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) 53×9

Answer (d): 477 [2]

(e) 32×23

allow M1 for a sensible method, A1 if fully correct

Answer (e): 736 [2]

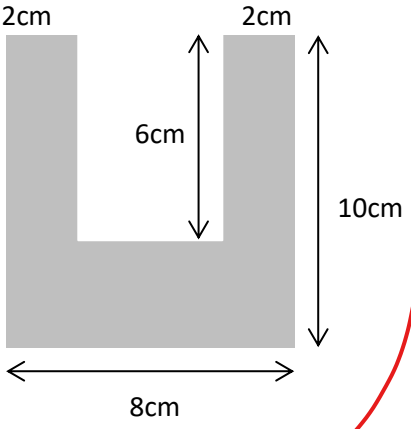
(f) $238 \div 7$

Answer (f): 34 [2]

(g) 17^2

Answer (g): 289 [2]

2. Find the area and perimeter of this shape:



M1 split into rectangles
M1 areas of rectangles correct

M1
$P = 2(10+6+8) = 48$

$A = 10 \times 8 - 6 \times 4$

$= 56$

A1 for 4 anywhere

A, area = 56 A1 cm^2

P, perimeter = 48 cm A1

[6]

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

A1

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

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

M1

A1 soi

A1

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

4. Find:

(a) 30% of £70

10% of 70 is 7 M1

so 30% of 70 is 3x7 = 21

Answer (a): £ 21 [2] A1

(b) a fifth of £70

70 ÷ 5 = 14 M1

Answer (b): £ 14 [2] A1

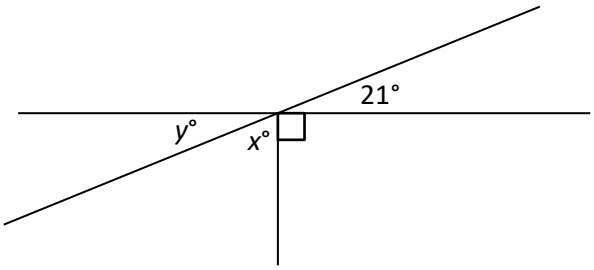
(c) 80% of a half of £70

is 40% of 70 M1

which is 4x7 = 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% ← A1 for both correct
$\frac{1}{4}$	0.25	25% ← A1 for both correct
$\frac{2}{5}$	0·4 A1	40% A1
$\frac{13}{20}$	0·65 A1	65% A1

[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		1557
Kircaldy		14:18		15:16		1609
Ladybank		14:23		15:21		1614
St Andrews	14:02	14:38	15:08	15:36	16:04	1629

+23 +12 +5 +15

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

A1

Answer: (a) 35 [1]

(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 mins is 1332 M1

+45 mins is 1417 M1

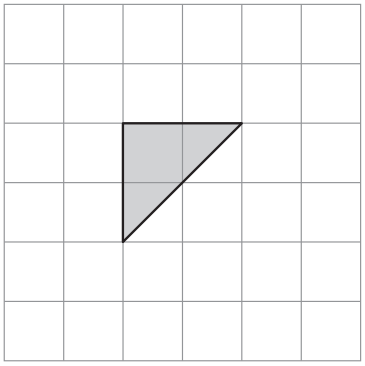
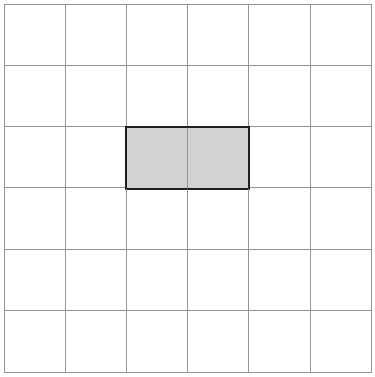
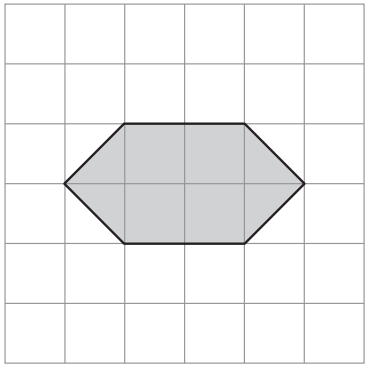
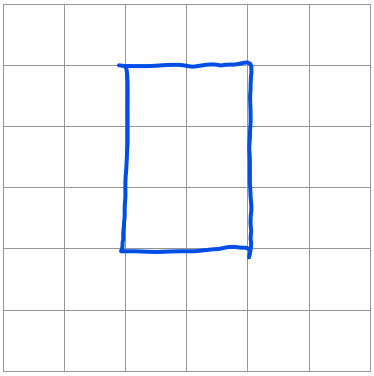
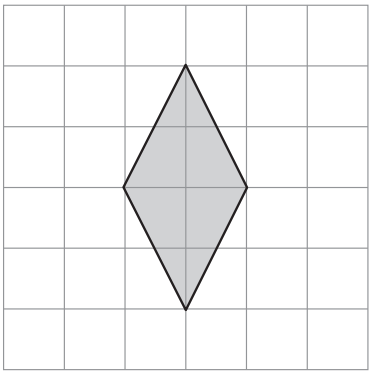
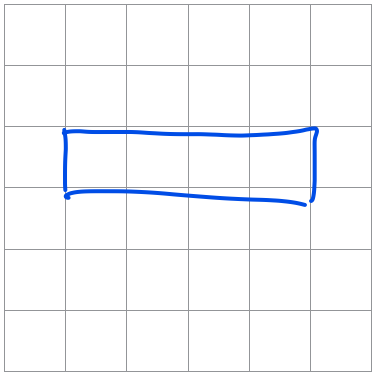
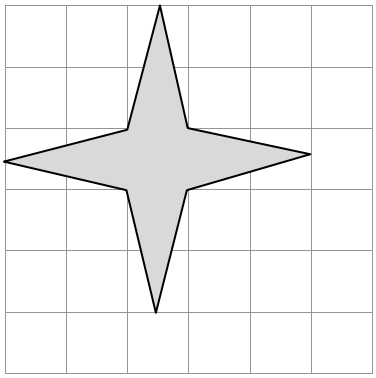
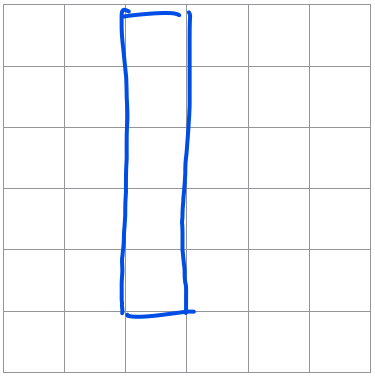
A1

so he waits 7 mins to the 1424 train

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.

Shape	Rectangle	
		***Example***
	EG: 	6 units² A2
	EG: 	4 units² A2
	EG: 	5 units² A2
		[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%	17/25	2/3	0.66
0.6	0.68 M1	0.666... M1	0.66

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

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 x 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?

5 × £1.25 = £6.25
7 × £0.80 = £5.60] M1
£11.85

So he has £15 − £11.85
= £3.15 left M1

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 × £0.80 = £4

So £11 remaining M1

9 pens cost £11.25 ×
8 pens cost £10 ✓] M1

Answer (b): 8 [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 = £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 (won't work)

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

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.

$12 \times 2 = 24$ 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 B

$4 \times 2 = 8$ 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
÷4 ↓ 3	4	7·5
	8	15 ↓ ×2

M1

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) 1237×68

$12.37 \times 6.8 = 84.116$
$\downarrow \times 100 \quad \downarrow \times 10 \quad \downarrow \times 1000$
$1237 \times 68 = 84,116$

M1

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

(b) $841.16 \div 68$

$84.116 \div 6.8 = 12.37$ (×10 / ×10)
$841.16 \div 6.8 = 123.7$
$\downarrow \times 10 \quad \downarrow \div 10$
$841.6 \div 68 = 12.37$

M1

Answer (b): 12.37 [2] A1

16. A square tile has an area of 81 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

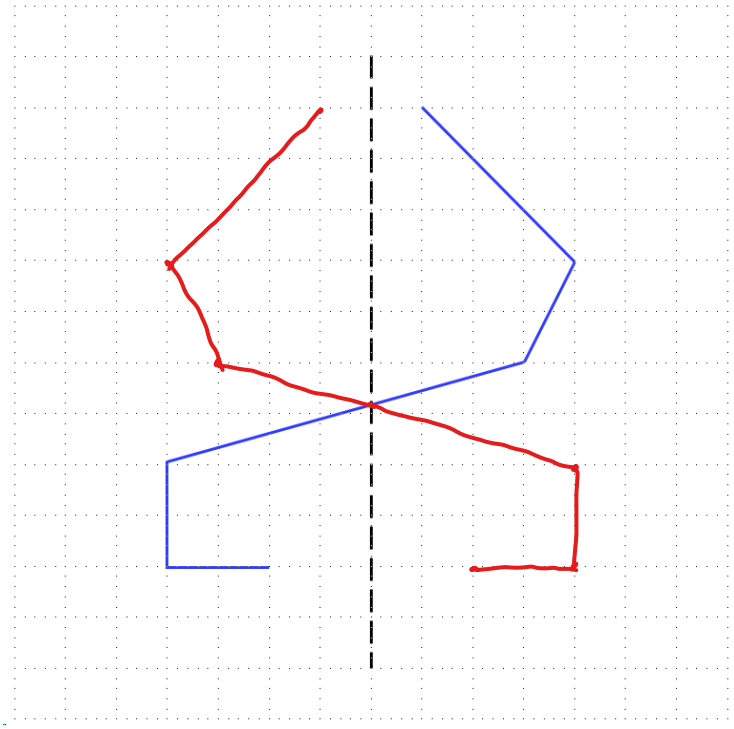
110 cm wide needs 13 (12 × 9 = 108 cm, too few)

90 cm deep needs 10

So overall we need 13 × 10 = 130

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.

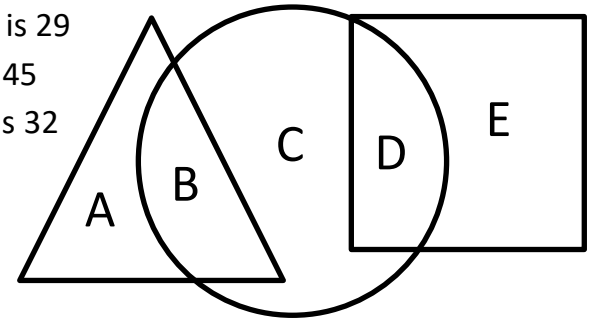


deduct one mark for each incorrect line segment

[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, so D = 15, E = 17
or
D = 17, E = 15

A + B = 29, so A = 13, B = 16
or
A = 16, B = 13 (can't be 14 or 15, as 15 is used in D or E)

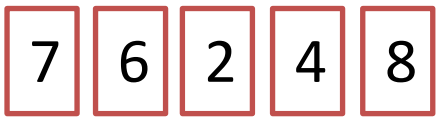
So C = 14 (only one left)

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

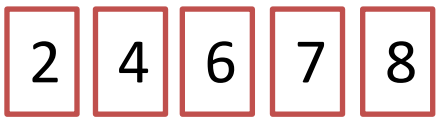
Answers: A = 13 B = 16 C = 14 D = 15 E = 17 [5]

A1 A1 A1 A1 A1

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

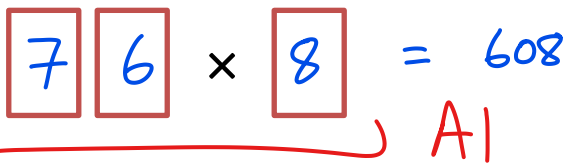
(c) Using only two of the cards, what is the largest possible prime number?

Must end in 7
Not 87, as 87 = 3 × 29] M1

Answer (c): 67 [2] A1

NB 87 is MO AO

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



A1

Close but not correct are

87 × 6 = 522
86 × 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.

$\frac{20}{7} = \frac{14+6}{7}$, so remainder 6 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.

M1

$\frac{84}{5} = \frac{80+4}{5}$, so remainder 4 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: M1
25 ×
55 ×
85 = 84+1

M1

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

A1 for each part.

[10]

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 / 8	÷	3 / 4	=	2 / 2
−				×
5 / 7				4 / 3
=				=
1 / 1	+	7 / 5	=	8 / 6

$6 \div 3 = 2$
$- \quad \times$
5 or 1 $\quad 4$
$= \quad =$
1 or 5 $+ 7 = 8$
↑ green work work

$6 \div 2 = 3$
$\times$
work work

$8 \div 4 = 2$
$- \quad \times$
$7 \quad 3$
$= \quad =$
$1 + 5 = 6$

$8 \div 2 = 4$
$\times$
work work

[8]

END OF TEST – GO BACK AND CHECK YOUR ANSWERS

A1 for each correct square. If a mix of each solution give the most generous mark.