

5MB2H/01

Edexcel GCSE

Mathematics B (Modular) – 2MB01

Paper 2H (Non-Calculator)

Higher Tier

Practice Paper B

Time: 1 hour 15 minutes



You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser. Tracing paper may be used.

Instructions

- Use **black** ink or ball-point pen.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

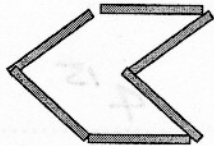
- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

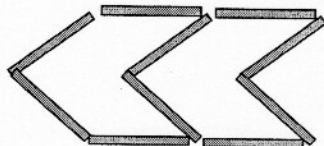
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.
Write your answers in the spaces provided.
You must write down all stages in your working.

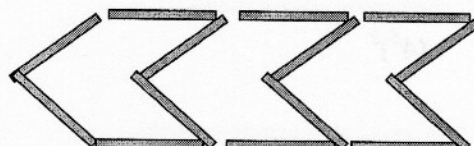
1. Here are some patterns made from sticks.



Pattern number 1



Pattern number 2



Pattern number 3

(a) Complete the table

Pattern number	Number of sticks
1	6
2	10
3	14
4	18
5	22
↓	↓
10	42

(3)

(b) Explain if a complete pattern can be made from 99 sticks.

No, because patterns have an even number of sticks. 99 is odd not even.

(2)

(c) Write down an expression, in terms of n , for the number of sticks in Pattern number n .

The number goes up in steps of +4,
so need " $4n + \text{something}$ ".

$$\underline{4n + 2}$$

(2)

$n=1$ needs 6 sticks
so " $4n + 2$ ".

(Total for Question number 10 is 7 marks)

2. (a) Work out 4.5^2

$$4.5 = \frac{9}{2}$$

$$4.5^2 = \left(\frac{9}{2}\right)^2 = \frac{81}{4}$$

$$20.25 \dots\dots\dots (2)$$

(b) Write as a power of 4

(i) $4^5 \times 4^7$

$$4^{12} \dots\dots\dots (1)$$

(ii) $(4^5)^3$

$$4^{15} \dots\dots\dots (1)$$

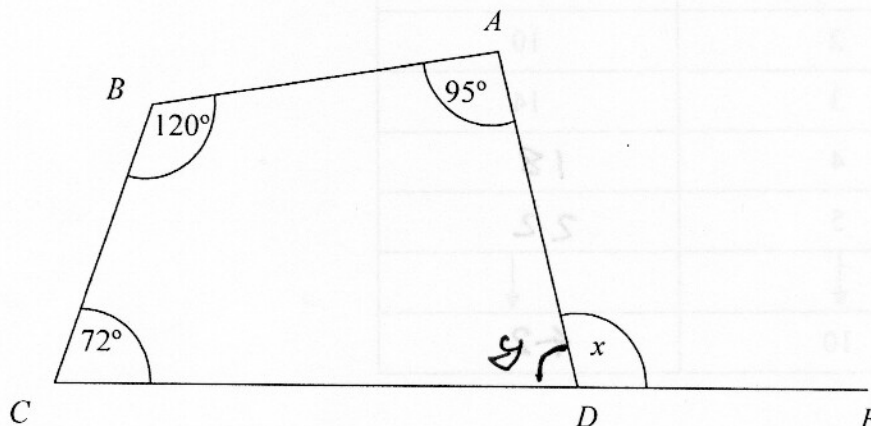
(c) $3^n = \frac{1}{9} = \frac{1}{3^2} = 3^{-2}$

Find the value of n .

$$n = -2 \dots\dots\dots (1)$$

(Total for Question 2 is 5 marks)

3.



$ABCD$ is a quadrilateral
 CDE is a straight line.

Find the size of angle x .

$$72 + 120 + 95 + y = 360^\circ$$

$$287 + y = 360^\circ$$

$$y = 360 - 287 = 73^\circ$$

$$x = 180 - y = 107^\circ$$

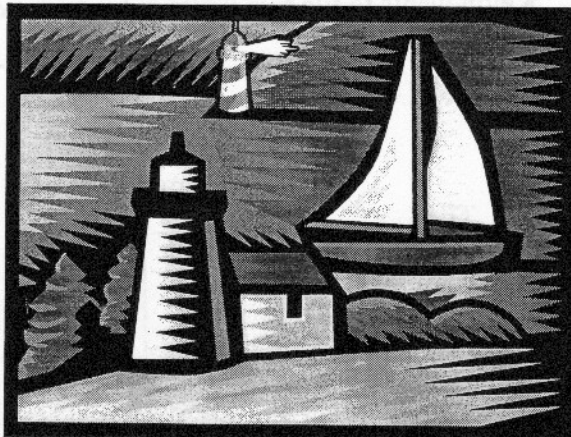
(Total for Question 3 is 3 marks)

4. From his yacht Peter can see two lighthouses.

One of them flashes every 120 seconds.
The other flashes every 100 seconds.

At 4 p.m. both lighthouses flash at the same time.

At what time will both lighthouses next flash at the same time.



1st lighthouse: 120, 240, 360, 480, 600, 720...

2nd " : 100, 200, 300, 400, 500, 600...

or

The lowest common multiple of 120 and 100 is

$$\frac{120 \times 100}{20} = 600 \text{ sec} = 10 \text{ minutes}$$

HCF \rightarrow 20

4:10 pm

(Total for Question 4 is 4 marks)

5. Simon spent $\frac{1}{3}$ of his pocket money on a computer game.

He spent $\frac{1}{4}$ of his pocket money on a ticket for a football match.

Work out the fraction of his pocket money that he had left.

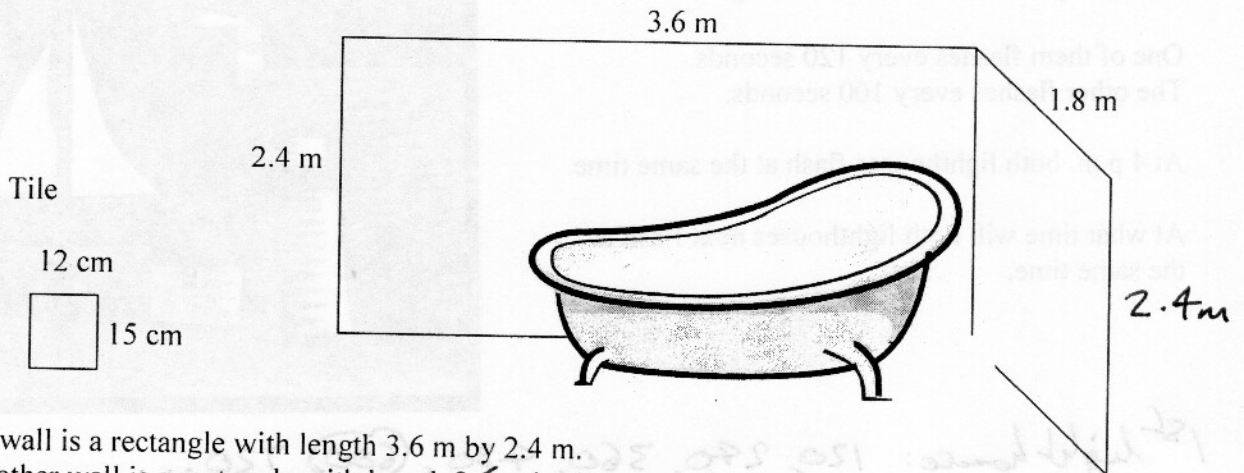
$$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

$$1 - \frac{7}{12} = \frac{12}{12} - \frac{7}{12} = \frac{5}{12}$$

$\frac{5}{12}$

(Total for Question 5 is 3 marks)

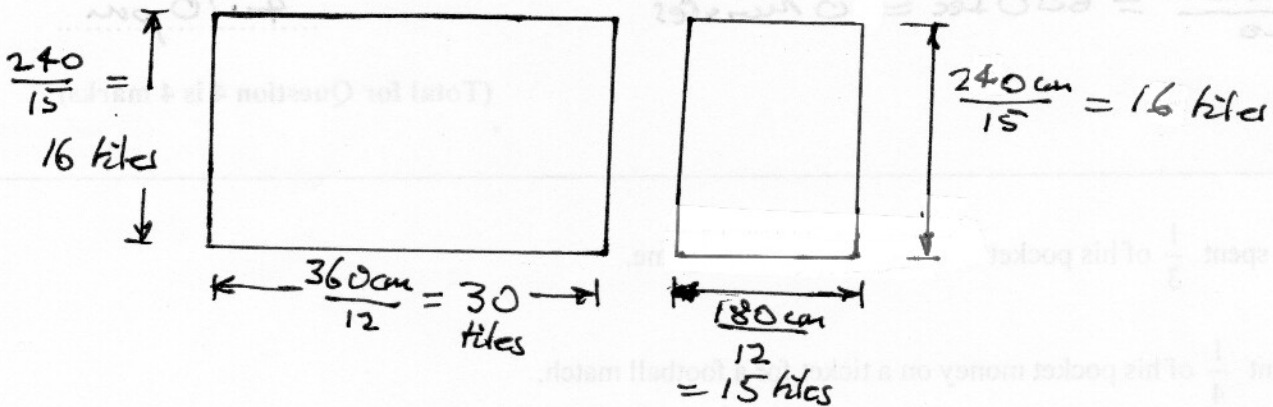
*6. Kevin wants to tile two walls in his bathroom.



One wall is a rectangle with length 3.6 m by 2.4 m.
 The other wall is a rectangle with length 1.8 m by 2.4 m.

The tiles that Kevin wants to use are 12 cm wide and 15 cm high.
 There are 40 tiles in each box.

How many boxes of tiles does Kevin need to buy?



$$\text{Number of tiles required} = 16 \times 30 + 16 \times 15$$

$$= 480 + 240 = 720$$

$$\frac{720}{40} = 18 \text{ boxes}$$

.....18..... boxes

(Total for Question 6 is 6 marks)

7. (a) Simplify $x^5 \times x^6$

x^{11}

(1)

(b) Simplify $y^{12} \div y^4$

y^8

(1)

(c) Simplify $(p^4)^5$

p^{20}

(1)

(Total for Question 7 is 3 marks)

8. (a) Write 0.00534 in standard form.

5.34×10^{-3}

(1)

(b) Write as an ordinary number 4.5×10^5

450 000

(1)

(Total for Question 8 is 2 marks)

9. (a) Expand and simplify $(x + 7)(x - 5)$

$(x+7)(x-5) = x^2 - 5x + 7x - 35$

$x^2 + 2x - 35$

(2)

(b) Factorise $x^2 - 5x + 6$

$1x^2 - 5x + 6 = ax^2 + bx + c,$

$ac = 6, b = -5.$

Factors of 6 that add to -5

are $-2x - 3$

$(x-2)(x-3)$

(2)

(Total for Question 9 is 4 marks)

*12.

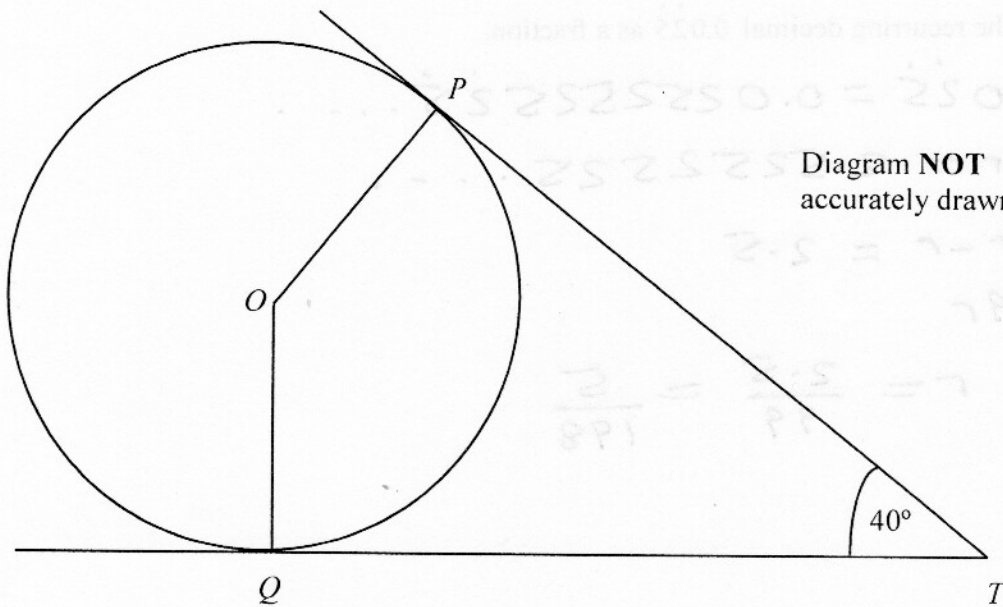


Diagram NOT accurately drawn

P and Q are two points on a circle centre O .

The tangents to the circle at P and Q intersect at the point T .

(a) Write down the size of angle OQT .

.....90.....^o
(1)

(b) Calculate the size of the obtuse angle POQ .

Angles in a quadrilateral add to
 $2 \times 180 = 360^\circ$.

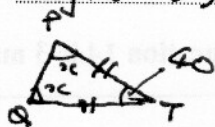
$$90 + 90 + 40 + POQ = 360$$

$$POQ = 360 - 220 = 140^\circ$$

.....140.....^o
(2)

(c) Give reasons why angle PQT is 70°

Lengths PT and QT are equal (since triangles OPT , OQT congruent). Hence triangle PQT is isosceles.



$$x + x + 40 = 180 \text{ (angles in triangle).}$$

$$2x = 180 - 40 = 140$$

$$PQT = x = 140/2 = 70^\circ$$

(2)

(Total for Question 13 is 5 marks)

13. Write the recurring decimal $0.0\dot{2}\dot{5}$ as a fraction.

$$r = 0.0\dot{2}\dot{5} = 0.025252525\dot{2}\dot{5}\dots$$

$$100r = 2.5252525\dot{2}\dot{5}\dots$$

$$100r - r = 2.5$$

$$= 99r$$

$$\therefore r = \frac{2.5}{99} = \frac{5}{198}$$

$$\frac{5}{198}$$

(Total for Question 13 is 3 marks)

14. (a) Simplify x^0

$$\frac{1}{1} \quad (1)$$

(b) Simplify $\left(y^{-\frac{3}{2}}\right)^4$

$$\left(y^{-\frac{3}{2}}\right)^4 = y^{-\frac{3}{2} \times 4} = y^{-6}$$

$$y^{-6} = \frac{1}{y^6} \quad (2)$$

(Total for Question 14 is 3 marks)

15. Write as a single fraction and simplify completely

$$\frac{x}{9x^2 - 4y^2} - \frac{y}{3x - 2y}$$

Difference of two squares:

$$9x^2 - 4y^2 = (3x - 2y)(3x + 2y)$$

$$\frac{x}{9x^2 - 4y^2} - \frac{y}{3x - 2y} = \frac{x - y(3x + 2y)}{(3x - 2y)(3x + 2y)}$$

$$= \frac{x - 3xy - 2y^2}{(3x - 2y)(3x + 2y)}$$

.....
(Total for Question 15 is 3 marks)

TOTAL FOR PAPER is 60 MARKS