

MATHEMATICS

PAPER 2 (CORE/EXTENDED) 3815/2

Wednesday **18 MAY 2016** 9:00 A.M.–11:00 A.M.

Additional materials:
Calculator (not graphing)
Geometrical instruments
Answer booklet
Graph paper

**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 on each answer booklet.

Answer **ALL** questions in the answer booklet.

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 may be used. **[NO GRAPHING CALCULATORS ALLOWED].**

Tracing paper may be used.

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

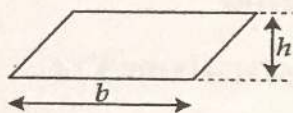
The total number of marks for this paper is 100.

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

INFORMATION AND FORMULAE

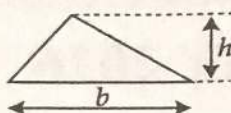
MENSURATION

Parallelogram



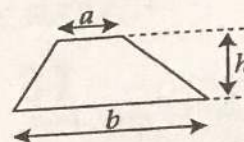
$$\text{Area} = bh$$

Triangle



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

Trapezium



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

Circle (radius r , diameter d)

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

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

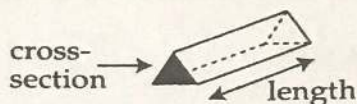
Cylinder (radius r , height h)

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

Prism

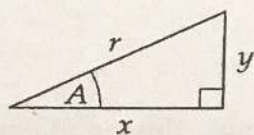
$$\text{Volume} = \text{area of cross-section} \times \text{length}$$

e.g. triangular prism

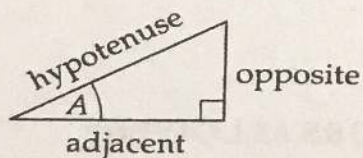


TRIGONOMETRY

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.

1. Express this ratio in its simplest form.

$$96 \text{ cm} : 2.4 \text{ m}$$

[2]

2. Light travels at 1.86×10^5 miles per second. Calculate how far it travels in a minute, giving your answer in scientific notation (standard form).

[2]

3. Solve $\frac{x}{3} - \frac{7}{12} = \frac{x}{4}$

[4]

4. (a) Solve the inequality $9 + 11x < 42$

[2]

- (b) Write down the solution set of **natural numbers** that satisfy the inequality in (a).

[2]

5. Evaluate

(a) 5^3

[1]

(b) 9^0

[1]

(c) $(2^3)^2$

[1]

(d) 4^{-2}

[1]

6. Jerry had \$100. He went to a Computer Store, a Book Store and a Music Store. He spent three times as much money in the Computer Store as he did at the Music Store. He spent \$12 less at the Book Store than at the Music Store. He then had \$37 left.

- (a) Using x to represent the amount he spent at the Music Store, express in terms of x ,

- (i) the amount spent at the Computer Store,

[1]

- (ii) the amount spent at the Book Store.

[1]

- (b) Form an equation in terms of x for the total amount of money spent.

[1]

- (c) Solve the equation formed in (b) to determine the amount of money spent at the Music Store.

[2]

7. Solve the following pair of simultaneous equations

$$y = \frac{3}{2}x$$

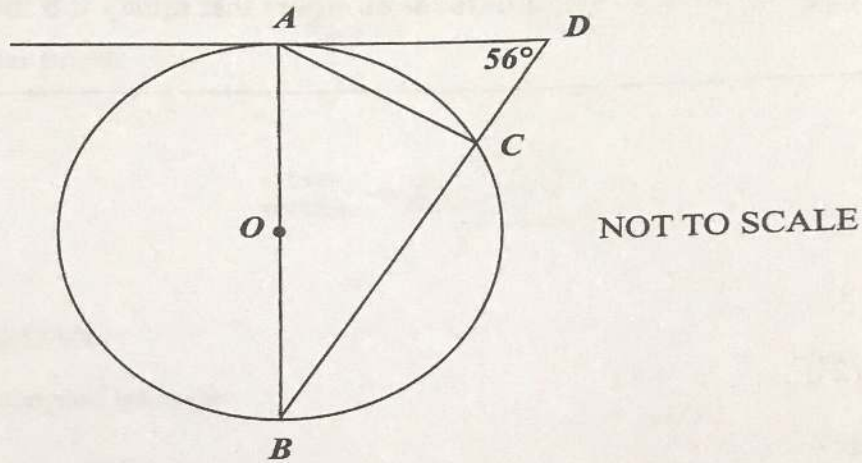
$$3x + 2y + 4 = 0$$

[5]

8. (a) Using a ruler, compass and pencil only, construct and label $\triangle ABC$ such that $AB = 11.2$ cm, $AC = 9$ cm and $\angle CAB = 60^\circ$. [5]

(b) Measure and write down the size of $\angle ABC$. [1]

9. (a) AB is a diameter of the circle ABC with centre O . AD is a tangent to the circle at A . $\angle ADC = 56^\circ$. [1]



Calculate (i) $\angle BCA$, [1]

(ii) $\angle ABD$, [1]

(iii) $\angle CAD$. [1]

(b) Each interior angle of a regular polygon is 165° .

Calculate

(i) the size of each exterior angle, [1]

(ii) the number of sides of the polygon. [2]

10. Use the formula $Q = 3t^2 - 5th$ to

(a) calculate the value of

(i) Q when $t = 7$ and $h = 6$,

[2]

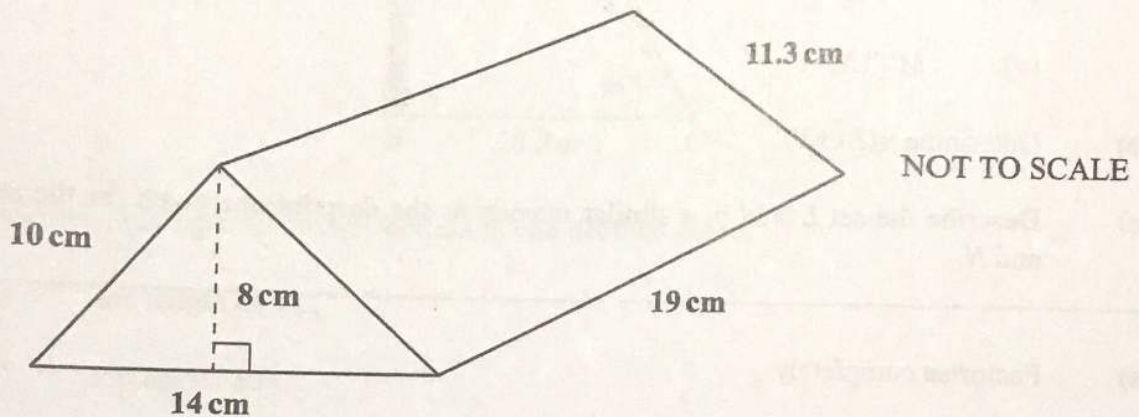
(ii) h when $Q = 332$ and $t = 16$,

[3]

(b) make h the subject of the formula.

[2]

11. The diagram represents a triangular prism of length 19 cm. The triangular cross-section has sides of length 10 cm, 11.3 cm and 14 cm, and a height of 8 cm.



Calculate

(a) the area of the cross-section,

[2]

(b) the volume of the prism,

[2]

(c) the total surface area of the prism.

[3]

12. $\mathcal{E} = \{\text{positive numbers less than } 30\}$
 $L = \{\text{positive multiples of } 2 \text{ less than } 30\}$
 $M = \{\text{positive multiples of } 3 \text{ less than } 30\}$
 $N = \{\text{positive multiples of } 5 \text{ less than } 30\}$

(a) List the elements of

(i) L , [1]

(ii) M , [1]

(iii) N , [1]

(iv) $L \cap N$, [1]

(v) $M' \cap N$. [2]

(b) Determine $n(L \cup N)$. [1]

(c) Describe the set $L \cap M$ in a similar manner as the descriptions given for the sets L , M and N . [1]

13. (a) Factorise completely

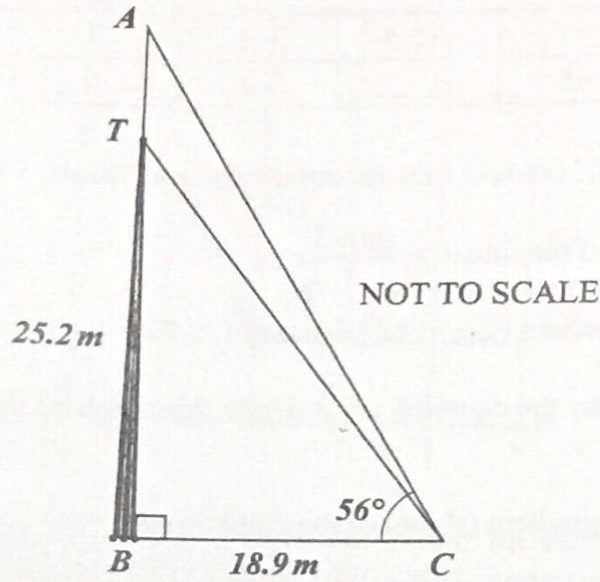
$$12pq^2 + 3p - 6p^2q \quad [3]$$

(b) Simplify

(i) $\left(\frac{5m}{n^3}\right)^2$ [3]

(ii) $13 - 3(t + 5) + 4t$ [3]

14. The diagram shows transmission tower TB of height 25.2 m topped with an antenna AT . The point C is 18.9 m from B and the angle of elevation at C to the top of the antenna is 56° .



Calculate, giving your answer correct to one decimal place,

- (a) the length of TC , [3]
- (b) the angle, BTC , [3]
- (c) the height of the antenna, AT . [4]

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

- (a) Copy and complete the following table for the graph of $y = \frac{2x-1}{3}$.

x	-7	-2.5	-1	2	8
y	-5		-1	1	

[2]

- (b) Using a scale of 1 cm to 1 unit for each axis, and values $-8 \leq x \leq 10$ and $-8 \leq y \leq 10$, draw the graph of the line $y = \frac{2x-1}{3}$.

[3]

- (c) Calculate the gradient (slope) of your graph in (b).

[2]

- (d) Another graph has the equation $y = 3$. Draw this graph on the same coordinate plane.

[1]

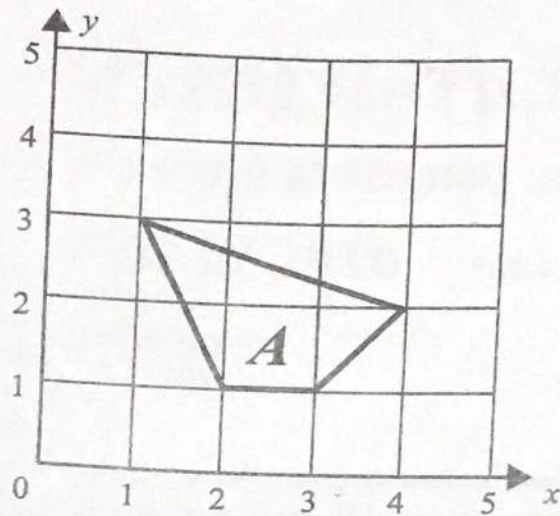
- (e) Write down the gradient (slope) of the graph in (d).

[1]

- (f) Write down the coordinates of the point where the graphs 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, taking values of x from $-8 \leq x \leq 10$ and values of y from $-8 \leq y \leq 10$, copy and draw the above quadrilateral A . [3]
- (b) Draw the image of quadrilateral A after a rotation of 180° about the origin. Label it B . [2]
- (c) Translate quadrilateral A by $\begin{pmatrix} 1 \\ -5 \end{pmatrix}$. Label the image C . [2]
- (d) Reflect quadrilateral A in the line $x = -1$. Label the image D . [2]
- (e) Enlarge quadrilateral A by a scale factor of 2 through the origin. Label the image E . [2]