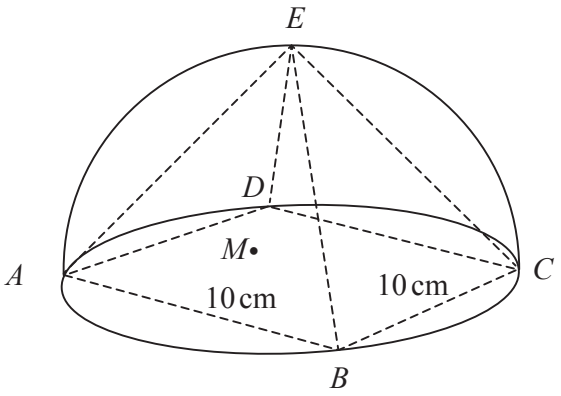
3 A square based pyramid is removed from a hemispherical plastic solid.
The length of each side of the base of the pyramid is 10 cm.
M is the centre of both the hemisphere and the base of the pyramid.
A, B, C, and D are on the edge of the circular base.
E is the top of both the pyramid and the hemisphere.
The triangular faces of the pyramid are all congruent.
The diagram below is a sketch of the hollow solid.



NOT TO SCALE

[Volume of a pyramid $= \frac{1}{3}$ base area $\times$ height] and [Volume of a sphere $= \frac{4}{3}\pi r^3$]

(a) Calculate the length AC, giving your answer to 2 decimal places.

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

(b) Find ME, the radius of the hemisphere.

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

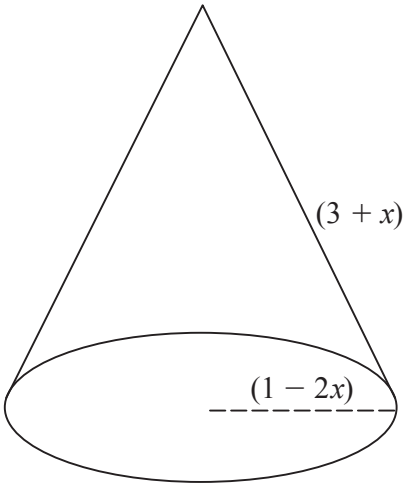
(c) **(i)** Find the volume of the removed pyramid.

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

(ii) Calculate the volume of the plastic that remained after the pyramid was removed.

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

4 The diagram shows a conical candle with radius $(1 - 2x)$ cm.
The slant height of the cone is $(3 + x)$ cm.



[The curved surface area of a cone $= \pi rl$]

(a) Form an expression, in terms of x and π, for the curved surface area of the candle.

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

(b) You are given that the total surface area of the candle is 10π cm^2.

(i) Form an equation for the **total** surface area of the cone and show that it simplifies to

$$2x^2 - 9x - 6 = 0$$

Answer (b)(i) .....

.....

.....

.....

.....

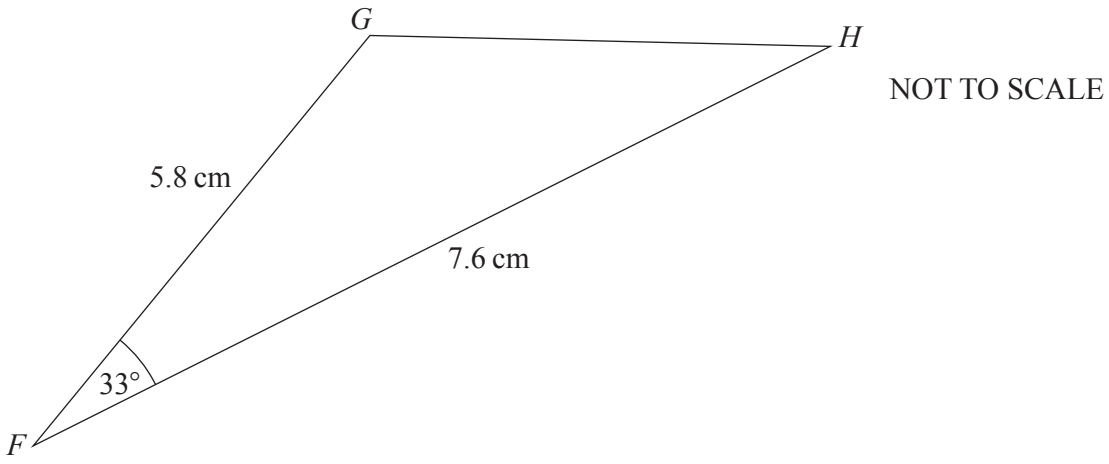
..... [3]

(ii) Solve the equation $2x^2 - 9x - 6 = 0$ giving your answers to 2 decimal places.

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

5 The diagram shows triangle *FGH*.

$FG = 5.8$ cm, $FH = 7.6$ cm and angle $GFH = 33°$.



(a) Calculate the area of triangle *FGH*.

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

(b) Show that the length $GH = 4.9$ cm.

Answer (b) .....

.....

.....

.....

..... [4]

(c) Calculate

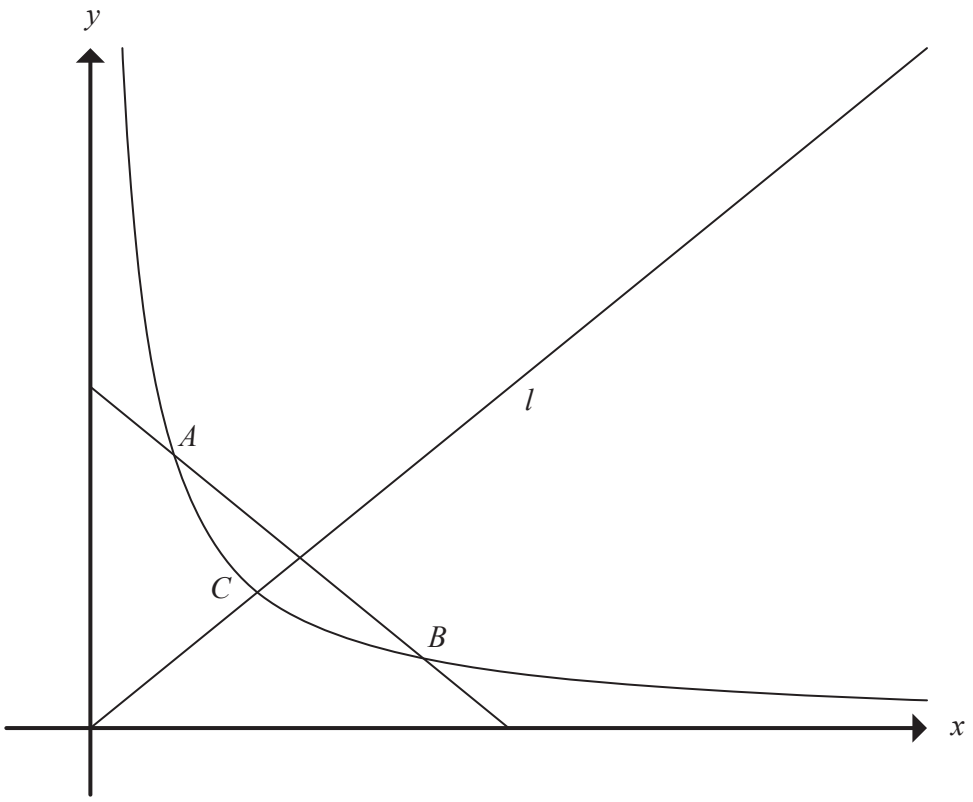
(i) angle *FGH*,

Answer (c)(i) angle *FGH* = ...° [3]

(ii) the height of triangle *FGH* with *FG* as base.

Answer (c)(ii) height = ...cm [3]

6 **(a)** The diagram shows sketches of the graphs of $y = \frac{4}{x}$ and $y = 5 -$ for $x \geqslant 0$



The graphs meet at the points A and B.
The line l is the line of symmetry of the curve line AB.
Line l meets the curve at C.

(i) Find the coordinates of the points A and B,

Answer (a)(i) A(....., ...), B(....., ...) [3]

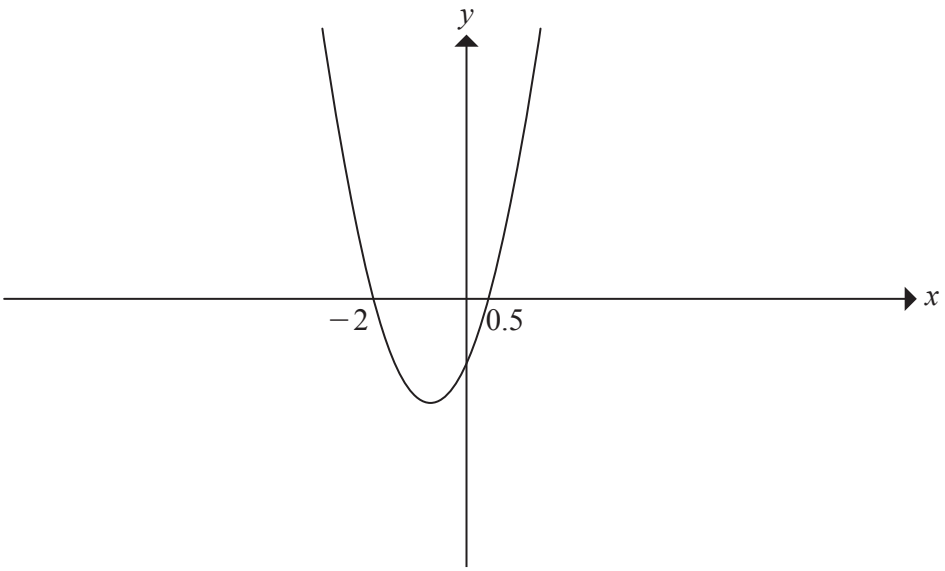
(ii) Find the equation of line l,

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

(iii) Find the coordinates of the point C.

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

(b) The diagram shows the sketch of $y = 2x^2 + 3x - 2$



(i) Find the coordinates of the turning point.

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

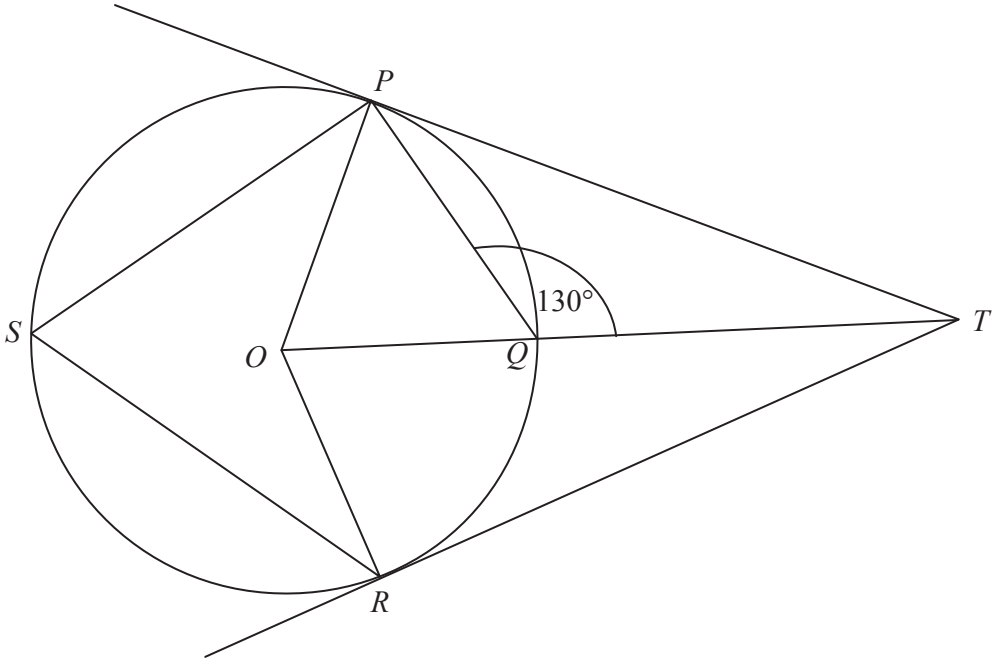
(ii) Use the sketch to find the range of values of x for which $2x^2 + 3x - 2 \leqslant 0$

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

(iii) Use the sketch to find the range of the values of x for which the gradient of $y = 2x^2 + 3x - 2$ is positive.

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

7 TP and TR are tangents to the circle with centre O.
P, Q, R and S lie on the circumference of the circle.
OQT is a straight line.
$P\hat{Q}T = 130°$



(a) Find the size of

$Q\hat{P}T$

Answer (a) $Q\hat{P}T =$ ..... [2]

(b) $P\hat{O}R$

Answer (b) $P\hat{O}R =$ ..... [2]

(c) $P\hat{S}R$

Answer (c) $P\hat{S}R =$ ..... [1]

(d) $O\hat{P}R$.

Answer (d) $O\hat{P}R =$ ..... [2]

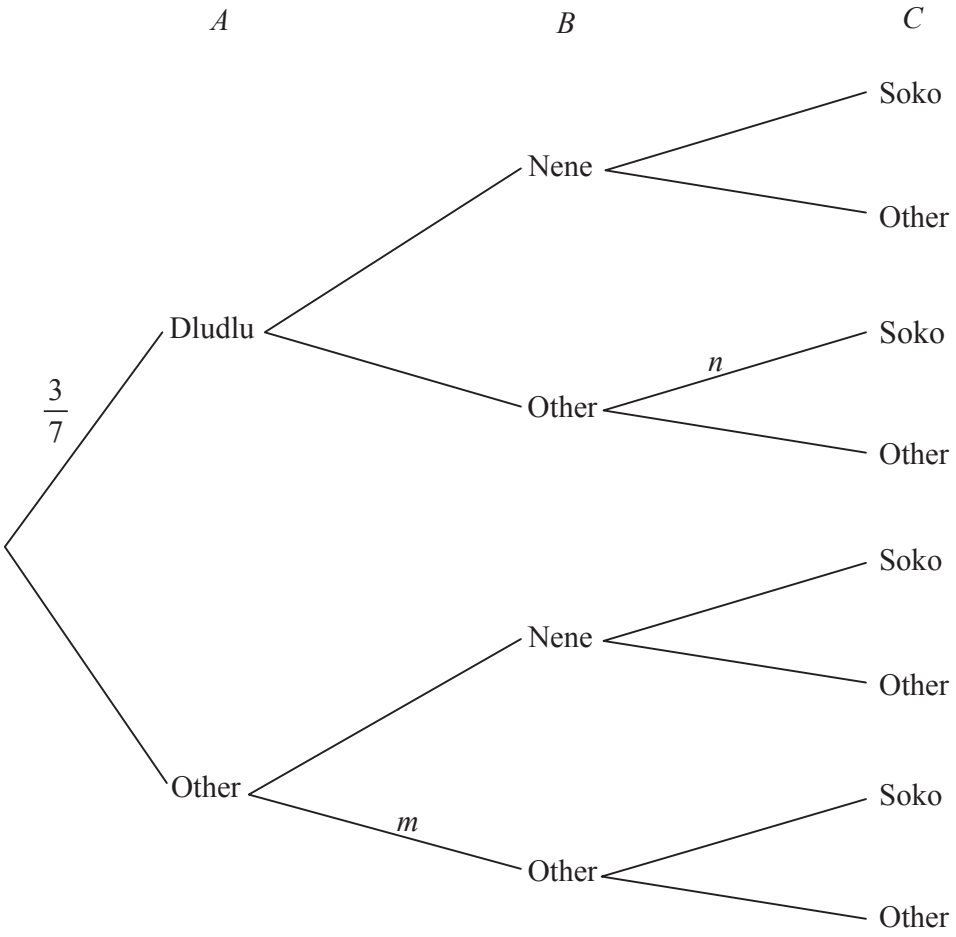
8 A delegation of three people is to represent three different committees A, B and C. Each committee independently selects one person.

The probability that Committee A selects Mr. Dludlu is $\frac{3}{7}$.

The probability that Committee B selects Miss Nene is $\frac{2}{9}$.

The probability that Committee C selects Mrs. Soko is $\frac{3}{5}$.

This information is summarised in the following tree diagram.



(a) Find the values of m and n.

Answer (a) ..... m = ... and n = ... [2]

(b) By following the necessary branches of the tree diagram find the probability that

(i) none of Mr Dludlu, Miss Nene and Mrs Soko is selected,

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

(ii) exactly one of these three is selected,

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

(iii) Mr Dludlu and just one of Mrs Soko and Miss Nene are selected.

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

(c) The probability that the delegation consists of women only is zero.

Explain the composition of committee *A*.

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

9 The following table summarises the masses of 100 pupils to the nearest kg.

Mass (x kg)	$20<x\leqslant 30$	$30<x\leqslant 40$	$40<x\leqslant 45$	$45<x\leqslant 50$	$50<x\leqslant 55$	$55<x\leqslant 60$	$60<x\leqslant 70$
Frequency	0	10	9	11	19	28	23

(a) Complete the cumulative frequency table from the information above.

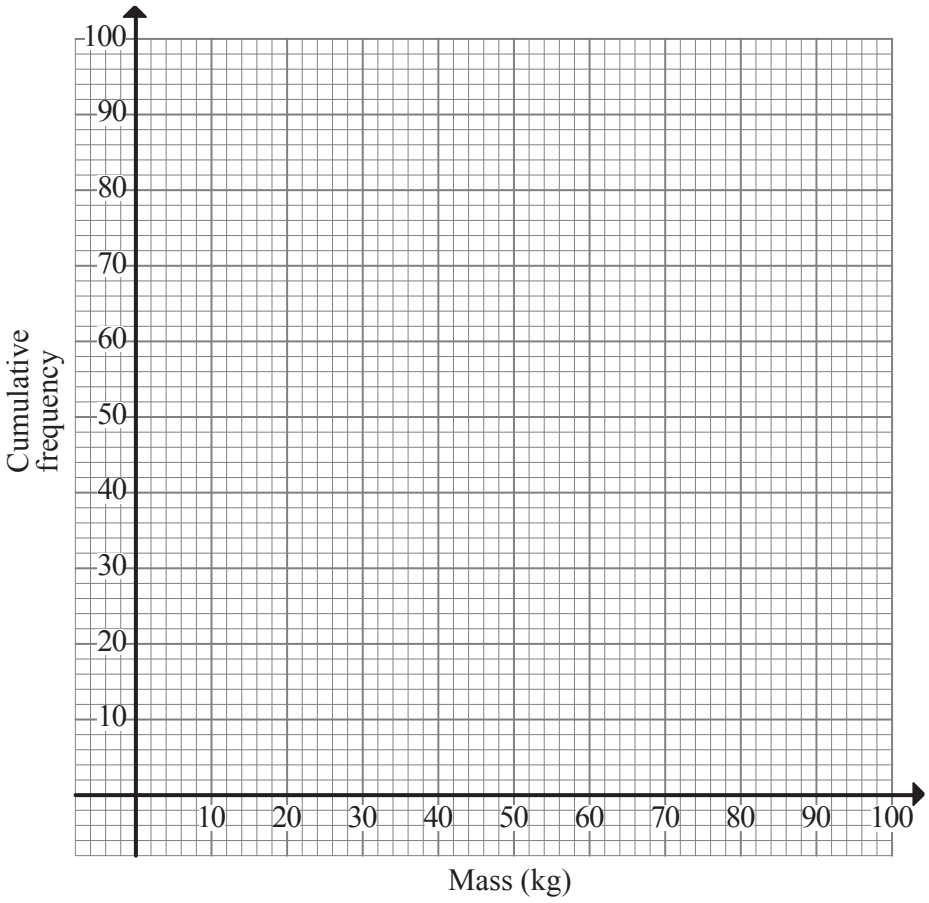
Mass (x kg)	$x\leqslant 30$	$x\leqslant 40$	$x\leqslant 45$	$x\leqslant 50$	$x\leqslant 55$	$x\leqslant 60$	$x\leqslant 70$
Cumulative frequency	0	10	19	s	t	u	100

Answer $s =$ .....

$t =$ .....

$u =$ ..... [2]

(b) On the grid opposite, draw a cumulative frequency curve.



[3]

(c) Use your graph to find the

(i) interquartile range,

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

(ii) the number of pupils with mass above 46 kg.

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

10 **(a)** Solve the equation

$$\frac{2}{x+3} = \frac{4}{x \quad 1}$$

Answer (a)$x =$ ..... [3]

(b) Express the following fraction in its simplest form.

$$\frac{t^2 + t - 12}{2t^2 - 32}$$

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

(c) You are given that $g(y) = y^{\frac{3}{2}}$.

Work out $g(\frac{4}{9})$.

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

(d) You are given that $h(z) = 3z + 1$ and $k(z) = z + 5$.
Work out expressions for

(i) $(hk)^{-1}(z)$,

Answer (d)(i) $(hk)^{-1} =$ ..... [4]

(ii) $hk^{-1}(3)$.

Answer (d)(ii) $hk^{-1}(3) =$ ..... [3]

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