**EXAMINATIONS COUNCIL OF SWAZILAND**

**JUNIOR CERTIFICATE EXAMINATION**

**ADDITIONAL MATHEMATICS 519**

 **November 2011**

 **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.

1. It is given that A =  , B =  and C = ;
2. Write down the order of matrix C [1]
3. Work out
4. CA [2]
5. B2 [3]
6. If BN = B, write down matrix N. [1]
7. When B2 – 2M = A, find matrix M. [4]
8. Given that f(*x*) = 2*x* and g(*x*) = 15 for all values of *x,*
9. Find
10. f(−3), [1]
11. g(0), [1]
12. 3f(*x*). [2]
13. If f(*x*) = g(*x*),

Find the value of *x*. [3]

1. Find the maximum integer value of *x* if f(*x*) > 10 . [4]
2. **(a)** Remove brackets and simplify
3. (*p* + 5) (*p* – 5) [2]
4. (*x* + 2*y*)2 [2]

**(b)** Given that *x*2 – 5*x* – 24 = (*x* + *a*) (*x* – *b*), find the value of *a* and *b.* [2]

**(c)** If 5(*x* – 3)2 = 0 write down the value of *x*. [2]

**(d)** Express as a single fraction

 . [3]

**(e)** You are given that P =  ,

**(i)** express *m* in terms of P and *n* [3]

**(ii)** hence find the value of *m* if *n* = 20 and P =  [2]

1. A bag contains 10 red balls and *x* white balls.

A ball is picked at random from the bag.

The probability that the ball is red is .

1. Find the number of white balls in the bag. [3]
2. Calculate the probability that the ball picked is;
3. Black, [1]
4. White. [2]
5. At a construction site, a rectangular concrete slab ABCD 5m by 2m rests against a vertical wall as shown.

B

E

A

D

C

62º

2m

5m

wall

Level ground

NOT TO SCALE

1. Calculate
2. the length BD, [2]
3. the length BE, [2]
4. the bearing of A from B, [2]
5. the height of C above ground. [3]
6. A mouse at point A on level ground looks at a bird at point C, the corner

of the slab.

Find the angle of elevation of the bird from the mouse. [4]

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

The table shows some of the values of *x* and *y* which satisfy the equation .

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *X* | −2 | −1 | 0 | 1 | 2 | 3 | 4 | 5 |
| *y* = *x*2 – 3*x* | 10 | 4 | 0 | −2 | −2 | 0 | *t* | 10 |

1. Find the value of *t*. [1]
2. Using a scale of 2 cm to 1 unit on the *x*-axis and 1 cm to 1 unit on the *y*-axis,

draw the graph of . [3]

1. Use your graph to solve the equations
2.  [2]
3.  [3]
4. Write down the equation of the line of symmetry of the curve. [1]
5. **(a)** Solve the simultaneous equations

 

  [3]

**(b)** Solve for *x* in the following equations

1.  [2]
2.  [2]
3. The points *A*(6, 7), *B*(2, 3) and *C*(0, 6) are shown on the diagram below.



1. Write $\vec{AB}$ as a column vector. [1]
2. Find two possible coordinates of *D* to make *ABCD* a parallelogram. [2]
3. Find
4. the length of *BC*  [2]
5. the perimeter of the parallelogram *ABCD*. [3]
6. the area of triangle *ABC*. [3]
7. Answer the whole of this question on a sheet of graph paper

The table shows the cumulative frequency distribution of the number of goals

scored by 60 players in a particular tournament.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of goals | 2 | 4 | 6 | 8 | 10 | 12 |
| Number of players (frequency) | 2 | 6 | 23 | *x* | 5 | *y* |
| Cumulative frequency | 2 | 8 | 31 | 53 | 58 | *z* |

1. Calculate the values of *x*, *y*, and *z*. [3]
2. **(i)** How many players scored 4 to 8 goals? [1]

**(ii)** A player is chosen at random from the distribution, find the probability

 that the player scored less than 6 goals. [2]

1. Using a scale of 1 cm to 1 unit on the horizontal axis and 2 cm to 10 units on

the vertical axis, draw the cumulative frequency curve. [3]

1. Use your curve to find

**(i)** An estimate median, [2]

**(ii)** The number of players. [2]

1. Given that players who scored more than 10 goals receive a golden boot award.

Find the number of players who got this ward. [2]