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MATHEMATICS

PAPER 1 (CORE/EXTENDED) 3815/1

Tuesday **21 MAY 2013** 1:00 P.M.–2:30 P.M.

Additional materials:
Calculator (not graphing)
Geometrical instruments.

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided at the top of this page.

Answer **ALL** questions in the spaces provided for each question.

ALL working must be shown.

ALL working must be done in blue or black ink, except for drawings, lines and constructions which may be done in pencil.

INFORMATION FOR CANDIDATES

Calculators [**NOT GRAPHING CALCULATORS**] may be used.

Tracing paper may be used.

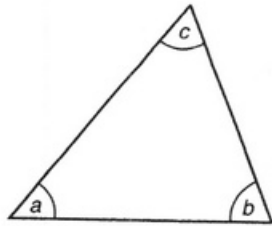
Geometrical instruments are required.

The mark for each question, or part question, is shown in brackets [].

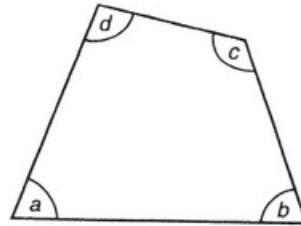
The total number of marks for this paper is 100.

This question paper consists of 15 printed pages and 1 blank page.

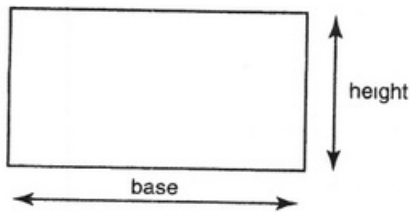
INFORMATION AND FORMULAE



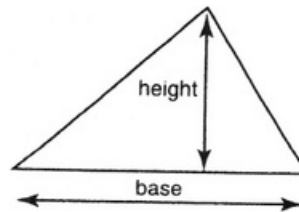
Angle sum of triangle
 $a + b + c = 180^\circ$



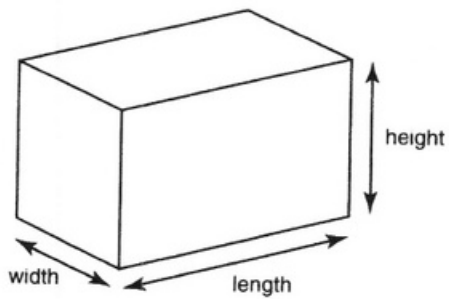
Angle sum of quadrilateral
 $a + b + c + d = 360^\circ$



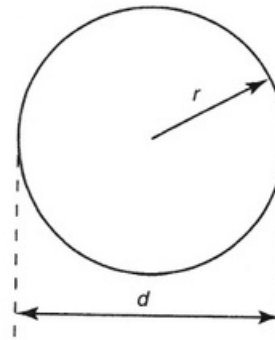
Area of rectangle = base $\times$ height



Area of triangle = $\frac{\text{base} \times \text{height}}{2}$



Volume of cuboid = length $\times$ width $\times$ height



Circumference of circle = $2\pi r$ or πd
Area of circle = πr^2

1. Write down the next two terms in this sequence.

81, 64, 47, 30, _____, _____. [2]

2. Simplify

$$8 + 5 \times (28 \div 4)$$

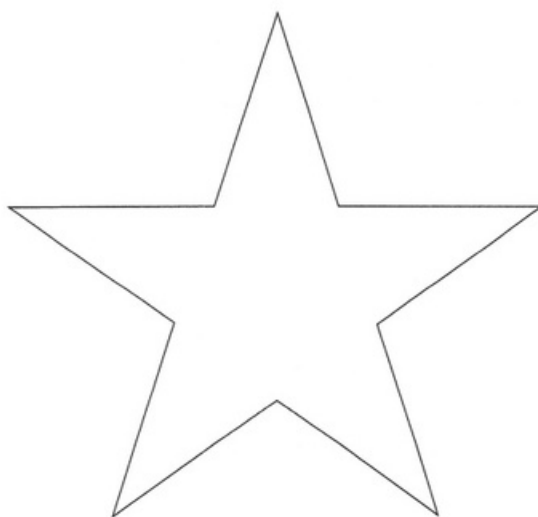
Answer: _____ [3]

3. Calculate the value of

$$13^2 - \sqrt[3]{216}$$

Answer: _____ [3]

4. Draw in **ALL** the lines of reflective symmetry for the following diagram.



[3]

5. Write down the value of $\frac{15299}{64}$

(a) exactly,

Answer: _____ [1]

(b) to one decimal place,

Answer: _____ [1]

(c) to two significant figures,

Answer: _____ [1]

(d) to the nearest hundred.

Answer: _____ [1]

6.



45¢ each

A fruit vendor bought 240 oranges at \$0.45 each. Twenty of the oranges were rotten and had to be thrown away. The remaining oranges were sold at \$0.75 each.

Calculate

(a) the cost to the fruit vendor,

Answer: \$ _____ [1]

(b) the total amount received when all the fruit was sold,

Answer: \$ _____ [2]

(c) the profit to the fruit vendor.

Answer: \$ _____ [1]

7.



Jason bought a racing bike, helmet and gloves. The helmet cost h dollars. The bike cost nine times as much as the helmet. The gloves cost \$23 less than the helmet.

Write an expression, in terms of h , for

- (a) the cost of the bike,

Answer: \$ _____ [1]

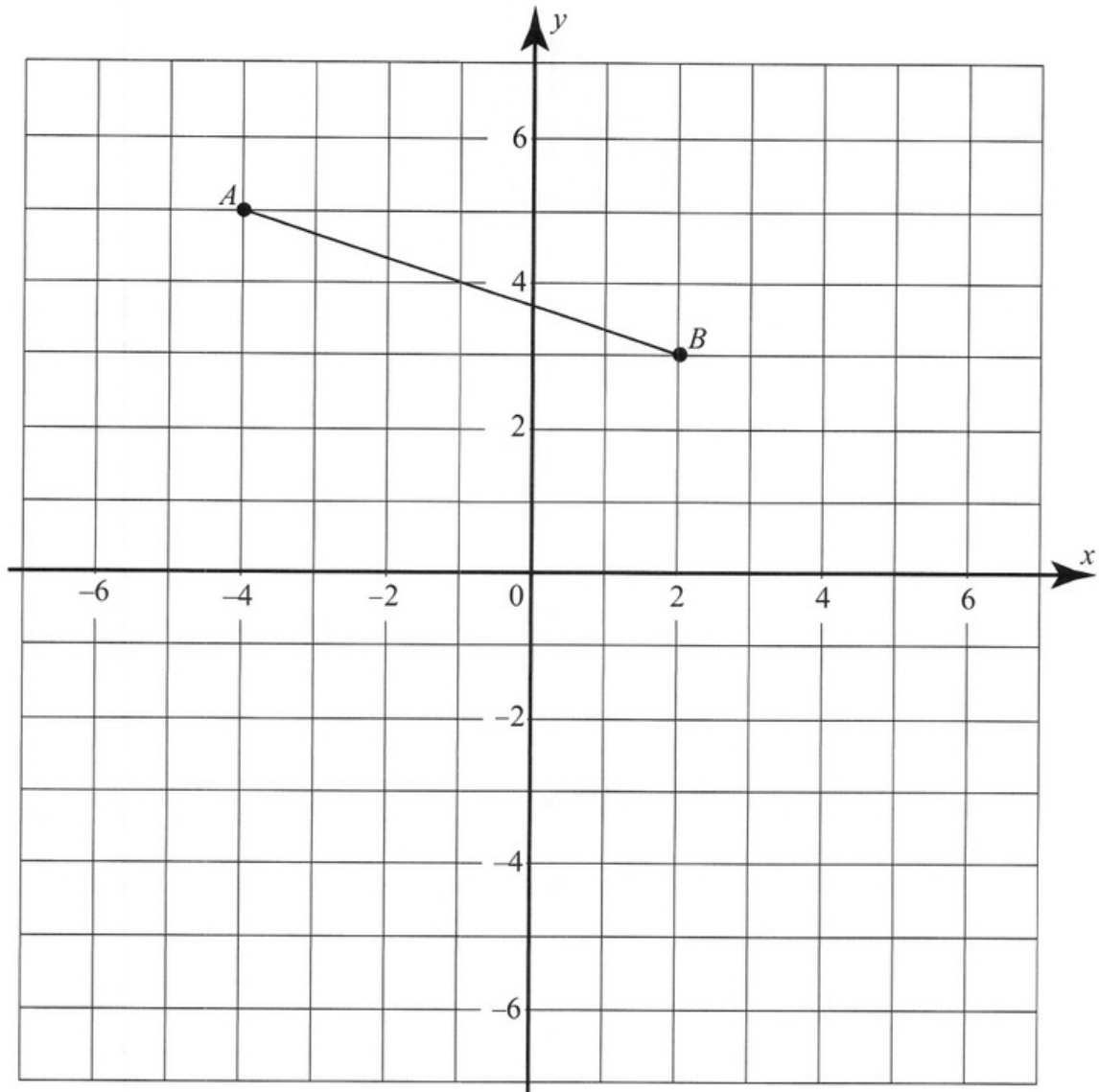
- (b) the cost of the gloves,

Answer: \$ _____ [1]

- (c) the total cost of the bike, helmet and gloves, giving your answer in simplest form.

Answer: \$ _____ [2]

8.



- (a) Write down the coordinates of the point A .

Answer: _____ [1]

- (b) Plot and label the point $C(4, -3)$. [1]
- (c) Draw the line segment BC . [1]
- (d) Plot the point D so that $ABCD$ forms a parallelogram. [1]
-

9. (a) Express as a fraction in lowest terms:

(i) 4%,

Answer: _____ [2]

(ii) 0.375.

Answer: _____ [2]

(b) For the fractions $\frac{3}{4}$, $\frac{2}{5}$, $\frac{1}{6}$, write down the Lowest Common Denominator (LCD).

Answer: _____ [1]

10. (a) Complete the following conversions.

(i) 4.7 l = _____ ml, [1]

(ii) 2840 cm = _____ m, [1]

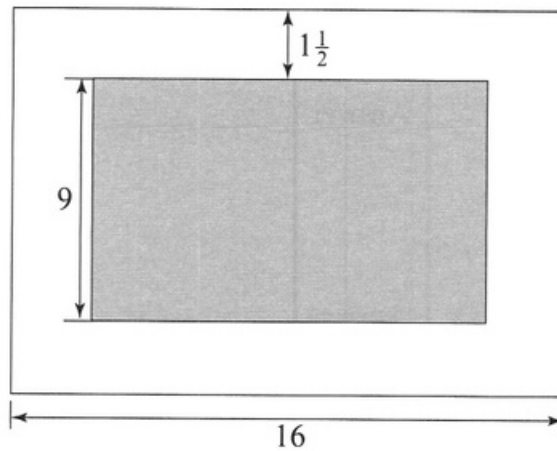
(iii) 560 g = _____ kg. [1]

(b) The gasoline tank of Darnell's new car is rated to hold 46.5 litres when full. Gasoline on the island is sold in gallon quantities.

Taking **1 litre = 0.264 gal(US)**, convert 46.5 litres to gallons.

Answer: _____ gals. [2]

11. The diagram shows the floor of a room of length 16 ft. A carpet of width 9 ft. is placed so that there is a border of $1\frac{1}{2}$ ft. wide all around it.



Calculate

- (a) the width of the room,

Answer: _____ ft [1]

- (b) the area of the room,

Answer: _____ ft^2 [2]

- (c) the area of the border.

Answer: _____ ft^2 [3]

-
12. (a) Given that $s = 7$ and $t = 13$, calculate the value of

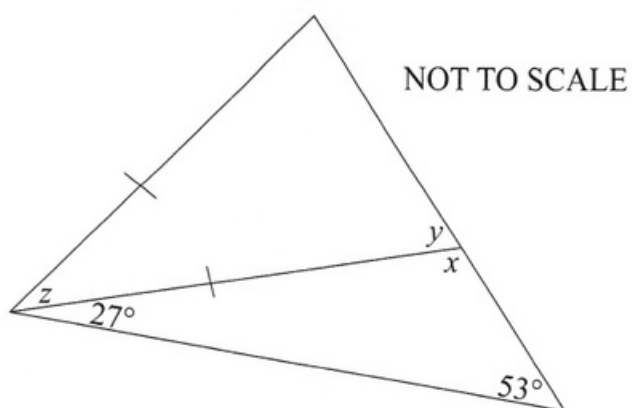
$$s^2 - 4t$$

Answer: _____ [3]

- (b) Solve $5(3 + m) = 60$

Answer: _____ [3]

13. Calculate the size of



- (a) (i) angle x ,

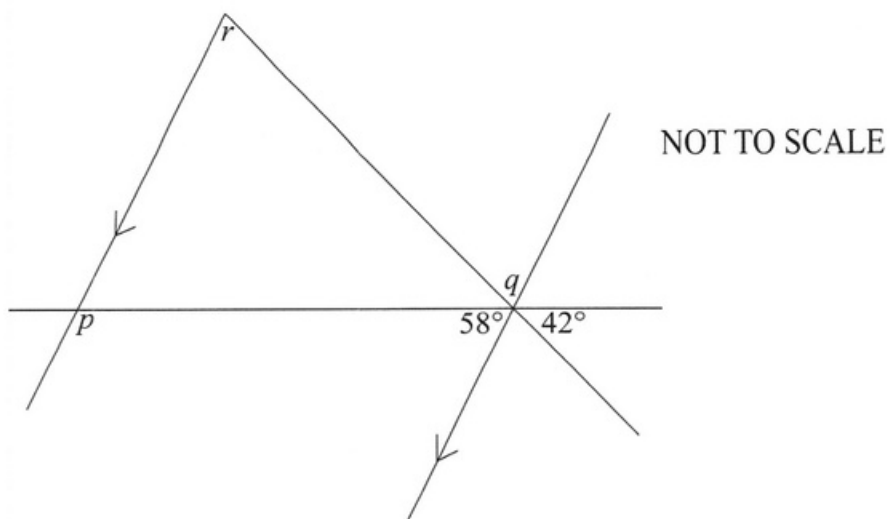
Answer: _____° [1]

- (ii) angle y ,

Answer: _____° [1]

- (iii) angle z .

Answer: _____° [1]



- (b) (i) angle p ,

Answer: _____ $^\circ$ [1]

- (ii) angle q ,

Answer: _____ $^\circ$ [1]

- (iii) angle r .

Answer: _____ $^\circ$ [1]

14.



Nathan collected data on the price of gasoline in the various family islands.

\$4.14, \$4.27, \$4.58, \$4.16, \$4.49, \$4.35, \$4.64, \$4.49

- (a) Write down the modal price.

Answer: \$ _____ [1]

Calculate

- (b) the median price,

Answer: \$ _____ [3]

- (c) the mean price.

Answer: \$ _____ [2]

15.



A fertiliser for fruit trees contains nitrogen, phosphate and potash in the ratio 3 : 10 : 6.

Calculate the amount of

- (a) nitrogen in 95 kg of this fertiliser,

Answer: _____ kg [2]

- (b) potash in a fertiliser mix containing 35 kg of phosphate,

Answer: _____ kg [2]

- (c) this fertiliser containing 18 kg of nitrogen.

Answer: _____ kg [2]

16.



The *Caribbean Marathon* bicycle race is a distance of 112 miles.

Andrew finished the race in $3\frac{1}{5}$ hours.

- (a) Calculate his average speed.

Answer: _____ mph [2]

Brandon finished the race at an average speed of 28 mph.

- (b) Calculate his time to complete the race.

Answer: _____ hrs. [2]

The starting time for this race is 7:45 a.m. David completed the race in 3 hours and 40 minutes.

- (c) Calculate the time at which David completed the race.

Answer: _____ [2]

Carlton finished the race at 11:35 a.m.

- (d) Calculate the time taken for Carlton to complete the race.

Answer: _____ [2]

17.



Cash Price \$907.20

Sally bought an iPad on hire-purchase. The cash price was \$907.20. She paid a 25% deposit followed by 6 monthly payments of \$130.41 each. Calculate

- (a) the amount of the deposit,

Answer: \$ _____ [2]

- (b) the total amount of the monthly payments,

Answer: \$ _____ [2]

- (c) the total hire-purchase price,

Answer: \$ _____ [2]

- (d) the amount that can be saved by paying cash.

Answer: \$ _____ [2]

18. Simplify

(a) $3w + 7z - z - 8w$

Answer: _____ [2]

(b) $6\left(3t - \frac{1}{3}\right)$

Answer: _____ [2]

(c) $9r^2 \times 5r^3$

Answer: _____ [2]

(d) $28p^7 \div 4p^3$

Answer: _____ [2]

19. Eric is paid \$12.50 per hour for the first 40 hours of a regular work week. Overtime is paid at time and a half. Last week he worked 48 hours.

(a) Calculate his earnings for

(i) the regular 40 hours worked,

Answer: \$ _____ [1]

(ii) one hour overtime,

Answer: \$ _____ [2]

(iii) the 48 hours worked last week.

Answer: \$ _____ [3]

The employee's National Insurance contribution is 3.9% of the total earnings.

(b) Calculate

(i) Eric's National Insurance contribution for last week,

Answer: \$ _____ [2]

(ii) his net earnings.

Answer: \$ _____ [1]

MATHEMATICS

PAPER 2 (CORE/EXTENDED) 3815/2

Wednesday **22 MAY 2013** 9:00 A.M.–11:00 A.M.

Additional materials:

Calculator (not graphing)

Geometrical instruments

Answer booklet

Graph paper

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

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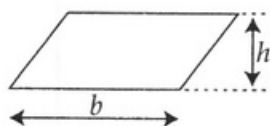
The total number of marks for this paper is 100.

This question paper consists of 9 printed pages and 3 blank pages.

INFORMATION AND FORMULAE

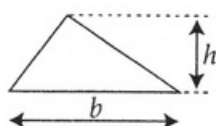
MENSURATION

Parallelogram



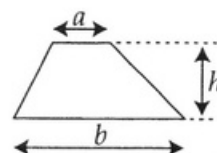
$$\text{Area} = bh$$

Triangle



$$\text{Area} = \frac{1}{2}bh$$

Trapezium



$$\text{Area} = \frac{1}{2}(a + b)h$$

Circle (radius r , diameter d)

$$\text{Circumference} = 2\pi r \text{ or } \pi d$$

$$\text{Area} = \pi r^2$$

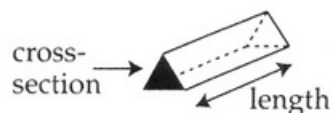
Cylinder (radius r , height h)

$$\text{Volume} = \pi r^2 h$$

Prism

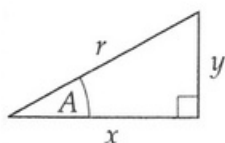
$$\text{Volume} = \text{area of cross-section} \times \text{length}$$

e.g. triangular prism

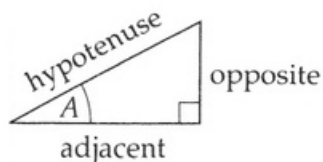


TRIGONOMETRY

Right-angled triangle



$$r^2 = x^2 + y^2, \text{ (result of Pythagoras)}$$



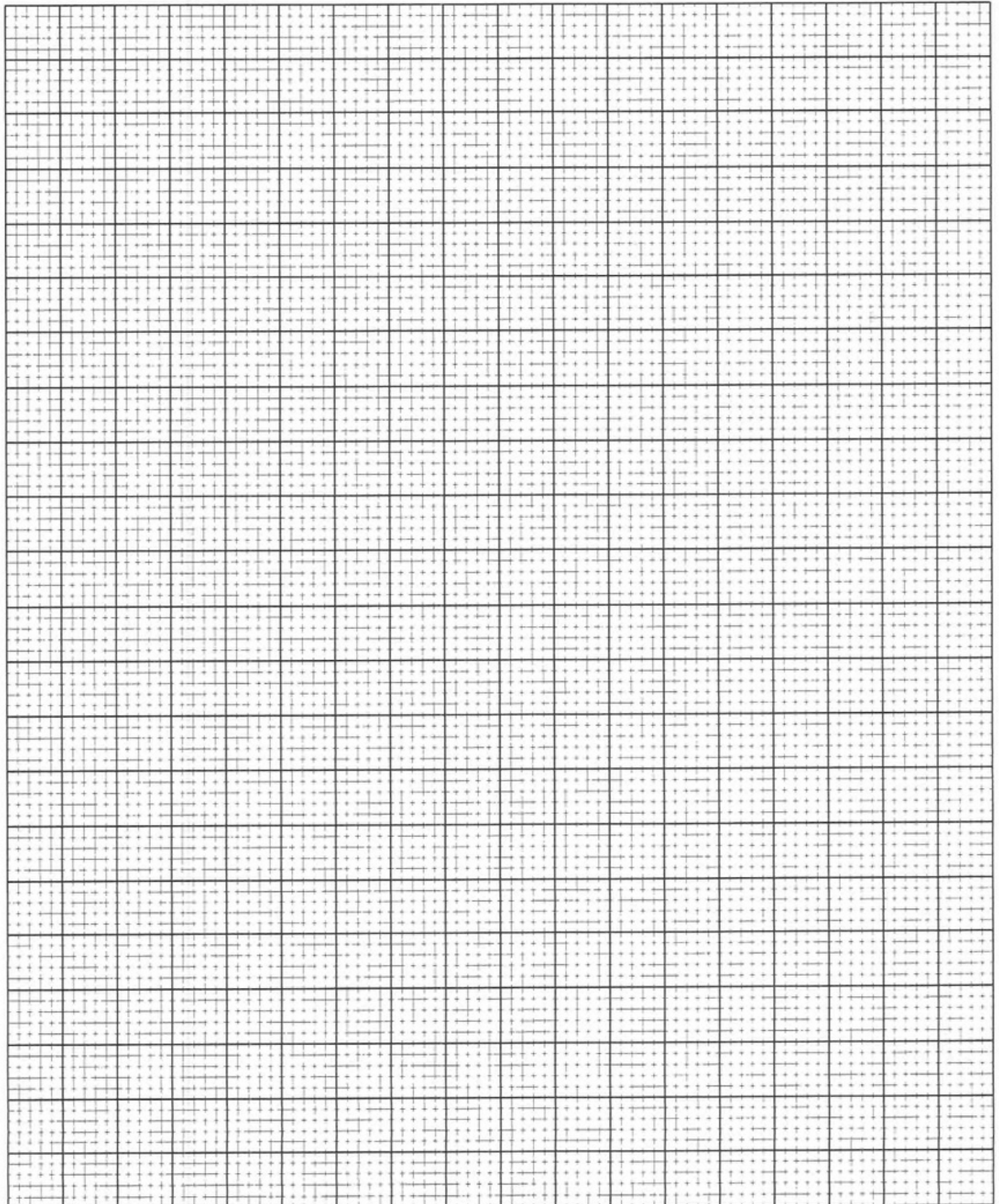
$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}, \cos A = \frac{\text{adjacent}}{\text{hypotenuse}}, \tan A = \frac{\text{opposite}}{\text{adjacent}}$$

NUMBER

Standard form is $a \times 10^n$ where $1 \leq a < 10$ and n is an integer.

**BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION**

School No.	Candidate No.	Level:	For Examiner's Use
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School No.	Candidate No.	Level:	For Examiner's Use
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Signature:	Date:	Qu. No.	

A full-page view of a standard sheet of graph paper. It features a uniform grid of small squares formed by thin black lines. The grid covers the entire area of the page, leaving no margins or additional markings.

1. From the set of numbers $\left\{\frac{22}{7}, 3.14, \pi\right\}$ write down an irrational number. [1]
-

2. Express this ratio in simplest form.

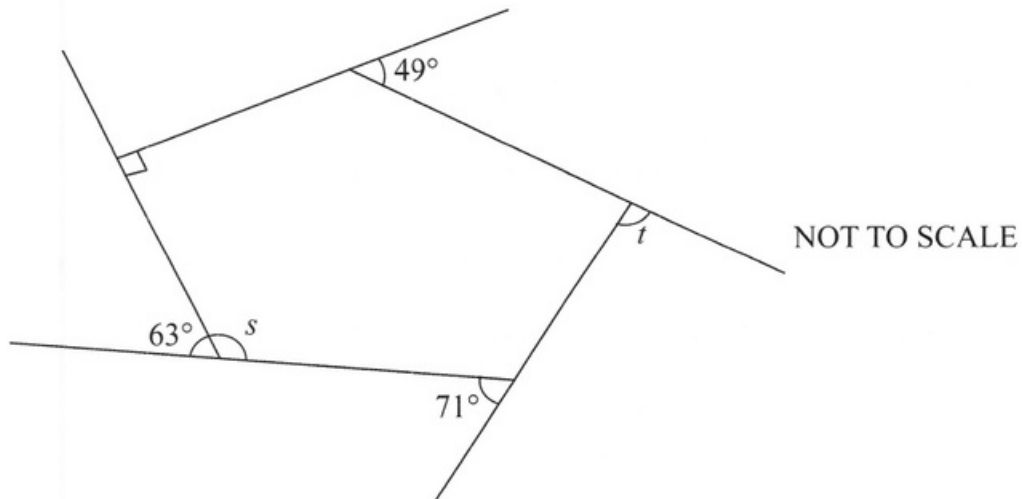
$$85¢ : \$2$$
 [2]

3. Solve $\frac{x}{2} - \frac{x}{6} = \frac{3}{4}$ [4]
-

4. (a) Solve the inequality $19 - 2x > 13$. [3]

- (b) Write down the solution set for (a) in the set of natural numbers. [1]
-

5.



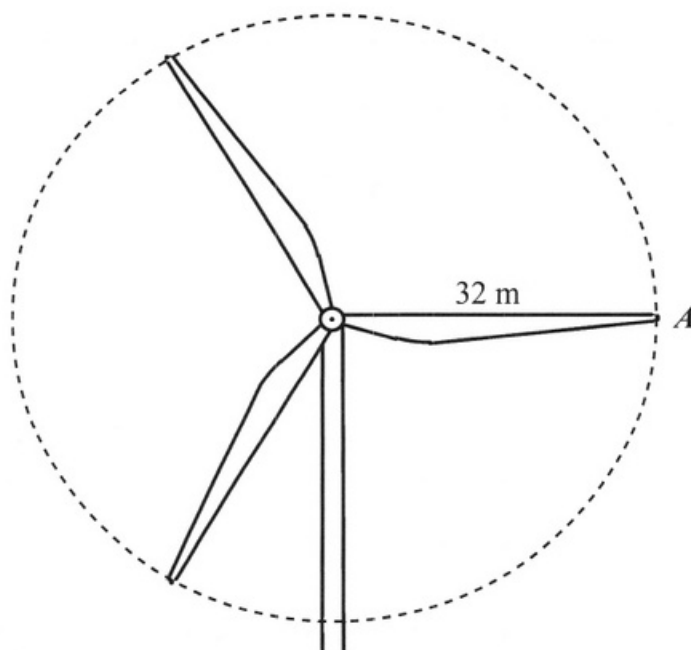
- (a) Calculate the value of

- (i) angle s , [1]

- (ii) angle t . [2]

- (b) A regular polygon has interior angles of 165° . Calculate the number of sides of the polygon. [2]
-

6. The blades of a wind turbine are of length 32 m. The point A on the tip of a blade traces out a circle as the blade rotates.



- (a) Using $\pi = 3.14$, calculate the distance travelled by the point A in one revolution. [2]

The blades are rotating at 12 revolutions per minute.

- (b) Calculate the speed of the point A in **metres per second**. [3]

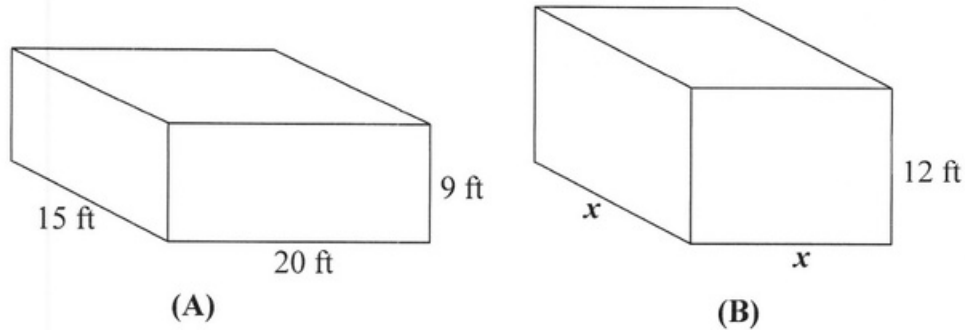
-
7. Solve the following pair of simultaneous equations.

$$4x - 3y = 8$$

$$y + 2x = 14$$

[5]

8. A holding tank (A) has a length of 20 ft, a width of 15 ft and a height of 9 ft. Another holding tank (B) has a square base and a height of 12 ft. Both tanks hold the same quantity of liquid when full.



Calculate

- (a) the volume of the holding tank (A) when full, [2]
- (b) the base length x of the holding tank (B). [3]
-
9. (a) **Using a ruler, compass and pencil only**, construct $\triangle ABC$ such that $AB = 11$ cm, $AC = 7.5$ cm and $\angle CAB = 60^\circ$. [5]
- (b) Measure and write down the degrees of $\angle ABC$. [1]
-

10. In house construction, the safe load, m kilograms, that can be supported by a beam with length x metres, thickness t centimetres, and height h centimetres is given by the formula

$$m = \frac{4th^2}{x}$$

- (a) Calculate
- (i) m when $t = 4.5$, $h = 10$ and $x = 3.6$, [2]
- (ii) h when $m = 588$, $t = 10$, and $x = 4.8$. [3]
- (b) Rearrange the formula to make ' t ' the subject. [2]
-

11. $\varepsilon = \{x : 1 \leq x < 13\}$
 $A = \{\text{multiples of } 3\}$
 $B = \{\text{factors of } 12\}$
 $C = \{\text{prime numbers}\}$

(a) List the elements of the set

(i) A , [1]

(ii) B , [1]

(iii) C , [1]

(iv) $A \cap B$, [1]

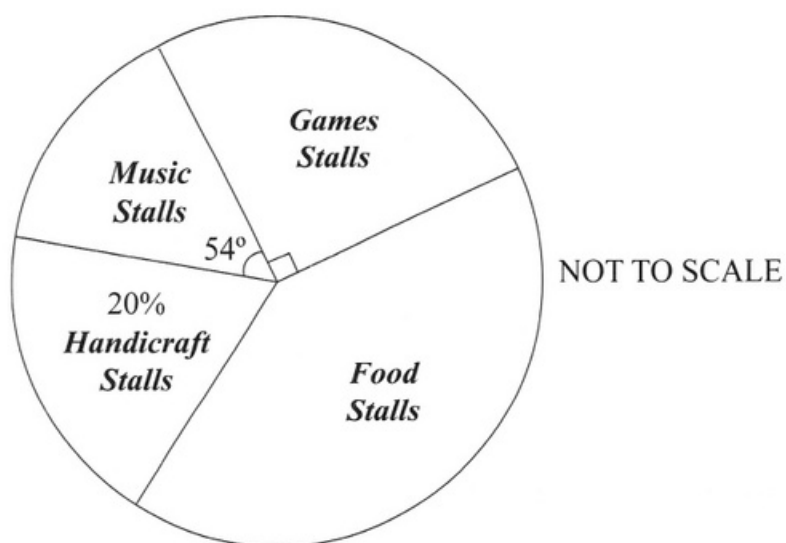
(v) B' . [1]

(b) Write down

(i) the value of $n(B \cup C)$, [1]

(ii) the number of subsets of A . [1]

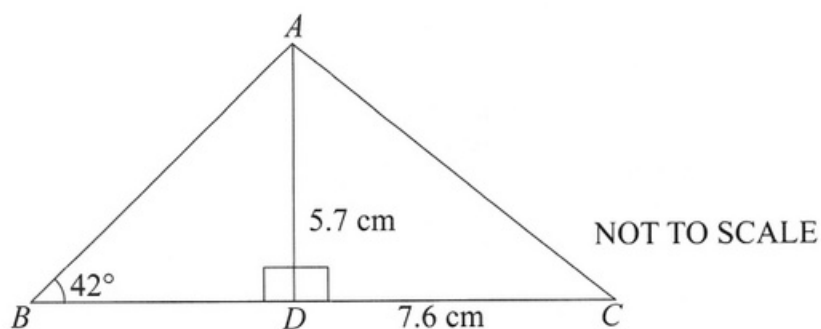
12. The pie chart represents the amount of money collected by various stalls at a church fair. An overall total of \$12,640 was collected.



Calculate

- | | | |
|-----|---|-----|
| (a) | the amount of money collected by the <i>Games Stalls</i> , | [2] |
| (b) | the percentage of the sector representing <i>Music Stalls</i> , | [2] |
| (c) | the angle of the sector representing <i>Handicraft Stalls</i> , | [2] |
| (d) | the angle of the sector representing <i>Food Stalls</i> . | [2] |
-

13. A reinforcement plate has the shape of a triangle ABC with altitude $AD = 5.7$ cm, $DC = 7.6$ cm and $\angle B = 42^\circ$ as shown.



Calculate

- | | | |
|-----|-------------------------------|-----|
| (a) | the length of the edge AC , | [3] |
| (b) | the length of the edge AB , | [3] |
| (c) | the angle $\angle ACD$. | [3] |
-
14. (a) Factorise completely $35y^3 - 7y + 14y^2$ [3]
- (b) Simplify
- | | | |
|------|---------------------------------|-----|
| (i) | $8 - 3(2x - 5) + 7x$ | [3] |
| (ii) | $\left(\frac{4y^2}{x}\right)^3$ | [3] |
-

15. **ANSWER THIS ENTIRE QUESTION ON THE GRAPH PAPER PROVIDED**

- (a) Copy and complete the following table for the graph of $y = \frac{3x-2}{2}$. [2]

x	-4	0	2	6
y	-7		2	

- (b) Using a scale of 1 cm to 1 unit for each axis, draw the graph of the line $y = \frac{3}{2}x - 1$. [3]
- (c) Calculate the slope of your graph in (b). [2]
- (d) Another graph goes through the point (3, -2) and has a slope of $\frac{2}{5}$. Draw this graph on the same coordinate plane. [3]
- (e) Write down the coordinates of the point where the lines intersect. [1]

16. **ANSWER THIS ENTIRE QUESTION ON THE GRAPH PAPER PROVIDED**

- (a) Using a scale of 1 cm to represent 1 unit on each axis, draw the x and y axis for $-9 \leq x \leq 9$ and $-11 \leq y \leq 11$. Draw and label $\triangle LMN$ with $L(2,1)$, $M(-1,3)$ and $N(2,-1)$. [3]
- (b) $\triangle LMN$ is translated by the vector $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$. Draw and label it $\triangle L_1M_1N_1$. [2]
- (c) $\triangle LMN$ is rotated 180° about the origin. Draw and label it $\triangle L_2M_2N_2$. [2]
- (d) $\triangle LMN$ is reflected in the line $y = -3$. Draw and label it $\triangle L_3M_3N_3$. [3]
- (e) $\triangle LMN$ is enlarged by a scale factor of 3, centre the origin. Draw and label it $\triangle L_4M_4N_4$. [2]

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MATHEMATICS

PAPER 3 (CORE/EXTENDED) 3815/3

Monday **27 MAY 2013** 9:00 A.M.–11:30 A.M.

Additional materials:

Calculator (not graphing)

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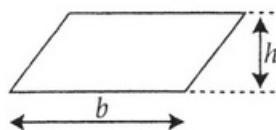
The total number of marks for this paper is 100.

This question paper consists of 10 printed pages and 2 blank pages.

INFORMATION AND FORMULAE

MENSURATION

Parallelogram



$$\text{Area} = bh$$

Circle (radius r , diameter d)

Cylinder (radius r , height h)

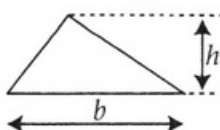
Sphere (radius r)

Prism

Pyramid

Cone (radius r , height h)

Triangle



$$\text{Area} = \frac{1}{2}bh$$

Circumference

Area

Volume

Area of curved surface

Volume

Area of surface

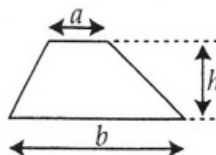
Volume

Volume

Volume

Area of curved surface

Trapezium



$$\text{Area} = \frac{1}{2}(a+b)h$$

$$= 2\pi r \text{ or } \pi d$$

$$= \pi r^2$$

$$= \pi r^2 h$$

$$= 2\pi r h$$

$$= \frac{4}{3}\pi r^3$$

$$= 4\pi r^2$$

$$= \text{area of cross-section} \times \text{length}$$

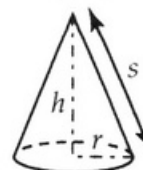
$$= \frac{1}{3} \times \text{area of base} \times \text{height}$$

$$= \frac{1}{3}\pi r^2 h$$

$$= \pi r s$$

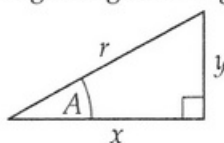
where s = slant height $\sqrt{h^2 + r^2}$

Cone

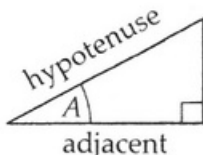


TRIGONOMETRY

Right-angled triangle

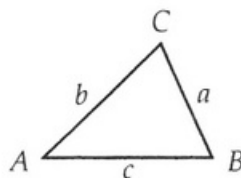


$$r^2 = x^2 + y^2 \text{ (result of Pythagoras)}$$



$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}, \cos A = \frac{\text{adjacent}}{\text{hypotenuse}}, \tan A = \frac{\text{opposite}}{\text{adjacent}}$$

Any triangle



In any triangle ABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\text{Area of triangle ABC} = \frac{1}{2}ab \sin C$$

NUMBER ALGEBRA

Standard form is $a \times 10^n$ where $1 \leq a < 10$ and n is an integer.

The quadratic equation $ax^2 + bx + c = 0$ has solutions

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

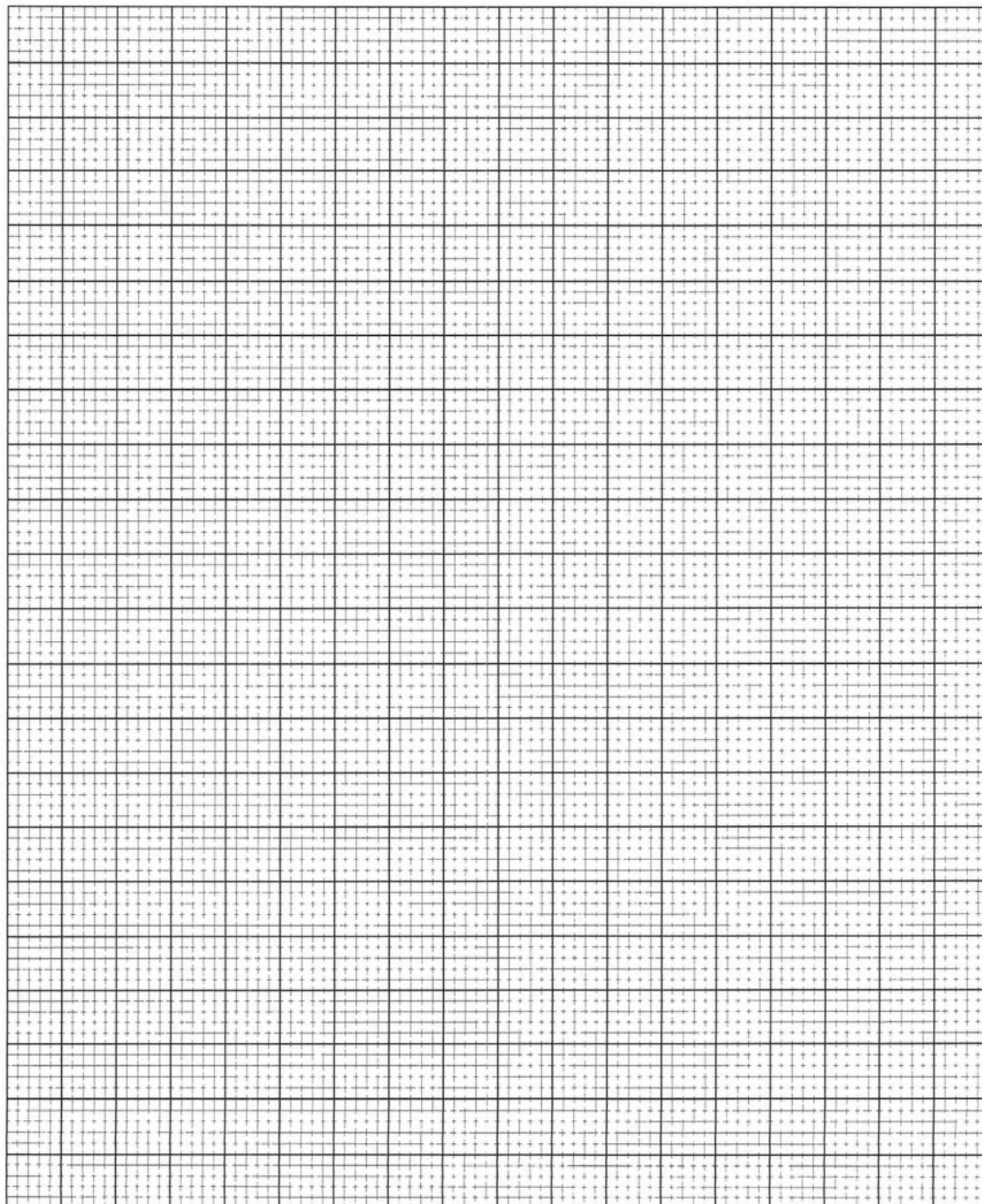
The determinant of matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is $ad - bc$

The inverse of $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is $\frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

If $y = ax^n$, then $\frac{dy}{dx} = anx^{n-1}$

**BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION**

School No.	Candidate No.	Level:	For Examiner's Use
Subject Number & Title:		Paper:	
Surname & Initials:		Section:	
Signature:	Date:	Qu. No.	



EXAMINATION

School No.	Candidate No.	Level:	For Examiner's Use
Subject Number & Title:		Paper:	
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Signature:	Date:	Qu. No.	

A full-page sheet of white graph paper featuring a uniform grid of thin black horizontal and vertical lines. The grid consists of small squares covering the entire area. There are no margins, text, or other markings on the page.

1. Write down the value of the acute angle θ for which $\sin\theta = \cos\theta$. [1]
-

2. Solve for p and q .

$$\begin{pmatrix} p & 0 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 1 \\ -3 \end{pmatrix} = \begin{pmatrix} 1 \\ q \end{pmatrix} \quad [2]$$

3. The table below satisfies the relation $y = mx + b$.

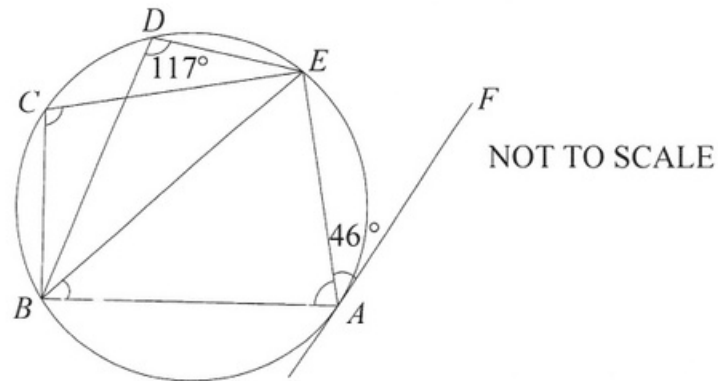
x	0	2
y	3	17

Calculate the value of

(i) b [1]

(ii) m [2]

4. In the diagram, the line AF is tangent to the circle $ABCDE$ at the point A , $\angle BDE = 117^\circ$ and $\angle EAF = 46^\circ$.



Calculate the value of

- | | | |
|-----|----------------|-----|
| (a) | $\angle ABE$, | [1] |
| (b) | $\angle BCE$, | [1] |
| (c) | $\angle BAE$. | [1] |

5. Determine the value of x that makes the following a true statement.

$$\frac{(7 \times 10^4)(3 \times 10^x)}{21 \times 10^{-8}} = 1 \quad [4]$$

6. (a) Factorise completely

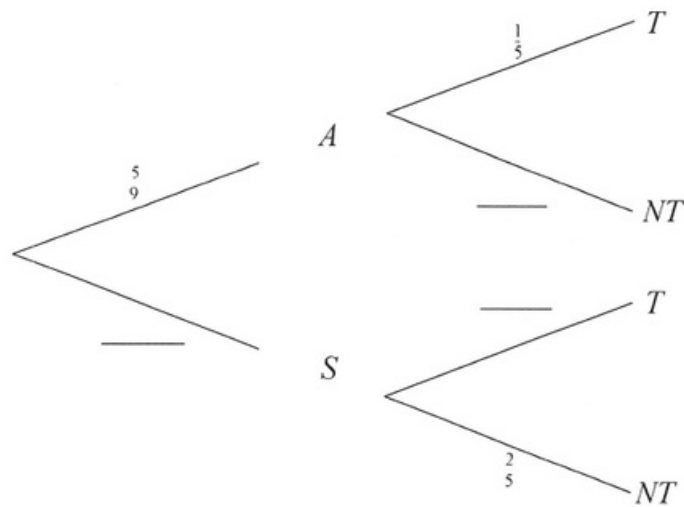
$$mn + n^2 + mp + np \quad [3]$$

- (b) Factorise and simplify

$$\frac{x^2 - 4}{5x + 10} \quad [3]$$

7. Tourists arrive in The Bahamas either by airplane (*A*) or by ship (*S*). While in The Bahamas, they either take a day trip (*T*) or do not (*NT*). The probability that a tourist arrives by airplane (*A*) is $\frac{5}{9}$. If a tourist arrives by airplane, the probability of going on a day trip is $\frac{1}{5}$. If a tourist arrives by ship, the probability of not going on a day trip is $\frac{2}{5}$.

(a) Copy and complete the following tree diagram.



[2]

(b) Calculate the probability that a tourist

(i) arrives by airplane and goes on a day trip,

[1]

(ii) goes on a day trip.

[3]

8. Solve for x

(a) $3^{2x} = 243$

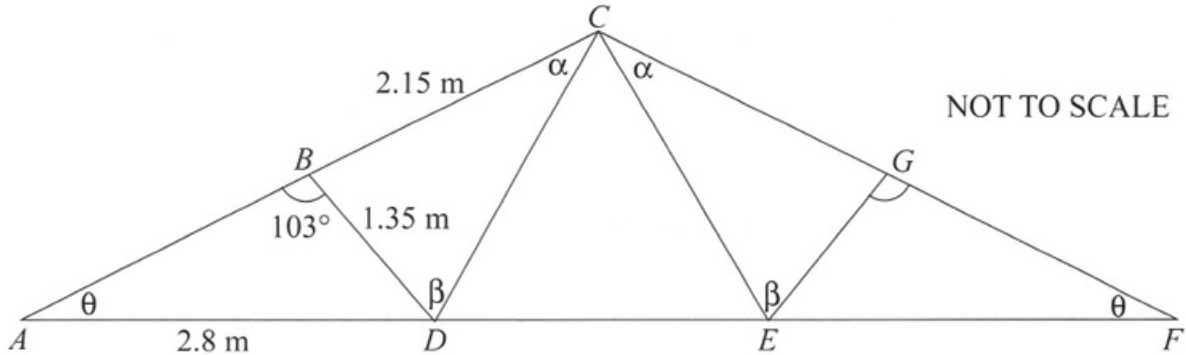
[3]

(b) $\frac{4x-5}{6} + 3 = \frac{x}{2}$

[4]

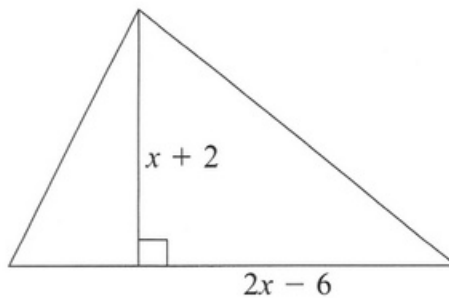
9. The diagram represents a truss rafter for the roof of a house.

$$\angle AED = 103^\circ, BC = 2.15 \text{ m}, BD = 1.35 \text{ m}, AD = 2.8 \text{ m}.$$



- (a) Write down a pair of triangles that are similar. [1]
- (b) Calculate, giving your answer to 2 decimal places,
 - (i) the slope of the roof, $\angle BAD$. [4]
 - (ii) the length of CD . [5]

10. The triangle below has a base of $(2x - 6)$ units and an altitude of $(x + 2)$ units.



- (a) Write down an expression that represents the area of this triangle. [1]
- (b) Show that this expression simplifies to $x^2 - x - 6$. [3]

The area of the triangle is 50 square units.

- (c) Use this information to calculate values for x . [4]
- (d) Hence determine the altitude of the above triangle. [2]

11. (a) Given that $f: x \rightarrow 7 - 2x$ and $g: x \rightarrow \frac{3x-1}{5}$,

calculate (i) the value of $g(2)$, [1]

(ii) the value of $gf(3)$, [2]

(iii) x where $f(x) = 1$, [2]

(iv) the inverse $f^{-1}: x \rightarrow$, [2]

(v) a simplified expression for $gf: x \rightarrow$. [3]

- (b) The function t is defined over the set {integers from 30 to 40 inclusive} as $t: x \rightarrow$ "the remainder when x is divided by 9".

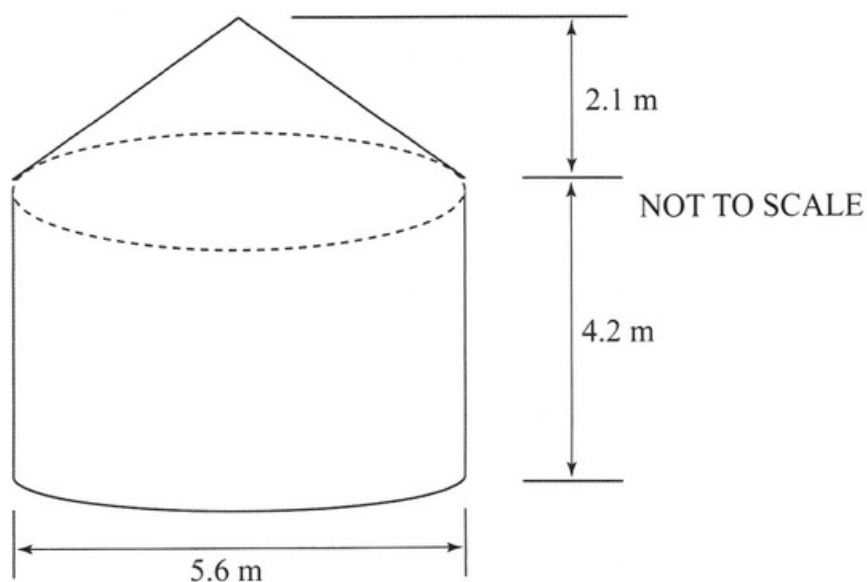
Write down the value of

(i) $t(34)$, [1]

(ii) x for which $t(x) = 3$. [1]

12. The diagram shows a cylindrical grain storage bin with a conical roof.

The diameter of the bin is 5.6 m, the height of the cylindrical section is 4.2 m, and the height of the conical section is 2.1 m.



Using the value $\pi = \frac{22}{7}$, calculate

- (a) the maximum volume of this grain bin, ignoring the thickness of the material used to make the bin, [5]
 - (b) the slant height of the conical section, [2]
 - (c) the total surface area of this grain bin. [5]
-

13. **ANSWER THIS ENTIRE QUESTION ON THE GRAPH PAPER PROVIDED**

- (a) Copy and complete the following table for the graph of $y = 5 + 3x - 2x^2$.

x	-2	-1.5	-1	-0.5	0	0.5	1	2	2.5	3
y	-9		0	3	5	6	6		0	-4

[2]

- (b) Using a scale of 2 cm to 1 unit on the x -axis for $-3 \leq x \leq 4$ and 1 cm to 1 unit on the y -axis for $-10 \leq y \leq 8$, draw the graph of $y = 5 + 3x - 2x^2$.

[4]

- (c) Use your graph to solve the equation $5 + 3x - 2x^2 = 2$.

[3]

- (d) Calculate the slope of the curve at the point (0,5).

[3]

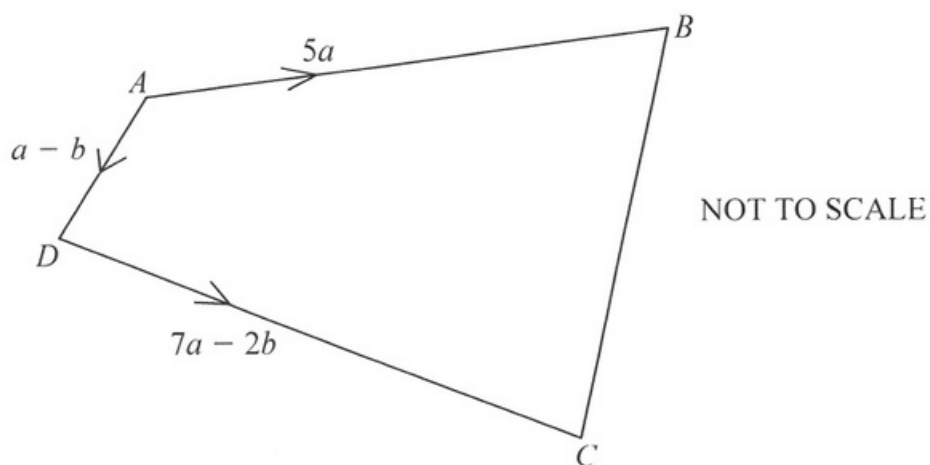
14. (a) $\vec{OX}$ and $\vec{OY}$ are position vectors relative to the origin. Given the points $X(13, -9)$ and $Y(-7, 24)$

(i) write $\vec{OX}$ and $\vec{OY}$ as column vectors, [2]

(ii) express $\vec{XY}$ as a column vector, [2]

(iii) calculate $|\vec{OY}|$, the magnitude of $\vec{OY}$. [2]

- (b) In the diagram, $\vec{AB} = 5a$, $\vec{AD} = a - b$, and $\vec{DC} = 7a - 2b$.



Express in terms of a , b and/or c in simplest form

(i) $\vec{AC}$ [2]

(ii) $\vec{BC}$ [2]

- (c) Write down **TWO** geometrical properties of $\vec{AD}$ and $\vec{BC}$. [2]

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