

Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				
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Examiner Comments	

Total Marks

PAPER 1H

GCSE MATHEMATICS

CM

Practice Set A

Non-Calculator

Time allowed: 1 hour 30 minutes

Instructions to candidates:

- In the boxes above, write your centre number, candidate number, your surname, other names and signature.
- Answer ALL of the questions.
- You must write your answer for each question in the spaces provided.
- You must not use a calculator.

Information to candidates:

- Full marks may only be obtained for answers to ALL of the questions.
- The marks for individual questions and parts of the questions are shown in round brackets.
- There are 15 questions in this question paper. The total mark for this paper is 80.

Advice to candidates:

- You should ensure your answers to parts of the question are clearly labelled.
- You should show sufficient working to make your workings clear to the Examiner.
- Answers without working may not gain full credit.



1 Find the value of $12\sqrt{610}$ to two decimal places.

.....
(Total for Question 1 is 3 marks)

2 The first five terms in a sequence are

6 2 -2 -6 -10

(a) From the list below, circle the correct term used to describe this sequence.

Arithmetic Fibonacci Geometric Harmonic

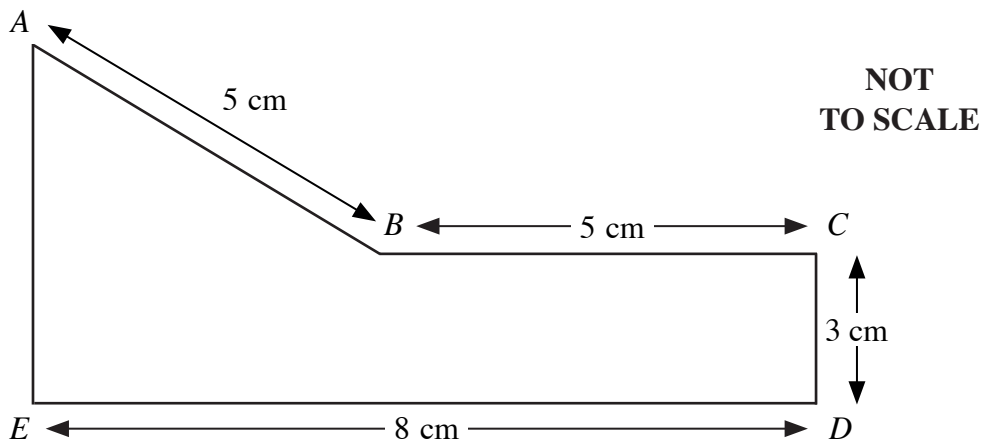
(1)

(b) Find an expression for the n th term of the sequence.

.....
(2)
(Total for Question 2 is 3 marks)



- 3 Marcus has designed an outline for the shape of the cross-section of his conservatory. This outline is shown below.



The diagram shows $AB = BC = 5$ cm

$$CD = 3$$
 cm

$$DE = 8$$
 cm

- (a) Show that the length of AE is 7 cm.

(3)

- (b) Calculate the cross-sectional area of Marcus' conservatory.

Give a suitable unit with your answer.

.....
(4)

(Total for Question 3 is 7 marks)



1 0 3 3 1 1 1 1 8 0 0 0 4



4 (a) Expand and simplify $(2a + b)(a - b)$

.....
(2)

(b) Simplify $4e^3 f^6 \div 2ef^{-2}$

.....
(2)

(c) Factorise $x^2 + 2x + 1$

.....
(1)

Alice has the number n , where

$$n = x^2 + 2x + 1 \quad \text{for positive integers } x$$

(d) (i) Explain what you understand by the term 'integer'.

.....
.....
(1)

(ii) Alex claims that n is a prime number for all x . Is he correct?

.....
.....
(1)

(Total for Question 4 is 7 marks)



5 The straight line l has the equation $2y = 2x + 6$.

(a) Write down the gradient of l .

.....

(1)

(b) Write down the y intercept of l .

.....

(1)

(c) (i) Is the line with equation $2x + 2y + 3 = 0$ parallel to l ? Explain your answer.

.....

.....

(1)

(ii) Write down the number of solutions to the simultaneous equations

$$2y = 2x + 6$$

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

.....

(1)

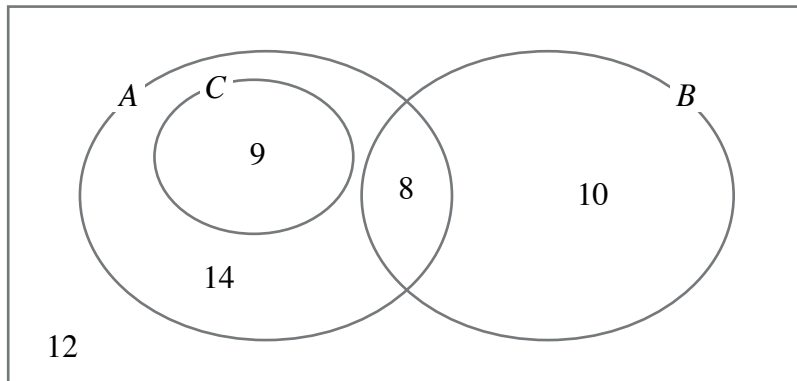
(Total for Question 5 is 4 marks)



1 0 3 3 1 1 1 1 8 0 0 0 4



6 The Venn diagram shows the number of observations of three events A , B and C .



(a) Are the events B and C mutually exclusive? Explain your answer.

.....
.....

(1)

(b) Write down the number of times just the event B was observed.

.....

(1)

(c) Write down the number times just the event A was observed.

.....

(1)

(d) Given that the event C was observed, state the probability that the event A was observed.

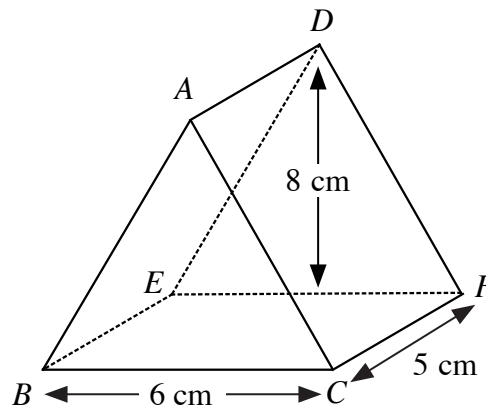
.....

(1)

(Total for Question 6 is 4 marks)



7 The diagram below shows the prism $ABCDEF$.



**NOT
TO SCALE**

The mass of the prism is 0.288 kg.

Annabelle needs to identify the solid that the prism is made from.

Here is a list of the possible solids and their densities.

Solid	A	B	C
Density (g / cm^3)	2.4	0.4	4.8

Find the solid the prism is made out of.

You should show your working clearly.

.....
(Total for Question 7 is 4 marks)



1 0 3 3 1 1 1 1 8 0 0 0 4



- 8 Two integers are said to be *coprime* if the only positive integer that divides both of them is 1.
(a) Give an example of two numbers that are coprime.

.....

(1)

- (b) Express the ratio

$$3\frac{3}{4} : 3\frac{1}{8}$$

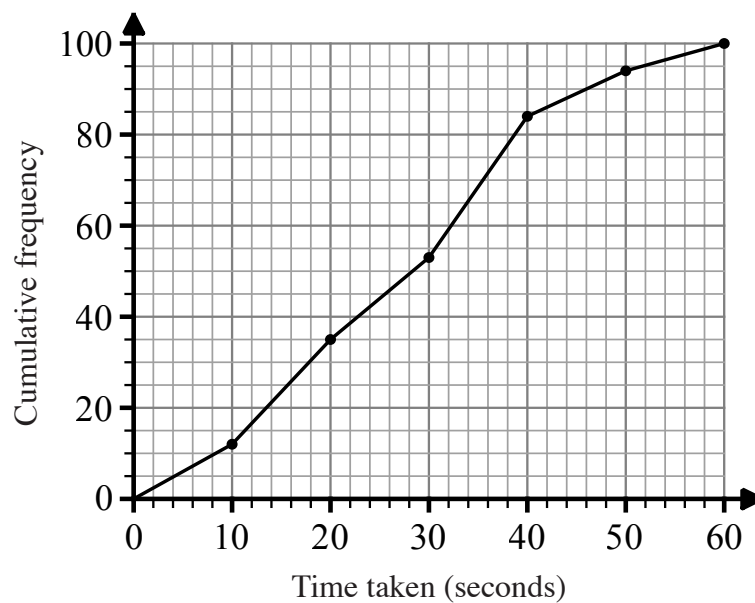
in the form $a : b$, where a and b are coprime.

.....

(3)

(Total for Question 8 is 4 marks)

- 9 Jenny records the times taken for 100 runners to complete a race. Her data is shown in the cumulative frequency diagram below.



1 0 3 3 1 1 1 1 8 0 0 0 4

(a) Complete the frequency table below for Jenny's data.

Time (t seconds)	Frequency
0 – 10	12
10 – 20	
20 – 30	18
30 – 40	31
40 – 50	10
50 – 60	

(2)

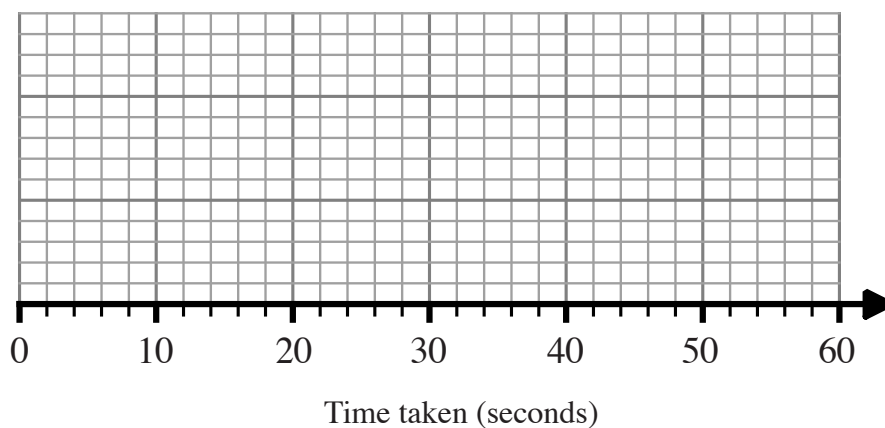
Two runners out of the 100 runners are picked at random.

(b) Find the probability that both runners took between 10 and 30 seconds to complete the race.

.....
(3)

The longest time someone took to complete the race was 54 s and the shortest time was 8 s.

(c) On the axes below, draw a box plot for Jenny's data.



(3)

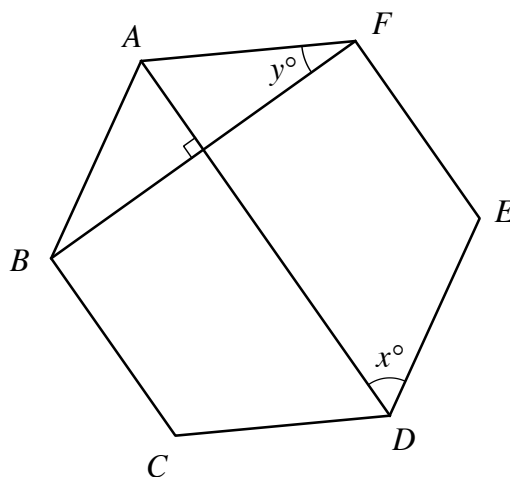
(Total for Question 9 is 8 marks)



1 0 3 3 1 1 1 1 8 0 0 0 4



10 The diagram below shows a regular hexagon $ABCDEF$.



**NOT
TO SCALE**

The angle $ADE = x^\circ$.

The angle $AFB = y^\circ$.

(a) Find the value of x .

.....

(2)

(b) Given that $AF = 10$ cm, find the length of BF .



.....

(5)

(Total for Question 10 is 7 marks)

11 A test has 40 questions and has a total score of 170 marks.

The test consists of written questions each worth 3 marks

 multiple choice questions each worth 5 marks

How many written and multiple choice questions are there in the test?

written questions =

multiple choice questions =

(Total for Question 11 is 5 marks)

1 0 3 3 1 1 1 1 8 0 0 0 4



12 Emily is studying a colony of bacteria.

The number of bacteria in the colony triples every hour.

She needs help to predict the number of bacteria in the colony, a_n , after n hours of study.

(a) Write down a suitable iterative formula, in terms of a_n , for Emily.

.....

(1)

(b) Interpret the meaning of a_0 in this context.

.....

.....

(1)

Emily uses 100 bacteria to begin a new colony.

(c) Use your iterative formula in (a) to predict the number of bacteria in the colony after three hours. You should show your working clearly.

.....

(3)

(Total for Question 12 is 5 marks)



13 A bag contains red, green and blue balls.

The proportion of red to green balls in the bag is a fifth.

The proportion of green to blue balls in the bag is a quarter.

Two balls are chosen from the bag at random.

Given that the bag contains 26 balls, find the probability that both balls are green.

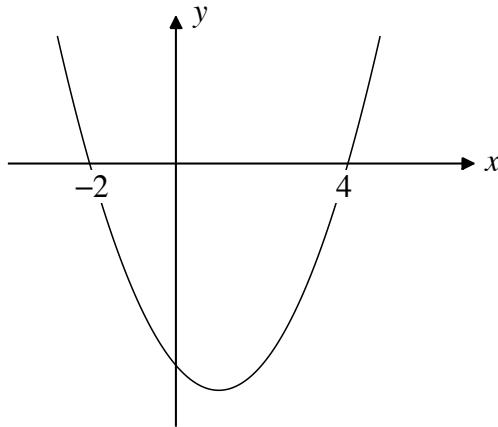
.....
(Total for Question 13 is 4 marks)



1 0 3 3 1 1 1 1 8 0 0 0 4



14 A graph of the function $y = x^2 + ax + b$ is shown below.



The curve crosses the x axis at $x = -2$ and $x = 4$.

(a) Find the values of the constants a and b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(3)

(b) Describe fully the geometrical transformation that maps the graph of the function $y = (x - 1)^2 + 1$ onto the graph of $y = x^2$.

.....

.....

.....

(1)

(Total for Question 14 is 4 marks)



15 A function f is defined such that

$$f(x) = \frac{2x+1}{x}$$

(a) Find an expression for $f^{-1}(x)$.

.....

(2)

(b) Find the exact values of x that satisfy $f(x^2 - 5) = 0$.

Give your answers in their simplest form.

.....

(4)

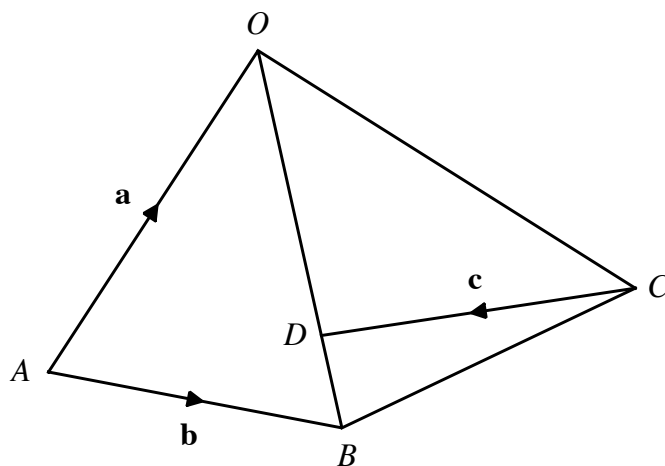
(Total for Question 15 is 6 marks)



1 0 3 3 1 1 1 1 8 0 0 0 4



16



In the diagram above, $\overrightarrow{AO} = \mathbf{a}$, $\overrightarrow{AB} = \mathbf{b}$ and $\overrightarrow{CD} = \mathbf{c}$.

The point D lies on the line OB such that $OD : DB = 3 : 1$.

(a) Find \overrightarrow{OB} in terms of \mathbf{a} and \mathbf{b} .

$$\overrightarrow{OB} = \dots\dots\dots$$

(1)

(b) Show that \overrightarrow{AC} is parallel to the vector $\mathbf{a} + 3\mathbf{b} - 4\mathbf{c}$.

(4)

(Total for Question 16 is 5 marks)

TOTAL FOR PAPER = 80 MARKS

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1 0 3 3 1 1 1 1 8 0 0 0 4