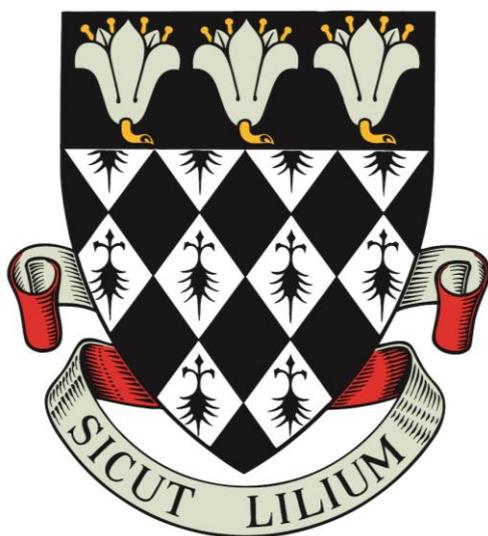


First name: \_\_\_\_\_ Surname: \_\_\_\_\_

Current school: \_\_\_\_\_



# Magdalen College School

## 11+ / Pre-Test Entrance Examination

### Specimen Paper

### Mathematics

Please read the following information carefully before the examination starts.

- Make sure you have filled in the details at the top of this page.
- This examination is **60 minutes** long.
- Calculators are **not** allowed.
- This test is designed to be challenging, so you may not find all the questions straightforward and you may not finish the whole paper.
- Read each question very carefully, think for a while and if you still do not understand what you need to do, then move on to the next question.
- All working and calculations should be written in the spaces provided on this paper. Marks are awarded for correct working, even if you don't get as far as an answer.
- The number of marks available for each question is shown in square brackets, like this: [3]. Please aim to try all **22** questions.
- Work through the paper steadily and carefully. If you have time at the end, go back and try to tackle any questions you did not find so easy when you first saw them.
- Good luck!

*Method marks (M1) can be seen or implied (soi). Accuracy marks must be seen unless otherwise specified.*

1. Work out:

(a)  $153 + 78$

Answer (a): 231 [1]

A1

(b)  $185 - 43$

Answer (b): 142 [2]

(c)  $532 - 85$

Answer (c): 447 [2]

(d)  $53 \times 9$

Answer (d): 477 [2]

(e)  $32 \times 23$

*allow M1 for a sensible method,  
A1 if fully correct*

Answer (e): 736 [2]

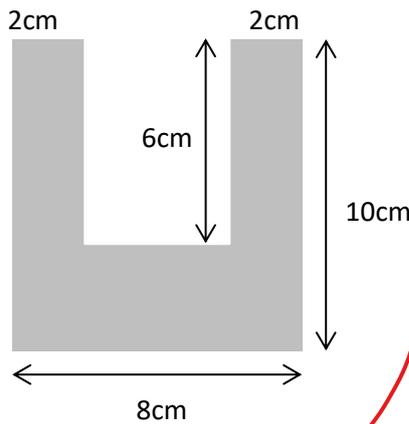
(f)  $238 \div 7$

Answer (f): 34 [2]

(g)  $17^2$

Answer (g): 289 [2]

2. Find the area and perimeter of this shape:



M1 ↓  
 $P = 2(10 + 6 + 8) = 48$

$A = 10 \times 8 - \frac{24 \times 6}{4} = 56$

AI for 4 any value

A, area = 56 AI cm<sup>2</sup>

P, perimeter = 48 AI cm [6]

M1 split into rectangles  
 M1 areas of rectangles correct

3. Calculate, giving your answer as a fraction as simply as possible:

(a)  $\frac{5}{12} + \frac{4}{12} = \frac{9}{12} = \frac{3}{4}$

M1

Answer (a):  $\frac{3}{4}$  AI [2]

(b)  $\frac{1}{6} + \frac{1}{3} = \frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$

M1  
 AI soi

Answer (b):  $\frac{1}{2}$  AI [3]

4. Find:  
(a) 30% of £70

10% of 70 is 7 M1  
so 30% of 70 is  $3 \times 7 = 21$

Answer (a): £ 21 [2] A1

- (b) a fifth of £70

$70 \div 5 = 14$  M1

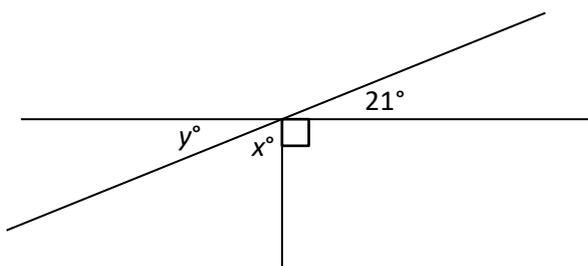
Answer (b): £ 14 [2] A1

- (c) 80% of a half of £70

is 40% of 70 M1  
which is  $4 \times 7 = 28$

Answer (c): £ 28 [2] A1

5. Find the missing angles in the diagram below (which is not to scale).



M1  $x = 180 - 21 - 90 = 69$

Answer:  $x =$  69 ° [2] A1

M1  $y = 90 - x = 90 - 69 = 21$

Answer:  $y =$  21 ° [2] A1

6. Find the next 2 numbers in the following sequences:

(a) 3, 7, 11, 15, 19, 23, 27      A2

(b) 3, 6, 12, 24, 48, 96      A2

(c) 3, 5, 9, 15, 23, 33, 45      A2

(d)  $\frac{1}{5}, \frac{3}{10}, \frac{5}{17}, \frac{7}{26}, \frac{9}{37}, \frac{11}{50}$       A2

[8]

7. Complete each row in the table below, giving the equivalent fraction, decimal or percentage. Ensure fractions are fully simplified.

| Fraction        | Decimal | Percentage |
|-----------------|---------|------------|
| $\frac{1}{2}$   | 0.5     | 50%        |
| $\frac{1}{4}$   | 0.25    | 25%        |
| $\frac{2}{5}$   | 0.4 A1  | 40% A1     |
| $\frac{13}{20}$ | 0.65 A1 | 65% A1     |

← A1 for both correct

← A1 for both correct

[6]

8. The table shows part of the railway timetable from Edinburgh to St Andrews. Some trains stop at every station and others are express trains. All stopping trains take the same time between each station as each other.

|            | Express | Stopping | Express | Stopping | Express | Stopping |
|------------|---------|----------|---------|----------|---------|----------|
| Edinburgh  | 13:18   | 13:43    | 14:24   | 14:41    | 15:20   | 15:34    |
| Haymarket  |         | 14:06    |         | 15:04    |         | 15:57    |
| Kircaldy   |         | 14:18    |         | 15:16    |         | 16:09    |
| Ladybank   |         | 14:23    |         | 15:21    |         | 16:14    |
| St Andrews | 14:02   | 14:38    | 15:08   | 15:36    | 16:04   | 16:29    |

*Handwritten notes:* +23 (Edinburgh to Haymarket), +12 (Haymarket to Kircaldy), +5 (Kircaldy to Ladybank), +15 (Ladybank to St Andrews)

(a) How many minutes does it take to travel between Edinburgh and Kircaldy?

Answer: (a) 35 [1] *A1*

(b) Complete the times in the boxes in the table above for the stopping train that leaves Edinburgh at 15:34

*subtract 1 mark for each error in time differences.*  
[3]

(c) How much longer does the stopping train take than the express train for the journey from Edinburgh to St Andrews?

$55 - 44 = 11$  *M1* *A1 f.t.*

Answer (c): 11 mins [2]

(d) James arrives at Edinburgh airport at 13:05. It takes him 27 minutes to get from the plane and collect his baggage. It then takes him 45 minutes to get to Edinburgh railway station. How long does he have to wait for the next train to St Andrews?

$1305 + 27 \text{ mins is } 1332$  *M1*

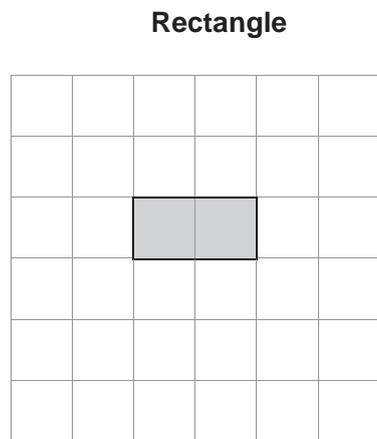
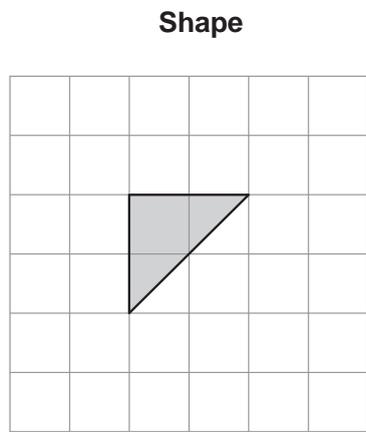
$+ 45 \text{ mins is } 1417$  *M1*

so he waits 7 mins to the 1424 train

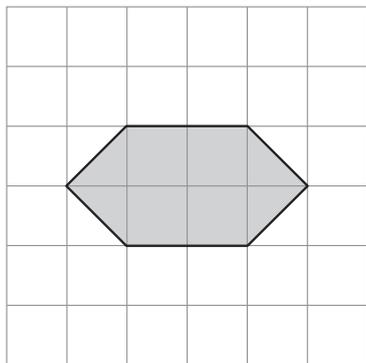
*A1*  
Answer (d): 7 mins [3]

9. For each shape draw a rectangle that has the same area as the shape on the left.

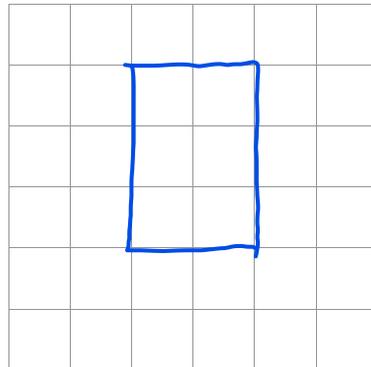
The first one is done for you as an example.



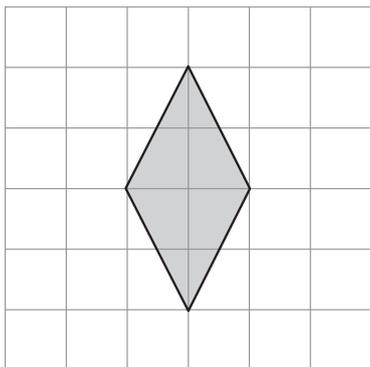
*Example*



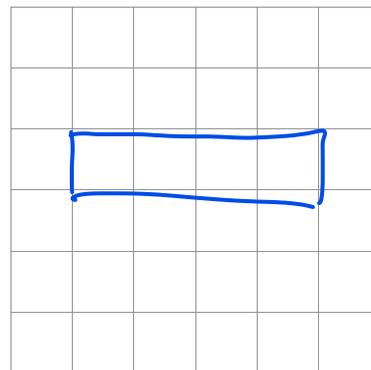
EG:



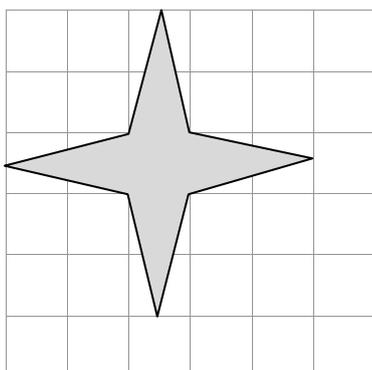
6 units<sup>2</sup>  
AZ



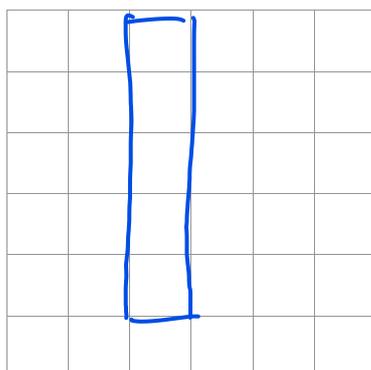
EG:



4 units<sup>2</sup>  
AZ



EG:



5 units<sup>2</sup>  
AZ

[6]

An incorrect answer on a particular part scores zero.

10. A traditional punt is 7.45 m long. How long is this:

(a) to the nearest metre?

Answer (a): 7 m [1] A1

(b) to one decimal place?

Answer (b): 7.5 m [1] A1

(c) in cm?

Answer (c): 745 cm [1] A1

11. Put these numbers in order from smallest to largest:

60%

$\frac{17}{25}$

$\frac{2}{3}$

0.66

0.6

0.68

0.666...

0.66

M1

M1

Answer: 60% < 0.66 <  $\frac{2}{3}$  <  $\frac{17}{25}$  [3] A1  
smallest largest

12. *Ten green bottles hanging on a wall  
Ten green bottles hanging on a wall  
If one green bottle should accidentally fall,  
There'd be nine green bottles hanging on  
the wall  
Nine green bottles...*



If the first bottle fell at ten past five in the morning (5.10am) and the others fell down at five minute intervals, at what time would the last bottle fall?

The remaining 9 bottles take  $9 \times 5 = 45$  mins, M1

0510 + 45 mins M1

[3]

is 5.55 am A1

13. James was given £15 to buy supplies for the school year. He chose to spend it on pens and pencils.



Each pen costs £1.25



and each pencil costs 80p

(a) If James buys 5 pens and 7 pencils, how much money will he have left?

$$\begin{array}{r} 5 \times \text{£}1.25 = \text{£}6.25 \\ 7 \times \text{£}0.80 = \text{£}5.60 \\ \hline \text{£}11.85 \end{array} \quad \text{M1}$$

So he has  $\text{£}15 - \text{£}11.85 = \text{£}3.15$  left Answer (a): £ 3.15 [3] A1

(b) If instead James buys a set of 5 pencils, what is the maximum number of pens he can buy?

$$5 \times \text{£}0.80 = \text{£}4$$

So  $\text{£}11$  remaining M1

$$\begin{array}{l} 9 \text{ pens cost } \text{£}11.25 \times \\ 8 \text{ pens cost } \text{£}10 \quad \checkmark \end{array} \quad \text{M1} \quad \text{Answer (b): } \underline{8} \text{ [3] A1}$$

(c) If instead James ends up with £2.80 left of his money how many pens and how many pencils did he buy?

Total cost was  $15 - 2.80 = \text{£}12.20$  M1

M1 [ The cost of the pens was therefore a multiple of 20p  
So it was either 4 or 8 pens  
4 pens costs £5, with £7.20 remaining (so 9 pencils)  
8 pens costs £10, with £2.20 remains (wait work)

Answer (c): Pens 4 Pencils 9 [4]  
A1 A1

14. 12 boy scouts will eat 30 loaves in 4 days.

(a) How many boy scouts will eat 60 loaves in 4 days?

Twice as many loaves, so need twice as many scouts.

$$12 \times 2 = 24 \quad M1$$

Answer: (a) 24 scouts [2] A1

(b) How many days will it take 6 boy scouts to eat 30 loaves?

Half as many scouts, so twice the time  $\Rightarrow$

$$4 \times 2 = 8 \quad M1$$

Answer: (b) 8 days [2] A1

(c) How many loaves will 3 boy scouts eat in 8 days?

|            | Scouts | Days | Loaves |      |
|------------|--------|------|--------|------|
|            | 12     | 4    | 30     | } M1 |
| $\div 4$ ↓ | 3      | 4    | 7.5    |      |
|            |        | 8    | 15     |      |

$\rightarrow \times 2$

Answer: (c) 15 loaves [2] A1

15. Boris uses his calculator to work out the following:

$$12.37 \times 6.8 = 84.116$$

Using Boris's calculation to help you, find:

(a)  $1237 \times 68$

$$\begin{array}{r} 12.37 \times 6.8 = 84.116 \\ \downarrow \times 100 \quad \downarrow \times 10 \quad \downarrow \times 1000 \\ 1237 \times 68 = 84,116 \end{array} \quad \text{M1}$$

Answer (a): 84,116 [2] A1

(b)  $841.16 \div 68$

$$\begin{array}{r} 84.116 \div 6.8 = 12.37 \\ \times 10 \downarrow \quad \downarrow \times 10 \quad \downarrow \times 10 \\ 841.16 \div 6.8 = 123.7 \\ \quad \downarrow \times 10 \quad \downarrow \div 10 \\ 841.16 \div 68 = 12.37 \end{array} \quad \text{M1}$$

Answer (b): 12.37 [2] A1

16. A square tile has an area of  $81 \text{ cm}^2$ .

(a) What is the side length of the tile?

$$\sqrt{81} = 9$$

Answer (a): 9 cm [1] A1

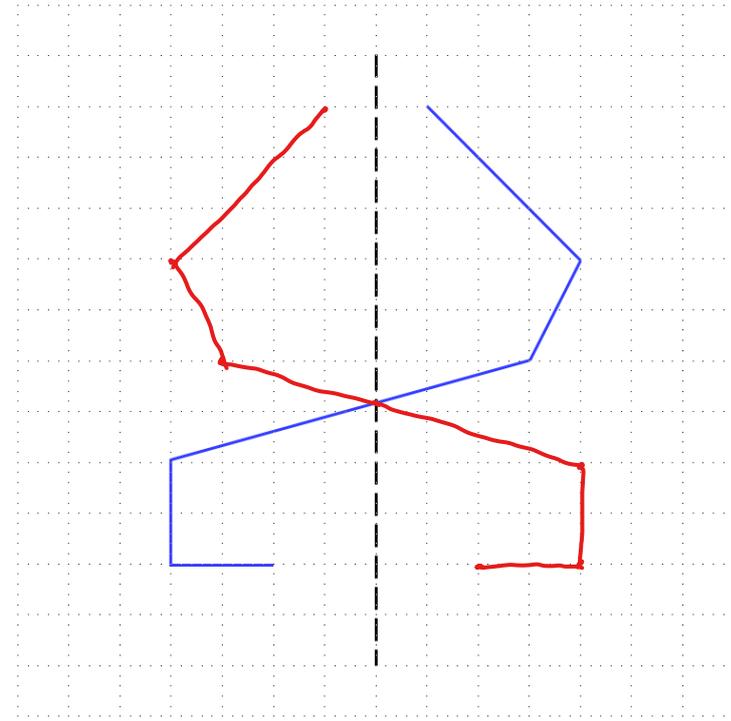
(b) Ben has a desk measuring 110 cm by 90 cm. What is the smallest number of these tiles required to completely cover Ben's desk?

M1

$$\begin{array}{l} 110 \text{ cm wide needs } \underline{13} \quad (12 \times 9 = 108 \text{ cm, too few)} \\ 90 \text{ cm deep needs } \underline{10} \\ \text{So overall we need } 13 \times 10 = 130 \end{array}$$

Answer (b): 130 tiles [2] A1

17. The vertical dashed line is a line of symmetry of a shape, which is only partly drawn. Complete the shape on the grid below.



deduct one mark for each incorrect line segment

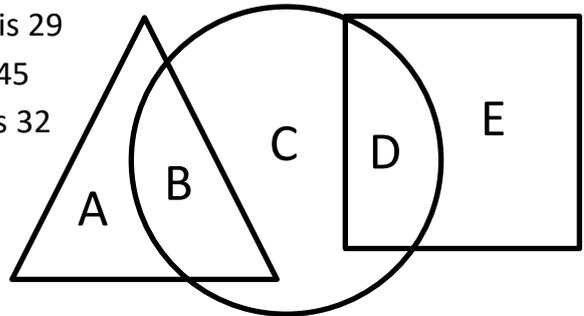
[4]

18. In the diagram each of the letters A to E stands for one of the numbers 13, 14, 15, 16, and 17. Each letter stands for a different number. Find the number corresponding to each letter if:

the total of the numbers in the triangle is 29

the total of the numbers in the circle is 45

the total of the numbers in the square is 32



$$D + E = 32, \text{ so } D = 15, E = 17$$

or

$$D = 17, E = 15$$

$$A + B = 29, \text{ so } A = 13, B = 16$$

or

$$A = 16, B = 13 \quad (\text{can't be 14 or 15, as 15 is used in } D \text{ or } E)$$

So  $C = 14$  (only one left)

In circle, need  $B + D = 45 - 14 = 31$ , so  $B = 16$ ,  $D = 15$

Answers:  $A = \frac{13}{A1}$   $B = \frac{16}{A1}$   $C = \frac{14}{A1}$   $D = \frac{15}{A1}$   $E = \frac{17}{A1}$  [5]

19. Here are five cards with numbers printed on them.



The cards can be placed in order to form a 5-digit number. For example, the smallest number that could be made with all five cards is



(a) Using all five cards, what is the largest possible odd number?

Must end in a 7

M1 for 8 \_ \_ \_ 7

Answer (a): 86427 [2]

A1

(b) Using all five cards, what is the number that is closest to 50,000?

M1 for 4 \_ \_ \_ \_

Answer (b): 48762 [2]

A1

(c) Using only two of the cards, what is the largest possible prime number?

Must end in 7

Not 87, as  $87 = 3 \times 29$  ] M1

Answer (c): 67 [2]

A1

NB 87 is MOAO

(d) Arrange any three of the number cards to give the largest possible answer to this multiplication:

$$\boxed{7} \boxed{6} \times \boxed{8} = 608$$

A1

Close but not correct are

$$87 \times 6 = 522$$

$$86 \times 7 = 602$$

] M2 considering others.

[3]

20. For each of the following questions you need to find a whole number between 0 and 100 that has the following properties.

- (a) When the number is divided by 4 the remainder is 0.  
 When the number is divided by 7 the remainder is 6.  
 When the number is divided by 5 the remainder is 0.  
 What is the number?

Multiple of 20.

$$\frac{20}{7} = \frac{14+6}{7}, \text{ so remainder } 6 \quad M1$$

Answer (a): 20 [2] A1

- (b) When the number is divided by 5 the remainder is 4.  
 When the number is divided by 6 the remainder is 0.  
 When the number is divided by 7 the remainder is 0.  
 What is the number?

Multiple of 42.

So 42 or 84.

84  
M1

$$\frac{84}{5} = \frac{80+4}{5}, \text{ so remainder } 4 \quad M1$$

Answer (b): 84 [3] A1

- (c) When the number is divided by 2 the remainder is 1.  
 When the number is divided by 3 the remainder is 1.  
 When the number is divided by 5 the remainder is 0.  
 When the number is divided by 7 the remainder is 1.  
 What is the number?

Odd multiple of 5 M1

One more than multiple of 3 and one more than multiple of 7.

5, 15, 25, 35, 45, 55, ...

↑  
only every 3rd is one more than a multiple of 3.

So check: 
$$\begin{matrix} 25 \times \\ 55 \times \\ 85 = \underline{84+1} \\ \quad \quad M1 \end{matrix}$$

Answer (c): 85 [4] A1

21. Write the whole numbers from 61 to 70 inclusive on the lines below so that each number agrees with the condition on the line where you have written it.

Each line may only have one number, and each number appears only once.

(a) 61 is 1 more than a multiple of 4

(b) 64 is a square number

(c) 70 is divisible by 7

(d) 66 is a multiple of 11

(e) 67 is a prime number

(f) 63 is divisible by 9

(g) 68 has digits which add to give an even number

(h) 69 is divisible by 3

(i) 62 has exactly four factors

(j) 65 is a multiple of 5

All for each part.

22. Place each whole number from 1 to 8 inclusive in one of the blank boxes below to make the calculations correct. The calculations read left to right and top to bottom. Two solutions: blue or red below.

|        |   |        |   |        |
|--------|---|--------|---|--------|
| 6<br>8 | ÷ | 3<br>4 | = | 2<br>2 |
| -      |   |        |   | ×      |
| 5<br>7 |   |        |   | 4<br>3 |
| =      |   |        |   | =      |
| 1<br>1 | + | 7<br>5 | = | 8<br>6 |

$$\begin{array}{r}
 6 \div 3 = 2 \\
 - \quad \times \\
 5 \text{ or } 1 \quad 4 \\
 = \quad = \\
 1 \text{ or } 5 + 7 = 8 \\
 \uparrow \\
 \text{green wait work}
 \end{array}$$

$$\begin{array}{r}
 6 \div 2 = 3 \\
 \quad \times \\
 \text{wait work}
 \end{array}$$

$$\begin{array}{r}
 8 \div 4 = 2 \\
 - \quad \times \\
 7 \quad 3 \\
 = \quad = \\
 1 + 5 = 6
 \end{array}$$

$$\begin{array}{r}
 8 \div 2 = 4 \\
 \quad \times \\
 \text{wait work}
 \end{array}$$

[8]

END OF TEST – GO BACK AND CHECK YOUR ANSWERS

All for each correct square. If a mix of each solution give the most generous mark.