

Maths Problem Solving Solutions Week 4

Due to the nature of some of the problems, there is often not one 'correct' solution. Below you will find marking guides and sample solutions to give an indication of what your answers might have looked like.

Senior – Multiples of 3

- a** The sum of the digits is always a multiple of 3.
- b** If the sum of the digits is not a multiple of 3, then the number is not a multiple of 3.
- c** Add the digits in the number. If this sum is a multiple of 3, then the number is a multiple of 3. If not, then the number is not a multiple of 3.
- d** We know that the numbers must have three 1s or six 1s in them (so that the sum of the digits is a multiple of 3) and end in 0 (so that they are even). If there were six 1s, there would need to be a 0 on the end to make it even, making seven digits in all, which is too large, so there are no even multiples of 3 less than 1 000 000 containing six 1s.

This leaves 1110, 10 110, 11 010, 11 100, 100 110, 101 010, 101 100, 110 010, 110 100, 111 000 – a total of 10 numbers.

Middle – Threedub

Threedub

Marks

a. $\boxed{3} \times 2 = 6 + 3 = 9$ $9 \div 3 = 3$

a. 1

b. 1

c. 1

d. 1

b. i) $6 \xrightarrow{\text{double}} 12 \xrightarrow{\text{double}} 24 \xrightarrow{\div 6} 4$

Total 4

ii) $6 \xrightarrow{+3} 9 \xrightarrow{\text{double}} 18 \xrightarrow{\div 6} 3$

iii) $6 \xrightarrow{+3} 9 \xrightarrow{+3} 12 \xrightarrow{\div 6} 2$

iv) $6 \xrightarrow{\text{double}} 12 \xrightarrow{+3} 15 \xrightarrow{\div 6} 2.5$

The answer to b. is 4

c. $2 \xrightarrow{\text{double}} 4 \xrightarrow{\text{double}} 8 \xrightarrow{\div 2} 4$

$2 \xrightarrow{+3} 5 \xrightarrow{\text{double}} 10 \xrightarrow{\div 2} 5$
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$2 \xrightarrow{+3} 5 \xrightarrow{+3} 8 \xrightarrow{\div 2} 4$

$2 \xrightarrow{\text{double}} 4 \xrightarrow{+3} 7 \xrightarrow{\div 2} 3.5$

The answer to C is add 3, double.

d. In (b) Beau rolled a 6 and the highest he got was 4. This is because, at the end you have to divide by your first number.

In (c) Cathy could get 5. So, I'm going to try 1 because it is the smallest number to divide by at the end.

$1 \xrightarrow{+3} 4 \xrightarrow{\text{double}} 8 \xrightarrow{\div 1} 8$

The answer to d is start with 1, add 3, double.

Junior – Adding Even and Odd Numbers

Adding Even and Odd Numbers.

a. 12, 14, 16, 18, 20, 22, 24, 26, 28, 30

b. 0, 2, 4, 6, 8

c. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19

d. 1, 3, 5, 7, 9

e. Even (because even numbers always have a partner)
 $\circ\circ\circ 6 + 8 \circ\circ\circ\circ = 14$

f. Odd (because odd numbers always have 1 'leftover' - without a partner. Each odd number would have 1 'leftover' and it would be paired with the other e.g. $\circ \leftarrow \rightarrow \circ$
 $\circ\circ\circ 7 + 5 \circ\circ = 12$

g.

+	Even	Odd
Even	Even	Odd
Odd	Odd	Even

Marks

a. /1

b. /1

c. /1

d. /1

e. /1

f. /1

g. /1 Total /7

