A Tangled Tale, by Lewis Carroll

KNOT 1 : EXCELSIOR

'Goblin, lead them up and down.'

The ruddy glow of sunset was already fading into the sombre shadows of night, when two travellers might have been observed swiftly — at a pace of six miles in the hour — descending the rugged side of a mountain; the younger bounding from crag to crag with the agility of a fawn, while his companion, whose aged limbs seemed ill at ease in the heavy chain armour habitually worn by tourists in that district, toiled on painfully at his side.

As is always the case under such circumstances, the younger knight was the first to break the silence.

'A goodly pace, I trow!' he exclaimed. 'We sped not thus in the ascent!'

'Goodly, indeed!' the other echoed with a groan. 'We clomb it but at three miles in the hour.'

'And on the dead level our pace is —' the younger suggested; for he was weak in statistics, and left all such details to his aged friend.

'Four miles in the hour," the other wearily replied. 'Not an ounce more,' he added, with that love of metaphor so common in old age, 'and not a farthing less!'

"Twas three hours past high noon when we left our hostelry," the young man said, musingly. "We shall scarce be back by supper-time. Perchance mine host will roundly deny us all food!"

'He will chide our tardy return,' was the grave reply, 'and such a rebuke will be meet.'

'A brave conceit!' cried the other, with a merry laugh. 'And should we bid him bring us yet another course, I trow his answer will be tart!'

'We shall but get our deserts,' sighed the elder knight, who had never seen a joke in his life, and was somewhat displeased at his companion's untimely levity. 'Twill be nine of the clock,' he added in an under tone, 'by the time we regain our hostelry. Full many a mile shall we have plodded this day!'

'How many?' How many?' cried the eager youth, ever athirst for knowledge.

The old man was silent.

'Tell me,' he answered, after a moment's thought, 'what time it was when we stood together on yonder peak. Not exact to the minute!' he added hastily, reading a protest in the young man's face. 'An' thy guess be within one poor half-hour of the mark, 'tis all I ask of thy mother's son! Then will I tell thee, true to the last inch, how far we shall have trudged betwixt three and nine of the clock.'

A groan was the young man's only reply; while his convulsed features, and the deep wrinkles that chased each other across his manly brow, revealed the abyss of arithmetical agony into which one chance question had plunged him.



"AT A PAGE OF SIX MILES IN THE HOUR."

Frontispiece.

Carroll's summary:

Two travellers spend from 3 o'clock till 9 in walking along a level road, up a hill, and home again: their pace on the level being 4 miles an hour, up hill 3, and down hill 6.

Find the distance walked: also (within half an hour) time of reaching the top of the hill.

Carroll"s solution:

A level mile takes 1/4 of an hour, up hill 1/3, down hill 1/6. Hence to go and return over the same mile, whether on the level or on the hill-side, takes 1/2 an hour.

Hence in 6 hours they went 12 miles out and 12 back.

If the 12 miles out had been nearly all level, they would have taken a little over 3 hours; if nearly all up hill, a little under 4.

Hence $3^{1}/_{2}$ hours must be within $1/_{2}$ an hour of the time taken in reaching the peak; thus, as they started at 3, they got there within $1/_{2}$ an hour of $1/_{2}$ past 6.

Problems from A Tangled Tale

Knot I, *Excelsior* (as above)

Knot II, Eligible Apartments

Problem 1. The Governor of Kgovjni wants to give a very small dinner party, and invites his father's brother-in-law, his brother's father-in-law, his father-in-law's brother, and his brother-in-law's father. Find the number of guests.

Problem 2. A Square has 20 doors on each side, which contains 21 equal parts. They are numbered all round, beginning at one corner. From which of the four, Nos. 9, 25, 52, 73, is the sum of the distances, to the other three, least?

Knot III, Mad Mathesis

Problem. (1) Two travellers, starting at the same time, went opposite ways round a circular railway. Trains start each way every 15 minutes, the easterly ones going round in 3 hours, the westerly in 2. How many trains did each meet on the way, not counting trains met at the terminus itself?

(2) They went round, as before, each traveller counting as 'one' the train containing the other traveller. How many did each meet?

Knot IV, The Dead Reckoning

Problem. There are 5 sacks, of which Nos. 1, 2, weigh 12 lbs.; Nos. 2, 3, $13^{1}/_{2}$ lbs., Nos. 3, 4, $11^{1}/_{2}$ lbs., Nos. 4, 5, 8 lbs., Nos. 1, 3, 5, 16 lbs. Required the weight of each sack.

Knot V, Oughts and Crosses

Problem. To mark pictures, giving 3×3 to 2 or 3, 2 to 4 or 5, and 1 to 9 or 10; also giving $3 \circ 3$ to 1 or 2, 2 to 3 or 4 and 1 to 8 or 9; so as to mark the smallest possible number of pictures, and to give them the largest possible number of marks.

Knot VI, Her Radiancy

Problem 1. A and *B* begin the year with only £1,000 a-piece. They borrowed nought; they stole nought. On the next New-Year's Day they had £60,000 between them. How did they do it?

Problem 2. L makes 5 scarves, while *M* makes 2: *Z* makes 7 while *L* makes 3. Five scarves of *Z*'s weigh one of *L*'s; 5 of *M*'s weigh 3 of *Z*'s. One of *M*'s is as warm as 4 of *Z*'s: and one of *L*'s as warm as 3 of *M*'s. Which is best, giving equal weight in the result to rapidity of work, lightness, and warmth?

Knot VII, Petty Cash

Problem. Given that one glass of lemonade, 3 sandwiches, and 7 biscuits, cost 1*s*. 2*d*; and that one glass of lemonade, 4 sandwiches, and 10 biscuits, cost 1*s*. 5*d*.: find the cost of (1) a glass of lemonade, a sandwich, and a biscuit; and (2) 2 glasses of lemonade, 3 sandwiches, and 5 biscuits.

Knot VIII, De Omnibus Rebus

Problem 1. Place twenty-four pigs in four sties so that, as you go round and round, you may always find the number in any sty nearer to ten than the number in the last.

Problem 2. Omnibuses start from a certain point, both ways, every 15 minutes. A traveller, starting on foot along with one of them, meets one in $12^{1}/_{2}$ minutes: when will he be overtaken by one?

Knot IX, A Serpent with Corners

Problem 1. Lardner states that a solid, immersed in a fluid, displaces an amount equal to itself in bulk. How can this be true of a small bucket floating in a larger one?

Problem 2. Balbus states that if a certain solid be immersed in a certain vessel of water, the water will rise through a series of distances, two inches, one inch, half an inch, &c., which series has no end. He concludes that the water will rise without limit. Is this true?

Problem 3. An oblong garden, half a yard longer than wide, consists entirely of a gravel-walk, spirally arranged, a yard wide and 3,630 yards long. Find the dimensions of the garden.

Knot X, Chelsea Buns

Problem 1. If 70 per cent. have lost an eye, 75 per cent. an ear, 80 per cent. an arm, 85 per cent. a leg: what percentage, at least, must have lost all four?

Problem 3. At first, two of the ages are together equal to the third. A few years afterwards, two of them are together double of the third. When the number of years since the first occasion is two-thirds of the sum of the ages on that occasion, one age is 21. What are the other two?

Answers

Knot II, *Problem 1*: One; *Problem 2*: From No. 9. Knot III, (1): 19; (2): The easterly traveller met 12; the other 8. Knot IV: $5^{1}/_{2}$, $6^{1}/_{2}$, 7, $4^{1}/_{2}$, $3^{1}/_{2}$.

Knot V: 10 pictures; 29 marks; arranged thus:-

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Knot VI, *Problem 1*: They went that day to the Bank of England. A stood in front of it, while *B* went round and stood behind it; *Problem 2*: The order is *M*, *L*, *Z*.

Knot VII, (1): 8d.; (2): 1s. 7d.

Knot VIII, *Problem 1*: Place 8 pigs in the first sty, 10 in the second, nothing in the third, and 6 in the fourth. 10 is nearer ten than 8; nothing is nearer ten than 10; 6 is nearer ten than nothing; and 8 is nearer ten than 6; *Problem 2*: $\ln 6^{1}/_{4}$ minutes.

Knot IX, *Problems 1 and 2*: solutions, but no answers, are given; *Problem 3*: $60, 60^{1}/_{2}$.

Knot X, Problem 1: Ten; Problem 3: 15 and 18.