EXAMINATIONS COUNCIL OF LESOTHO
Lesotho General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

MATHEMATICS **0178/02**

Paper 2 (Extended) **May/June 2018**

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 Work out.

(a) $-2^3 - {}^{-}9 \times 4 \div (2 \times 3^2)$

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

(b) $4^{-\frac{1}{2}} + 16^{\frac{3}{4}}$

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

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2 Given the sequence.

$\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{6}$, p, ..., $\frac{21}{22}$, q, ...

Find

(a) the missing terms p and q,

Answer (a) $p =$ ....., $q =$ ..... [2]

(b) the nth term.

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

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3 Temperatures at 04 00 hours and 12 00 hours were −5 °C and 19 °C, respectively.

(a) Find the difference between the two temperatures.

Answer (a) ..... °C [1]

(b) Assuming that the temperature was rising at a steady rate, find

(i) the temperature at 09 30 hours,

Answer (b)(i) ..... °C [3]

(ii) the time when the temperature was 8 °C.

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

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4 (a) (i) Factorise $a^2 - b^2$.

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

(ii) Use your answer to part (a)(i) to evaluate $97^2 - 9$.

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

(b) Factorise **fully** $3x^2 - 13x - 10$.

5 $\mathbf{A} = \begin{pmatrix} 4 & 2 \\ 0 & 3 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} \frac{1}{4} & k \\ 0 & \frac{1}{3} \end{pmatrix}$ $\mathbf{C} = \begin{pmatrix} 12 & 0 \\ -9 & m \end{pmatrix}$

Find

(a) $\mathbf{A}^2$,

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

(b) k if $\mathbf{AB} = \mathbf{I}$,

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

(c) m if the determinant of **A** is equal to the determinant of **C**.

Answer (c) $m =$ ..... [2]

6 Solve the following equations.

(a) $3x - 5(3 - x) = 41$

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

(b) $2^{x+1} - 32 = 0$

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

(c) $2x + y = 10$
$7x - 3y = 9$

Answer (c) $x =$ ..... $y =$ ..... [3]

7 The diagram shows a design of a tile in the shape of a regular octagon.
The design is made from eight squares all of the same size symmetrically placed inside the octagon as shown.

NOT TO SCALE

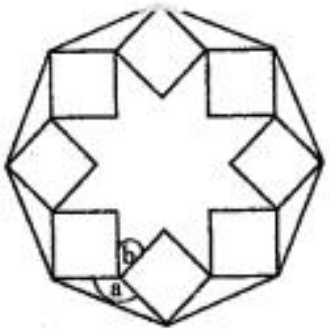
(a) State the number of lines of symmetry of the shape.

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

(b) Calculate the size of the angle between any two adjacent lines of symmetry.

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

(c) The letters a and b represent some angles in the diagram.

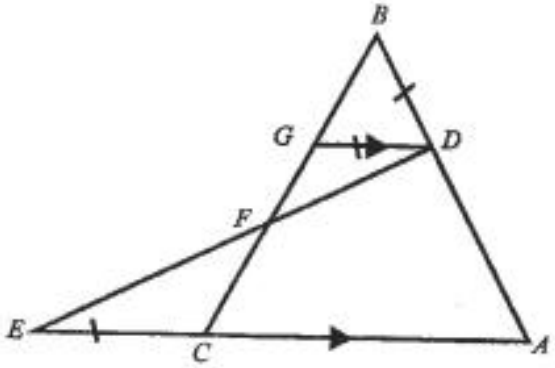


NOT TO SCALE

Given that $a = 135°$, calculate the value of b.

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

8 In the diagram, ABC is an isosceles triangle with $AB = AC$.
ECA and DFE are straight lines.
DG is parallel to AE and $BD = CE = DG$.



NOT TO SCALE

(a) Name the triangle that is similar to ΔABC.

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

(b) Show that ΔDGF is congruent to ΔECF.

Answer (b) .....

.....

..... [3]

(c) Given that $BC = 9$ cm and $CF = 3$ cm.

(i) Explain why $BC = 3BG$.

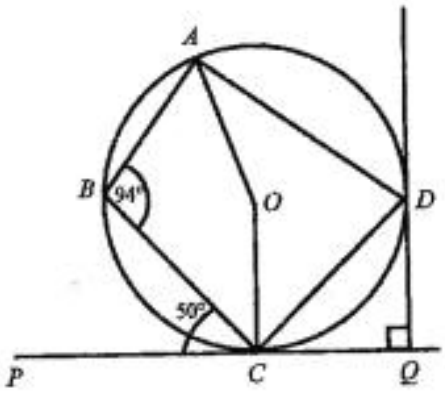
Answer *(c)*(i) ..... [1]

(ii) Find the ratio

area $ADGC$: area ABC

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

9 In the diagram, A, B, C and D are points on the circumference of the circle with the centre O.
PCQ is a tangent to the circle at C and DQ is a tangent to the circle at D.
Angle $ABC = 94°$ and angle BCP $= 50°$.



NOT TO SCALE

(a) Find

(i) reflex angle AOC,

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

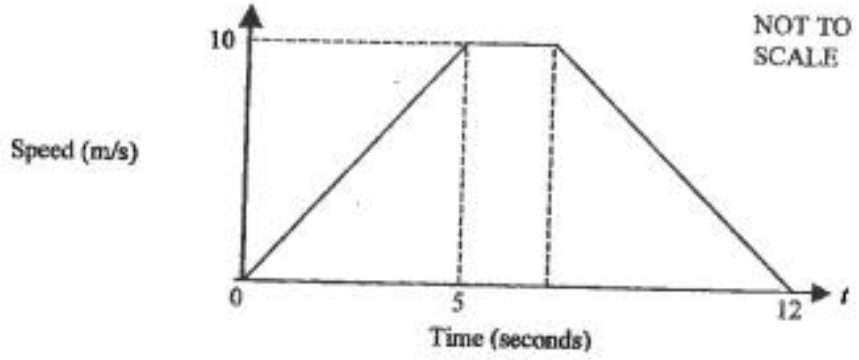
(ii) angle BAO.

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

(b) If the area of triangle $CDQ = 8$ cm^2, find CD^2.

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

10 The diagram shows the speed-time graph of a toy-car.



(a) Find the speed of the toy-car when $t = 3$.

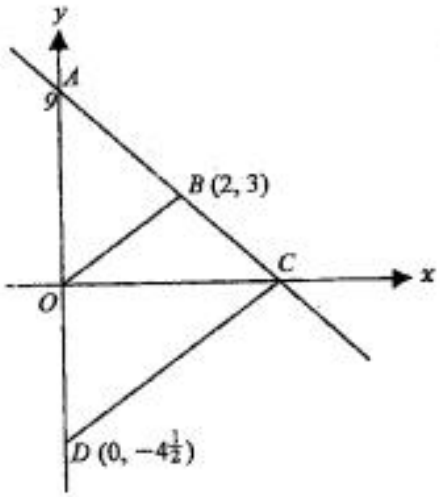
Answer (a) ..... m/s [1]

(b) The toy-car travelled a total distance of 65 m,

Find how long the toy-car took to decelerate.

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

11 In the diagram, the coordinates of B and D are $(2, 3)$ and $(0, -4\frac{1}{2})$.
OB is parallel to DC.



NOT TO SCALE

(a) Show that the point C is $(3, 0)$.

[2]

(b) Find the equation of line CD.

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

(c) Given that the length of BC is $\sqrt{r}$, find the value of r.

Answer (*c*) $r =$ ..... [2]

12 Given the distribution 12, 10, 8, 15, 18, 6, 8.

(a) **(i)** Find the lower quartile.

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

(ii) Find the inter-quartile range.

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

(b) Calculate the mean.

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

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13 **(a)** Given that $T = \frac{2r\sqrt{p}}{3}$, make p the subject of the formula.

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

(b) Find the quadratic equation whose solutions are $x = -3$ and $x = 5$.

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