**EXAMINATIONS COUNCIL OF SWAZILAND**

**JUNIOR CERTIFICATE EXAMINATION**

**Additional Mathematics** **519**

**October/November 2010**

**2 hours 30 Minutes**

**Additional materials:** Answer Booklet/paper

Geometrical instruments

Mathematical tables (optional)

Electronic calculators (optional)

Graph paper

**READ THESE INSTRUCTIONS FIRST**

If you have been given an Answer Booklet, follow the instructions on the cover of the Booklet.

Write in dark blue or black pen.

You may use soft pencil for any diagrams or graphs.

Do **not** use highlighters, glue or correction fluid.

Answer **all** questions.

All working must be clearly shown. It should be done on the same sheet as the rest of the answer.

Marks will be given for working which shows that you know how to solve the problem even if you get the wrong answer.

Electronic calculators may 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 3.142 or the value given in the specific question.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 100.

This document consists of **7** printed pages and **1** blank page.

1. (a) Simplify the expressions
2.  [2]
3.  [3]

(b) Sihle used as an approximation of **π**.

Find the difference between this value and the value of **π** given in your

calculator. Give your answer to 3 decimal places. [2]

**[7]**

1. (a) Express as a single fraction

 [3]

(b) Solve the equations

(i)  [2]

(ii)  [4]

**[9]**

1. A boy standing on top of a hill looks downwards and spots his lost cow. The hill is 200m high and the angle of depression of the cow from the top of the hill is 39º.
2. Draw a sketch diagram showing the information given in this question. [2]
3. How far is the boy away from the cow? [3]

**[5]**

1. (a) In the rectangle below, the length iscentimetres and the breadth is centimetres.

4*x*+3*y*

2*x*+*y*

NOT TO SCALE

If the length of the rectangle is 15 cm and the breadth is 6 cm;

1. Write down two equations in *x* and *y*. [1]
2. Solve the two equations to find the values of *x* and *y*. [4]

(b) Given that A = , B = , C = 

Calculate;

1. AB [2]
2. C2 [2]
3. D, given that 2C – D =  [3]

**[12]**

1. (a) Given that  evaluate;

 [1]

1. Two functions, and , are given. Using the following

set of values as your domain,

{ −2 , , 3 , 6 };

Calculate;

1. The smallest value of  [2]
2. The biggest value of  [3]

**[6]**

1. **Answer this question on a sheet of graph paper.**

The points A (-6, 6) and B (2, 10) are plotted on the grid below.



1. Using a scale of 1cm to 1 unit on both axes, copy the grid with the points A and B. [2]
2. C is the image of B after a translation of vector 

Mark and label point C. [2]

1. The shape ABCD is a parallelogram. Mark and label a possible position of D and

complete the parallelogram. [2]

1. Draw the diagonals of the parallelogram. Write down the coordinates of the

point of intersection. [1]

1. Given that ; Work out the coordinates of F. [3]
2. Show that the magnitude of AB = 8.94 units to 3 significant figures. [3]

**[13]**

1. The diagram shows the route taken by a boat on a fishing trip. The boat starts from port A and sails 16 km on a bearing of 0420 to its first stop B. The boat then sails 12 km due East to its second stop at port C. Another port R is such that it is due North of A and due West of B.

(a) Calculate

R

A

B

C

12km

16km

420

N

N

1. the distance AR. [3]
2. the distance BR. [3]

(iii) the bearing of C from A to the nearest degree. [3]

(iv) the distance AC, in km to 1 decimal place. [3]

(v) the area of triangle ABC. [3]

(b) The boat returns directly to A from C at a speed of 6.4 km/h.

Find the time it takes to return directly to A from C. [3]

**[18]**

1. **(a) Answer the whole of this question on a sheet of graph paper.**

The table below shows Additional Mathematics test scores in one school.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| Number of students | 0 | 4 | 11 | 33 | 52 | 64 | 26 | 8 | 2 |
| Cumulative frequency | 0 | 4 | 15 |  |  |  |  | 198 |  |

1. Copy and complete the cumulative frequency table. [3]
2. How many pupils wrote the test? [1]
3. Using a scale of 1 cm to represent 20 units on the horizontal axis

and 1cm to represent 10 units on the vertical scale, draw the cumulative frequency diagram. [4]

1. If grade B ranges from 47.5 to 57.5 marks,

calculate the number of candidates that obtained grade B. [2]

(b) The table shows the number of goals scored by Vusi’s football team in 20 matches.

|  |  |
| --- | --- |
| Number of goals scored | Number of matches |
| 0 | 6 |
| 1 | 3 |
| 2 | 5 |
| 3 | 3 |
| 4 | 2 |
| 6 | 1 |

1. What is the modal number of goals scored per match? [1]
2. Calculate the mean number of goals scored per match. [3]
3. Calculate the probability of Vusi’s team scoring 0 goals. [1]
4. Calculate the probability of the team scoring at most 2 goals. [2]

**[17]**

1. **Answer the whole of this question on a sheet of graph paper.**

The variables  and y are connected by the equation. Some of the corresponding values are given in the table below.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *x* | −3 | −2 | −1 | 0 | 1 | 2 | 3 | 4 | 5 |
| *y*=2*x*−*x*2−1 | −16 | −9 | −4 | ***a*** | 0 | −1 | ***b*** | −9 | −16 |

1. Calculate the value of ***a*** and ***b .*** [2]
2. Using a scale of 2 cm to represent 1 unit on the horizontal axis and 1 cm to

1 unit on the vertical scale, draw the graph of . [5]

1. What is the maximum value *y* can take for this function? [1]
2. Write down the equation for the axis of symmetry of the graph. [1]
3. (i) On the same axis draw the line *y* = *x* – 7. [2]

(ii) Using your graph, find two values of *x* which satisfy the equation

 [2]

**[13]**