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MATHEMATICS

PAPER 2 (CORE/EXTENDED) 3815/2

Friday 19 MAY 2023 9:00A.M.–11:00A.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.

Remove the graph paper from the question paper. Close the question paper.

Write your School Number, Candidate Number, Surname and Initials in the spaces provided on the answer booklet **AND** the graph paper. **Place the graph paper in the 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 and geometrical instruments may be used.

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

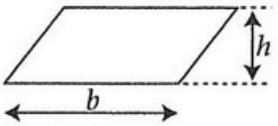
The total number of marks for this paper is 100.

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

INFORMATION AND FORMULAE

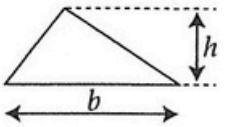
MENSURATION

Parallelogram



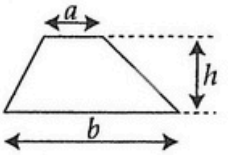
Area = bh

Triangle



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

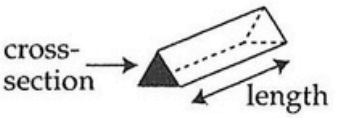
Trapezium



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

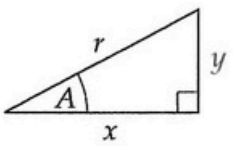
Circle (radius r, diameter d)	Circumference	$= 2\pi r$ or πd
	Area	$= \pi r^2$
Cylinder (radius r, height h)	Volume	$= \pi r^2 h$
Prism	Volume	= area of cross-section × length

e.g. triangular prism

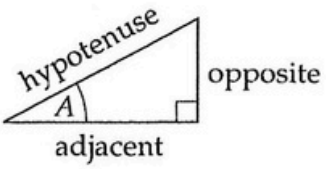


TRIGONOMETRY

Right-angled triangle



$r^2 = x^2 + y^2$, (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 $1 \leqslant a < 10$ and n is an integer.

1. A college sent out 3,150 invitations to their summer graduation.

5,000 invitations were sent out last year.

Find the percentage decrease in invitations sent. [2]

---

2. (a) Represent each sentence as an algebraic inequality.

(i) x is at most 69. [1]

(ii) y is at least 100. [1]

(iii) The minimum value of z is 25. [1]

(b) Draw a number line showing the inequality $n \geq 2$. [2]

---

3. There are several t-shirts on a rack in a store.

$\frac{2}{3}$ are white.

$\frac{1}{8}$ are pink.

All the remaining t-shirts are blue.

(a) Find the fraction of t-shirts that are blue. [2]

There are 20 blue t-shirts on the rack.

(b) Find the total number of t-shirts on that rack. [2]

---

4. A fisherman has 10 groupers for sale.

The mean weight of the 10 groupers is 14 kg.

He sells two groupers that weigh a total of 32 kg.

Find the mean weight of the remaining groupers. [3]

---

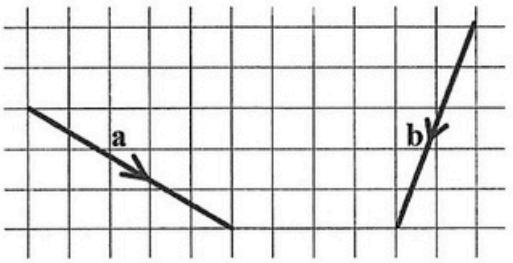
5. The interior angle of a regular polygon is 162°.

(a) Calculate the size of each exterior angle. [1]

(b) Calculate the number of sides of the polygon. [1]

---

6. Two vectors **a** and **b** are shown on the grid below.



Write as column vectors:

(a) **a** and **b** [2]

(b) **a** + **b** [2]

(c) 2**a** [1]

---

7. Samantha leaves home at 7:55 a.m. and drives 75 km to work at an average speed of 60 km/h. It takes 15 minutes for her to walk from the parking lot at work to her office. Determine her arrival time at the office. [4]

---

8. (a) Factorise $16ab^3c - 8ab + 32a^2bc^2$ [3]

(b) Simplify:

(i) $1.1a + 3.3 - 5(3 - 0.2a)$ [3]

(ii) $\left(\frac{3x}{y^2}\right)^3$ [3]

---

9. A floor is covered with 16-inch square tiles.

There are $17\frac{1}{2}$ tiles along the width and 19 tiles along the length.

(a) Using 1 inch = 2.54 centimetres, find in centimetres the

(i) width of the floor, [2]

(ii) length of the floor. [2]

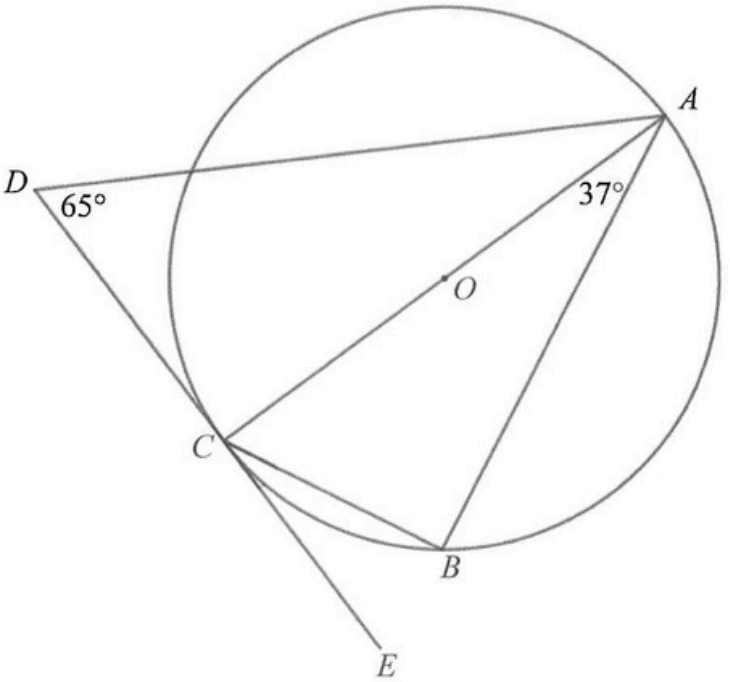
(b) Find the area of the floor in square metres. [2]

---

10. Circle ABC has a centre at O.

DE is tangent to the circle at C.

Angle $BAC = 37°$ and angle $ADC = 65°$.



NOT TO SCALE

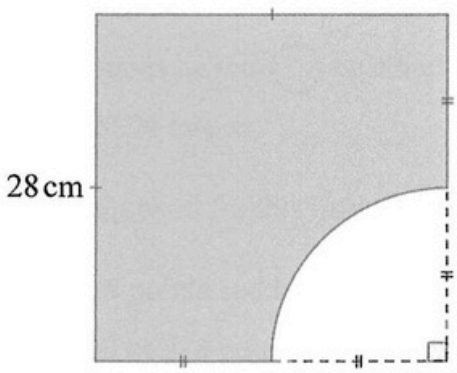
Find angle

(a) ABC, [1]

(b) BCE, [1]

(c) DAC. [1]

11.

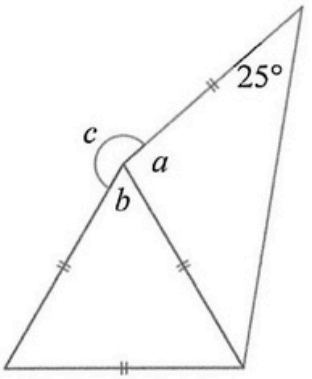


NOT TO SCALE

Using $\pi = \frac{22}{7}$, find the perimeter of the shaded region above. [4]

---

12. (a)



NOT TO SCALE

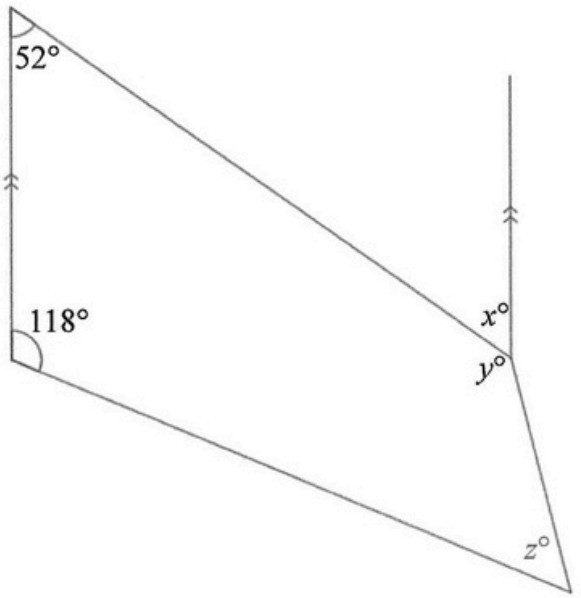
Find the size of the following angles.

(i) a [1]

(ii) b [1]

(iii) c [1]

(b)



NOT TO SCALE

In the above diagram, $y = 2x$.

Find the size of the following angles.

(i) x [1]

(ii) y [1]

(iii) z [1]

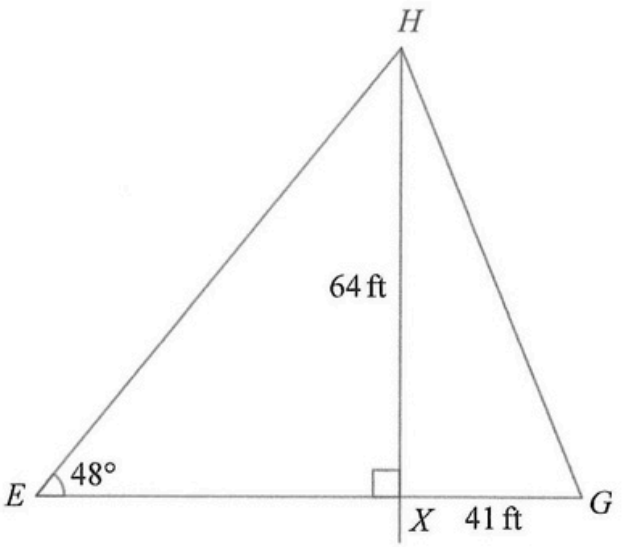
13. The diagram shows the design plans of a sail.

EG is a straight line.

$HX = 64$ ft.

$XG = 41$ ft.

$\angle HEX = 48°$



NOT TO SCALE

Calculate, correct to the nearest whole number,

(a) length HG, [3]

(b) $\angle XGH$, [3]

(c) length EG. [4]

---

14. In a dart game, Jordan can hit targets that are either ◯ or ☆.

Let the number of times he hits ◯ be $\boldsymbol{a}$ and the number of times he hits ☆ be $\boldsymbol{b}$.

Jordan hits a total of 24 targets.

(a) Write an equation for this information in terms of $\boldsymbol{a}$ and $\boldsymbol{b}$. [1]

Hitting ◯ scores 8 points and hitting ☆ scores 10 points.

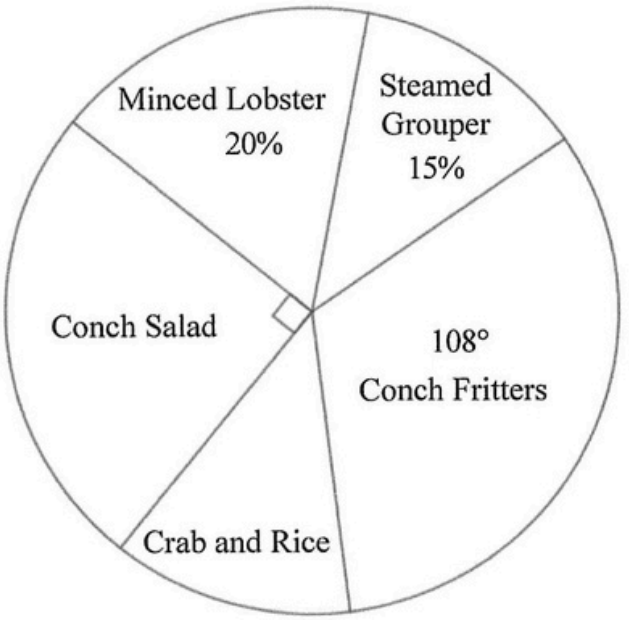
Jordan scores a total of 218 points.

(b) Write an equation for the total score in terms of $\boldsymbol{a}$ and $\boldsymbol{b}$. [2]

(c) Solve the simultaneous equations to find how many times each target was hit. [4]

---

15. In a survey a group of 1,440 tourists were asked to name their favourite Bahamian dish. Their responses are shown in the pie chart below.



NOT TO SCALE

Find the

(a) angle representing Minced Lobster, [2]

(b) percentage of tourists that chose Conch Fritters, [2]

(c) number of tourists that picked Crab and Rice. [3]

---

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

Height	1	1.5	3	5	6	9	12	15
Cross-sectional Area	180	120	60	36	30	20	15	12

The table shows the relationship between the height of a box and its cross-sectional area.

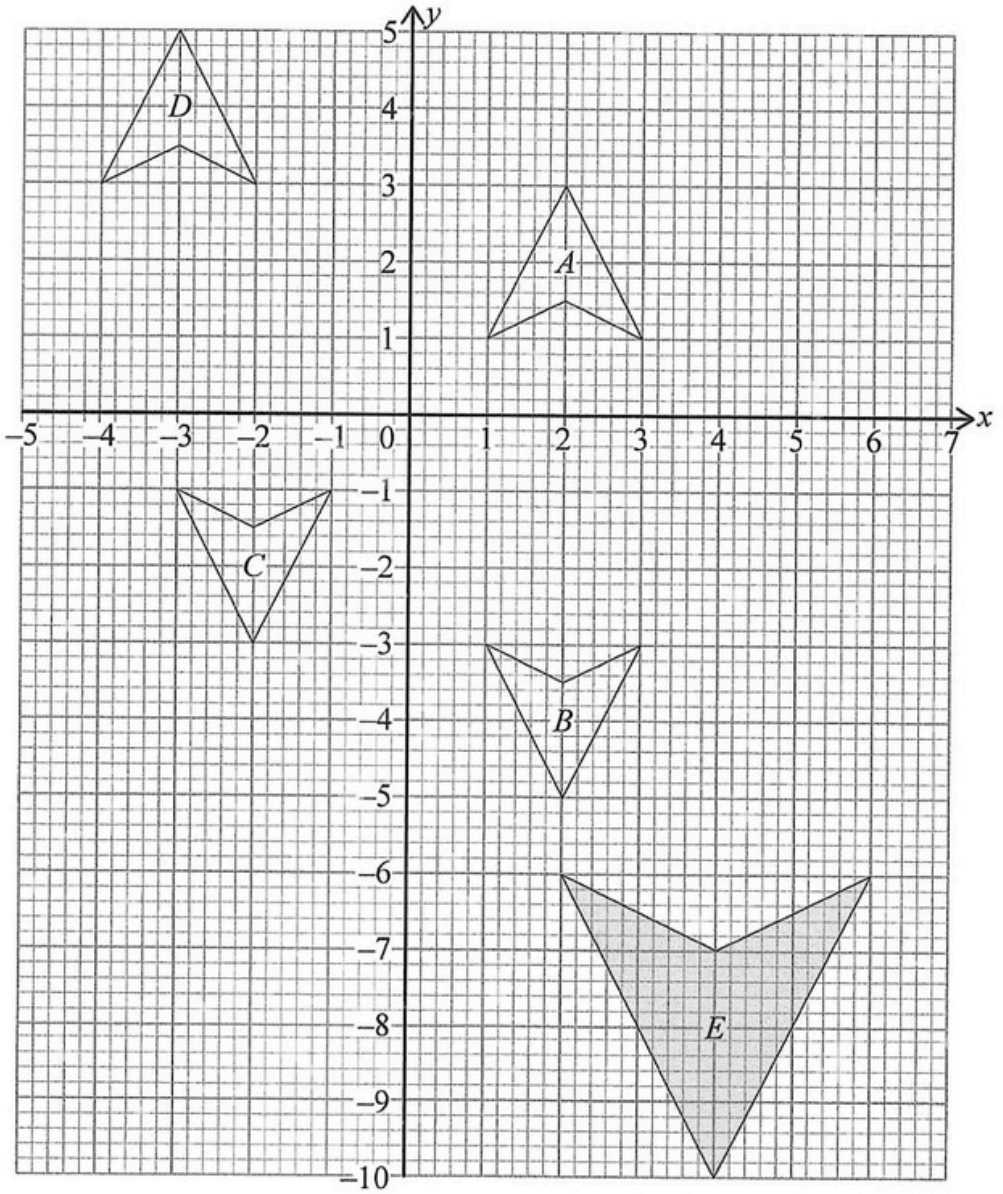
(a) Using a horizontal scale of 1 cm to 1 unit for the height and a vertical scale of 1 cm to 10 units for the cross-sectional area, plot the data points from the table and join them with a smooth curve. [4]

(b) Use your graph to estimate

(i) the cross-sectional area when the height is 4 units, [1]

(ii) the height when the cross-sectional area is 90 square units. [1]

17.



Describe fully the single transformation that maps

(a) Shape *A* onto Shape *B*, [2]

(b) Shape *A* onto Shape *C*, [3]

(c) Shape *A* onto Shape *D*, [3]

(d) Shape *B* onto Shape *E*. [3]

---

18. Jamie purchases a laptop which costs $1,200.

Jamie gets a loan for the full price of the laptop at a simple interest rate of 3% per year.

She pays back the loan in equal monthly payments over 18 months.

Calculate her monthly payments, correct to the nearest cent. [6]

End]

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MATHEMATICS GRAPH PAPER

MINISTRY OF EDUCATION **AB7**

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