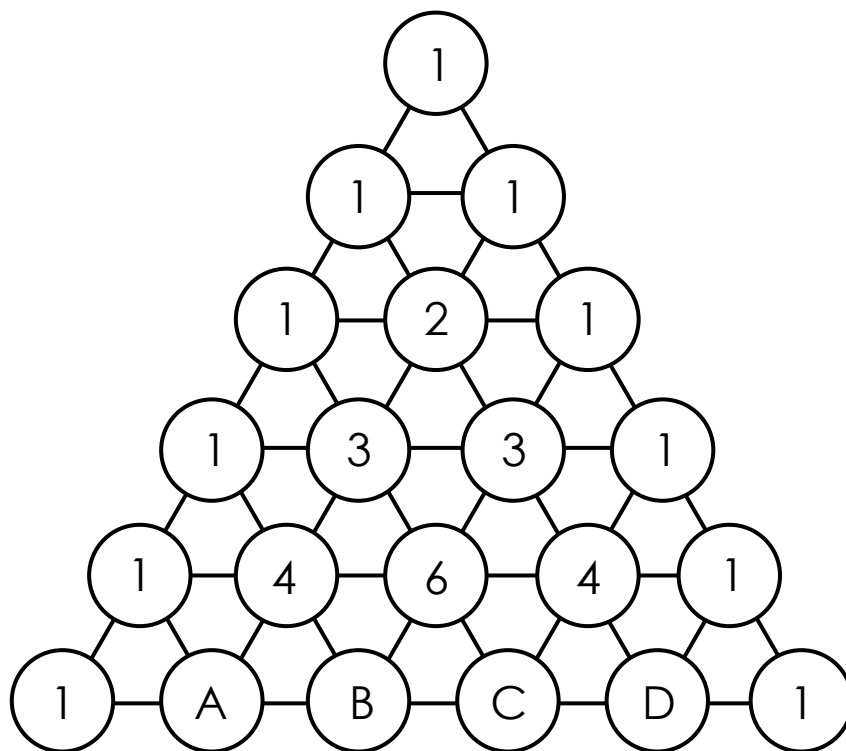# Junior Maths Mastery Challenge Sample

Paper A

Section A

Questions 1 to 5 carry 3 marks each.

1. Study the pattern below.

What is the value of A + B + C + D? [Patterns and sequences]

A = 1 + 4 = 5
B = 4 + 6 = 10
C = 6 + 4 = 10
D = 4 + 1 = 5
5 + 10 + 10 + 5 = 30

(A) 22   (B) 24   (C) 26

(D) 28   (E) 30

2. Paul wants to distribute 10 cookies among 3 plates so that each plate has a different number of cookies. How many ways can he distribute all the cookies if each plate has at least 1 cookie?

[Problem solving / Make a systematic list]

List all the ways Paul can distribute the cookies among 3 plates.
1) 1, 2 and 7
2) 1, 3 and 6
3) 1, 4 and 5
4) 2, 3 and 5

(A) 4   (B) 6   (C) 8

(D) 10   (E) 12

3. There are 18 people queueing for ice-cream. Emma is 7th in the queue. John is behind Emma. There are 5 people between them. What is John's position from behind?

[Problem solving / Draw a diagram]

18 people

John   Emma

18 – 5 – 7 = 6 people   5 people   7 people

John is 6th from behind.
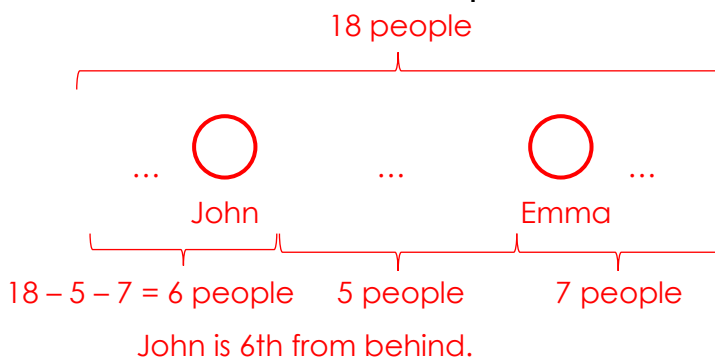
(A) 4th   (B) 5th   (C) 6th

(D) 12th   (E) 13th

4. Numbers are to be filled in the circles so that the three numbers along each side of the triangle add up to 30. What number does the letter P represent? [Arithmetic / Repeated identity]
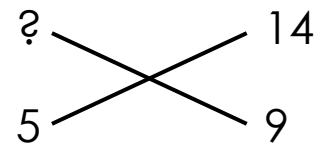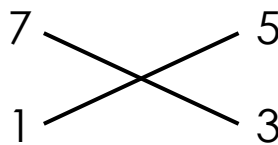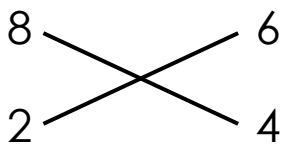
30 – 9 – 16 =

14 — P — 5

7   16

30 – 14 – 7 = 9

30 – 14 – 5 = 11
The letter P represents 11.
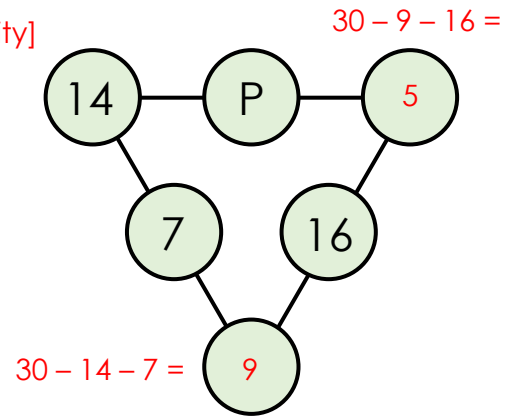
(A) 5   (B) 8   (C) 9

(D) 11   (E) 16

5. Find the missing number in the pattern below.

8 ⤬ 6
2   4

7 ⤬ 5
1   3

? ⤬ 14
5   9

[Patterns and sequences]

In each figure, the numbers on the left-hand side add up to the same number as the numbers on the right-hand side.
2 + 8 = 10   4 + 6 = 10
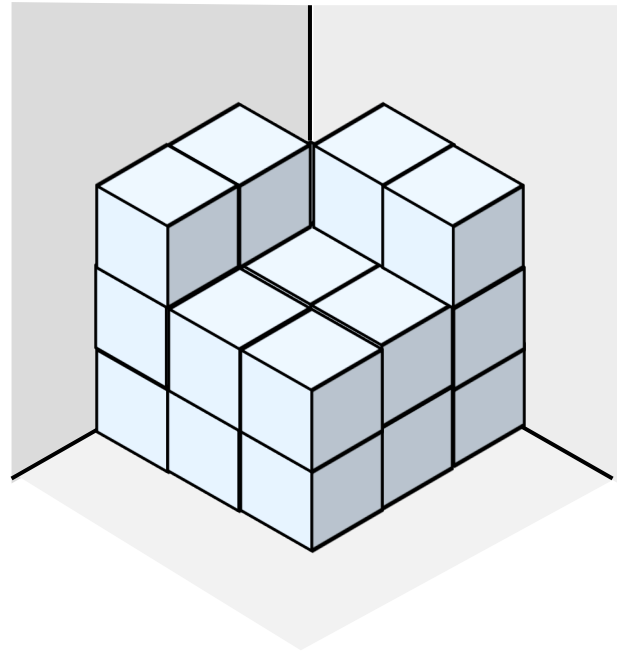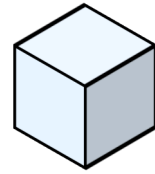
1 + 7 = 8   3 + 5 = 8

14 + 9 = 23
23 – 5 = 18

(A) 15   (B) 16   (C) 17

(D) 18   (E) 20

Questions 6 to 10 carry 4 marks each.

6. What is the greatest possible number of in the figure? [Spatial visualisation]

The greatest possible number of cubes that can form the figure is with 2 layers of 9 cubes and 4 cubes in the top layer.

9 + 9 + 4 = 22
The greatest possible number of cubes in the figure is 22.

(A) 20   (B) 21   (C) 22

(D) 23   (E) 24

7. Trace along the following figures using a pencil. Which figure(s) can be traced without drawing over any line twice and without lifting the pencil?
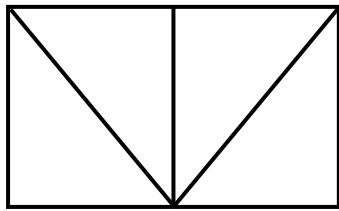
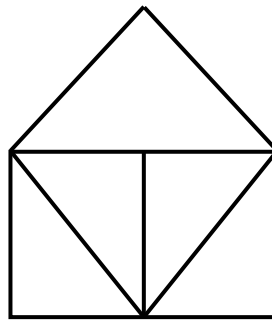[Geometry / Act it out]
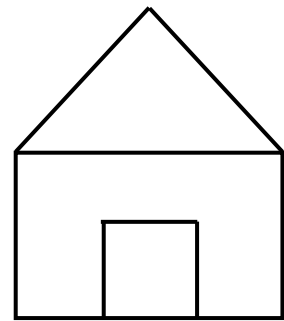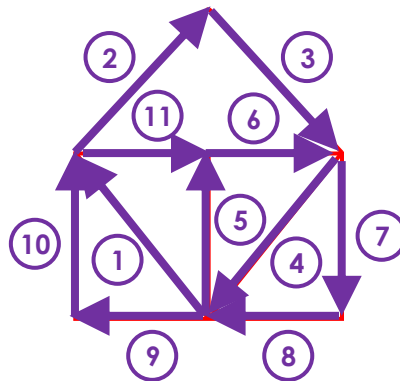
Figure A   Figure B   Figure C

Only Figure B can be traced without drawing over any line twice and without lifting the pencil.

(A) Figure A only
(B) Figure B only
(C) Figure C only
(D) Figures A, B and C
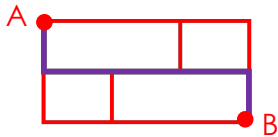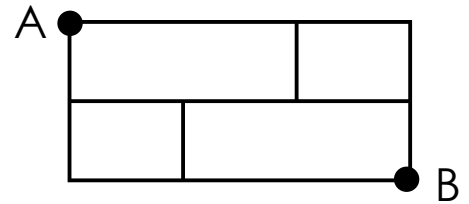(E) None of the above

8. A postman wants to deliver a parcel from Point A to Point B. How many ways can he walk from Point A to Point B using the directions $\longrightarrow$ and $\downarrow$ only? [Combinatorics]
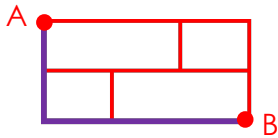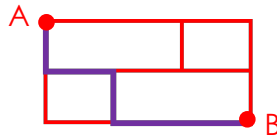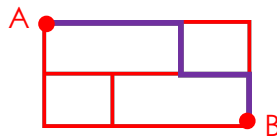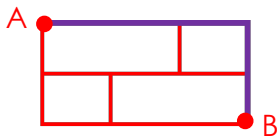
(A) 5

(B) 6

(C) 7

(D) 8

(E) None of the above

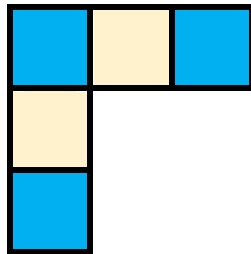9. The two figures below can be used to form a larger square.
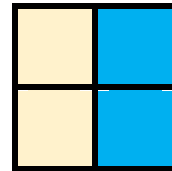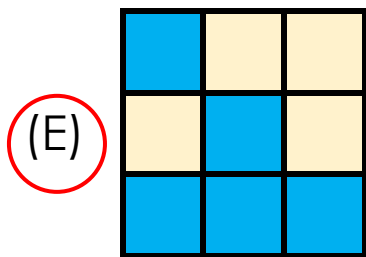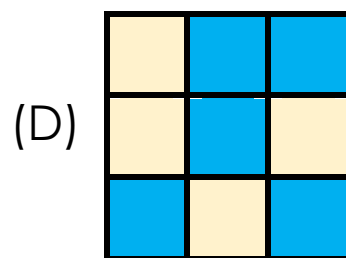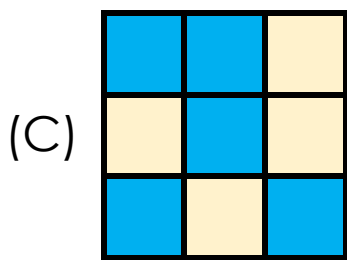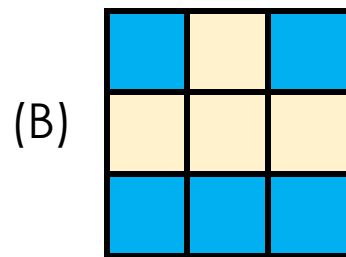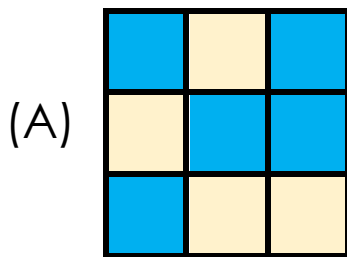
Figure A   Figure B

Which of the following cannot be the larger square?

[Spatial visualisation]

(A)

(B)

(C)

(D)

(E)

10. Mrs Brown left an apple on the table. When she came back, she found that the apple had been eaten by one of her children, Joe, Lina or Tom.

Joe said, 'Lina ate the apple.'

Lina said, 'Tom ate the apple.'

Tom said, 'Lina was lying.'   [Logical reasoning]

Only one of them lied. Which of the following statements is **true**?

If Joe was telling the truth, then Lina ate the apple.
This means that Lina was lying and Tom was telling the truth.
So, it is possible that Lina was the only one who lied and she ate the apple.

If Lina was telling the truth, then Tom ate the apple.
This means Joe and Tom were lying.
This is not possible.

If Tom was telling the truth, then Lina was lying. Tom did not eat the apple.
This means Joe was telling the truth and Lina ate the apple.
This brings us back to the first scenario that we arrived at.

Lina ate the apple and she was the one lying.

(A) Joe ate the apple.
(B) Lina was lying.
(C) Tom ate the apple.
(D) Tom was lying.
(E) None of the above

Section B

Questions 11 and 12 carry 6 marks each.

11. Each letter below represents a different digit.

$$
\begin{array}{r}
S\ A \\
+\ M\ A \\
\hline
A\ M
\end{array}
$$

Find the greatest possible 2-digit number AM can represent. [Cryptarithm]

Since SA + MA gives a 2-digit number, the greatest possible digit A can be is 9. If A = 9, then M = 8.
1 + S + 8 = 9 but S cannot be 0. So, A cannot be 9.

Let A = 8. So, M = 6.
1 + S + 6 = 8
This is possible.

Note that M is an even number because two of the same number added together is an even number.

So, S = 1.
The greatest possible 2-digit number AM can represent is 86.

$$
\begin{array}{r}
^{1} \\
S\ \ 8 \\
+\ 6\ \ 8 \\
\hline
8\ \ 6
\end{array}
$$

$$
\begin{array}{r}
^{1} \\
1\ \ 8 \\
+\ 6\ \ 8 \\
\hline
8\ \ 6
\end{array}
$$

12. Numbers 1 to 100 are arranged in the pattern shown below.

[Patterns and sequences]

	Column A	Column B	Column C	Column D	...
Row 1	1	10	11	20	...
Row 2	2	9	12	19	...
Row 3	3	8	13	18	...
Row 4	4	7	14	17	...
Row 5	5	6	15	16	...

In which row and column does 48 appear in?

10, 20, 30, 40, ... appear in Row 1.
10 appears in Column B.
20 appears in Column D.
30 appears in Column F.
40 appears in Column H.
50 appears in Column J.

If we count backwards, we will observe that 48 appears in Row 3.

So, 48 appears in Row 3 Column J.