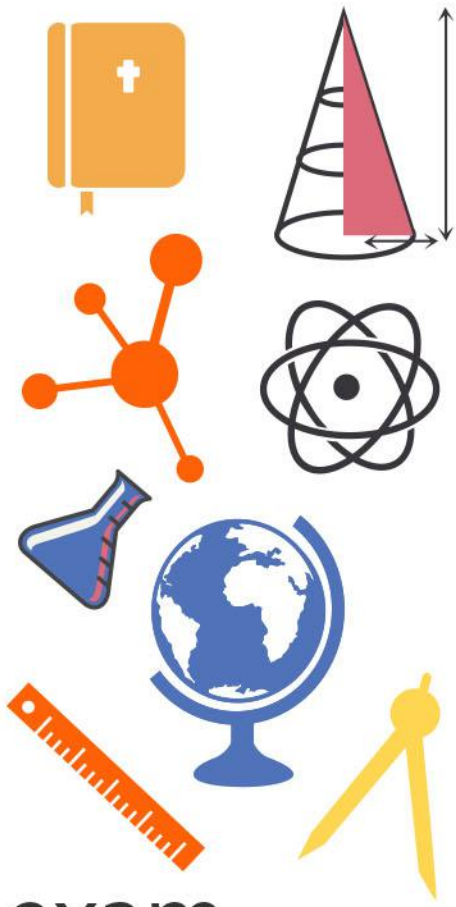

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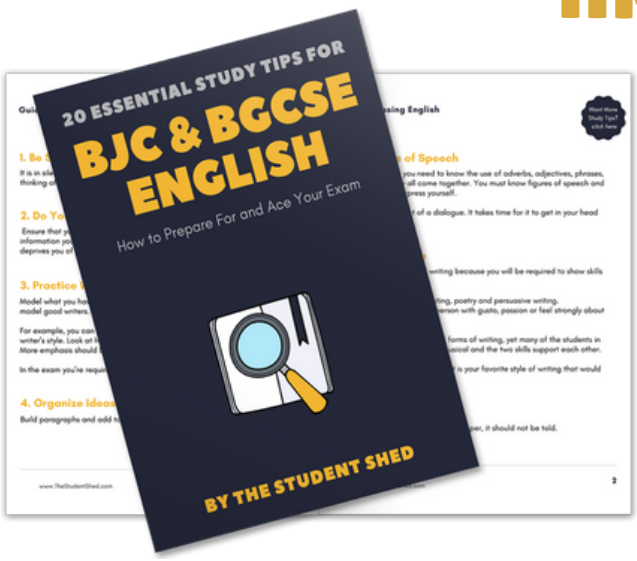

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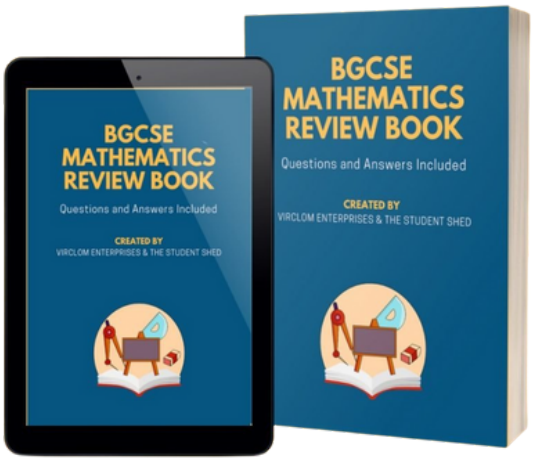

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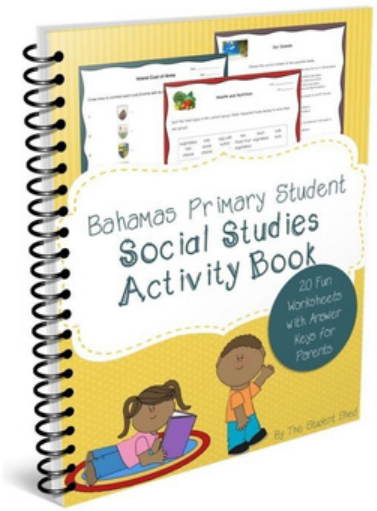

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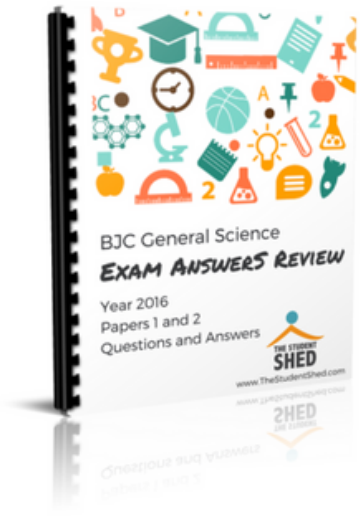

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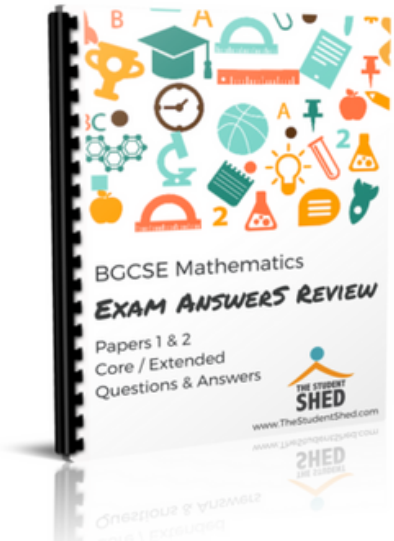

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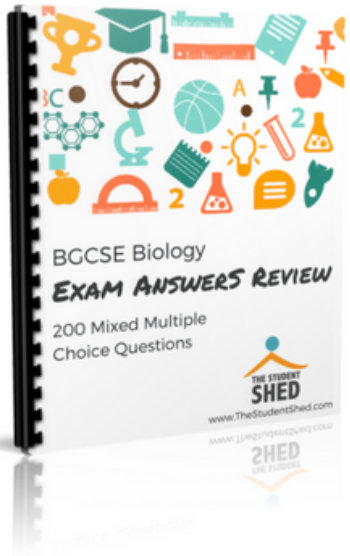

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3815/1 **BGCSE**

School Number	Candidate Number
Surname and Initials	

MATHEMATICS

PAPER 1 (CORE/EXTENDED) 3815/1

Friday 18 MAY 2018 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.

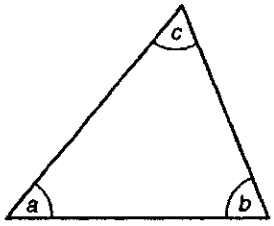
Geometrical instruments are required.

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

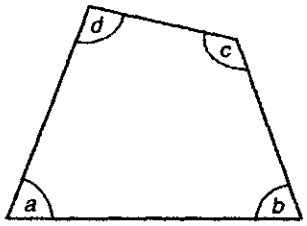
The total number of marks for this paper is 100.

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

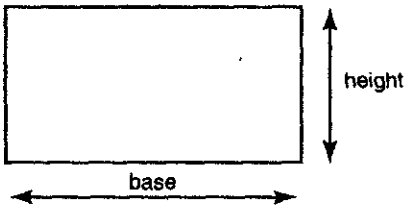
INFORMATION AND FORMULAE



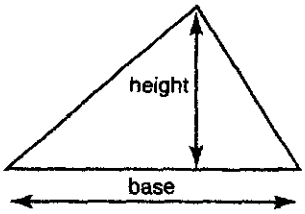
Angle sum of triangle
$a + b + c = 180°$



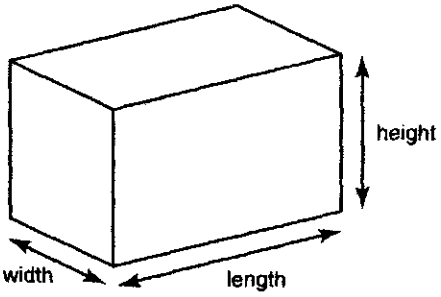
Angle sum of quadrilateral
$a + b + c + d = 360°$



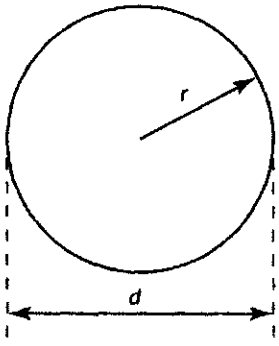
Area of rectangle = base × height



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



Volume of cuboid = length × width × height



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

1. In the subtraction problem below, 2 digits are left off. Write the missing digits in the boxes to make the statement true.

$$\begin{array}{r} 4\ 9\ 2 \\ -\ 3\ 8\ \square \\ \hline \square\ 0\ 5 \\ \hline \end{array}$$

[2]

---

2. Write down the next two numbers in the sequence

$1,\ 1\frac{3}{4},\ 2\frac{1}{2},\ 3\frac{1}{4},\ _____,\ _____.$ [2]

---

3. (a) Calculate the value of

$12 + 9 \div 3$

Answer: _____ [1]

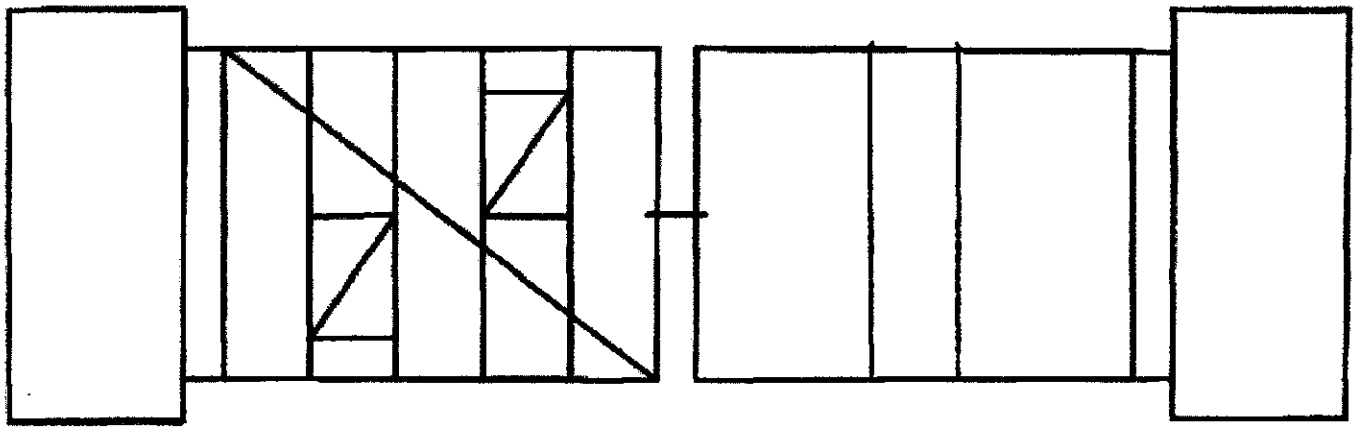
(b) Insert a pair of brackets to make this a true statement.

$10 + 3 \times 5 - 4 = 3$

Answer: _____ [1]

---

4. The diagram below represents a set of gates. Complete the diagram so that the set of gates are symmetrical.



[3]

---

5. The temperatures in several cities in a day in January were:

Nassau	27 °C	New York	−4 °C
Atlanta	14 °C	Edmonton	−18 °C

Calculate the difference in temperature between

(a) Nassau and Atlanta,

Answer: _____ °C [1]

(b) Atlanta and New York,

Answer: _____ °C [1]

(c) New York and Edmonton.

Answer: _____ °C [1]

---

6. Given that $a = 5$ and $b = -2$, calculate the value of $a^3 + 3b$.

Answer: _____ [3]

---

7. In the *Fine Cookies* factory, a machine produces 120 cookies every minute.

(a) Calculate the number of cookies produced in an 8-hour shift.

Answer: _____ cookies [3]

The cookies are packaged in boxes of 36.

(b) Calculate the number of boxes filled during the shift.

Answer: _____ boxes [1]

---

8. Write 7.53619 correct to:

(a) the nearest whole number,

Answer: _____ [1]

(b) one decimal place,

Answer: _____ [1]

(c) two significant figures,

Answer: _____ [1]

(d) four decimal places.

Answer: _____ [1]

---

9. Solve the following equations.

(a) $7x + 5 = 47$

Answer: _____ [2]

(b) $\frac{y}{12} = \frac{5}{4}$

Answer: _____ [2]

---

10. Ashley bought skateboarding equipment. The safety pads cost a total of \$48. The skateboard cost \$$y$ more than the safety pads. The helmet cost \$15 less than the skateboard.

Write an expression, in terms of y, for

(a) the cost of the skateboard,

Answer: \$ _____ [1]

(b) the cost of the helmet,

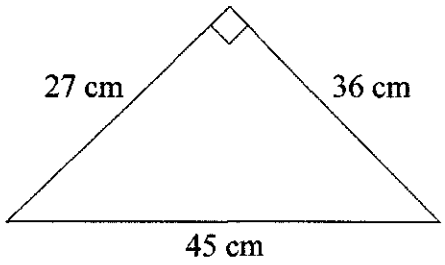
Answer: \$ _____ [1]

(c) the total cost of the equipment, giving your answer in simplest form.

Answer: \$ _____ [2]

---

11. A right-angled triangle has a hypotenuse of length 45 cm and adjacent sides of 36 cm and 27 cm as shown.



For this triangle, calculate

(a) the perimeter,

Answer: _____ cm [2]

(b) the area.

Answer: _____ cm^2 [2]

---

12. An airplane flew from Nassau to Chicago, a distance of 1300 miles, at an average speed of 520 mph.

(a) Calculate the time taken.

Answer: _____ [2]

The airplane left Nassau at 9:50 am. Chicago time is one hour behind Nassau time.

(b) Calculate the time of arrival in Chicago.

Answer: _____ [3]

---

13. (a) (i) Using ruler and compass only, construct triangle XYZ with $YZ = 6$ cm, $XY = 5$ cm and $XZ = 4$ cm.

[3]

(ii) Measure and write down the size of $\angle XYZ$.

Answer: _____ ° [1]

(b) Measure and write down the length of the line MN.

M _____ N

Answer: _____ cm [1]

---

14. A cooler contains bottles of orange juice, apple juice and grapefruit juice in the ratio of 3:4:3. There are 960 bottles of orange juice in the cooler.

(a) Calculate the number of bottles of apple juice that are in the cooler.

Answer: _____ [2]

(b) Calculate the total number of bottles of juice in the cooler.

Answer: _____ [2]

640 bottles of pineapple juice are added to the cooler.

(c) Calculate the ratio of orange juice to apple juice to grapefruit juice to pineapple juice now in the cooler, giving your answer in simplified form.

Answer: _____ [2]

15. '*Shoes – a – go* held a back to school sale'. Harry bought a pair of tennis shoes originally priced at \$75. He was given a 30% discount by the cashier.

(a) Calculate the discounted price of the tennis shoes.

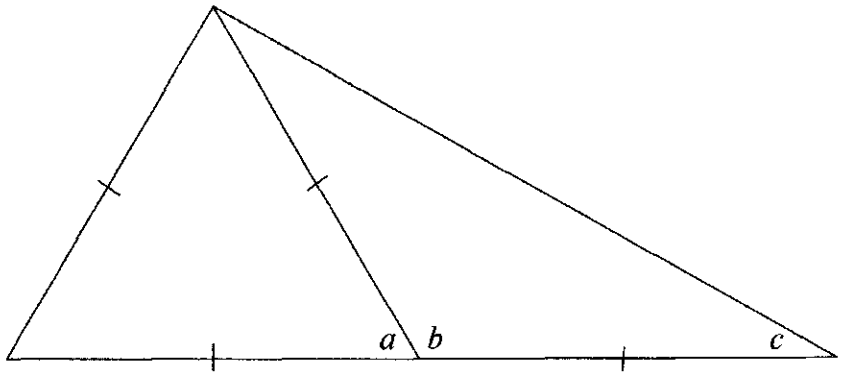
Answer: \$ _____ [4]

Shoes were discounted from \$40 to \$26.

(b) Calculate the percentage saving on the original price of the shoes.

Answer: _____ % [2]

16. Calculate the size of



NOT TO SCALE

(a) (i) angle *a*,

Answer: _____ ° [1]

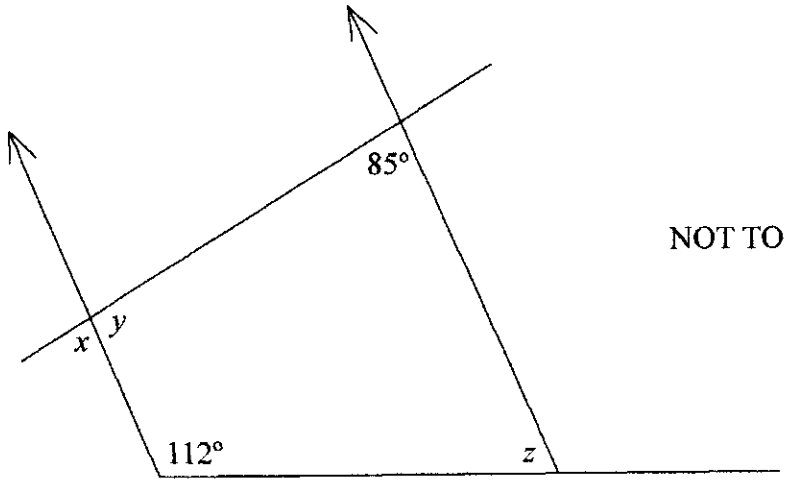
(ii) angle *b*,

Answer: _____ ° [1]

(iii) angle *c*.

Answer: _____ ° [1]

(b)



NOT TO SCALE

(i) angle x,

Answer: _____ ° [1]

(ii) angle y,

Answer: _____ ° [1]

(iii) angle z.

Answer: _____ ° [1]

17. The *Annual Walkathon* has a walking distance of 12 km. Jerry has an average walking speed of 5 km/h.

(a) Calculate the time it took for Jerry to complete the walkathon.

Answer: _____ hrs [2]

Susan completed the walkathon in $2\frac{2}{3}$ hours.

(b) Calculate Susan's average walking speed.

Answer: _____ km/h [2]

Ken has an average walking speed of $4\frac{2}{3}$ km/h but could only walk for $1\frac{1}{2}$ hours.

(c) Calculate the distance walked by Ken.

Answer: _____ km [2]

18. Elsa purchased a car. She borrowed the money from *Banko Bank* at a simple interest rate of 8% per annum for 3 years. She paid the Bank \$6 360 in interest charges.

(a) Calculate the amount borrowed from the bank.

Answer: \$ _____ [3]

(b) Calculate the total amount of the loan.

Answer: \$ _____ [1]

Elsa's first payment was \$1 080. She repaid the rest in 35 equal monthly payments.

(c) Calculate the amount of each monthly payment.

Answer: \$ _____ [2]

19. The weights of 8 men on *The Athletic Team* are:

96 kg, 92 kg, 88 kg, 96 kg, 108 kg, 114 kg, 106 kg, 104 kg

(a) Calculate

(i) the mean weight,

Answer: _____ kg [2]

(ii) the median weight.

Answer: _____ kg [3]

When a 9th person joins *The Athletic Team*, the overall mean weight changes to 102 kg.

(b) Calculate the weight of the 9th person.

Answer: _____ kg [3]

---

20. Simplify (a) $-3(a - 2)$

Answer: _____ [2]

(b) $6b^2 - 3b - b^2 + 5b$

Answer: _____ [2]

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

Answer: _____ [2]

(d) $18d^6 \div 3d^3$

Answer: _____ [2]

---

21. Jaime is paid $12.50 per hour for a regular 40-hour week. Overtime hours are paid at time and a half. The chart below is a record of the hours Jaime worked last week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Time	8	8	9	9	10

(a) Calculate

(i) the regular earnings,

Answer: $ _____ [1]

(ii) the overtime hours worked,

Answer: _____ hrs. [1]

(iii) the overtime earnings,

Answer: $ _____ [3]

(iv) the total earnings for the week.

Answer: $ _____ [1]

Jaime's National Insurance contribution is 3.8% of his total earnings.

(b) Calculate

(i) his National Insurance contribution for the week,

Answer: $ _____ [2]

(ii) his net earnings.

Answer: $ _____ [1]

MATHEMATICS

PAPER 2 (CORE/EXTENDED) 3815/2

Tuesday 22 MAY 2018 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

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Tracing paper may be used.

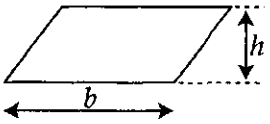
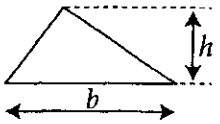
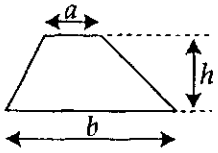
The mark for each question, or part question, is shown in brackets [ ].

The total number of marks for this paper is 100.

This question paper consists of _9_ printed pages and _3_ blank pages.

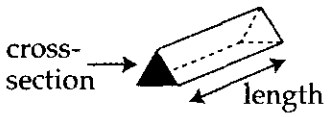
INFORMATION AND FORMULAE

MENSURATION

Parallelogram	Triangle	Trapezium
		
Area = bh	Area = $\frac{1}{2}bh$	Area = $\frac{1}{2}(a+b)h$

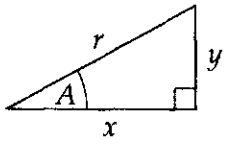
Circle (radius r, diameter d)	Circumference	$= 2\pi r$ or πd
	Area	$= \pi r^2$
Cylinder (radius r, height h)	Volume	$= \pi r^2 h$
Prism	Volume	= area of cross-section × length

e.g. triangular prism

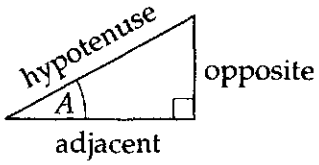


TRIGONOMETRY

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 $1 \leq a < 10$ and n is an integer.

MATHEMATICS GRAPH PAPER

MINISTRY OF EDUCATION **AB7**

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

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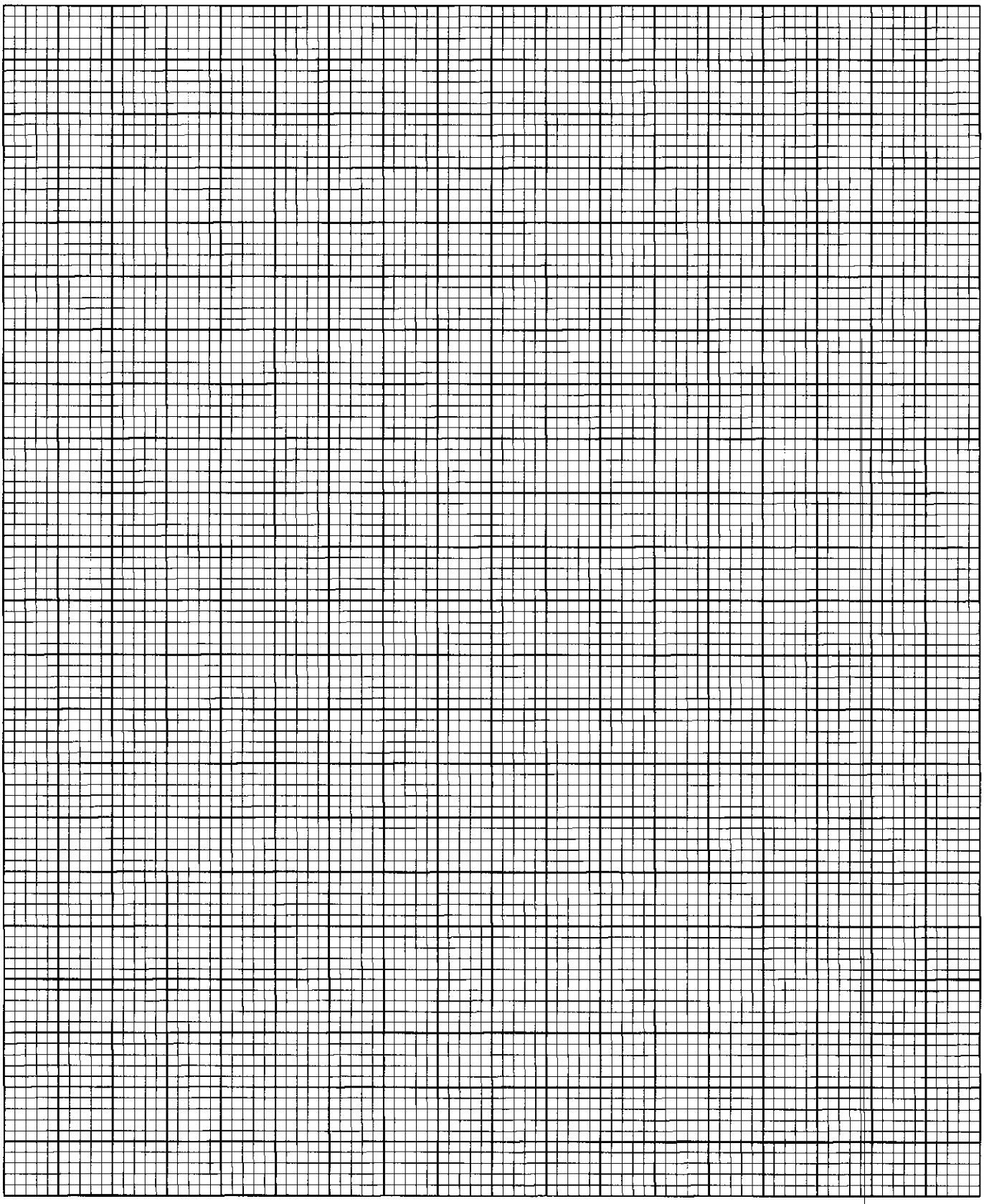
Subject Number & Title:		Paper:	
Surname & Initials:		Section:	
Signature:	Date:	Qu. No.	



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EXAMINATION

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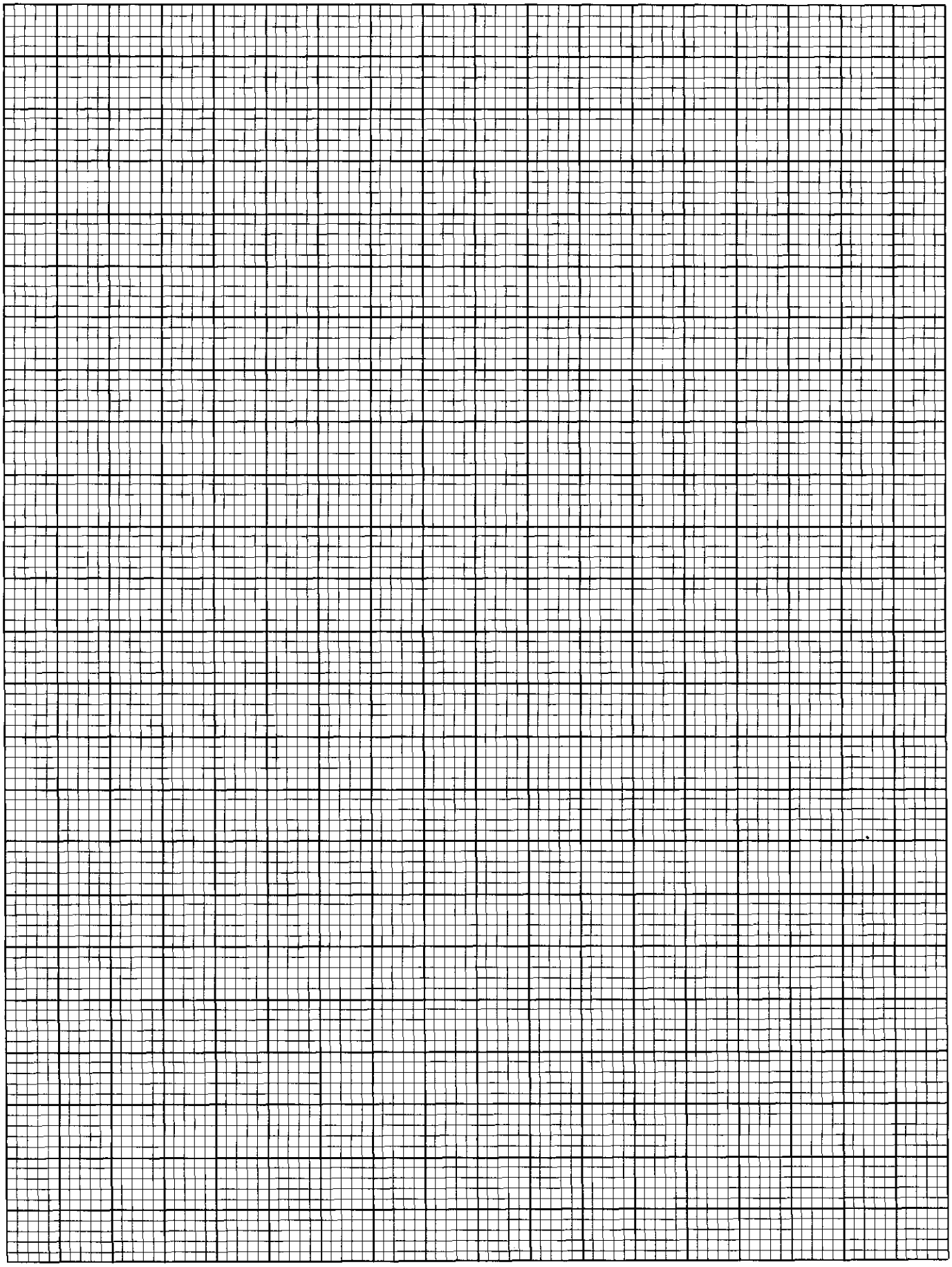
Surname & Initials:		Section:	
Signature:	Date:	Qu. No.	



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1. From the set of numbers, $\left\{-\sqrt{3},\ 3\frac{1}{7},\ 0,\ \frac{10}{3},\ 5.\dot{7}\right\}$ write down

   (a) an integer, [1]

   (b) an irrational number. [1]

---

2. Express this ratio in simplest form.

   $\frac{1}{4} : \frac{1}{2} : 1$ [2]

---

3. To make a tuna salad of six servings, 240 grams of canned tuna fish is needed.

   Calculate

   (a) the amount of grams of tuna fish needed for 10 servings, [2]

   (b) the number of servings that can be obtained from 600 grams of tuna fish. [2]

---

4. Solve this equation for h:

   $\frac{4h-7}{9} = \frac{h}{2}$ [4]

---

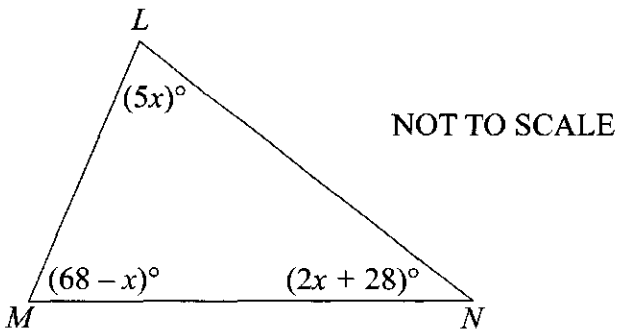
5. (a) Solve the inequality

   $7 - 9x \geq 25$. [3]

   (b) Graph your solution from (a) on a directed number line. [2]

---

6. In ΔLMN, $\angle L = (5x)°$, $\angle M = (68 - x)°$ and $\angle N = (2x + 28)°$, as shown.



(a) Write down and simplify an expression for the sum of the angles of ΔLMN. [2]

(b) Calculate the value of x. [3]

---

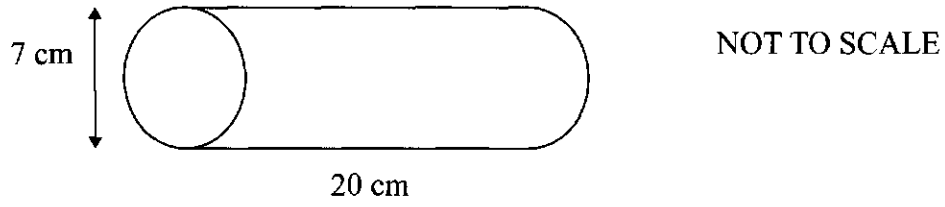
7. Solve the following pair of simultaneous equations.

$5x - 6y = 18$
$3x + 8y = 5$

[5]

---

8. Window frame sealant is purchased in cylindrical-shaped canisters of 7 cm diameter and 20 cm in length, as shown.



(a) Using $\pi = 3.14$, calculate the volume of the canister. [3]

One canister contains 425 g of sealant. A window sealing job requires 1.8 kg of sealant.

(b) Calculate the number of canisters to be purchased. [3]

---

9. A taxi driver charges \$3 for the first mile of a journey and 50¢ for each additional mile.

(a) Calculate the cost of a 9 mile journey. [2]

Another journey costs \$13.50.

(b) Find the length of this journey. [3]

(c) Write down the formula for finding the cost (\$C) for a journey of m miles. [2]

---

10. In an examination, 100 candidates wrote at least one exam. 62 wrote Mathematics (M) and 53 wrote Biology (B).

(a) Represent this information using a Venn diagram. [4]

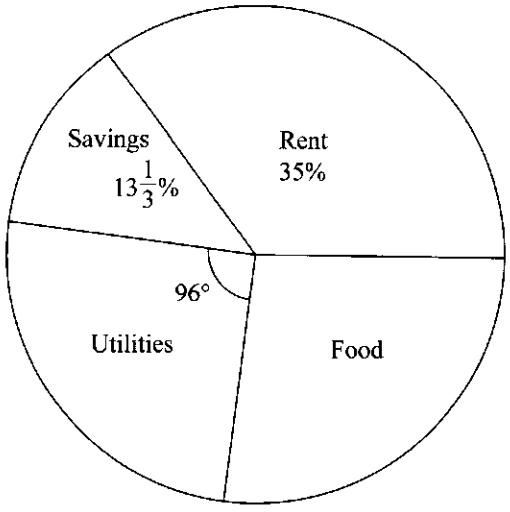
(b) How many candidates wrote Mathematics only? [1]

(c) How many candidates are in the set $(M \cup B)^1$? [1]

(d) State the number of candidates in the set $(M \cap B)^1$. [1]

---

11. The circle graph shows how Shelly allocates her monthly salary of \$1800.



NOT TO SCALE

Calculate

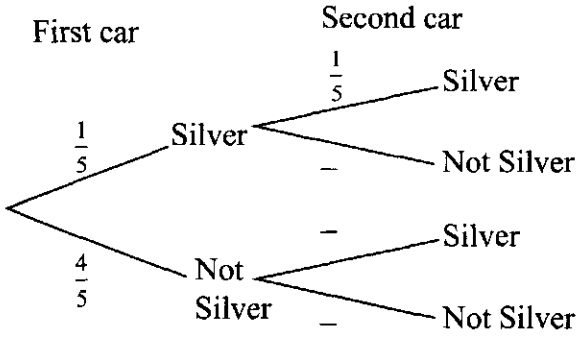
(a) the amount allocated for Rent, [2]

(b) the degrees of the sector representing Savings, [2]

(c) the amount that Shelly spends on Food. [3]

---

12. In a town, $\frac{1}{5}$ of all cars are silver in colour. Two cars pass the gates of a school. The incomplete tree diagram gives the possible colour combinations.



(a) Copy and complete the tree diagram. [3]

(b) Calculate the probability that

(i) both cars are silver, [2]

(ii) only one car is silver. [3]

---

13. (a) Factorise completely $9mn^2 - 3mn$. [2]

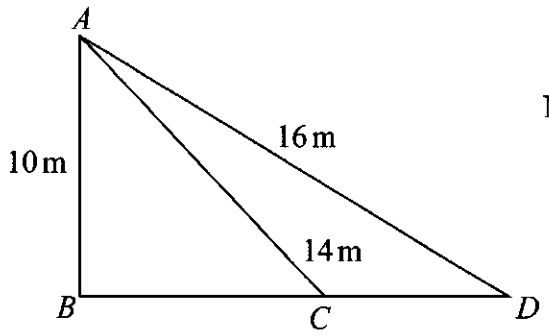
(b) Simplify

(i) $\left(\frac{2t}{z^2}\right)^3$ [3]

(ii) $\frac{3p}{7} - \frac{5p}{14}$ [3]

---

14. The perpendicular height, AB, of a tree is 10 m. A wire, 14 m long, is attached from the top of the tree *(A)* to a point on the ground, *(C)*.



NOT TO SCALE

Calculate, to 2 decimal places,

(a) the distance BC, [3]

(b) the angle of elevation of the top of the tree from C. [3]

A bird, perched at A, flies 16 m in a straight line to land on the ground at D. BCD is a straight line.

(c) Calculate the distance CD. [3]

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

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

x	–4	–3	0	2	6
y	–3		3		12

[2]

(b) Using a scale of 1 cm to 1 unit for each axis, and values $-4 \leq x \leq 6$ and $-5 \leq y \leq 13$, draw the graph of the line $y = \frac{3}{2}(x+2)$. [3]

(c) Write down the gradient (slope) of your graph in (b). [1]

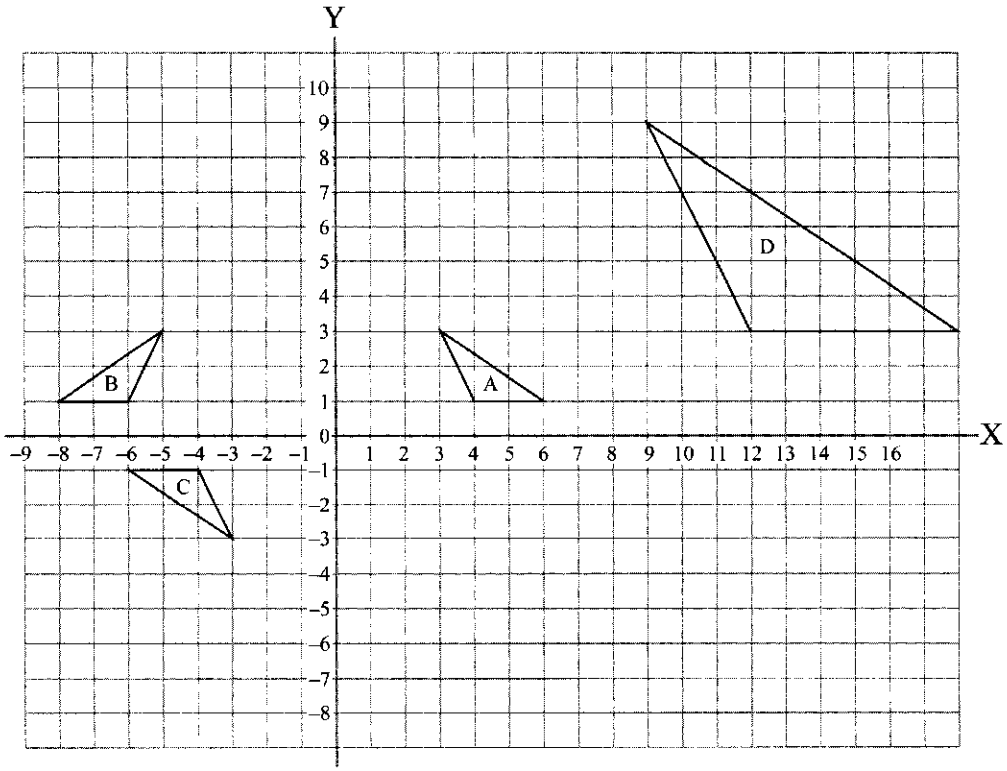
(d) Give the y-intercept of the line in (b). [1]

(e) Another graph has the equation $x = 4$. Draw this graph on the same coordinate plane. [1]

(f) Write down the gradient (slope) of the graph in (e). [1]

(g) Write down the coordinates of the point where the graphs intersect. [1]

16.



Describe completely the single transformation that maps

(a) ΔA onto ΔB, [2]

(b) ΔA onto ΔC, [3]

(c) ΔA onto ΔD, [3]

(d) ΔA is translated to ΔE by the vector $\begin{pmatrix} -6 \\ -8 \end{pmatrix}$. State the coordinates of the vertices of ΔE. [3]

End]

MATHEMATICS

PAPER 3 (CORE/EXTENDED) 3815/3

Friday 25 MAY 2018 9:00A.M.–11:30A.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 [ ].

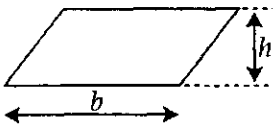
The total number of marks for this paper is 100.

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

INFORMATION AND FORMULAE

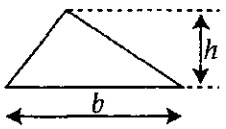
MENSURATION

Parallelogram



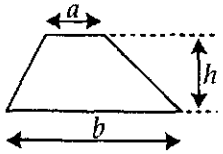
Area = bh

Triangle



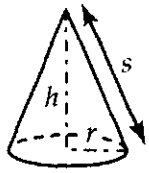
Area = $\frac{1}{2}bh$

Trapezium



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

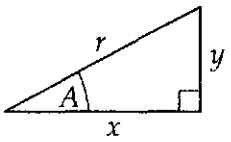
Cone



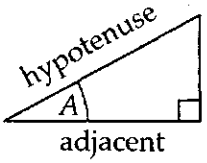
Circle (radius r, diameter d)	Circumference	$= 2\pi r$ or πd
	Area	$= \pi r^2$
Cylinder (radius r, height h)	Volume	$= \pi r^2 h$
	Area of curved surface	$= 2\pi rh$
Sphere (radius r)	Volume	$= \frac{4}{3}\pi r^3$
	Area of surface	$= 4\pi r^2$
Prism	Volume	= area of cross-section × length
Pyramid	Volume	$= \frac{1}{3}$ × area of base × height
Cone (radius r, height h)	Volume	$= \frac{1}{3}\pi r^2 h$
	Area of curved surface	$= \pi rs$ where s = slant height $\sqrt{h^2 + r^2}$

TRIGONOMETRY

Right-angled triangle

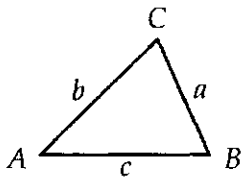


$r^2 = x^2 + y^2$ (result of Pythagoras)



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

Any triangle



In any triangle ABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

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

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

ALGEBRA 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 $\dfrac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

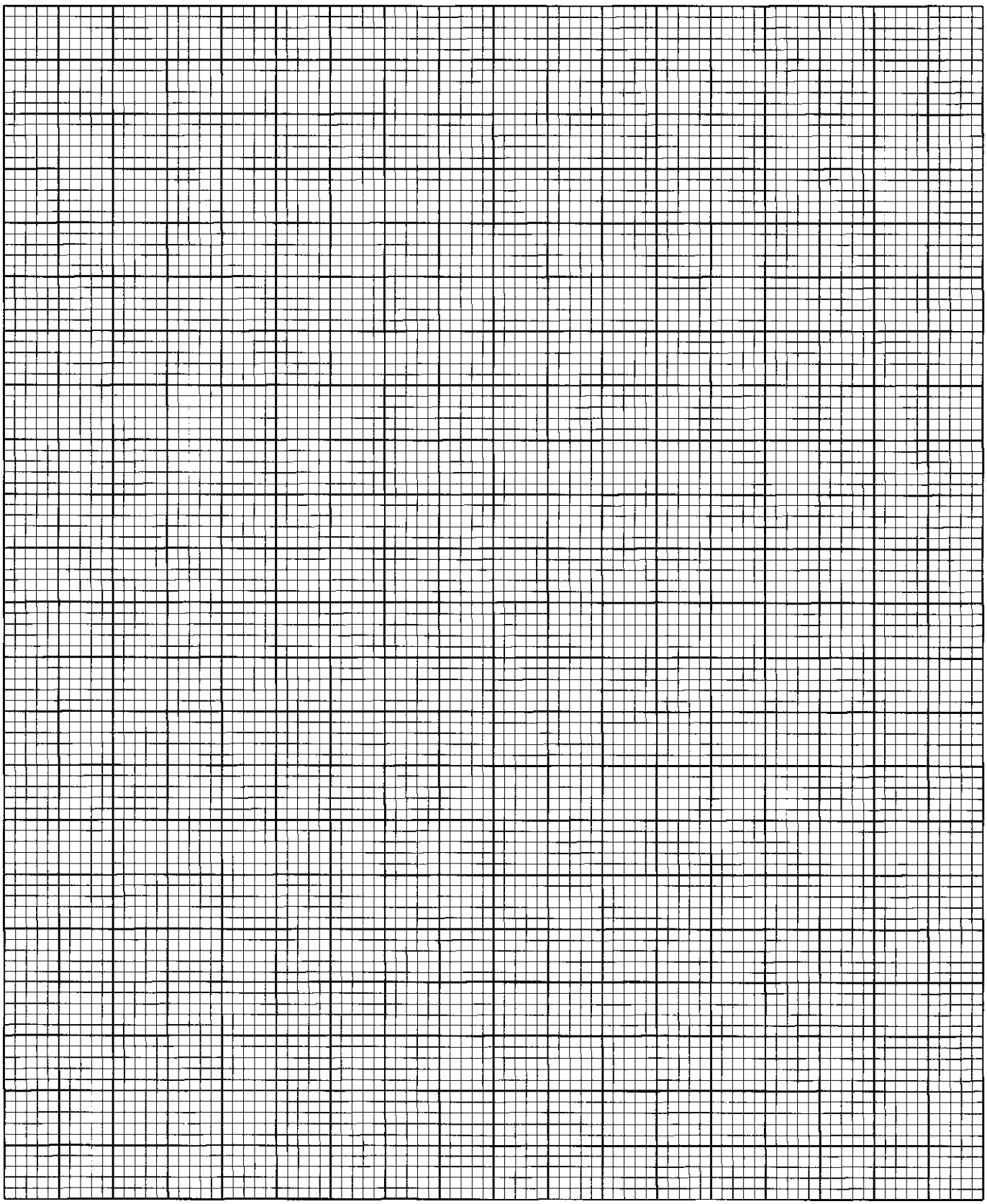
If $y = ax^n$, then $\dfrac{dy}{dx} = anx^{n-1}$

MATHEMATICS GRAPH PAPER

MINISTRY OF EDUCATION **AB7**

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.	



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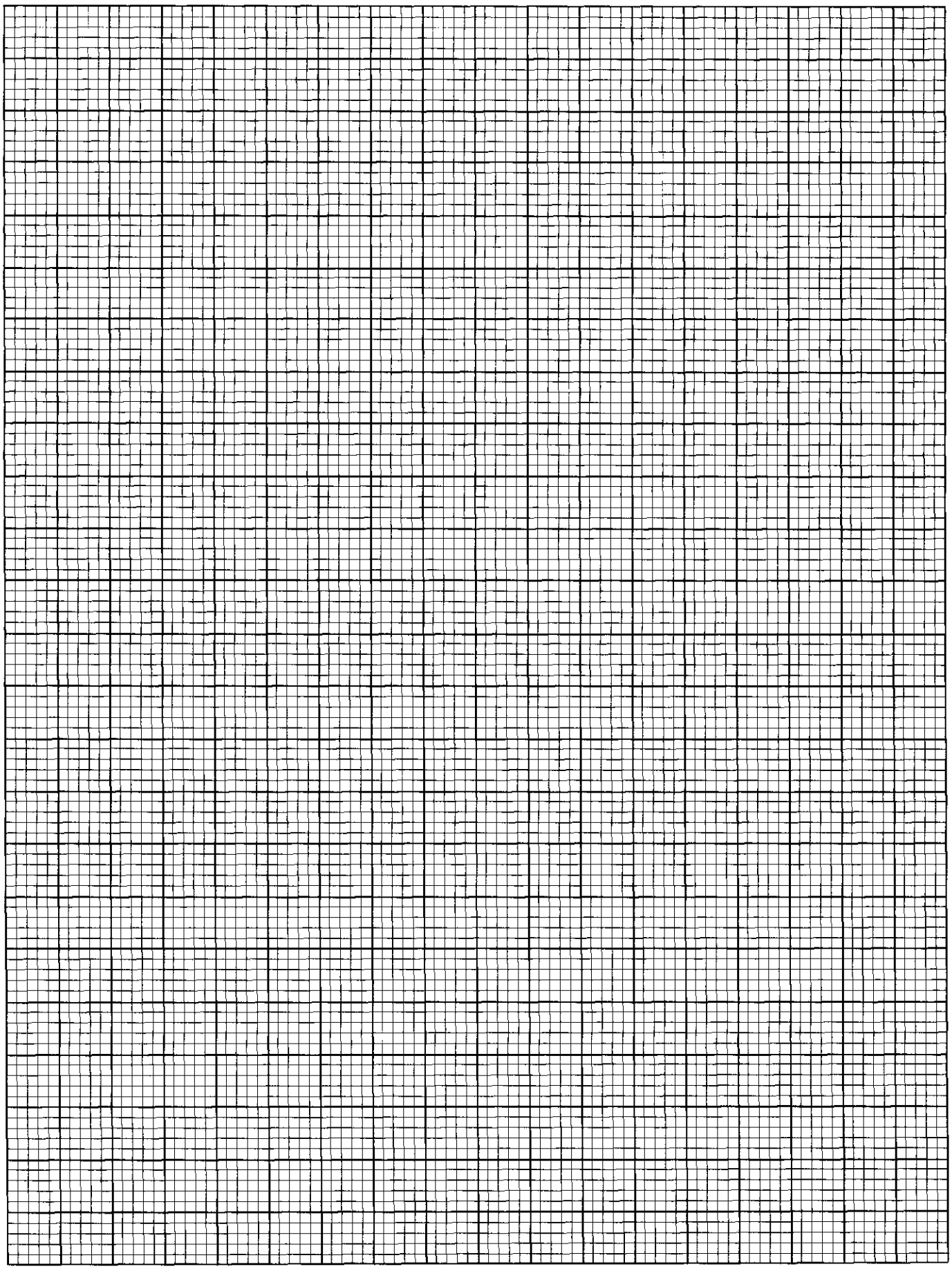
EXAMINATION

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



1. Value Added Tax of 7.5% is added to the purchase price of consumer goods. The total price of a wristwatch is \$96.75.

Calculate the price of the wristwatch before Value Added Tax is added on. [2]

---

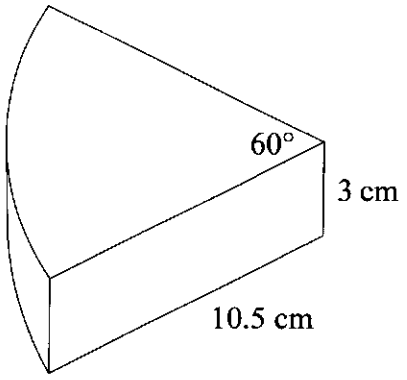
2. For the matrices $L = \begin{pmatrix} 7 & 0 \\ -1 & 3 \end{pmatrix}$ and $M = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$, calculate the matrix product

(a) LM, [2]

(b) ML. [1]

---

3. The diagram shows a slice of cake, cut from a large cylindrical shaped cake. The cake is of radius 10.5 cm and thickness of 3 cm. The cross-section of the slice is a sector of a circle making an angle of 60° at the centre.



NOT TO SCALE

Taking $\pi = \frac{22}{7}$, calculate the volume of the slice of cake. [3]

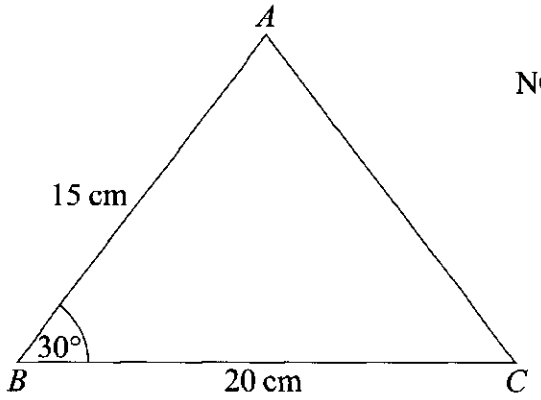
---

4. Solve the following equation for y, giving your answer in scientific notation (standard form).

$$\left(1.1\times10^{-16}\right)y-\left(1.2\times10^{10}\right)=\left(6.5\times10^{10}\right)$$ [4]

---

5. In ΔABC, $AB = 15\,\text{cm}$, $\angle B = 30°$ and $BC = 20\,\text{cm}$.



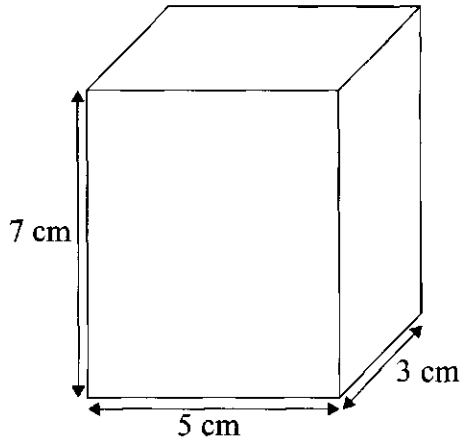
NOT TO SCALE

(a) Calculate the area of ΔABC. [2]

ΔABC is enlarged by scale factor 3 to form ΔPQR.

(b) Calculate the area of ΔPQR. [2]

6.



NOT TO SCALE

The diagram shows a cuboid of length 5 cm, width 3 cm and height 7 cm. Each measurement is correct to the nearest cm.

Calculate

(a) the minimum possible volume of the cuboid, [2]

(b) the maximum possible value of the total surface of the cuboid. [3]

---

7. Merissa works a regular 40 hours per week with overtime paid at time and a half. Last week she worked 48 hours in total.

(a) Letting x represent her hourly wage, write down and simplify an expression for her total earnings for last week. [3]

Her total earnings last week was \$650.

(b) Use your results in (a) to write down and solve an equation for her hourly wage. [2]

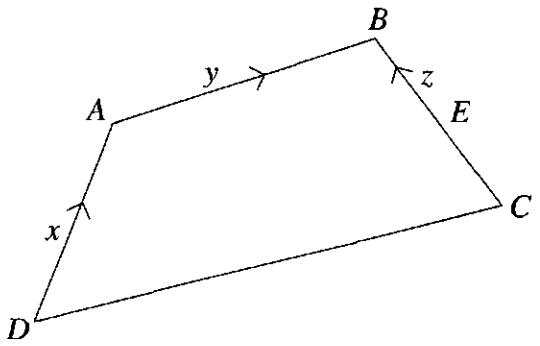
---

8. Solve the following quadratic equation, giving your answers correct to one decimal place.

$$w^2 + 3w - 8 = 0$$ [5]

---

9. E is the midpoint of $\overrightarrow{BC}$. $\overrightarrow{AB} = \boldsymbol{y}$, $\overrightarrow{EB} = \boldsymbol{z}$ and $\overrightarrow{DA} = \boldsymbol{x}$.



NOT TO SCALE

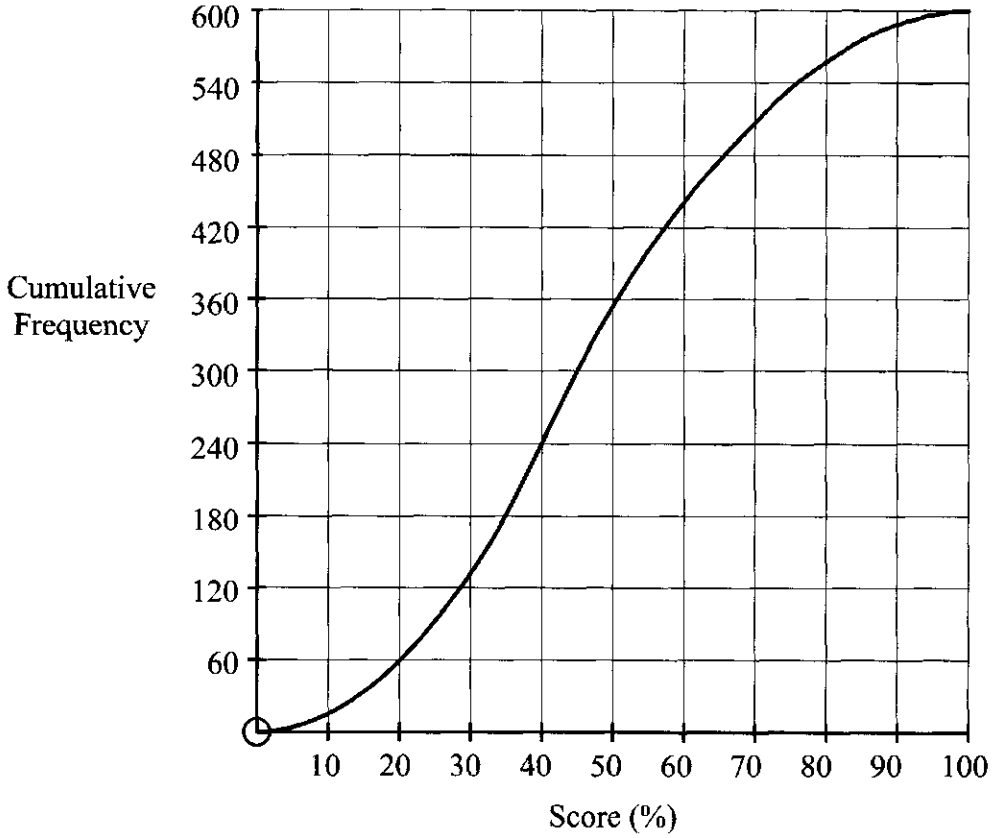
Express in terms of $\boldsymbol{x}$, $\boldsymbol{y}$ and $\boldsymbol{z}$:

(a) $\overrightarrow{CB}$ [1]

(b) $\overrightarrow{DB}$ [2]

(c) $\overrightarrow{CD}$. [2]

10.



The graph shows the cumulative frequency curve of the scores of 600 candidates in a College Placement exam.

From the graph, estimate

(a) the median mark, [1]

(b) the lower quartile, [1]

(c) the number of candidates who scored 40% or more, [2]

(d) the pass mark if only 90 candidates were accepted. [2]

11. The variables q and t are related such that

$$q = \frac{54}{3^t}$$

(a) Calculate the value of q

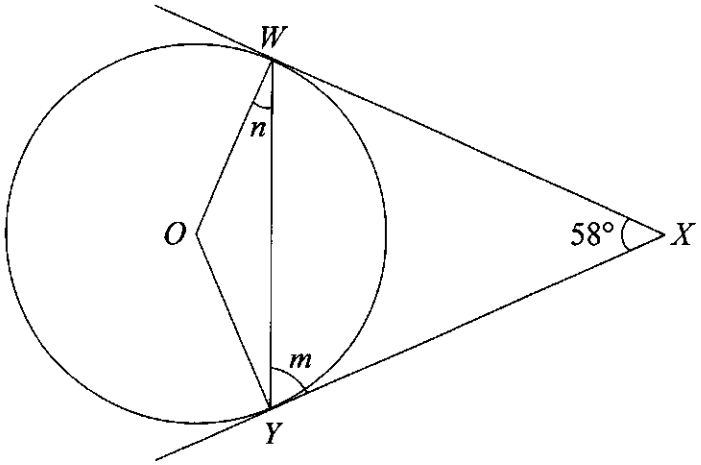
(i) when $t = 0$, [1]

(ii) when $t = -2$. [2]

(b) Calculate the value of t when $q = \frac{2}{3}$. [3]

---

12. (a) In the diagram, O is the centre of the circle. XW and XY are tangents to the circle from a point X. $\angle WXY = 58°$



NOT TO SCALE

Calculate, giving a reason for each answer, the value of

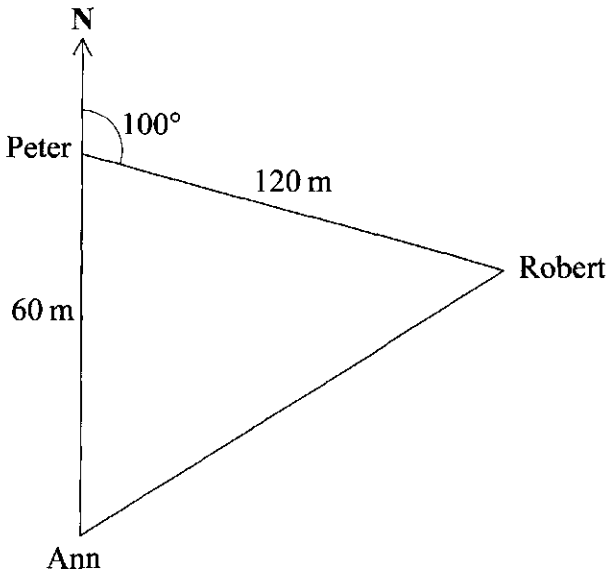
(i) $\angle m$, [3]

(ii) $\angle n$. [3]

(b) A regular polygon has interior angles of 135°. Calculate the number of sides the polygon has. [3]

---

13. The diagram shows that Peter is standing 60 m due north of Ann while Robert is 120 m on a bearing of 100° from Peter.



NOT TO SCALE

(a) Show that the distance of Robert from Ann is 124 m, correct to the nearest metre. [4]

(b) Calculate the bearing of Ann from Robert. [5]

---

14. (a) Simplify the following:

(i) $\frac{c}{x}+\frac{y}{2x}$ [2]

(ii) $\frac{3ab^{\frac{3}{2}}}{4a^{-2}\sqrt{b}}$ [2]

(iii) $\frac{x^2-9}{2x^2-5x-3}$ [3]

(b) Find what $9n^3p^{-2}$ must be divided by in order to get the quotient $0.75np^3$. [3]

---

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

(a) Given the graph of $y = x^2 + 3x - 2$, calculate the value of a and of b in the table of values below.

x	-5	-4	-3	-2	-1	0	1	2
y	8	2	-2	a	-4	-2	b	8

[2]

(b) Using a scale of 1 cm to 1 unit on the x-axis and the y-axis where $-6 \leq x \leq 2$ and $-5 \leq y \leq 10$, draw the graph of $y = x^2 + 3x - 2$. [5]

(c) On the same graph, draw the line that passes through the point $(0,-2)$ and has a gradient of $-\frac{3}{2}$. [2]

(d) Give the points of intersection. [2]

(e) Write the equation of the straight line in (c). [1]

---

16. The functions f and g are defined as follows:

$$f(x) = 2 + x^2$$
$$g(x) = 1 - x$$

(a) Calculate the value of

(i) $g(-4)$, [1]

(ii) $gf(-4)$. [2]

(b) Calculate the values of x for which $f(x) = 11$. [4]

(c) Determine, in simplified form, expressions for

(i) $fg(x)$, [3]

(ii) $g^{-1}(x)$. [2]

End]

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