Table 3-10. Federal obligations for basic research in universities and colleges, by selected supporting agencies and by selected fields, 1973-74
[Dollars in millions]

Field of science[1]		Six-agency total	Department of Agriculture	Department of Defense	Department of Health, Education, and Welfare	Atomic Energy Commission	NASA	National Science Foundation
		Current dollars						
All fields	1973	$903.5	$37.2	$105.0	$317.9	$59.9	$56.3	$327.2
	1974(est.)	1,035.0	36.1	110.1	412.9	60.6	61.3	354.0
Astronomy	1973	26.5	—	1.6	—	—	17.1	7.8
	1974(est.)	30.6	—	1.7	—	—	20.5	8.4
Life sciences	1973	369.8	26.2	8.3	263.5	11.1	3.5	57.2
	1974(est.)	454.6	25.2	8.9	349.6	11.2	3.3	56.4
Psychology	1973	29.3	—	5.3	14.3	—	0.3	9.4
	1974(est.)	33.9	—	4.9	18.5	—	0.5	10.0
Chemistry	1973	66.1	1.9	4.4	18.0	8.3	3.4	30.1
	1974(est.)	71.6	1.7	4.5	23.4	7.8	2.9	31.3
Physics	1973	109.1	—	13.3	—	34.7	9.4	51.7
	1974(est.)	114.6	—	13.9	.1	36.1	11.1	53.4
Environmental sciences	1973	93.4	.4	28.9	—	—	12.9	51.2
	1974(est.)	103.9	.5	30.1	—	—	13.3	60.0
Mathematical and computer sciences	1973	41.0	—	16.2	1.1	2.4	0.1	21.2
	1974(est.)	42.0	—	16.8	1.4	2.0	0.2	21.6
Engineering	1973	81.5	1.2	26.4	3.3	3.5	6.0	41.1
	1974(est.)	88.6	1.1	29.0	4.3	3.5	6.9	43.8
Social sciences	1973	45.7	7.5	.1	16.2	—	(4)	21.9
	1974(est.)	44.1	7.5	—	13.7	—	0.1	22.8
Other sciences[2]	1973	41.2	—	0.5	1.5	—	3.6	35.6
	1974(est.)	51.0	—	0.3	1.8	—	2.5	46.4
		Constant 1967 dollars[3]						
All fields	1973	$688.5	$28.3	$80.0	$242.2	$45.6	$42.9	$249.3
	1974(est.)	715.2	24.9	76.1	285.3	41.9	42.4	244.6
Astronomy	1973	20.2	—	1.2	—	—	13.0	5.9
	1974(est.)	21.1	—	1.2	—	—	14.2	5.8
Life sciences	1973	281.8	20.0	6.3	200.8	8.5	2.7	43.6
	1974(est.)	314.1	17.4	6.1	241.6	7.7	2.3	39.0
Psychology	1973	22.3	—	4.0	10.9	—	0.2	7.2
	1974(est.)	23.4	—	3.4	12.8	—	0.3	6.9
Chemistry	1973	50.4	1.4	3.4	13.7	6.3	2.6	22.9
	1974(est.)	49.5	1.2	3.1	16.2	5.4	2.0	21.6
Physics	1973	83.1	—	10.1	—	26.4	7.2	39.4
	1974(est)	79.2	—	9.6	0.1	24.9	7.7	36.9
Environmental sciences	1973	71.2	0.3	22.0	—	—	9.8	39.0
	1974(est.)	71.8	0.3	20.8	—	—	9.2	41.5
Mathematical and computer sciences	1973	31.2	—	12.3	0.8	1.8	0.1	16.2
	1974(est.)	29.0	—	11.6	1.0	1.4	0.1	14.9
Engineering	1973	62.1	0.9	20.1	2.5	2.7	4.6	31.3
	1974(est.)	61.2	0.8	20.8	3.0	2.4	4.8	30.3
Social sciences	1973	34.8	5.7	0.1	12.3	—	(4)	16.7
	1974(est.)	30.5	5.2	—	9.5	—	0.1	15.8
Other sciences[2]	1973	31.4	—	0.4	1.1	—	2.7	27.1
	1974(est.)	35.2	—	0.2	1.2	—	1.7	32.1

[1] See Appendix table 3-6a for descriptions of these fields.
[2] Including inter- and multi-disciplinary sciences.
[3] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.
[4] Less than $50,000.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, special tabulations.

Table 3-13. Estimated basic research expenditures in doctorate-granting institutions per scientist and engineer[1] by selected fields, 1966-74

Field of science	1966	1968	1970	1972	1973	1974 (Prelim.)
	Estimated constant 1967 dollars per scientist and engineer					
Physics	$24,500	$20,600	$16,600	$16,600	$15,300	$14,900
Biological sciences	10,900	10,600	10,100	9,600	10,400	9,700
Engineering	12,100	12,600	11,300	11,800	11,400	9,600
Chemistry	12,100	11,600	9,700	10,300	9,000	8,200
Clinical medicine	10,500	9,800	8,700	8,400	7,800	8,000
Psychology	7,400	8,200	6,600	7,900	6,800	6,100
Social sciences	4,800	6,000	4,900	5,000	4,800	4,600
Mathematical sciences	4,800	4,900	4,800	4,500	4,100	3,800
	Estimated constant 1967 dollars[2] (in millions)					
Physics	$132	$128	$108	$111	$104	$100
Biological sciences	323	346	353	328	347	325
Engineering	184	209	195	212	206	172
Chemistry	69	74	66	73	66	64
Clinical medicine	316	364	377	396	375	386
Psychology	28	41	39	52	48	46
Social sciences	75	118	109	123	120	117
Mathematical sciences	29	37	43	43	40	39
	Estimated current dollars (in millions)					
Physics	$128	$133	$124	$138	$137	$144
Biological sciences	313	360	406	407	455	470
Engineering	178	217	224	264	270	249
Chemistry	67	77	76	91	87	92
Clinical medicine	306	379	434	492	492	559
Psychology	27	43	45	65	63	66
Social sciences	73	123	125	153	157	169
Mathematical sciences	28	39	50	53	52	56
	Estimated scientists and engineers (as of January)					
Physics	5,400	6,200	6,500	6,700	6,800	6,700
Biological sciences	29,500	32,700	34,800	34,000	33,400	33,600
Engineering	15,200	16,600	17,200	17,900	18,000	18,000
Chemistry	5,700	6,400	6,800	7,100	7,300	7,800
Clinical medicine	30,200	37,000	43,200	47,400	48,300	48,100
Psychology	3,800	5,000	5,900	6,600	7,100	7,600
Social sciences	15,700	19,700	22,100	24,300	24,900	25,400
Mathematical sciences	6,100	7,600	8,900	9,600	9,700	10,400

[1] Includes all scientists and engineers (full-time equivalent basis) employed in universities granting doctorates in science or engineering. Estimates used for January 1966, 1968, 1970 and 1972.
[2] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

SOURCE: National Science Foundation, special tabulations.

Table 3-14a. Federally Funded Research and Development Centers

Name	Sponsoring agency	Organizational affiliation
	Administered by universities	
Ames Laboratory	Atomic Energy Commission	Iowa State University of Science and Technology
Applied Physics Laboratory	Department of the Navy	Johns Hopkins University
Applied Research Laboratory	Department of the Navy	Pennsylvania State University
Argonne National Laboratory	Atomic Energy Commission	University of Chicago and Argonne Universities Association
Brookhaven National Laboratory	Atomic Energy Commission	Associated Universities, Inc.
Cambridge Electron Accelerator	Atomic Energy Commission	Harvard University
Center for Naval Analysis	Department of the Navy	University of Rochester
Cerro Tololo Inter-American Observatory	National Science Foundation	Association of Universities for Research in Astronomy, Inc.
E.O. Lawrence Berkeley Laboratory	Atomic Energy Commission	University of California
E.O. Lawrence Livermore Laboratory	Atomic Energy Commission	University of California
Jet Propulsion Laboratory	National Aeronautics and Space Administration	California Institute of Technology
Kitt Peak National Observatory	National Science Foundation	Association of Universities for Research in Astronomy, Inc.
Lincoln Laboratory	Department of the Air Force	Massachusetts Institute of Technology
Los Alamos Scientific Laboratory	Atomic Energy Commission	University of California
Fermi National Accelerator Laboratory	Atomic Energy Commission	Universities Research Association, Inc.
National Astronomy and Ionosphere Center	National Science Foundation	Cornell University
National Center for Atmospheric Research	National Science Foundation	University Corporation for Atmospheric Research
National Radio Astronomy Observatory	National Science Foundation	Associated Universities, Inc.
Oak Ridge Associated Universities	Atomic Energy Commission	Oak Ridge Associated Universities
Plasma Physics Laboratory	Atomic Energy Commission	Princeton University
Space Radiation Effects Laboratory	National Aeronautics and Space Administration	College of William and Mary
Stanford Linear Accelerator Center	Atomic Energy Commission	Stanford University
	Administered by industrial firms	
Bettis Atomic Power Laboratory	Atomic Energy Commission	Westinghouse Electric Corporation
Hanford Engineering Development Laboratory	Atomic Energy Commission	Westinghouse-Hanford Corporation
Knolls Atomic Power Laboratory	Atomic Energy Commission	General Electric Company
Liquid Metal Engineering Center	Atomic Energy Commission	Rockwell International Corporation
Mound Laboratory	Atomic Energy Commission	Monsanto Research Corporation
National Reactor Testing Station	Atomic Energy Commission	Aerojet Nuclear Corporation
Oak Ridge National Laboratory	Atomic Energy Commission	Union Carbide Corporation
Sandia Laboratory	Atomic Energy Commission	Western Electric Company, Inc.-Sandia Corp.
Savannah River Laboratory	Atomic Energy Commission	E.I. du Pont de Nemours & Co., Inc.
	Administered by other nonprofit institutions	
Institute for Defense Analysis	Department of Defense	Institute for Defense Analysis
Research Analysis Corporation	Department of the Army	Research Analysis Corporation
Aerospace Corporation	Department of the Air Force	Aerospace Corporation
Analytic Services, Inc.	Department of the Air Force	Analytic Services, Inc.
MITRE Corporation	Department of the Air Force	MITRE Corporation
RAND Corporation	Department of the Air Force	RAND Corporation
Atomic Bomb Casualty Commission	Atomic Energy Commission	National Academy of Sciences
Pacific Northwest Laboratory	Atomic Energy Commission	Battelle Memorial Institute

SOURCE: National Science Foundation, *Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1973, 1974, and 1975.* Vol. XXIII (NSF 74-320).

Table 3-16. Industrial basic research expenditures, by source, 1960-74

[Dollars in millions]

Year	Total		Industry		Federal Government	
	Current dollars	Constant 1967 dollars[1]	Current dollars	Constant 1967 dollars[1]	Current dollars	Constant 1967 dollars[1]
1960	$376	$428	$297	$338	$ 79	$ 90
1961	395	444	314	353	81	91
1962	488	542	345	384	143	159
1963	522	573	375	411	147	161
1964	549	593	384	415	165	178
1965	592	628	406	431	186	197
1966	624	644	451	465	173	179
1967	629	629	427	427	202	202
1968	642	617	462	444	180	173
1969	618	567	458	420	160	147
1970	629	547	471	410	158	137
1971	610	507	485	403	125	104
1972	579	466	452	364	127	102
1973	605	461	473	360	132	101
1974(est.) .	640	442	500	345	140	97

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, *National Patterns of R&D Resources, 1953-75* (NSF 75-307).

Table 3-18. Expenditures for basic research in industry by selected fields, 1967-73
[Dollars in millions]

Selected fields[1]	1967	1968	1969	1970	1971	1972	1973
	Current dollars						
Engineering	$172	$181	$170	$170	$159	$182	$187
Chemistry	162	191	213	196	186	181	186
Physics and astronomy	146	126	111	107	101	94	93
Biological sciences	NA	50	58	71	77	60	67
Clinical medical sciences	NA	26	16	36	40	21	27
Mathematics	12	13	13	13	14	12	12
Environmental sciences	14	11	11	8	8	6	6
	Constant 1967 dollars[2]						
Engineering	$172	$174	$156	$148	$132	$146	$142
Chemistry	162	184	195	170	155	146	142
Physics and astronomy	146	121	102	93	84	76	71
Biological sciences	NA	48	53	62	64	48	51
Clinical medical sciences	NA	25	15	31	33	17	21
Mathematics	12	12	12	11	12	10	9
Environmental sciences	14	11	10	7	7	5	5

[1] See Appendix table 3-18a for descriptions of these fields.
[2] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, *Research and Development in Industry 1973* (NSF 75-315).

Table 3-18a. Fields of industrial basic research expenditures

Field of science	Illustrative subfields
Engineering	Aeronautical, astronautical, chemical, civil, electrical, mechanical engineering, and metallurgy and materials.
Geological sciences	Geodesy, hydrology, geochemistry, seismology, and soil sciences.
Atmospheric sciences	Aeronomy, weather modification, and meteorology.
Clinical medical sciences	All sciences concerned with the use of scientific knowledge for the identification, treatment, and cure of disease. Includes internal medicine, neurology, preventive medicine and public health, psychiatry, dentistry, and pharmacy.
Biological sciences	All sciences which deal with life processes, including plant and animal sciences, bacteriology, pathology, microbiology, and pharmacology.
Other sciences	Multidisciplinary and interdisciplinary projects which cannot be classified within one of the above primary fields of science.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973* (NSF 75-315).

Table 3-21. Publication output for selected fields of science, percent of yearly totals by sectors, 1960-73

Field and sector	1960	1962	1964	1966	1968	1969	1970	1971	1972	1973
Astronomy										
Academic	71	79	80	74	76	79	84	84	82	79
Industry	5	—	3	6	4	5	3	4	5	4
Government	20	10	9	19	18	17	12	11	12	16
Nonprofit	2	4	3	2	3	—	—	—	1	1
Other	2	6	5	—	—	—	2	1	—	—
Atmospheric sciences										
Academic	56	53	53	50	53	52	60	57	56	58
Industry	6	9	13	20	12	12	9	7	11	10
Government	31	36	32	26	32	33	29	33	31	29
Nonprofit	8	3	2	4	1	1	1	2	3	3
Other	0	—	—	2	1	2	1	2	—	1
Biology										
Academic	70	78	73	73	79	75	80	78	79	81
Industry	5	3	3	5	4	3	3	3	3	2
Government	16	14	14	13	10	14	12	12	11	10
Nonprofit	7	4	8	7	6	7	5	6	6	7
Other	2	1	2	2	1	1	1	1	1	1
Chemistry										
Academic	59	61	62	60	70	68	68	69	77	75
Industry	25	30	29	26	21	24	23	22	17	18
Government	11	8	6	10	8	7	8	6	4	5
Nonprofit	3	1	2	4	1	1	1	2	1	(1)
Other	2	(1)	1	1	1	1	1	1	1	1
Economics										
Academic	72	75	70	83	87	82	92	81	88	78
Industry	7	9	14	6	6	—	1	7	3	5
Government	12	10	11	8	4	16	4	8	3	9
Nonprofit	3	—	—	—	—	—	—	—	—	1
Other	7	7	5	3	3	3	3	5	7	7
Engineering										
Academic	25	25	27	29	33	33	35	37	37	39
Industry	58	60	55	50	49	49	48	48	49	44
Government	12	14	16	17	15	16	14	13	13	14
Nonprofit	2	(1)	2	2	1	2	2	2	1	2
Other	3	2	1	2	1	1	1	1	1	1
Geology										
Academic	51	48	57	58	70	58	60	66	68	67
Industry	14	23	13	20	14	22	15	10	14	10
Government	18	18	20	15	10	14	16	17	11	18
Nonprofit	3	4	5	2	3	3	9	7	6	3
Other	15	8	6	5	2	4	1	1	2	2
Mathematics										
Academic	77	71	79	77	88	90	91	93	93	93
Industry	17	18	13	18	6	6	5	5	5	5
Government	4	5	1	2	4	1	3	2	2	2
Nonprofit	—	—	1	—	—	—	—	—	(1)	—
Other	2	7	7	3	1	3	(1)	(1)	(1)	(1)
Oceanography										
Academic	63	67	71	55	57	54	67	67	61	64
Industry	2	4	2	5	10	9	10	12	7	7
Government	33	22	21	26	25	30	19	13	24	21
Nonprofit	2	7	7	12	8	4	4	9	5	7
Other	—	1	—	2	—	1	1	—	2	1

(Continued)

Table 3-22b. Index of R&D expenditures in universities and colleges, 1964-72
(based on constant 1967 dollars[1])

Field	1964	1966	1968	1970	1971[2]
Biology	100	129	140	142	152
Chemistry	100	121	135	119	120
Engineering	100	154	173	162	162
Mathematics	100	125	159	182	173
Physics	100	128	130	111	107

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.
[2] Interpolated from 1970 and 1972 data.

SOURCE: National Science Foundation, *Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1973* (NSF 75-316-A).

Table 3-23. Citations per basic patent, by type of citation, 1950-61 and 1962-73

Type of citation	1950-61[1]	1962-73[2]
	Citations per basic patent	
All types	3.2	2.9
Basic research	0.6	0.7
Basic and/or applied research	1.2	1.3
Other patents	2.1	1.6
	Number of citations	
All types	148	135
Basic research	26	35
Basic and/or applied research	53	59
Other patents	95	76

[1] Based on 46 basic patents with citations.
[2] Based on 47 basic patents with citations.

SOURCE: Franklin Pierce College Law Center and the PTC Research Foundation, *Indicators of the Role of Science in Patented Technology*, 1974 (A study commissioned specifically for this report).

Table 3-24. Number and percent of basic patents citing research literature, by field of science and engineering, 1950-61 and 1962-73[1]

	1950-61		1962-73	
Field	Number[2]	Percent	Number[3]	Percent
Electrical engineering	7	32	9	31
Chemistry	7	32	8	28
Physics	2	9	9	31
Biology	5	23	2	7
Metallurgy	3	14	1	3
Mechanical engineering	2	9	2	7
Medicine	1	5	1	3

[1] A single patent may contain more than one citation, and these may be related to more than one field of science and engineering.
[2] Based on 22 basic patents with citations to basic or applied research.
[3] Based on 29 basic patents with citations to basic or applied research.

SOURCE: Franklin Pierce College Law Center and the PTC Research Foundation, *Indicators of the Role of Science in Patented Technology*, 1974 (A study commissioned specifically for this report).

Table 4-1. Industrial R&D expenditures, 1960-74
(Dollars in billions)

Year	Current dollars	Constant 1967 dollars[1]
1960	$10.5	$12.0
1961	10.9	12.3
1962	11.5	12.7
1963	12.6	13.9
1964	13.5	14.6
1965	14.2	15.0
1966	15.5	16.0
1967	16.4	16.4
1968	17.4	16.8
1969	18.3	16.8
1970	18.1	15.7
1971	18.3	15.2
1972	19.4	15.6
1973	20.9	16.0
1974 (est)	22.0	15.2

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

SOURCE: National Science Foundation, *National Patterns of R&D Resources, 1953-75*, (NSF 75-307).

Table 4-2. Expenditures for industrial R&D, advertising, and new plant and equipment, by manufacturing industries, 1960-73
(Current dollars in billions)

Year	Expenditures for industrial R&D		Expenditures for advertising	Expenditures for new plant and equipment
	All sources	Industry sources		
1960	$10.5	$4.4	$5.2	$10.1
1961	10.9	4.7	5.3	9.8
1962	11.5	5.0	5.6	10.4
1963	12.6	5.4	6.0	11.4
1964	13.5	5.8	6.6	13.3
1965	14.2	6.4	7.5	16.6
1966	15.5	7.2	8.1	20.2
1967	16.4	8.0	8.3	20.4
1968	17.4	8.9	8.7	20.6
1969	18.3	9.9	9.5	22.3
1970	18.1	10.3	9.5	22.2
1971	18.3	10.6	9.7	21.0
1972(est)	19.4	11.3	10.0	22.9
1973(est)	20.9	12.7	12.8	27.8

SOURCE: National Science Foundation, *National Patterns of R&D Resources, 1953-75* (NSF 75-307) and Department of Commerce, Bureau of the Census, *Statistical Abstracts of the U.S.*, 1960-74.

Table 4-3. Expenditures for industrial R&D, by source of funds, 1960-74

(Dollars in billions)

Year	Current dollars		Constant 1967 dollars[1]	
	Industry	Federal Government	Industry	Federal Government
1960	$4.4	$6.1	$5.0	$6.9
1961	4.7	6.2	5.2	7.0
1962	5.0	6.4	5.6	7.2
1963	5.4	7.3	5.9	8.0
1964	5.8	7.7	6.3	8.3
1965	6.4	7.7	6.8	8.2
1966	7.2	8.3	7.4	8.6
1967	8.0	8.4	8.0	8.4
1968	8.9	8.6	8.5	8.2
1969	9.9	8.5	9.0	7.8
1970	10.3	7.8	8.9	6.8
1971	10.6	7.7	8.9	6.4
1972	11.3	8.0	9.1	6.5
1973	12.7	8.3	9.7	6.3
1974(est)	13.7	8.3	9.2	5.7

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

SOURCE: National Science Foundation, *National Patterns of R&D Resources, 1953-75* (NSF 75-307).

Table 4-4. Scientists and engineers[1] engaged in industrial R&D, by source of funds, 1960-74
(as of January of each year)

Year	Total	Industry	Federal Government
1960	292,000	163,400	128,600
1961	312,100	172,900	139,200
1962	312,000	172,800	139,200
1963	327,300	168,800	158,500
1964	340,200	174,700	165,500
1965	343,600	180,400	163,200
1966	353,200	190,100	163,100
1967	367,200	205,000	162,200
1968	376,700	218,200	158,500
1969	387,100	227,500	159,600
1970	384,100	232,500	151,600
1971	366,800	237,800	129,000
1972	350,100	232,000	118,100
1973	356,600	238,400	118,200
1974	360,600	249,600	111,000

[1] Full-time equivalent basis.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973* (NSF 75-315).

Table 3-25. Number and percent of citations in basic patents to research literature and other patents, by source of citation, 1950-61 and 1962-73

Source of citation[1]	1950-61		1962-73	
	Number	Percent	Number	Percent
	All citations			
All sources	148	100	135	100
Government	8	5	19	14
Universities and nonprofit institutions	15	10	30	22
Corporations	120	81	79	59
Unidentified	5	3	7	5
	Basic research			
All sources	26	100	35	100
Government	1	4	8	23
Universities and nonprofit institutions	13	50	20	57
Corporations	9	35	3	9
Unidentified	3	12	4	11
	Basic and/or applied research			
All sources	53	100	59	100
Government	3	6	15	25
Universities and nonprofit institutions	15	28	28	48
Corporations	30	57	9	15
Unidentified	5	9	7	12
	Other patents			
All sources	95	100	76	100
Government	5	5	4	5
Universities and nonprofit institutions	—	—	2	3
Corporations	90	95	70	92
Unidentified	—	—	—	—

[1] Source is defined as the institution performing the cited research, or owning the cited patent.

SOURCE: Franklin Pierce College Law Center and the PTC Research Foundation, *Indicators of the Role of Science in Patented Technology*, 1974 (A study commissioned specifically for this report).

Table 3-21 (Continued)

Physics										
Academic	50	57	62	62	66	70	68	66	61	72
Industry	28	29	27	29	23	19	19	17	20	16
Government	17	12	8	7	10	10	12	15	18	11
Nonprofit	4	2	2	3	1	—	(1)	1	—	—
Other	1	—	1	—	—	1	1	—	(1)	—
Political science										
Academic	81	85	84	85	89	90	93	83	82	91
Industry	—	—	5	3	4	4	2	6	4	2
Government	6	9	5	8	2	4	4	6	8	6
Nonprofit	8	—	5	5	—	2	—	2	2	—
Other	6	6	—	—	4	2	2	4	6	2
Psychology										
Academic	59	65	64	72	79	80	70	74	74	NA
Industry	4	3	1	1	1	2	2	3	3	NA
Government	7	12	6	7	7	7	6	5	5	NA
Nonprofit	9	7	9	12	5	7	16	11	12	NA
Other	21	14	19	8	8	5	6	7	7	NA
Sociology										
Academic	63	64	66	83	82	86	86	86	83	90
Industry	2	4	3	2	(1)	1	2	2	1	1
Government	4	7	6	2	4	3	4	3	4	3
Nonprofit	—	3	7	4	5	4	2	3	3	2
Other	31	22	19	9	8	6	6	7	9	3

[1] Less than 0.5 percent.

SOURCE: National Federation of Abstracting and Indexing Services, *Indicators of the Output of Scientific Research*, 1974 (A study commissioned specifically for this report and partially supported by the Office of Science Information Service of the National Science Foundation).

Table 3-22a. Index of research publications in universities and colleges, 1966-73

Field	1966	1968	1970	1972	1973
Biology	100	123	132	141	151
Chemistry	100	136	129	160	149
Engineering	100	127	147	157	158
Mathematics	100	135	168	193	191
Physics	100	129	125	114	131

SOURCE: National Federation of Abstracting and Indexing Services, *Indicators of the Output of Scientific Research*, 1974 (A study commissioned specifically for this report and partially supported by the Office of Science Information Service of the National Science Foundation).

Table 3-19. Basic research expenditures in nonprofit institutions,[1] by source, 1960-74
[Dollars in millions]

Year	Current dollars				Constant 1967 dollars[2]			
	Total	Federal Government	Industry	Own funds[3]	Total	Federal Government	Industry	Own funds[3]
1960	$117	$ 58	$10	$ 49	$133	$ 66	$11	$56
1961	126	57	11	58	142	64	12	65
1962	161	80	12	69	179	89	13	77
1963	180	95	14	71	197	104	15	78
1964	194	108	15	71	210	117	16	77
1965	210	120	16	74	223	127	17	78
1966	226	132	18	76	233	136	19	78
1967	221	125	19	77	221	125	19	77
1968	217	118	20	79	209	113	19	76
1969	213	111	22	80	195	102	20	73
1970	208	100	25	83	181	87	22	72
1971	225	110	25	90	187	92	21	75
1972	245	125	25	95	197	101	20	76
1973	255	130	30	95	194	99	23	72
1974(est.)	274	144	30	100	189	100	21	69

[1] Includes State-administered hospitals.
[2] GNP inplicit deflators used to convert current dollars to constant 1967 dollars.
[3] Includes State and local government funds.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, *National Patterns of R&D Resources, 1953-75* (NSF 75-307).

Table 3-20. Relative growth in scientific research publications, by selected fields of science, 1960-73

Field of science	Percent growth after 1960								
	1962	1964	1966	1968	1969	1970	1971	1972	1973
Astronomy	17	44	66	90	107	107	124	144	144
Atmospheric sciences	56	79	117	198	181	223	231	264	240
Biology	22	47	77	102	113	114	119	130	142
Chemistry	28	47	56	82	75	77	67	94	87
Engineering	7	39	56	72	74	90	94	92	79
Geology	7	15	24	32	43	39	55	50	69
Mathematics	22	42	84	117	159	162	162	195	193
Oceanography	19	21	49	76	116	91	84	100	75
Physics	36	47	72	109	108	97	99	98	93
Economics	—	—	5	15	33	26	26	25	25
Political science	—	3	8	31	58	53	44	50	53
Psychology	15	141	129	145	198	234	263	256	NA
Sociology	56	177	176	216	216	199	226	275	210

SOURCE: National Federation of Abstracting and Indexing Services, *Indicators of the Output of Scientific Research*, 1974 (A study commissioned specifically for this report and partially supported by the Office of Science Information Service of the National Science Foundation).

Table 3-17. Expenditures for basic research in industry, by major performing industries, 1960-73
[Dollars in millions]

Year	All industries	Aircraft and missiles	Electrical equipment and communications	Machinery	Chemicals and allied products	All other industries
			Current dollars			
1960	$376	$62	$ 77	$22	$115	$100
1961	395	40	79	25	124	127
1962	488	55	125	27	136	145
1963	522	59	133	25	152	153
1964	549	68	134	26	153	168
1965	592	74	148	22	173	175
1966	624	74	122	26	176	226
1967	629	73	131	26	184	215
1968	642	71	134	31	201	205
1969	618	67	134	21	206	190
1970	629	63	144	20	230	172
1971	610	54	145	20	241	150
1972	579	61	154	23	206	135
1973	599	52	166	25	222	134
			Constant 1967 dollars[1]			
1960	$428	$71	$ 88	$25	$131	$114
1961	444	45	89	28	139	143
1962	542	61	139	30	151	161
1963	573	65	146	27	167	168
1964	593	73	145	28	165	181
1965	628	78	157	23	183	186
1966	644	76	126	27	182	233
1967	629	73	131	26	184	215
1968	617	68	129	30	193	197
1969	567	61	123	19	189	174
1970	547	55	125	17	200	150
1971	507	45	121	17	200	125
1972	466	49	124	19	166	109
1973	456	40	126	19	169	102

[1] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, *Research and Development in Industry, 1973* (NSF 75-315).

Table 3-15. Federal obligations for intramural basic research, by selected agencies, 1960-74
[Dollars in millions]

Agency	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974 (est.)
	Current dollars														
Total	$160	$206	$251	$299	$363	$424	$444	$472	$502	$565	$646	$535	$607	$585	$635
Department of Defense	53	54	64	73	76	80	85	82	86	90	96	99	113	112	104
National Aeronautics and Space Administration[1]	27	49	63	84	127	158	155	163	179	202	239	172	202	189	222
Department of Agriculture	23	28	32	37	43	57	62	63	67	77	85	87	97	100	107
Department of Health, Education and Welfare	18	25	31	39	45	47	59	67	70	88	114	68	77	79	86
Department of the Interior	19	21	23	24	26	31	34	40	41	43	40	41	47	55	66
Department of Commerce	9	11	15	19	21	22	20	22	24	26	36	35	33	14	15
Other agencies	11	18	22	23	25	29	29	35	35	39	36	33	38	36	35
	Constant 1967 dollars[2]														
Total	$182	$231	$279	$328	$389	$446	$458	$472	$483	$518	$562	$445	$488	$446	$439
Department of Defense	60	62	72	80	82	85	88	82	83	83	83	82	91	85	72
National Aeronautics and Space Administration[1]	31	55	70	92	137	168	160	163	172	185	208	143	163	144	153
Department of Agriculture	26	31	36	41	46	60	64	63	64	71	74	72	78	76	74
Department of Health, Education and Welfare	20	28	34	43	49	50	61	67	67	81	99	57	62	60	59
Department of the Interior	22	24	26	26	28	33	35	40	39	39	35	34	38	42	46
Department of Commerce	10	12	17	21	23	23	21	22	23	24	31	29	27	11	10
Other Agencies	13	20	24	25	27	31	30	35	34	36	31	27	31	27	24

[1] The large amounts reported by NASA for basic research are due to the substantial cost of support equipment such as spacecraft and launch vehicles peculiar to space exploration, and the statistical prorations of costs for tracking and data acquisition.
[2] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, *Federal Funds for Research, Development and other Scientific Activities, Fiscal Years 1973, 1974, and 1975*, Vol. XXIII (NSF 74-320-A), and earlier volumes.

Table 3-14. Basic research expenditures at Federally Funded Research and Development Centers administered by universities, by source, 1964-74
[Dollars in millions]

Year	All sources		Federal sources		Non-Federal	
	All R&D	Basic research	All R&D	Basic research	All R&D	Basic research
	Current dollars					
1964	$629.2	$191.0	$629.2	$191.0	(1)	(1)
1966	629.5	226.5	629.4	226.5	$0.1	(1)
1968	718.9	275.6	715.3	273.4	3.6	$2.2
1970	736.8	268.7	734.1	267.1	2.7	1.6
1972	763.6	250.2	758.3	248.0	5.3	2.2
1973	816.9	297.0	812.9	295.0	4.0	2.0
1974	865.0	290.9	861.2	288.9	3.8	2.0
	Constant 1967 dollars[2]					
1964	$679.7	$206.3	$679.7	$206.3	(1)	(1)
1966	649.6	233.7	649.5	233.7	$0.1	(1)
1968	691.2	265.0	687.7	262.9	3.5	$2.1
1970	640.6	233.6	638.3	232.2	2.3	1.4
1972	614.5	201.4	610.3	199.6	4.3	1.8
1973	622.5	226.3	619.4	224.8	3.0	1.5
1974	597.7	201.0	595.1	199.6	2.6	1.4

[1] Less than $50,000.
[2] GNP implicit price deflators used to convert dollars to constant 1967 dollars.

SOURCE: National Science Foundation, *National Patterns of R&D Resources, 1953-75* (NSF 75-307) and special tabulations.

Table 3-11. Concentration of R&D expenditures at the 100 universities and colleges with the greatest expenditures in selected fields, 1974
[Dollars in millions]

Rank of institutions	Life sciences		Physical sciences		Social sciences		Engineering		Environmental sciences	
	Current dollars	Cumulative percent[1]	Current dollars	Cumulative percent[1]	Current dollars	Cumulative percent[1]	Current dollars	Cumulative percent[1]	Current dollars	Cumulative percent[1]
First 10	$ 354	22	$104	31	$ 75	30	$113	33	$108	47
First 20	605	37	160	47	116	47	164	47	146	63
First 30	790	49	197	58	142	58	203	59	169	73
First 40	931	58	226	67	161	66	234	68	183	79
First 50	1,049	65	250	74	176	72	259	75	194	84
First 60	1,153	71	266	78	187	76	278	80	203	88
First 70	1,242	77	279	82	196	80	293	85	209	91
First 80	1,316	81	289	85	204	83	304	88	214	93
First 90	1,378	85	297	88	210	86	314	91	217	94
First 100	1,431	89	304	90	215	88	322	93	220	95

[1] Based on total R&D expenditures in individual fields.

SOURCE: National Science Foundation, special tabulations.

Table 3-12. Basic research expenditures per scientist and engineer[1] in doctorate-granting institutions, by source, 1966-74

	1966	1968	1970	1972	1973	1974 (Prelim.)
	Basic research expenditures per scientist and engineer (in constant 1967 dollars[2])					
All sources	$11,500	$11,700	$10,300	$10,100	$9,500	$8,400
Federal	8,900	8,900	7,500	7,100	6,900	6,300
Non-Federal	2,600	2,800	2,900	3,000	2,700	2,100
	Basic research expenditures (in millions of constant 1967 dollars)					
All sources	$1,319	$1,555	$1,538	$1,598	$1,519	$1,372
Federal	1,021	1,178	1,110	1,123	1,096	1,034
Non-Federal	298	377	427	475	424	338
	Basic research expenditures (in millions of current dollars)					
All sources	$1,278	$1,617	$1,769	$1,986	$1,994	$1,986
Federal	989	1,225	1,277	1,396	1,438	1,497
Non-Federal	279	392	492	591	556	489
Scientists and engineers[1]	114,500[3]	132,800[3]	148,700[3]	158,500[3]	159,641	163,526

[1] Includes all scientists and engineers (full-time equivalent basis) employed in universities granting doctorate degrees in at least one field of science or engineering as of January.
[2] GNP implicit price deflators used to convert current dollars to constant 1967 dollars.
[3] Estimated.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, special tabulations.