Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

MATHEMATICS ORDINARY LEVEL

4324/4

PAPER 4 (Extended)

2 hours 30 minutes

Marks 120

2017

Additional Materials: Geometrical instruments
Non-programmable calculator

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.

- Answer **all** questions.

- If working is needed for any question it must be shown below, or where working is indicated.
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Non-programmable 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 for angle sizes to one decimal place.
- For π, either use your calculator value, or use 3.142.

For Examiner's Use	
Marker	
Checker	

This document consists of **16** printed pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

1 **(a)** 120, 121, 122, 123, 124, 125, 126, 127.

From the list of numbers above, write down,

(i) a prime number,

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

(ii) the square of 11,

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

(iii) a cube number.

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

(b) π, $\frac{22}{7}$, $\sqrt{\frac{0}{4}}$, $\frac{4}{0}$, $4.\dot{2}$.

From the list, write down

(i) an irrational number,

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

(ii) a rational number,

Answer **(b) (ii)** ..... [1]

(iii) an undefined number.

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

For Examiner's Use

(c) Written as a product of its prime factors, $120 = 2 \times 2 \times 2 \times 3 \times 5$.

(i) Write 84 as a product of its prime factors.

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

(ii) Find the highest common factor of 84 and 120.

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

(iii) Find the lowest common multiple of 84 and 120.

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

For Examiner's Use

2 (a) Anna travelled to Germany for a conference. Her company offered her N$55 000 when the exchange rate was €1 = N$14.20.

She spent €445 per day for 5 days and changed what was left at the end of the conference back to Namibian dollars (N$) at an exchange rate of €1 = N$13.80.

(i) Calculate the amount she spent in Germany in euros (€).

Answer **(a) (i)** € ..... [1]

(ii) Show that the amount of money Anna brought back to Namibia is N$22 745.70.

Answer **(a) (ii)**

[3]

(b) Upon arrival in Namibia, Anna decided to invest $\frac{1}{3}$ of her money at 8% compound interest per annum for 2 years. She plan to use the rest of the money to treat her family to a weekend at a local National Park travelling in a family car.

Calculate

(i) the amount Anna invested,

Answer **(b) (i)** N$ ..... [1]

(ii) the total amount that she received after 2 years,

Answer **(b) (ii)** N$ ..... [2]

(iii) the amount she plan to use for the weekend.

Answer **(b) (iii)** N$ ..... [1]

(c) The charges at the National Park were as follows:

- The entry fees
  - N$30 per adult
  - N$10 per vehicle
  - Free entry for children under 16 years
- Accommodation fees
  - N$850 per person per night, excluding children under 16 years

The family, consisting of Anna, her husband, their 19 year old son and 11 year old daughter, stayed at the National Park for 2 nights. They used their own car during their stay.

Calculate,

(i) the total entry fee paid by the family,

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

(ii) the total accommodation fees paid by the family,

Answer **(c) (ii)** N$ ..... [2]

(iii) the total amount spent at the National Park.

Answer **(c) (iii)** N$ ..... [2]

(d) The family drove back to Windhoek at 11:20 on a Sunday and arrived in Windhoek at 15:50 on the same day. The distance between Windhoek and the National Park is 430 km to the nearest 10 km. The time is correct to one decimal place.

(i) Calculate the time taken for the journey to the nearest minute.

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

(ii) Calculate the lowest possible average speed at which the family drove, giving your answer as a fraction in its simplest form.

Answer **(d) (ii)** .....km/h [3]

3 **(a)** It is given that $m = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ and $n = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ are vectors.

Calculate

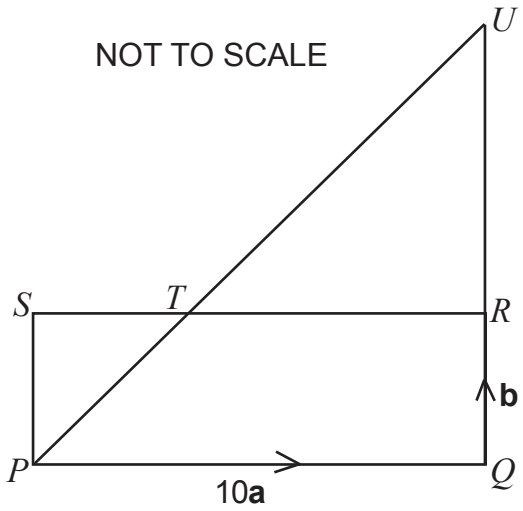
(i) $3m + n$,

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

(ii) $|3m + n|$.

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

(b) The diagram shows a rectangle $PQRS$.



The point T on SR, is such that $ST : TR = 2 : 3$ and QR is $\frac{1}{3}$ of QU.

$\overrightarrow{PQ} = 10\mathbf{a}$ and $\overrightarrow{QR} = \mathbf{b}$.

Express each of the following vectors in terms of **a** and/or **b**.

(i) $\overrightarrow{ST}$,

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

(ii) $\overrightarrow{QS}$,

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

(iii) $\overrightarrow{UP}$,

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

(iv) $\overrightarrow{QT}$.

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

For Examiner's Use

4 (a) (i) Solve $-4x - 3 = -3(x + 3)$.

Answer **(a) (i)** x = ... [3]

(ii) Solve the following simultaneously.

$3x + 2y = 19$,

$7x - y = 33$.

Answer **(a) (ii)** x = ... y = ... [3]

(iii) Solve $x^2 - 5x - 2 = 0$, show all your working and give your answers correct to 2 decimal places.

Answer **(a) (iii)** x = ... or x = ... [4]

(b) Factorise completely

(i) $18x^2 - 50$,

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

(ii) $2x^2 + 5x - 3$.

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

(c) Simplify the expressions

(i) $(2x^2y^3)^3$,

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

(ii) $(9a^4b^2)^{\frac{1}{2}}$.

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

(d) (i) Simplify $\dfrac{3^{n+2} \times 9^{n+1}}{81^{\frac{n}{2}}} = 3^k$ and find k in terms of n.

Answer **(d) (i)** k = ... [4]

(ii) Given that $n = -2$, find the value of k.

Answer **(d) (ii)** k = ... [1]

For Examiner's Use

5 Bonga does some work during the school holidays at the farm.

In one week he spends x hours ploughing the field and y hours looking after the goats.

The time he spends looking after the goats is at least equal to the time he spends ploughing the field. This can be written as $y \geq x$.

He spends no more than 12 hours working.

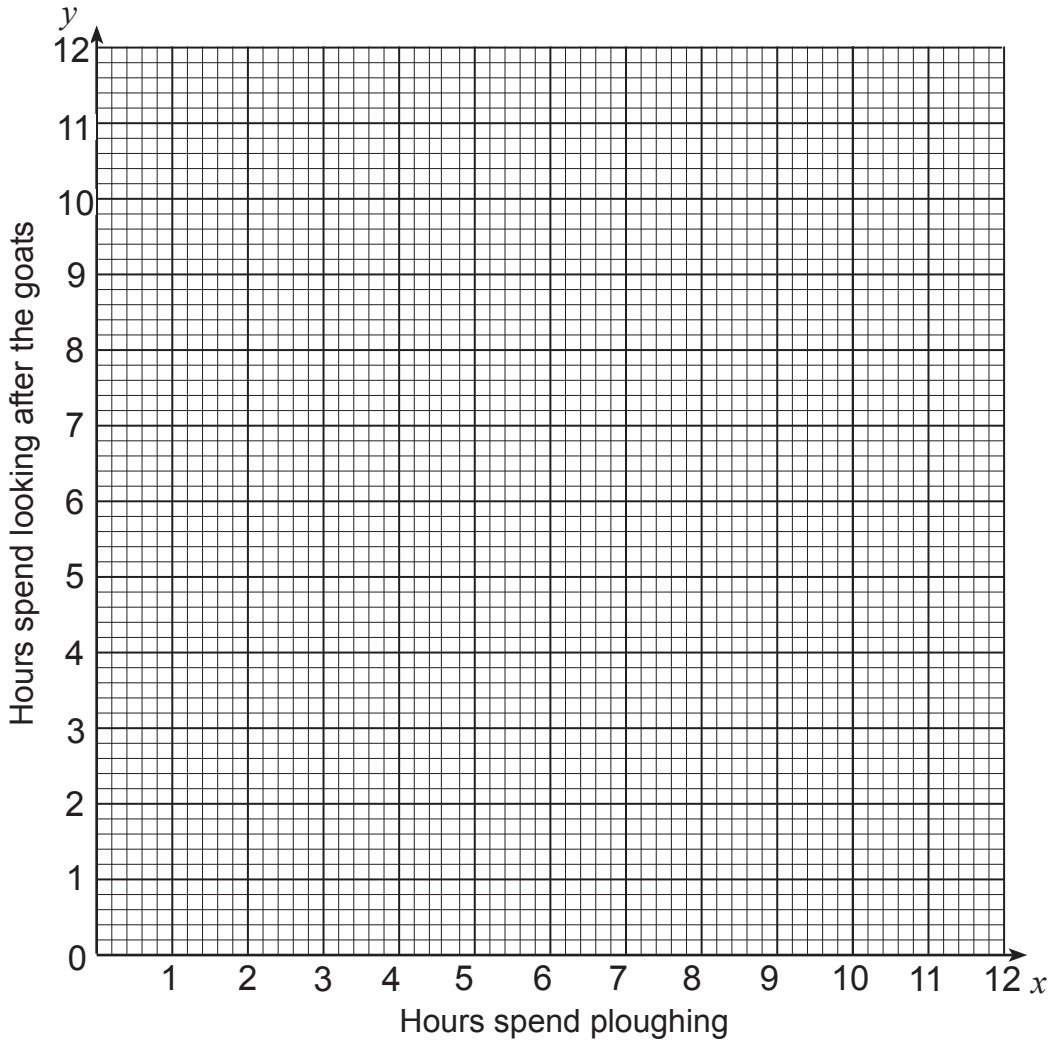
He spends at least 4 hours ploughing the field.

(a) Write down two more inequalities in x and y to show this information.

Answer **(a)** .....

..... [2]

(b) On the grid below, draw the three lines to show the inequalities and shade the unwanted regions.



[5]

(c) Bonga receives N$30 each hour for ploughing the field and N$15 each hour for looking after the goats.

Find the maximum amount of money that he can make?

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

For Examiner's Use

6 The functions f, g and h are defined as follows,

$f(x) = 1 - 2x$, $g(x) = \frac{12}{x+2}$ where $x \neq -2$, $h(x) = 2x^2 + 1$.

(a) Find

(i) $f(-1)$,

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

(ii) $h(0)$.

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

(b) Solve $f(x) = h(x)$.

Answer **(b)** x = ... [3]

(c) Find $g^{-1}(x)$.

Answer **(c)** $g^{-1}(x)$ = ... [3]

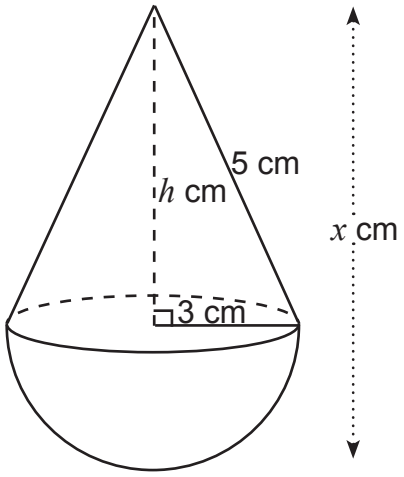
(d) Show that $hf(x)$ simplifies to $8x^2 - 8x + 3$.

Answer **(d)**

[3]

7 The diagram shows a toy which is made up of a hemisphere and a cone.
The cone has a radius of 3 cm and a slant height of 5 cm.

NOT TO SCALE



(a) Calculate

(i) the vertical height, h cm, of the cone,

Answer **(a) (i)** h = ... cm [2]

(ii) the height, x cm of the toy,

Answer **(a) (ii)** x = ... cm [1]

(iii) the volume of the toy.

[volume of sphere is $v = \frac{4}{3}\pi r^3$ and volume of a cone is $v = \frac{1}{3}\pi r^2 h$]

Answer **(a) (iii)** ..... cm^3 [3]

For Examiner's Use

(b) The toy is painted on the surface.

Calculate the total surface area that is painted.

[total surface area of a cone = $\pi r\ell + \pi r^2$ and total surface area of a sphere = $4\pi r^2$]

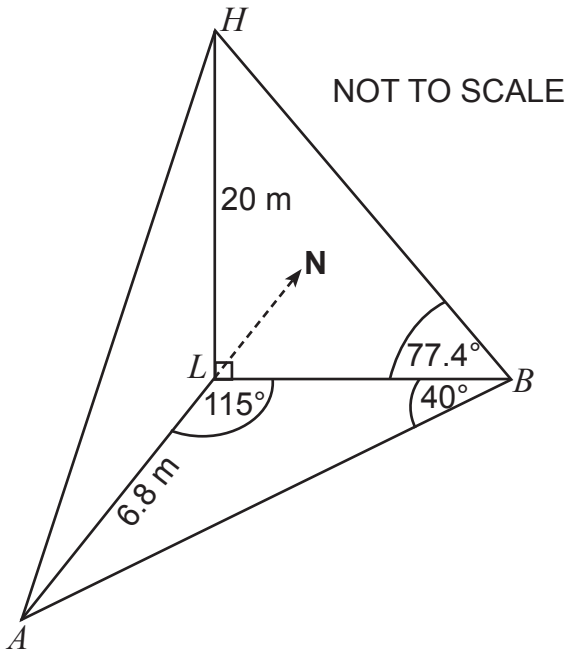
Answer **(b)** ..... cm^2 [3]

(c) A tin of paint will cover a surface area of 22.5 cm^2. How many tins are needed to paint one toy?

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

8 The diagram shows a vertical pole, HL, which is 20 m high.

The points L, A and B all lie in the same horizontal plane such that AL = 6.8 m, angle ALB = 115°, angle LBA = 40° and angle LBH = 77.4°. The line AL points due north.



Calculate

(a) the length of AB,

Answer **(a)** AB = ... m [3]

(b) the length of LB,

Answer **(b)** LB = ... m [2]

(c) the bearing of A from L.

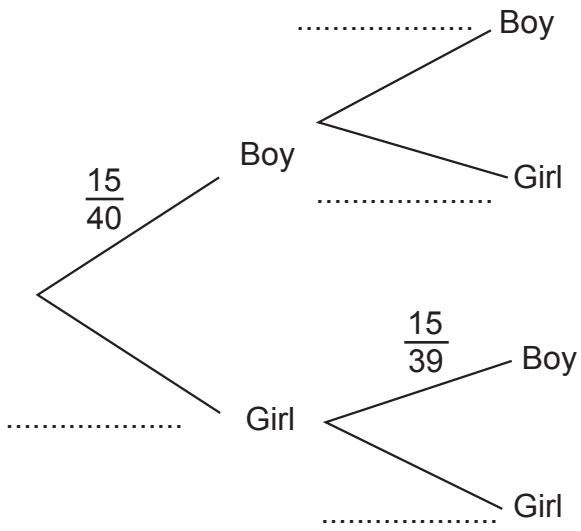
Answer **(c)** .....° [2]

For Examiner's Use

9 (a) An English teacher has 40 Grade 12 students, who need to do their final oral assessment. There are 15 boys in this group of 40 students. Each student takes the oral assessment once only.

Two students are chosen at random.

(i) Complete the tree diagram below.



[2]

(ii) What is the probability that the first two students assessed are both boys?

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

(iii) What is the probability that the second student assessed is a girl?

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

(iv) A third student is chosen at random.

What is the probability that the first three students assessed, at least one is a boy?

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

(b) The table shows the time, t minutes, taken by the 40 Grade 12 students to complete their English written paper.

Time (t minutes)	$40 < t \leq 60$	$60 < t \leq 70$	$70 < t \leq 85$	$85 < t \leq 90$
Frequency	6	9	21	4

(i) Find the modal class of the time taken.

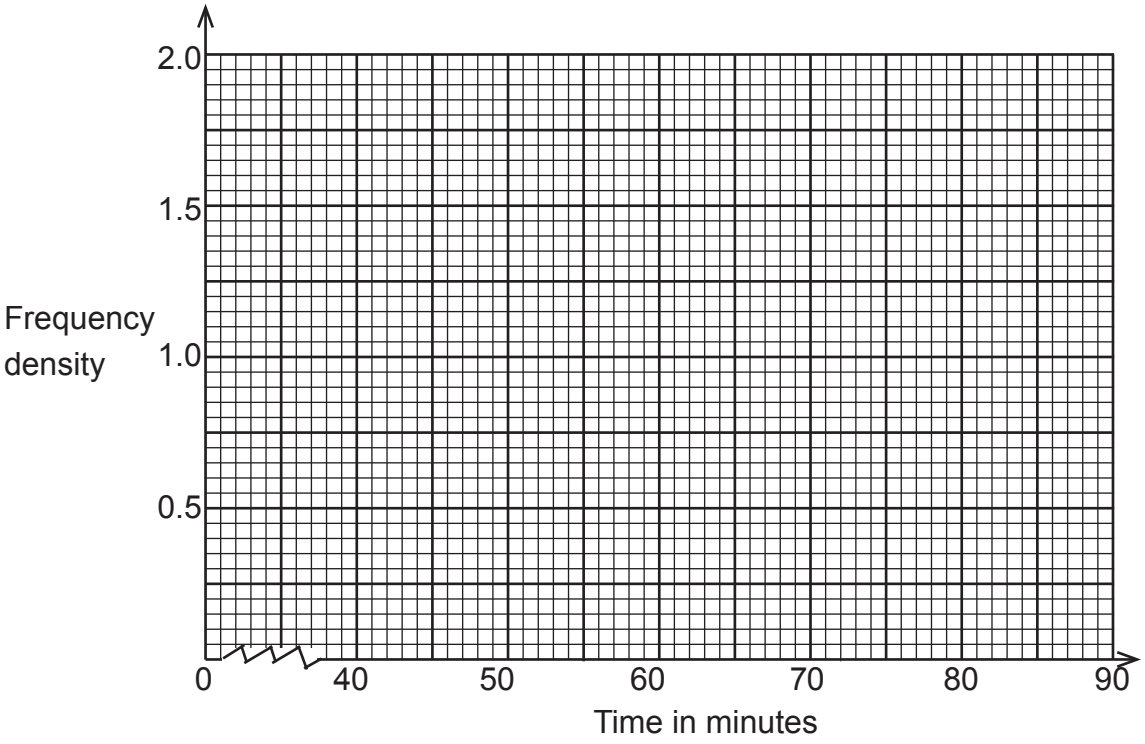
Answer **(b) (i)** ..... [1]

(ii) Calculate an estimate of the mean time.

Give your answer correct to the nearest minute.

Answer **(b) (ii)** ..... minutes [4]

(c) On the grid below, draw a histogram to show the information in the table.



[4]