so $k = 10(10s^2+19s+9)$ $r=0$

$\therefore$ The only possible values of r are 0, 2, 6

ii) Triangular numbers are of the form $T_n = \frac{1\,n(n+1)}{2}$ $\left(= \frac{m}{2}\right)$

Expressing m in the form $10k+r$ ($r = 0, 2$ or 6 from i)b)) there are two cases to consider: k even, k odd.

If k is even

$m = 10 \times 2a + r$ for some integer a

$\frac{m}{2} = 10a + \frac{r}{2}$ where $r = 0, 2$ or 6

$\therefore \frac{r}{2} = 0, 1$ or 3.

Since a is an integer, the last digit of a triangular number can be 0, 1 or 3 for even k.

If k is odd, $k = 2a+1$ for some integer a

$m = 10 \times (2a+1) + r$

$\frac{m}{2} = \frac{10(2a+1)}{2} + \frac{r}{2} = 10a + \left(5 + \frac{r}{2}\right)$

$r = 0, 2$ or 6 $\therefore \frac{r}{2} = 0, 1$ or 3

$\therefore 5 + \frac{r}{2} = 5, 6$ or 8

Since a is an integer, the last digit of a triangular number can be 5, 6 or 8 for odd k.

Hence the last digit of a triangular number can only be one of 0, 1, 3, 5, 6 or 8 and may not be any of 2, 4, 7 or 9 as required.

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