| Centre Number | Candidate Number | Candidate Name |
|---|---|---|
| | | |

**NAMIBIA SENIOR SECONDARY CERTIFICATE**

# MATHEMATICS HIGHER LEVEL

# 8323/1

PAPER 1

2 hours

Marks 80

**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.

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You may use non-programmable calculators.
- 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 $\pi$, either use your calculator value, or use 3.142.

| *For Examiner's Use* | |
|---|---|
| | |
| *Marker* | |
| *Checker* | |



This document consists of **12** printed pages.

**Republic of Namibia**

**MINISTRY OF EDUCATION, ARTS AND CULTURE**

*For Examiner's Use*

**1** **(a)** A car starts a journey at 20 minutes past 11 a.m. and finishes it at a quarter to 3 p.m.

Express these times in terms of the 24-hour clock.

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

**(b)** The journey is 246 kilometers long.

Calculate the car's average speed in kilometers per hour.

Answer **(b)** ..... km/h [2]

**(c)** The car uses 1 litre of fuel for each 5.3 kilometers it travels. The fuel costs N$11.55 per litre.

Calculate the cost of the fuel used on this journey, correct to the nearest N$.

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

**(d)** The price of N$11.55 had just been increased by 10%.

What was the price before the increase?

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

---

**2** $x$ is an integer such that $1 \leq x < 4$ and $y$ is an integer such that $-3 \leq y \leq 2$.

Calculate

**(a)** the greatest value of $x - y$,

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

**(b)** the least value of $x^2 + y^2$.

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

*For Examiner's Use*

**3** Make $y$ the subject of the formula $\sqrt{xy} = 2x^3$.

Answer ..... [2]

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**4** Solve the equation $3(2^x + 1) = 27$.

Answer $x$ = ..... [2]

---

**5** The length of a pendulum is measured as 1.63 m, correct to the nearest cm. The pendulum swings through an angle which is measured as 22° correct to the nearest degree.

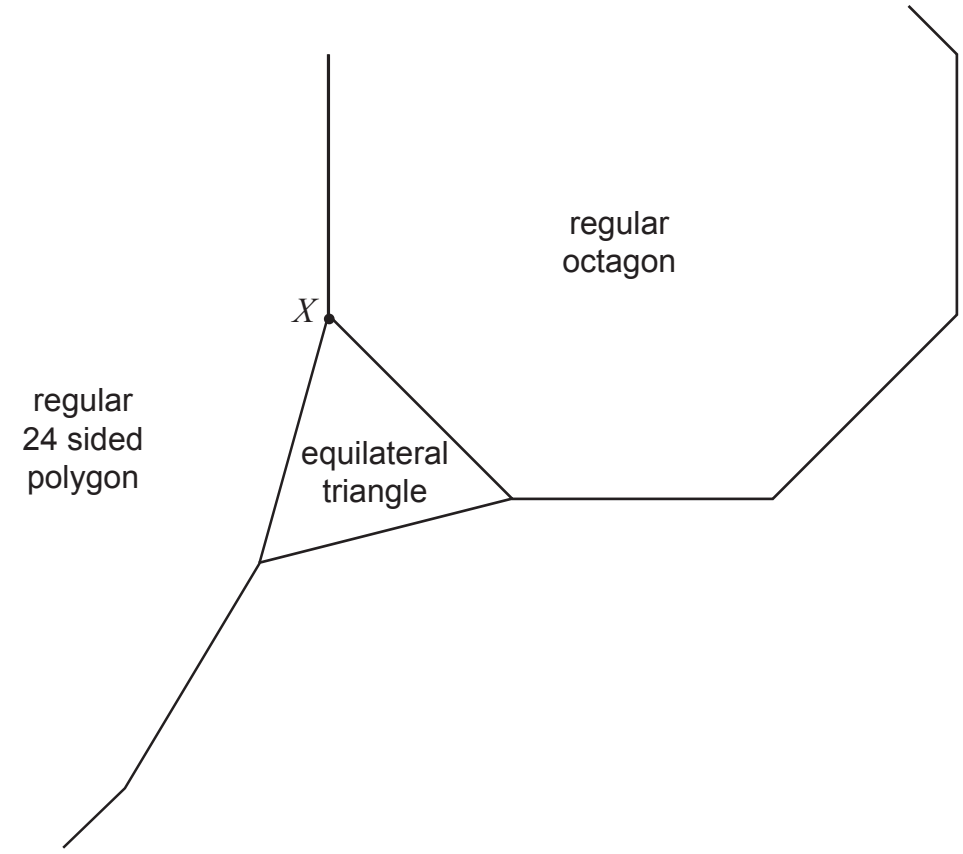
Calculate the lower limit of the arc length through which the end of the pendulum swings.

Answer ..... m [4]

**6**

*For Examiner's Use*

NOT TO SCALE




Show, by calculation, that an equilateral triangle, a regular octagon and a regular 24-sided polygon fit together exactly at the point $X$, as shown in the diagram above.

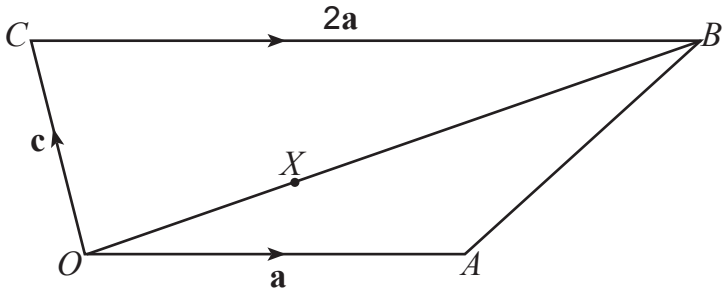
Answer

[4]

**7**

*For Examiner's Use*

NOT TO SCALE




The diagram shows a quadrilateral $OABC$. It is given that $\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{CB} = 2\mathbf{a}$. The point $X$ on line $OB$ is such that $OX = \frac{1}{3}OB$.

**(a)** Find in terms of $\mathbf{a}$ and/or $\mathbf{c}$, in its simplest form

**(i)** $\overrightarrow{OB}$,

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

**(ii)** $\overrightarrow{AX}$.

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

**(b)** Show that $A$, $X$ and $C$ lie on a straight line.

Answer **(b)** .....

..... [2]

---

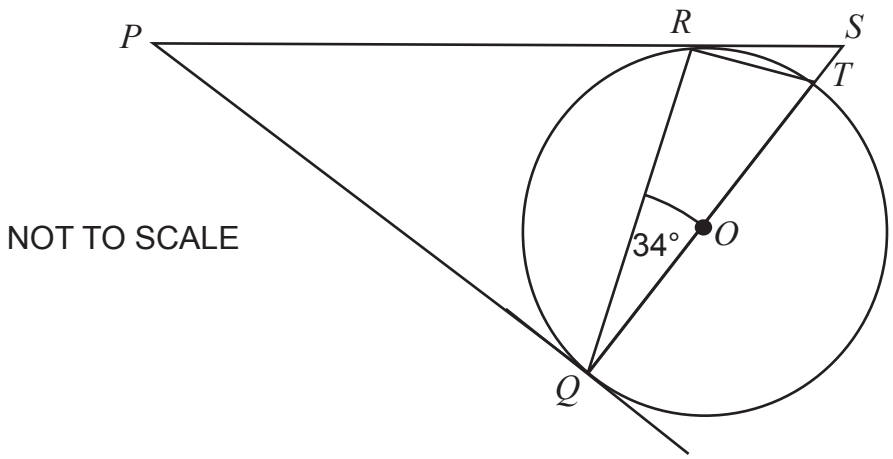
**8** Give the following expression as a single fraction in its simplest form.

$$\frac{a+b}{a^2+ab-2b^2} - \frac{2}{3a-3b}.$$

Answer ..... [5]

**9**

*For Examiner's Use*




NOT TO SCALE

The tangents $PQ$ and $PR$ are drawn from $P$ to a circle, centre $O$.
The tangent $PR$ and the diameter $QT$ are produced to meet at $S$.
It is given that angle $RQT$ = 34°.

Find the value of

**(a)** angle $PQR$,

Answer **(a)** ..... ° [1]

**(b)** angle $RPQ$,

Answer **(b)** ..... ° [1]

**(c)** angle $SRT$.

Answer **(c)** ..... ° [1]

---

**10** In a factory, three machines, $A$, $B$ and $C$, produce objects which are identical except for their colour. Of the combined output of the machines, $A$ produces one quarter which are red, $B$ produces two thirds which are blue and $C$ produces the remainder which are green.

**(a)** If one object is taken at random from the combined output, find the probability that it is green.

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

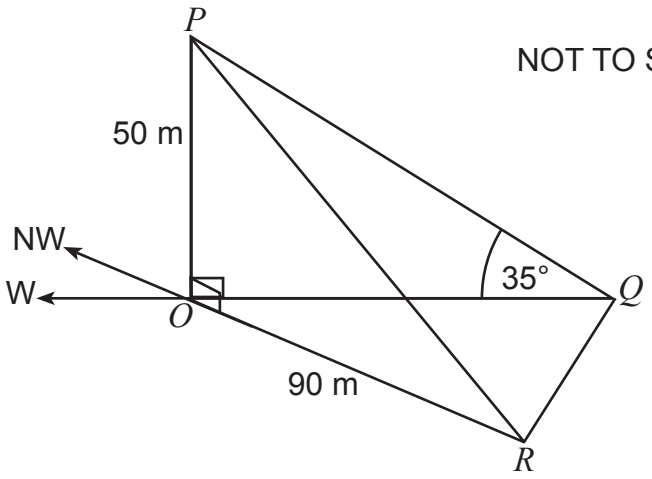
**(b)** Two objects are taken together from the combined output. Using a tree diagram, or otherwise, find the probability that one object is red and the other is blue.

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

---

**11**

*For Examiner's Use*




A vertical tower $OP$, 50 m high, stands on a horizontal ground.
The angle of elevation of $P$ from $Q$ is 35°.
When the sun is to the west of $O$, the shadow of the tower is $OQ$.
When the sun is north-west of $O$, the shadow $OR$ is 90 m long.

Calculate, to the **nearest whole number**

**(a)** the length of the shadow $OQ$,

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

**(b)** the distance $QR$,

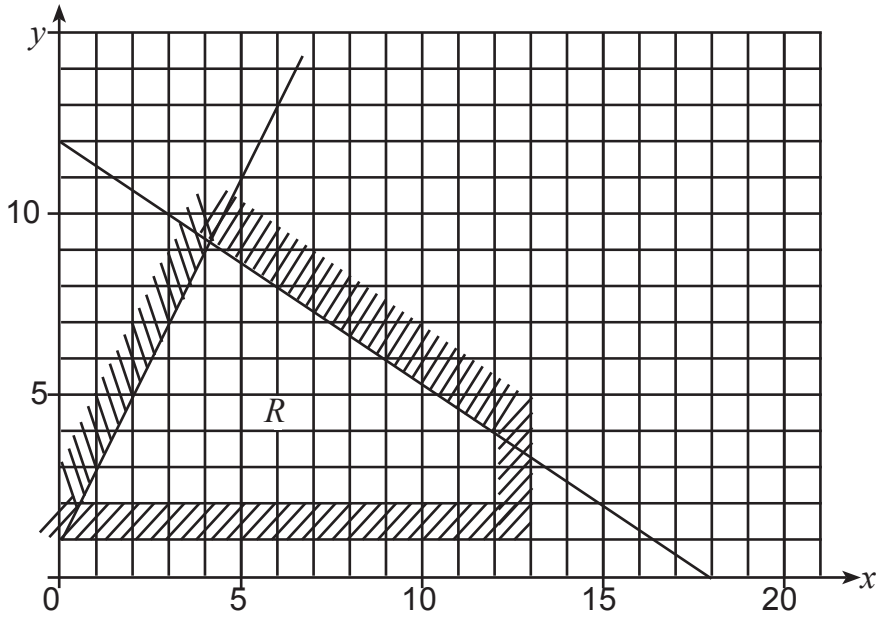
Answer **(b)** ..... m [3]

**(c)** the area of the ground of triangle $QOR$.

Answer **(c)** ..... $m^2$ [2]

**12**

*For Examiner's Use*




The region $R$ in the diagram shows the set of points $(x, y)$ satisfying four inequalities. Two of the inequalities are $x \leq 12$ and $2x + 3y < 36$.

**(a)** Write down the other **two** inequalities.

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

..... [3]

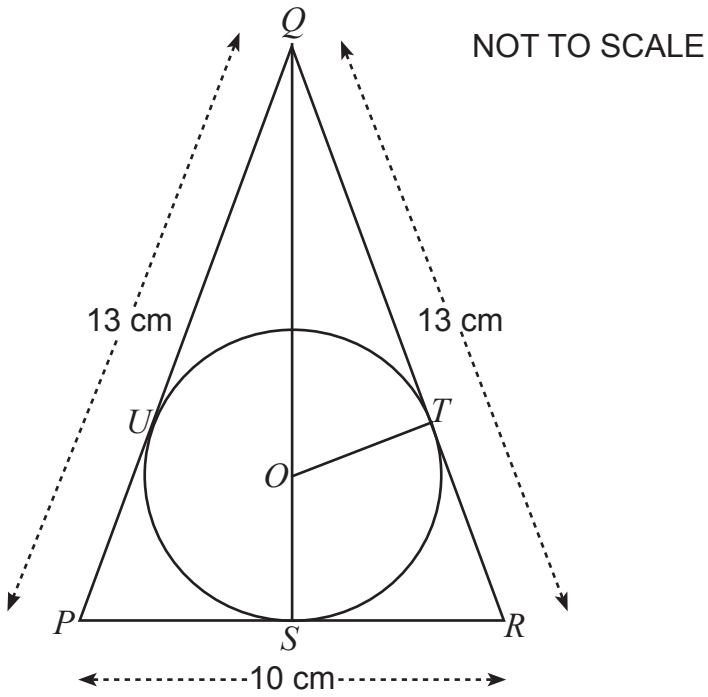
**(b)** The owner of a toy shop decides to buy $x$ Kiddicars and $y$ Tribikes. The values of $x$ and $y$ are restricted by these inequalities. He makes N$50 profit on a Kiddicar and N$30 on a Tribike. The shopkeeper sells all the toys he buys.

Find the minimum profit he can make.

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

**13**

*For Examiner's Use*




In the diagram, $PQR$ is an isosceles triangle in which $PQ$ = $QR$ = 13 cm and $PR$ = 10 cm. The circle, centre $O$, touches the side $QR$ at $T$, the side $PR$ at $S$ and the side $PQ$ at $U$.
$QOS$ is a straight line.

**(a)** Giving reasons, explain why triangles $QOT$ and $QRS$ are similar.

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

.....

.....

.....

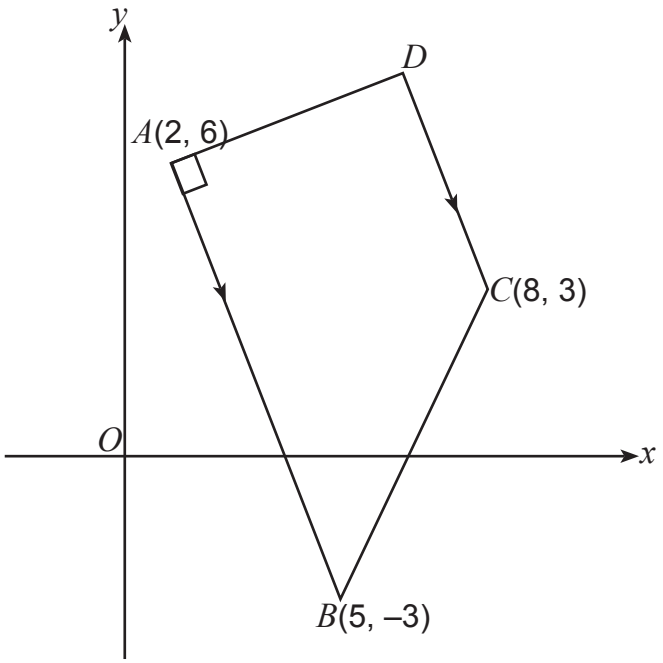
..... [3]

**(b)** Hence, find the length of $OT$, the radius of the circle.

Answer **(b)** ..... cm [4]

**14**

*For Examiner's Use*




The diagram shows a trapezium $ABCD$ in which $AB$ is parallel to $DC$ and angle $BAD$ is 90°. The coordinates of $A$, $B$ and $C$ are (2, 6), (5, –3) and (8, 3) respectively.

**(a)** Find the equation of $AD$.

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

**(b)** Find the coordinates of $D$.

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

**(c)** The point $E$ is such that $ABCE$ is a parallelogram.

Find the length of $BE$.

Answer **(c)** ..... [3]

**(d)** Find the area of parallelogram $ABCE$.

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

---

**15** A survey was carried out to find the number of children in each of 400 families. The results are shown in the table.

| **Number of children in family** | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| **Number of families** | 46 | 92 | 98 | 104 | 60 |

**(a)** Calculate the mean number of children per family.

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

**(b)** A similar survey was carried out on 200 different families and, in this case, the mean number of children per family was $m$.

**Given** that the mean number of children per family for all 600 families was 2.2, calculate the value of $m$.

Answer **(b)** $m$ = ..... [3]

**16**

*For Examiner's Use*

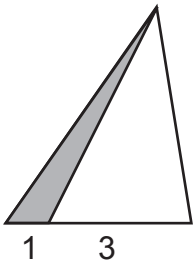



Diagram 1

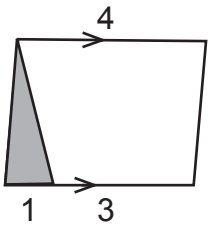



Diagram 2

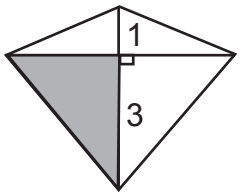



Diagram 3

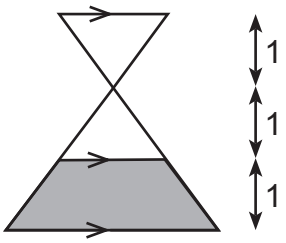



Diagram 4

The figures in the diagrams shows lengths in units.

For each of the four diagrams, write down the fraction of the total area which is shaded.

Answer Diagram 1: ..... [1]

Diagram 2: ..... [2]

Diagram 3: ..... [2]

Diagram 4: ..... [1]