EXAMINATIONS COUNCIL OF ESWATINI
Junior Certificate Examination

CANDIDATE NAME

CENTRE NAME

CANDIDATE NUMBER

ADDITIONAL MATHEMATICS **519**

October/November 2020

2 hours 30 minutes

Candidates answer on Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on the spaces provided.
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 or rough working.
Do **not** use staples, paperclips, highlighters, and glue or correction fluid.

Answer **all** questions.

All working should be clearly shown below that question.
The number of marks is given in brackets [ ] at the end of each question or part question.

Scientific 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 3.14 or the value given in the specific question.
The total of marks for this paper is 100.

For Examiner's Use	
1	
2	
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8	
9	
Total	

This document consists of **15** printed pages and **1** blank page.

1 **(a)** Evaluate

(i) $-2\begin{pmatrix} -3 & -7 \\ 5 & -1 \end{pmatrix}$,

Answer (a)(i) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(ii) $(-3 \quad 5 \quad 0)\begin{pmatrix} -1 \\ 4 \\ -7 \end{pmatrix}$,

Answer (a)(ii)…………………….. [2]

(iii) $\begin{pmatrix} 4 & -2 \\ 0 & -3 \end{pmatrix} - 3\begin{pmatrix} 3 & -1 \\ -5 & 0 \end{pmatrix}$.

Answer (a)(iii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [3]

(b) Given that $\begin{pmatrix} 3 & 0 \\ 3 & -1 \end{pmatrix}\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} -6 \\ 10 \end{pmatrix}$, find a and b.

Answer (b) a =……………………..

b = ………………… [3]

2 **(a)** Simplify.

$$\frac{7}{x+3} - \frac{3}{x-1}$$

Answer (a)…………………….. [3]

(b) Factorise the following.

(i) $x^2 - 4x - 12$

Answer (b)(i)…………………….. [2]

(ii) $p^2 - 1$

Answer (b)(ii)…………………….. [2]

(c) Solve the equation.

$$\frac{2-x}{3} - \frac{4}{5} = 1$$

Answer (c)…………………….. [4]

3 **(a)** *ABCD* is a trapezium.

O and P are points such that *OPCB* is a rectangle.

AO = *PD*.

$\overrightarrow{BC}$ = 5**a** and $\overrightarrow{AD}$ = 9**a**. $\overrightarrow{BO}$ = 3**b**.
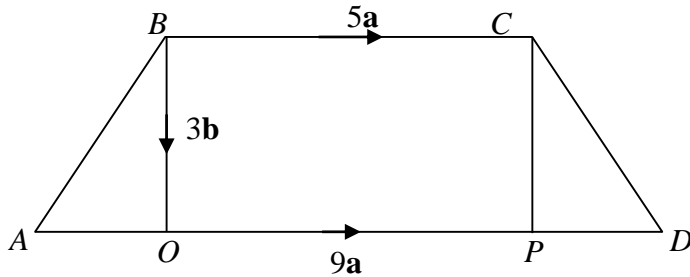
Find

(i) $\overrightarrow{AO}$

Answer (a)(i)……………..…..………….. [2]

(ii) $\overrightarrow{CD}$

Answer (a)(ii)……………….………… [2]

(iii) $\overrightarrow{DB}$

Answer (a)(iii)……..……………..…… [2]

(iv) $\overrightarrow{CA}$

Answer (a)(iv)…………….………….. [2]

(b) You are given that $\overrightarrow{AB} = \begin{pmatrix} 8 \\ -6 \end{pmatrix}$ and $\overrightarrow{CD} = \begin{pmatrix} 4 \\ 3x-2 \end{pmatrix}$.

(i) Find $\left| \overrightarrow{AB} \right|$

Answer (b)(i)………..……….……….. [3]

(ii) Find the value of x, given that $\overrightarrow{AB}$ is parallel to $\overrightarrow{CD}$.

Answer (b)(ii)…………………………… [3]

4   A game is played using two dice. The possibility space is shown below.

[improve the crosses and axis lines and arrows, make text of numbers same as the rest of text]
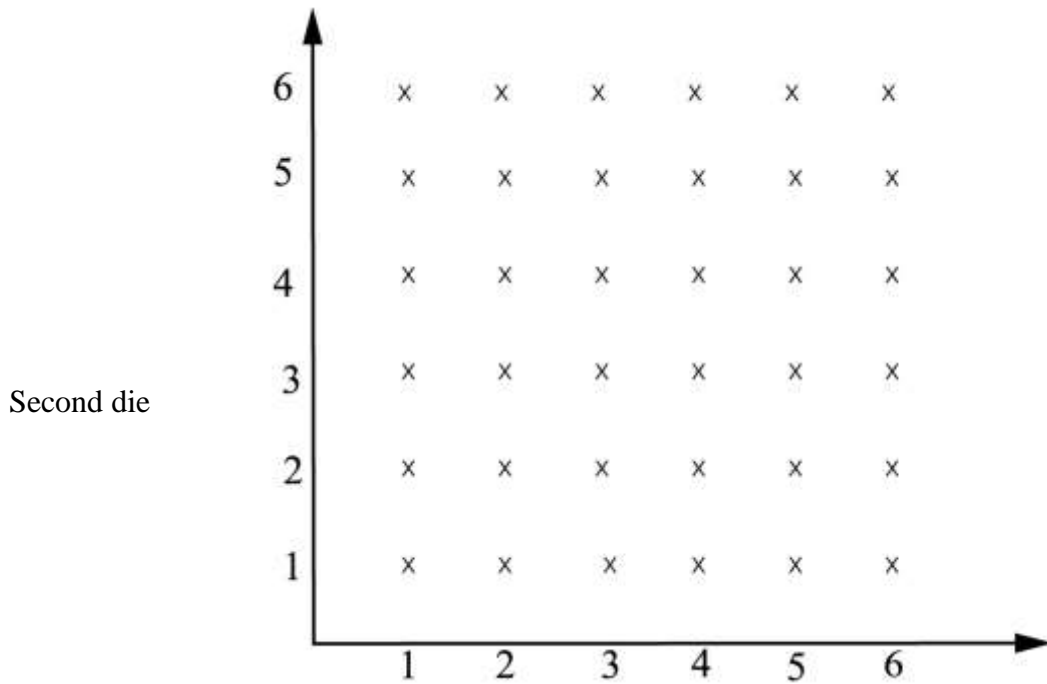
Second die

Find the probability that

(a)   The sum of the scores is 7,   First die

Answer (a)…..………………..…….. [2]

(b)   The number on the first die is greater than number on the second die,

Answer (b)……………..……….. [2]

(c)   The number on both dice are square numbers,

Answer (c)………..……..………. [2]

(d)   The number on the first die is a multiple of 5 and the number on the second die is
        a multiple of 3.

Answer (d)…………………………. [2]

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5   A boy looks outside a window of a tall building.
    The vertical distance of the window from the ground is 7 m.
    He sees a ball on the ground 15 m from the base of the building.

(a)   Draw a sketch showing the position of the boy, the base of the building and the ball.

[2]

(b)   Calculate the angle of depression of the ball from the boy.

Answer (b) …………………………..° [3]

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6 **(a)** Given that $m = \dfrac{\sqrt{n-8}}{3}$

(i) make *n* the subject of the formula,

Answer (a)(i)……………..…..……….. [3]

(ii) find *n* when $m = -2$.

Answer (a)(ii) *n* =………………..……….. [2]

(b) Solve the inequality $5 - 3x > x - 2$.

Answer (b)……………………….….. [3]

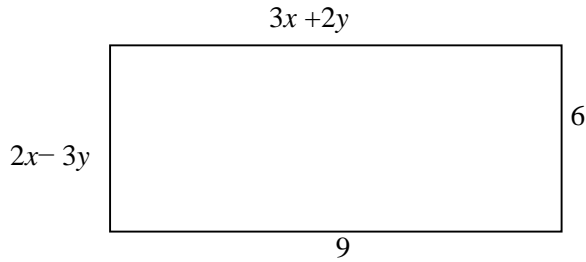**(c)** You are given the function $f(x) = \dfrac{5x-2}{10}$

Find

(i) f(2)

Answer (c)(i)………………..……….. [2]

(ii)   f(0)

Answer (c)(ii)…………..……….. [2]

(d)   You are given the rectangle below.

$3x + 2y$

$2x - 3y$ 6

9

(i)   form two simultaneous equations from the rectangle,

Answer (d)(i)…………….…………………..

…………………………………[2]

(ii)   Solve the two simultaneous equations in **(d)(i)**.

Answer (a)(ii) $x = $ ……………. and y = ………………….. [3]

7 The variables x and y are connected by the equation $y = 4x - x^2$.

x	-2	-1	0	1	2	3	4	5	6
$y = 4x - x^2$	-8	-5	0	3	p	3	0	q	-8

(a) Find the values of p and q.

Answer (a) $p = $ ……………….…..…

$q = $ …………….….…… [2]

(b) On the grid below, draw the graph of $y = 4x - x^2$.

[Insert grid with small squares, x axis and y axis with solid arrows]
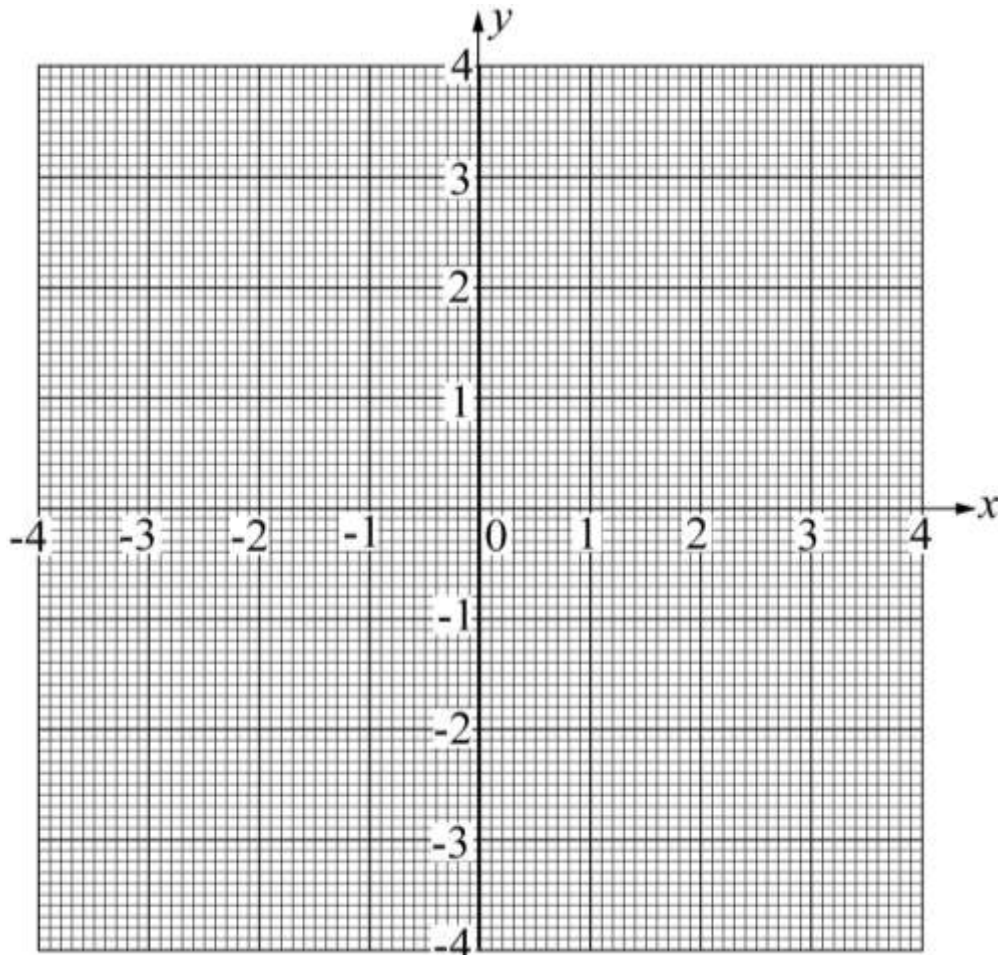
[3]

(c)   Write down the equation of the line of symmetry for the curve.

Answer (c)……….……………... [1]
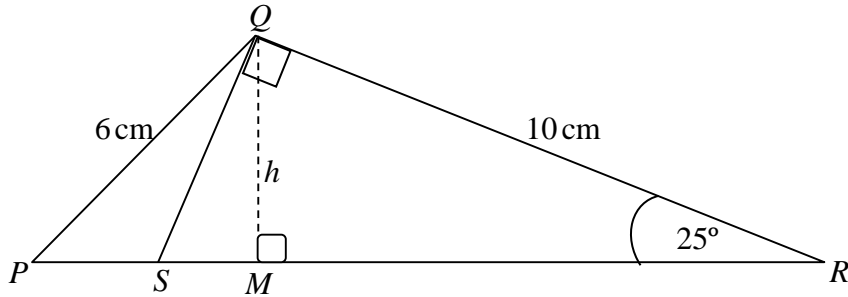
(d)   Use your curve to solve the following equations,

(i) $4x - x^2 = -2$,

Answer (d)(i) x = ………. *or x =* …………... [2]

(ii) $4x - x^2 = x - 1$.

Answer (d)(ii) x = ………. *or x =* …………... [4]

8 *PQR* is a triangle.
PQ = 6 cm and *QR* = 10 cm.
Angle *QRP* = 25°, angle *SQR* = angle *QMR* = 90°
S and *M* are points on *PR*.
The height of the triangle is *h* cm.

Calculate

(a) *SR*,

Answer (a)……………………………cm [3]

(b) *h*, the height of the triangle,

Answer (b)……………………………cm [3]

(c) *PM*,

Answer (c)…………………………….cm [3]

(d)   Angle *PQR*.

Answer (d)…………………..……….. ° [4]

9 A survey was carried out in a school to find masses of learners.
The table shows some the masses of learners, measured in kilograms.

Mass in kg	Frequency	Cumulative frequency
55	3	3
56	6	9
57	11	20
58	17	
59	28	
60	18	
61	12	
62	5	

(a) Complete the cumulative frequency table. [2]

(b) State the total number of learners in the survey.

Answer (b)……………………….. [1]

(c) Calculate the number of learners that had a mass of 59 kg or more.

Answer (c)………………………….. [2]

(d) On the grid below, draw the cumulative frequency curve. Insert grid

[insert grid with small squares, x axis and y axis with solid arrows]
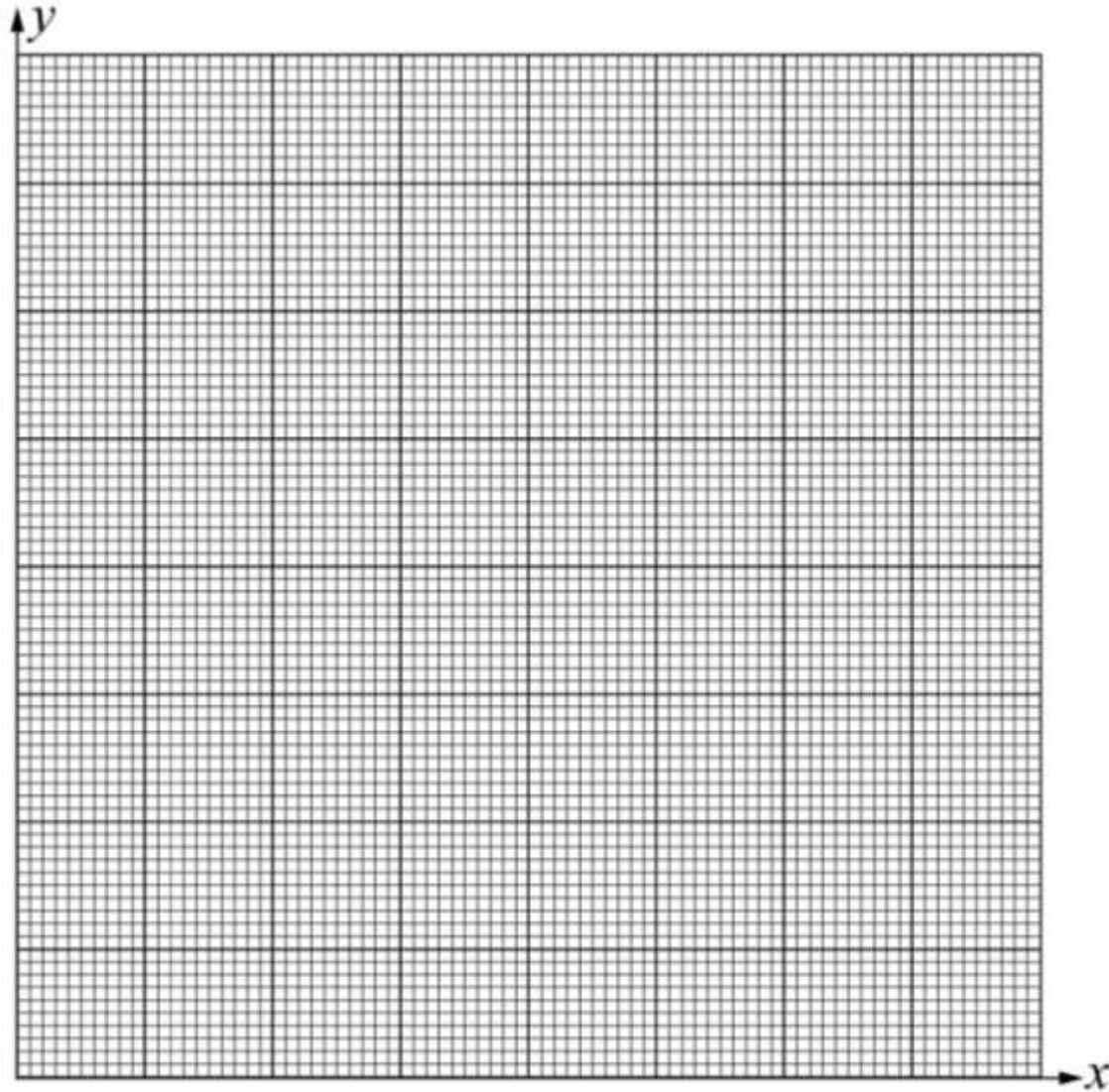
[3]

(e) Using your curve, estimate the median mass.

Answer (e)……………………………. [2]

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