

William Leybourn [1626-1700]

1694 *Pleasure with profit: consisting of recreations of divers kinds, viz., numerical, geometrical, mechanical, statical, astronomical, horometrical, cryptographical, magnetical, automatical, chymical, and historical.*

Published to recreate ingenious spirits; and to induce them to make farther scrutiny into these (and the like) sublime sciences. And to divert them from following such vices, to which youth (in this age) are so much inclin'd. By William Leybourn, philomathes. To this work is also annext, A treatise of algebra, according to the late improvements, applied to numerical questions and geometry; with a new series for the speedy extractions of roots; as also a converging series for all manner of adfected equations. By R. Sault, master of the mathematical school in Adam's Court, in Broadstreet, near the Royal Exchange, London.

Richard Baldwin, and John Dunton, London.

UK BK L.35/17 and 531.m.20.(1.)

UK Bodleian E 1.21 Art.

1695 *Pleasure with profit: consisting of recreations of divers kinds, viz., numerical, geometrical, mechanical, statical, astronomical, horometrical, cryptographical, magnetical, automatical, chymical, and historical.*

printed for Nathaniel Rolls, at his Auction House in Petty-Cannon-Hall, near the north side of St. Paul's Church, 1695

[2], VI, [2], 56, [1], 86 [i.e., 68], 31, [1], 24, 63, [1], 28, 12, 10, 9, [1], 11, [1], 26; [4], 52 p., [2]

UKOxU Bodleian BOD J Floor Vet. A3 c.180

1667 *Arithmetical recreations, or, Enchiridion of arithmetical questions both delightful and profitable whereunto are added diverse compendious rules in arithmetick by which some seeming difficulties are removed and the performance of them rendred familiar and easie to such as desire to be proficient in the science of numbers / by Will. Leybourn.*

Printed by J.C. for Hen. Brome and Sam. Speed, London

10], 179 p.

EEBO 1311:18

1676 *Arithmetical recreations, or, Enchiridion of arithmetical questions both delightful and profitable, all of them performed without algebra : with several arithmetical problems and their answers : also divers subtile contracts or agreements : a discourse by Will. Leybourn*

2nd ed., corrected.

Printed for Hen. Brome ..., London.

[12], 191 p.

EEBO 282:06

UK Bodleian 80 S 4(3) Art

1699 *Arithmetical recreations: or, enchiridion of arithmetical questions: both delightful and profitable All of them performed without algebra. With several arithmetical problems and their answers. Also, divers subtile contracts or*

agreements. A discourse concerning the harmony of numbers, and variety of compendiums in the several rules of arithmetick. By Will. Leybourn, philomathemat. 3rd ed., corrected.

Printed for Ch. Brome, at the Gun at the west-end of St. Paul's, London.

[8], 163, [9] p.

EEBO 2189:15

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Leybourn writes in his forward of *Nine Geometrical excercises, for young sea-men* (1669) that he privously published “Arithmetically recreations”.

Nr	Question	1667	99
1	How to finde the number which any person shall think upon, be it never so great	1	
2	If two, three, four or five persons should each of them think upon several number, to tell what number each person thought upon, provided that none of the persons think above 9.		
3	A more artificial way to finde the number that any person thinketh upon, without asking him any questions.	7	
4	If a pile of counters, or other pieces of money, or other things, lie on a heap together and three parties take out from then a certain number unknown to you ; by knowing the fum of them all, to finde how many each party took.	12	
5	Any number of counters, stones, eggs, or other things being laid in a row, to tell what number any person, sitting by, thinketh upon, provided the party think not a number grater than the number greater than number of counters, stones, eggs, &c. which lie before him.	14	
6	One person having two bottles of wine, in each hand one, the one being sack, and the other claret, (or any other two things, as two pieces of money, &c. provided the one be even and the other odde) to finde in which hand the bottle of sack is, and in which claret; or in which hand the odde, and in which the even piece of money is.	18	
7	Ian being 100 years of age, upon his birth-day had his three sons with him at dinner, namely, William, James and Thomas : the father saying to them, well sons, i am this day just 100 years old; the towngest, William, said, father, my brother Thomas is four times as old as I am, and my brother James is three times as old as i am, and all our ages together are just 100 years. How old was each of the three sons ?	21 22	
8	A man dies, and leaves a legacy of 900 L. to be disposed of among four of his relations, viz. A, B, C and D; which legacie is to be disposed of in this order : B is to have twice as much as A, and C thrice as much as B, and D us to have as much and half as much as C : what must each person have ?	23	
9	A man dies and leaves 3000 L. to be distributed to his wife, his son, and his two daughters, in this wise; that the son's portion	25	

	should be double to that of the mother, and the mothers portion double to each of the daughters . How much must each of their portions be ?		
10	There were in company together four persons, Adam, Edward, Charles, and William. Adam told Edward that he was older than him by two years : Charles told them that he was as old as both of them together, and four years over. William hearing theme say so, said to them, i am just 96 years old, and that is equal to all your ages. Now how old was Adam, Edward and Charles severally ?	27	
11	Three persons, Andrew, Benjamin and Charles are to go a journey of 235 miles; of this journey, Andrew is to go a certain number of miles unknown; Benjamin is to go four times as many miles as Andrew, and three miles more, and Charles is to go twice as many miles as Benjamin, and five miles more. How many miles must each of these persons travel severally ?	29	
12	The captain, licutant, and cornet of a troop have taken among them from some enemy 478 crowns, which they agree to share in this manner : the captain is to have 24 times as much as the cornet, wanting only 7 crowns; and the licutant is to have 5 times as much as the cornet, wanting 3 crowns. I demand bow much the cornet must have, and consequently the lieutenant and captain ?	32	
13	A drover driving of sheep, one meets him, says, good speed friend with thy 20 sheep. Nay, says the drover, I have not 20 sheep; but I as many more, and half as many more, and two sheep, and half a sheep, then I should have 20 sheep. How many sheep had he in his Drove ?	34	
14	There is 273 l. to be divided amongst 4 persons; namely, Andrew, Bennet, Christopher, and Daniel. Andrew is to have a share unknown : Bennet is to have twice as much as Andrew, and 30 l. more: Christopher is to have 3 times as much as Andrew, wanting 52 l. And Daniel is to have 5 times as much as Andrew, and 20 l. more. How must this 273 l. be divided amongst them, that every one have his true share ?	36	
15	A master agrees with a Servant to work with him 30 days, agreeing to give him for every day that he wrought 7 s. and for every day that he idled, the Servant was to abate 5 s. At the expiration of the 30 days, they come to an account, that the master and Servant were both even, neither to receive any thing. How many days did the Servant work? And how many did he play ?	39	
16	A dog is pursuing of a Hare, which is 100 yards befor him; and for every yard that the hare runs, the dog runs two yards and an half (that is, the dog runs two times and an half swifter than the hare.) I would know how many yards tha hare hath run when the dog overtaketh her ?	41	
17	There are two messengers set out from two towns, which are 140 miles asunder, upon one and the same day : the one travels	43	

	8 miles a day and the other 6 miles. I demand how many days it will be ere they meet together.		
18	A footman goes a journey, undertaking to go every day 9 miles: when he had been gone 10 days, more expedition was required, and a horseman is sent after him. How many miles in a day must the horseman ride to overtake the footman in 18 days?	44	
19	One buys 100 Turkeys for 17 pound, in the selling of which again, he loseth 18 pound in his laying out of his 102 pound. I would know how many turkeys he sold for one pound.	45	
20	One bought 8 yards if two sorts of stuff, as Calico, and Tammy, for 20 s. the Tammy cost 4 s. a yard, and the Calico 2s. How many yards did he buy of each other ?	47	
21	There are four sorts of money of which of one sort 7 pieces makes a pound sterling: of the second sort, 18 pieces makes a pound: of the third sort 21 pieces makes a pound: and of the fourth sort, 28 pieces makes a pound. Of each of these pieces, a merchant received in exchange a like number, all of them making 568 pound sterling. I demand how many pieces there were in all ? and how much money he had of each several piece?	48	
22	There is an army, whose foot are 8 times the number of the horse : amongst them there is 392000 dollars to be distributed; so that each horseman is to have 16 dollars. I demand, of how many horse and how many foot the whole army consisted ?	51	
23	An hegler goes to a country-market and buys 100 eggs, (which is 120) after the rate of 3 for a penny. At another market he buys 120 more, at the rate of 2 for a penny; these eggs ge mingles together, and sells his 240 eggs at another market, after the rate of 5 eggs for two pence. I demand, whether he lost, gain'd, of saved by this bargain.	53	
24	One comes to a draper, and demands the price of a yard of canvas; the draper demands 12 d. Says the chapman, I will willingly give you two shillings for every angel of me money may go for twenty shillings : to which the draper asserts.	55	
25	There are 100 stones which lie 3 foot or one yard upon the ground one from the other; and there is one employed to gather up these stones one by one, and bring them to a basket which standeth 3 foot from the first stoned. How many yards of ground must he go backwards and forwards.	56	
26	I caught a fish (others among) whose head was full five foot long, and his tail was (truly) as long as his head and half his body. And his body (without fail) was just as long as his head and tail. This is my question, resolve it who can; how long was the body, and fishes tail than ?	58	
27	There is a steeple, the top whereof casteth its shadow upon the ground 260 foot from the bottom thereof : at the same time as you measure the shadow, the lenght of the shadow of your two-foot rule is 3 foot: I demand how high this steeple is.	60	
28	There is a fountain which hath 4 streams: in the cistern whereof	61	

	there is contained 8 barrels of water; if the least of the streams be onely opened, the water will be 6 hours running out: if the second, it will be 4 hours running out: the third be opened, it will be 3 hours running out: and it fourth and greatest be set running, it will run the water out in 2 hours. I would know in what time all the water would run out if all the 4 streames were set running together ?		
29	A man dying, leaves his wife which childe of her first; and by will bequeathed his estate, which amounted to 2600 l. conditionally thus, that if the childe his wife went withal were a woman-kinde that then his wife should have two thirds thereof, and the childe the other third: but if she should be delivered of a man-childe, then the childe was to have two thirds, and his wife the other third. But after the decease of the father, the mother was delivered of two sons and a daughter. In what nature shall this estate be parted amongst them, according to the testator's will ?	65	
30	The grand-father, the father, and the son met together, and spent 209. When the reckoning came to be paid, the grand-father would pay one half, the father one third, and the son one quarter. How much must every one pay of this reckoning ?	66	
31	There are four cities or towns lying one from the other in a right line; and the two farthermost are distant one from the other 56 miles: and the distance from the third to the first to the second, with half as much as between the second and the third: and the distance between the second and the third: and the distance between the second and third is as much as the distance between the first and second, with the third and fourth together. How far were each of the towns distant one from the other ?	69	
32	Two ships set sail at one time; the one sails directly east, 74 leagues: the other sails directly north, 62 leagues; I would know how many leagues these two ships are asunder.	71	
33	There was a may-pole, which in a windy night was broken, so that the top thereof lit upon the ground 30 foot distant from the bottom thereof; and the piece which was broken off was 50 foot long: at what length was the may-pole broken off, and how high was it in all ?	72	
34	There is 160 l. to be distributed amongst a number of poor people; some are to have shillings, some six pences, some groats, and some three-pences: how many poor people will this relieve, so that the number of those that receive shillings, six-pences, groats, and three-pences, shall be equal ?	73	
35	How many persons will there be required to receive 2880 pence, some receiving 6 d. some 5 d. some 4d. some 3d. some 2d. some 1d. there being a like number of each fort ?	75	
36	There are 1000 loaves of bread to be divided amongst three sorts of persons; those that were above 40 years of age, were to have 12 penny loaves, those above 20 years of age, were to have 6 penny loaves, and those above 10 years of age were to	76	

	have penny loaves. How many 12 penny loaves, how many 6 penny, and how many penny loaves must there be provided ?		
37	A debtor owes his creditor a certain sum of money, of which, because he cannot make one entire payment, he condescends to pay it by the weeks in the year, according to this progression, namely, to pay the first week 5 s. the second week 10 s. the third week 15 s. &c. I would know how much the creditor received of his debtor at the years end.	78	
38	A certain person by will, bequeaths his estate to his executor enjoying him every year (so long as executor lived) to bestow on certain charitablenses by him named, a certain sum of money encreasing every year 55L. more then the preceding; so the first year the executor expended 55 l. and the last year 495 l. How many years lived the executor aster the Donor ? and how much to the sore-mentioned uses did he expend?	80	
39	A father gave to his eldest son 252 l. and to his toungest he gave but 28 l. and to every son successively from the youngest he gave 28l. more than to the other. How many sons had the father ? and how much money did all their legacies amount to ?	81	
40	A bishop dying, left 10000l/ to be distributed amongst three sorts of men, viz. Divines, lawyers, and physicians, in such order, tha 40 divines were to have 10 l. the lawyers 5 l. the physicians were to have their parts out of the legacy also. I would know what the divines, lawyers, and physicians share will be? and also what will the portion of share of every divine, lawyer, and physician be ?	83	
41	There are two cities, which are distant 500 miles, and there are two other cities lying between them/ now from the first city to the second the distance is not known; but from the second to the third it is 6 times as far from the first to the second, and 15 miles more. And from the third city to the fourth it is 9 times as far as from the second to the third wanting 16 miles. How far are these 4 cities one from the other ?	86	
42	There is 400 crowns to be distributed among 5 persons, A,B,C,D,E in this wise. A must have an unknown share:B must have 3 times as many as A, and 6 more: C must have 9 times as many as A, and 3 times as many as B wanting 9. D must have three times as many as B, 4 times as many as C, 2 times as many as a, and 8 over : and E must have 2 times as many as C, 3 times as many as B, and 4 times as many as A, wanting 11. How many must each persons have ?	90	
43	There is 100 l. left to be divided among 3 persons, A,B,C, of which A is to have one third; B two sevenths ; and C five eighths. How much must each persons have ?	92	
44	There is a grand-father which is aged 125 years, his sons hath a wife and 3 sons ; now the father is as old as his wife and his second son, and 4 years over? The wife is as old as all her 3 sons, and 3 years over. The eldest son is as old as his two brothers, Over. The second son is 4 times the age of the	94	

	youngest, and 1 year over. And all these ages together, are equal to the age of the grandfather, namely 125 years. Now i would know how old was the father, mother and all the 3 sons severally ?		
45	What whole number is that, which if you divide it by 9 there shall remain 8, divide it by 8 there shall remain 7, divide it by 7 there shall remain 6; and so on till you divide it by 2, and then there shall remain one.	97	
46	How many stroaks cloth a clock strike in 12 hours, all the stroaks being added together ?	99	
47	If a man should sell a horse for a penny a nail for every nail in his 4 shoes, which are 28, according to this rate; for the first nail 2 d. for the second 4 d. for the third 6d. and so on increasing 2 d. every nail till the 28 nails were out ; How much money should be receive for his horse ?	101	
48	A traveller goes a journey, and goes every day 8 miles. At the same time another traveller goes the same journey, and goes the first day 1 mile, the second day 2 miles, the third day 3 miles, &c? I would know in how many days the second traveller will overtale the first, that went 8 miles a day ?	102	
49	A boy getting into a Hen-roost, stole from thence a certain number of eggs. Another boy discovering him, be to satisfie him, gave him falf the eggs which he stole, but he gave him back 12. Then a second boy accuses him, and be to appease him, gives him half his eggs remaining, who returns him 7. And meeting with a third accuser, he gives him half his eggs remaining, who gives him back 4. And when he was clear of all his accusers, he had still 20 eggs remaining. How many eggs did the boy steal at first ?	103	
50	A young scholar being come to a country - town, where he intended to reside some time, lit into a gentleman's house, where there were in family the master, mistris, and 4 children, which with himself made 7. At dinner they discoursed concerning the scholar's board there for a year, for which the gentleman demanded a certain sum; which the scholar thinking too much, made this overture, that he would give him so much as he did demand of him for a year, provided for that same money he would have his board so long time as he could daily place those 7 persons at the table in a several and distinct order, so that they should never all of them sit in the same places as then they did. The gentleman's condescends. The question is, how many days may the scholar sojourn with the gentleman before all these changes come about ?	105	
51	Three butchers do buy together a parcel of sheep, which wille cost them 72 l. Now they do agree together that the second shall pay of the money one third part more then the first : and that the third shall pay a fourth part more than the second. How much must each Butcher pay of that sum ?	107	
52	A man and his wife did usually drink out a certain vessel of	107	

	beer in 12 day, and the husband found by often experience, that in his wife's absence, he could drink it off in 20 day. The question is, in how many day the wife could drink it off alone ?		
53	If 3 pair of gloves be equal in value to 2 pieces of ribbon; 3 pieces of ribbon to 7 douzen of points; 6 dpuzen of points to 2 yard of lace; 3 yards of lace to 81 shillings. How many pair of gloves may be bought for 28 shillings ?	108	
54	There is a gallery to be paved with stones in the form of a long square; each stone is 28 inches long, and 24 inches broad, and the gallery is 40 yars long, and 7 yards broad. How many suchs stoned will pave this gallery ?	109	
55	Five merchants, viz. A, B, C, D, E, have gained 2025 l. which is to be divided amongst them in this sort : So that the half of A his share, shall be equal to $\frac{1}{4}$ of the share of B, to $\frac{1}{3}$ of the share of C, ti $\frac{1}{6}$ if the share of D, and ti $\frac{1}{8}$ if the share of E? I demand each merchant's share ?	112	
58	There is an I shand 36 miles in compas : now at the same time, and from the same place two footman A, and B, set forward to go round the same, and they follow one the other in such sort, that A travels every day 9 miles, and B 7 miles. The question is, to finde in what place of time they would again meet; and also how many miles, and how many times about the island each footman would then have travelled ?	115	
59	Two merchants, as A, and B, are in trade of company, and the sun of both thir stocks is 300 l. The money of A continued in company 9 months, and the money of B continued 11 months in company; by their twoo stocks 200 l. is gained; which upon account is equally divided. Now the question is, to know how much money each merchants did put in ?	117	
60	Two merchants a, and B, do company; a put into stock 325 l. more than B, and A his stock did continue in company 7 months and an half. B put into stocjs a certain sum unknown, and it contineud in company 10 months and 3 quearters; after a certain time they divide the gain equally. The question is, what each marchant did put in ?	118	
P01	There were 6 cups of gold which weighed together 600 ounces, but each cup was heavier than the other by one ounce; now how much did each cup weigh severally ?	121	
P02	There are four several measures as A, B, C, D of which D holds 24 pints, and C holds as luch again as B, and 3 times as much as A; and D with twice A, will hold double as much as C, and four times as much as B. How much did every one of these measures hold severally ?	122	
P03	A father leaves 1000 L. to be disposed of his son and daughter, conditionally thus; that the fifth part of that which his son should have, should exceed the fourth part of that which the daughter should have, by 10 l. what must each have ?	123	
P04	One coming into an orchard, asks the gardener how many trees there were in that orchard ? the gardener answered, that the one	124	

	half of the trees were apple-trees, the quarter-part pear-trees, the seventh-part were plumb-trees, and that there were 12 cherry-trees besides. How many trees were there in his orchard?		
P05	Two persons, as James and Paul, had between them a certain number of sheep in two droves ; James said to Paul, if you put 70 of your sheep into my drove, I shall have tree times as many sheep as you have : ... but Paul said to James, if you put 70 of yours into my drove, I shall have five times as many as you. How many sheep had each of them ?	125	
P06	The father and son travelling together, each of them carrying a certain number of bottles of wine; the son complains to the father, that he was overladen ; the father replied, if I should take one of your bottles, then I should have as many more bottles you have; and if I shold give you one of mine, yet I should have as many as you have in all still. How many bottles had each of them ?	126	
P07	One having in the market a basket of apples, another comes and asks him how many there is of them ? The owner replies, he cannot tell; but he remembers that when he told them into his basket by two and two, there was one odde one at last : also when he told them in by three and three, there was still one odde one; and also by four and four, there was still an odde one remaining; the like when he told them in by five and five, and by six and six, still one odde one remained : but when he told them in by seven and seven, then they fell even. How many apples were there in hiw basket ?	127	
P08	If one should buy 12 loaves of bread for 12 pence, so that some of them may be two penny loaves, some penny loaves, some halfpenny loaves : and some farthing loaves. How many of a sort must he buy ?	129	
P09	There is 1000 l. to be distributed amongst 10 persons, namely, some men, some women, some male-children, and some female-children; with this condition, that every man must have 50 l. every women 70 l. every male-whild 130 l. and every female-childe 150 l. How many must there be of each sort ?	130	
P10	A man dying, and leaving seven sons, equeaths his estate in money to be thus divided; one half to his eldest son, the half of the remainder to his second son, the half of the remainder to his third son; and so to all the seven; and the remaining half to an executor, to see his will perfordmed, which remaining half was 34l. What was his whole estate ? and what childs part ?	134	
P11	A mand dying, gave to his eldest son $\frac{1}{3}$ of $\frac{1}{4}$ of his estate; to his second son $\frac{1}{3}$ of $\frac{1}{2}$ of his estate; and when they had counted their portions, the one had 40 l. more than the other : the remainder of the estate was given to the wife and younger childeren. The question is, how much was the first and second sons portions ? and how much was left to hiw wife and younger children ?	135	
P12	One delivered to a banker a certain sum of money, to have of	136	

	him by the year only simple interest, at the rate of 6 percent. And at the end of 10 years he received of the banker 500 l. in full for principal and interest. What was the sum at first delivered ?		
P13	One man in a morning demanded of another what it was a clock? The other answered, if you adde the $\frac{1}{4}$ of the hours which be past since midnight, to the $\frac{2}{3}$ of the hours which are to come still noon, you shall know the true hour that now it is : What was it then a clock ?	137	
P14	A dog, a wolf, and a lyon, are to devour a sheep; and supposing that the dog could eat up the sheep in one hour, the wolf in 3 quarters of an hour, and the lion in half an hour: now ir the lion begin to eat 7 minutes and an half before the dow and wolf, and afterwards all three eat together; in what time wille the sheep be devoured ?	137	
P15	If a house be to be built by 3 bricklayers A, B and C, they working in such sirt, tha A aline will finish it in 30 daies, B aline in 40 daies, and A, B and c together in 15 daies ; in what time could C aline build that house ?	138	
P16	Two neighbours had either of them a piece of land, the one field was four-square, every side containing 120 perches, so that it was round about 480 oerches. The other was square also, but the sides longer than the other field, and the ends shorter ; for the sides of this field were 140 perches long apiece, and the ends thereof were 100 perches apiece; so that this field was 480 perches about as welle as the other . Now, which of these two had the best bargain ?	139	
P17	A countrfarmer had in his house a vessel of wood full of wheat, which was 4 foot high, 4 foot broad both at top and bottom; and in all parts 4 foot, as the sides of a die... One of his neighbours desires him to lend him half his wheat till harvest, which doth :... Harvest comong, and his neightout is to repay; he makes a vessel 2 foot every may, as his neighbours was 4 foot every mau, andfills him that twice, in lieu of what he borrowed. Was there gain of lost in this particular ?	141	
P18	A trich farmer being in a fair, espies at a goldsmith's shop a neck-lace of pearl, upon which were 72 pearls ; the farmer cheapening of it, the goldsmith asked 30 s.a pearl; at which rate the neck-lace woyle come to 103 l. The farmer looking upon it as dear, goes his way, offering nothing : where upon the goldsmith calls him, and tells him, if he thought much to part with money, he would deal with him for corn :... To which the farler hearkens ; asks him how much corn he would have for it at two shillings the bushel : the goldsmith told him, he would be very reasonable, and would take for the first pearl one barley-corn only, for the second two corns, for the third four corns; and so doubling the corns till the 72 pearls were out. To this the farmer agrees, and immediately strikes the bargain : but see the event.	144	

P19	A country fellow comes to a farmer, and offers to serve him for 8 years; all which time he would require no other wages than one grain of corn, and one quarter of an inch of land to sow it in the first year; and land enough to sow that one corn, and the encrease of it, for his whole 8 years: to which the farmer assents.	150	
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