

Program Description I

Program Title ARITHMETIC PROGRESSIONS

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Program Description, Equations, Variables

THE BASIC EQUATIONS USED ARE:

$$l = a + (n - 1) * d$$

$$S_n = n * (a + \frac{1}{2} * d * (n - 1))$$
$$= \frac{1}{2} * n * (a + l)$$

AND VARIATIONS, WHERE:

a IS THE FIRST TERM OF THE ARITHMETIC PROGRESSION

n IS THE NUMBER OF TERMS IN THE PROGRESSION

d IS THE INCREMENT (DIFFERENCE BETWEEN TERMS IN THE PROGRESSION)

l IS THE LAST TERM OF THE PROGRESSION

S_n IS THE SUM OF THE TERMS IN THE PROGRESSION

Operating Limits and Warnings IF THREE QUANTITIES ARE NOT GIVEN THE RESULTS ARE MEANINGLESS.

FLAG 3 IS USED TO DECIDE WHETHER TO STORE OR SOLVE FOR A QUANTITY. HENCE, PRESS NUMERIC KEYS TO ENTER a,n,d,l,S_n. BUT DO NOT PRESS ANY KEY OTHER THAN A,...,E ANTER KNOWN QUANTITIES ARE ENTERED, UNTIL BOTH UN-KNOWNs ARE FOUND.

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es)

Sample Problem(s)

(1) GIVEN THE ARITHMETIC PROGRESSION 1,2,3,4,5,6,7,8,9, FIND ITS SUM AND THE NUMBER OF TERMS.

SOLN: HERE, $a = 1$, $l = 9$, $d = 1$

ANSWERS: SUM = $S_n = 45$; NUMBER OF TERMS = $n = 9$

(2) GIVEN THE ARITHMETIC PROGRESSION WITH 9 TERMS EACH DIFFERING BY 2, ARRANGED IN DECREASING ORDER, THAT SUMS TO -27, FIND ITS FIRST AND LAST TERMS.

SOLN: HERE, $S_n = 27$, $n = 9$, $d = -2$

ANSWERS : FIRST TERM = $a = 5$; LAST TERM = $l = -11$.

Solution(s) (1) f CLREG 1 B --- 1

1 C --- 1

9 D --- 9

A --- 9 (n)

E --- 45 (S_n)

(2) f CLREG 9 A --- 9

2 CHS C --- -2

27 CHS E --- -27

B --- 5 (a)

D --- -11 (l)

Reference(s)

ARITHMETIC PROGRESSION				
1	n	a	d	l
2	S_n			

[illegible]

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	f LBL A	31 25 11	n		+	61	
	h F? 3	35 71 03	if n given,		f -x	31 54	
	GTO 0	22 00	go to 0		RCL 2	34 02	
	f LBL 5	31 25 05	if n not given:	060	STO / 5	33 81 05	
	RCL B	34 12	if a is given		/	81	
	f x ≠ 0	22 05	go on		2	02	
	GTO 5	05			STO / 5	33 81 05	
	RCL 3	34 03	if not find n		/	81	
	2	02	from d, <i>l</i> , S		RCL 5	34 05	
010	x	71			h xEXy	35 52	
	RCL 2	34 02			+	61	
	+	61			f xLT 0	31 71	
	ENTER	41			g GSB fd32	22 14	
	g x**2	32 54		070	GTO 0	22 00	
	RCL 2	34 02			f LBL 5	31 25 05	find n from a, d,
	8	08			RCL 3	34 03	<i>l</i>
	x	71			RCL 1	34 01	
	RCL 4	34 04			-	51	
	x	71			RCL 2	34 02	
020	-	51			/	81	
	f x** $\frac{1}{2}$	31 54			1	01	
	-	51			+	61	
	2	02			f LBL 0	31 25 00	store n and
	/	81		080	STO 0	33 00	indicator
	RCL 2	34 02			1	01	
	/	81			STO A	33 11	
	GTO 0	22 00			GTO 9	22 09	
	f LBL 5	31 25 05	if a, d given		f LBL B	31 25 12	a
	RCL C	34 13	go on		h F? 3	35 71 03	if a given go to
030	f x ≠ 0	31 61			GTO 1	22 01	1
	GTO 5	22 05			f LBL 6	31 25 06	else
	RCL 4	34 04	if d not given		RCL A	34 11	if n not given
	2	02	find n from a,		f x=0	31 51	find it
	x	71	<i>l</i> , S	090	f GSB 5	31 22 05	else go on
	RCL 3	34 03			RCL C	34 13	if d given go
	RCL 1	34 01			f x ≠ 0	31 61	on
	+	61			GTO 6	22 06	
	/	81			RCL 4	34 04	if not get a
	GTO 0	22 00			RCL 0	34 00	from n, <i>l</i> , S
040	f LBL 5	31 25 05	if a, d, <i>l</i> given		/	81	
	RCL D	34 14	go on		2	02	
	f x ≠ 0	31 61			x	71	
	GTO 5	22 05			RCL 3	34 03	
	RCL 1	34 01	if <i>l</i> not given	100	-	51	
	2	02	find n from a,		GTO 1	22 01	
	x	71	d, S		f LBL 6	31 25 06	if <i>l</i> given go
	RCL 2	34 02			RCL D	34 14	on
	-	51			f x ≠ 0	31 61	
	CHS	42			GTO 6	22 06	
050	STO 5	33 05			RCL 4	34 04	if not find a
	g x**2	32 54			RCL 0	34 00	from n, d, S
	RCL 2	34 02			/	81	
	RCL 4	34 04			RCL 0	34 00	
	x	71		110	1	01	
	8	08			-	51	
	x	71			RCL 2	34 02	

REGISTERS

0	n	1	a	2	d	3	<i>l</i>	4	S _n	5	USED	6		7		8		9	
S0		S1		S2		S3		S4		S5		S6		S7		S8		S9	
A	USED	B	USED	C	USED	D	USED	E	USED	F	USED	G	USED	H	USED	I	USED	J	USED

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	x	71			f LBL D	31 25 14	1
	2	02		170	h F? 3	35 71 03	if 1 is given
	/	81			GTO 3	22 03	store it
	-	51			f LBL 8	31 25 08	if n not given
	GTO 1	22 01			RCL A	34 11	find it
	f LBL 6	31 25 06			f x=0	31 51	
	RCL 3	34 03	find a from		f GSB 5	31 22 05	
120	RCL 0	34 00	n, d, l		RCL B	34 12	if a not given
	1	01			f x=0	31 51	find it
	-	51			f GSB 6	31 22 06	
	RCL 2	34 02			RCL C	34 13	if d not given
	x	71		180	f x=0	31 51	find it
	-	51			f GSB 7	31 22 07	
	f LBL 1	31 25 01	store a and in-		RCL 2	34 02	find l from
	STO 1	33 01	dicator		RCL 0	34 00	n,a,d
	2	02			1	01	
	STO B	33 12			-	51	
130	GTO 9	22 09			x	71	
	f LBL C	31 25 13	d		RCL 1	34 01	
	h F? 3	35 71 03	if d given		+	61	
	GTO 2	22 02	store it		f LBL 3	31 25 03	store l and in-
	f LBL 7	31 25 07	if n not given	190	STO 3	33 03	dicator
	RCL A	34 11	find it		4	04	
	f x=0	31 51			STO D	33 14	
	f GSB 5	31 22 05			GTO 9	22 09	
	RCL B	34 12	if a not given		f LBL E	31 25 15	S _n
	f x=0	31 51			h f? 3	35 71 03	if S _n given,
140	f GSB 6	31 22 06			GTO 4	22 04	store n it
	RCL D	34 14	if l is given		RCL A	34 11	if n not given
	f x=0	31 51	go on		f x=0	31 51	find it
	GTO 7	22 07			f GSB 5	31 22 05	
	RCL 4	34 04	if not, find d	200	RCL B	34 12	if a not given
	RCL 0	34 00	from n, a, S _n		f x=0	31 51	find it
	/	81			f GSB 6	31 22 06	
	RCL 1	34 01			RCL C	34 13	if d not given
	-	51			f x=0	31 51	find it
	RCL 0	34 00			f GSB 7	31 22 07	
150	1	01			RCL 0	34 00	
	-	51			RCL 1	34 01	find S _n from n,
	/	81			RCL 3	34 03	a, d _n
	2	02			+	61	
	x	71		210	x	71	
	GTO 2	22 02			2	02	
	f LBL 7	31 25 07	find d from n,a,		/	81	
	RCL 3	34 03	l		f LBL 4	31 25 04	store S _n and in-
	RCL 1	34 01			STO 4	33 04	dicator _n
	-	51			5	05	
160	RCL 0	34 00			STO E	33 15	
	1	01			f LBL 9	31 25 09	display answer
	-	51			h x ex y	35 52	
	/	81			h RTN	35 22	
	f LBL 2	31 25 02	store d and in-	220	g LBL fd	32 25 14	
	STO 2	33 02			RCL 5	34 05	
	3	03			h LSTX	35 82	
	STO C	33 13			-	51	
	GTO 9	22 09			h RTN	35 22	

LABELS

FLAGS

SET STATUS

n	B a	C d	D l	E S _n	0	FLAGS	TRIG	DISP
a	b	c	d _{used}	e	1	ON OFF	DEG ☒	FIX ☒
0 end of n	1 end of a	2 end of d	3 end of l	4 end of S	2	0 ☐ ☐	GRAD ☐	SCI ☐
5 find n	6 find a	7 find d	8 find l	9 find S	3 data in?	1 ☐ ☒	RAD ☐	ENG ☐
						2 ☐ ☒		n <u>2</u>
						3 ☐ ☒		