

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

ELEVENTH YEAR MATHEMATICS

Wednesday, June 18, 1980 — 9:15 a.m. to 12:15 p.m., only

The last page of the booklet is the answer sheet. Fold the last page along the perforations and, slowly and carefully, tear off the answer sheet. Then fill in the heading of your answer sheet.

The "Reference Tables for Mathematics" which you may need to answer some questions in this examination are stapled in the center of this booklet.

When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer paper cannot be accepted if you fail to sign this declaration.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.

Directions (1–20): Write in the space provided on the separate answer sheet the numeral preceding the expression that best completes each statement or answers each question.

1 The sum of $\sqrt{-2}$ and $\sqrt{-18}$ is

- (1) $6i$ (3) $5i\sqrt{2}$
 (2) $2i\sqrt{5}$ (4) $4i\sqrt{2}$

2 What is the solution set of the equation

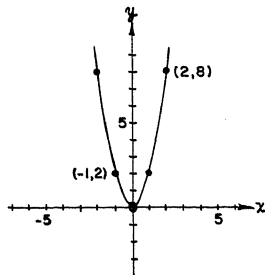
$$\frac{1}{15} + \frac{1}{10} = \frac{1}{x}?$$

- (1) {12.5} (3) {3}
 (2) {25} (4) {6}

3 If $x = \frac{a\sqrt{b}}{c}$, then $\log x$ is equal to

- (1) $\log a + \frac{1}{2} \log b - \log c$
 (2) $\log a + 2 \log b - \log c$
 (3) $\log a - \frac{1}{2} \log b + \log c$
 (4) $\log a - 2 \log b - \log c$

4 Which is an equation of the quadratic function shown in the accompanying graph?



- (1) $y = \frac{1}{2}x^2$
 (2) $y = -\frac{1}{2}x^2$
 (3) $y = 2x^2$
 (4) $y = -2x^2$

5 If the product of two consecutive integers is 0, one of the integers may be

- (1) 1 (3) 3
 (2) 2 (4) 4

6 The function $\sin \frac{9\pi}{4}$ has the same value as

- (1) $\sin 90^\circ$ (3) $\sin 45^\circ$
 (2) $\sin 60^\circ$ (4) $\sin 30^\circ$

7 What is the amplitude of the graph of

$$y = 2 \sin \frac{1}{2}x?$$

- (1) 1 (3) $\frac{1}{2}$
 (2) 2 (4) 4

8 What is the numerical value of $3^{-1} + 4^{-1}$?

- (1) $\frac{1}{7}$ (3) $\frac{1}{12}$
 (2) 7^{-2} (4) $\frac{7}{12}$

9 The solution set of $2^{x^2+2x} = 2^{-1}$ is

- (1) {1} (3) {1, -1}
 (2) {-1} (4) { }

10 Which value of B is in the solution set of the equation $\sin 2B = 0$?

- (1) $\frac{\pi}{6}$ (3) $\frac{\pi}{3}$
 (2) $\frac{\pi}{2}$ (4) $\frac{\pi}{4}$

11 Which represents the solution set for x in the inequality $|2x - 1| < 7$?

- (1) $\{x|x < -3 \text{ or } x > 4\}$ (3) $\{x|-3 < x < 4\}$
 (2) $\{x|x < -4 \text{ or } x > 3\}$ (4) $\{x|-4 < x < 3\}$

12 If $\sin(A - 30^\circ) = \cos 60^\circ$, the number of degrees in the measure of angle A is

- (1) 30 (3) 90
 (2) 60 (4) 120

13 The expression $(\cot \theta)(\sec \theta)$ is equivalent to

- (1) $\csc \theta$ (3) $\cos \theta$
 (2) $\sin \theta$ (4) $\tan \theta$

14 Given the equation: $x^2 + bx + x + b = 0$

One value of x which satisfies the equation is $x = -b$. Which is another value of x that satisfies the equation?

- (1) 1 (3) -1
 (2) 2 (4) -2

15 If b is a positive real number, then $\frac{b}{\sqrt{b}}$ is equivalent to

- (1) 1 (3) $\frac{1}{\sqrt{b}}$
 (2) $\frac{1}{\sqrt{1}}$ (4) \sqrt{b}

16 If $\sin \theta = \frac{1 - \sqrt{17}}{4}$, then angle θ lies in which quadrants?

- (1) I and II, only (3) III and IV, only
(2) II and IV, only (4) I, II, III, and IV

17 If x varies directly with y , then when x is

- (1) multiplied by 2, y is multiplied by 2
(2) multiplied by 2, y is divided by 2
(3) increased by 2, y is increased by 2
(4) increased by 2, y is decreased by 2

18 Which value of k will make the roots of the equation $x^2 - 2kx + 16 = 0$ real, rational, and equal?

- (1) $-2\sqrt{2}$ (3) $4\sqrt{2}$
(2) 2 (4) -4

19 What is the domain of the function $f(x) = \sqrt{x - 2}$?

- (1) $\{x|x \geq 0\}$ (3) $\{x|x \leq 2\}$
(2) $\{x|x \geq 2\}$ (4) $\{x|x \geq -2\}$

20 In triangle ABC , $a = 2$, $b = 3$, and $c = 4$. What is the value of $\cos C$?

- (1) $-\frac{1}{16}$ (3) $-\frac{1}{4}$
(2) $\frac{1}{16}$ (4) $\frac{1}{4}$

Directions (21–30): Write your answers in the spaces provided on the separate answer sheet. Unless otherwise specified, answers may be left in terms of π or in radical form.

21 If $f(x) = x^{\frac{2}{3}}$, find $f(-27)$.

22 Factor completely: $6t^2 - 7t - 3$

23 What is the additive inverse of $2 - 3i$?

24 In triangle ABC , $\sin A = 0.8$, $\sin B = 0.3$, and $a = 24$. Find the length of side b .

25 Express 72° in radian measure. [Answer may be left in terms of π .]

26 Solve the following system of equations for x in terms of a and b , where $a \neq 0$ and $b \neq 0$:

$$\begin{aligned} ax + y &= b \\ 2ax + y &= 2b \end{aligned}$$

27 If $\sin x = \frac{3}{5}$, what is the value of $\cos 2x$?

28 If $\theta = \text{Arc cos} \left(\frac{\sqrt{3}}{2} \right)$, what is the measure of angle θ ?

29 What is the slope of a line that is perpendicular to the line which passes through the points $(0,0)$ and $(5,5)$?

30 Find the value of $\cos 55^\circ 23'$.

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Answers to the following questions are to be placed on paper provided by the school.

Part II

Answer four questions from this part. Show all work unless otherwise directed.

31 *a* Find to the *nearest tenth* the roots of the equation

$$3x = 2 + \frac{2}{x}. \quad [8]$$

b If $x = \sin \theta$, use the answers obtained in part *a* to determine the quadrant(s) in which angle θ may lie. [2]

32 *a* Starting with the formulas for $\sin(A - B)$ and for $\cos(A - B)$, derive the formula for $\tan(A - B)$ in terms of $\tan A$ and $\tan B$. [5]

b For all values of B for which the expressions are defined, prove the following is an identity:

$$\tan(45^\circ - B) = \frac{\cos B - \sin B}{\cos B + \sin B} \quad [5]$$

33 A shopkeeper bought a shipment of identical dresses for a total of \$800. She sold all but 4 of the dresses for \$10 more than each dress cost her, and had total receipts of \$980. How many dresses were in the original shipment? [*Only an algebraic solution will be accepted.*] [5.5]

34 *a* The volume of a cylinder is found by the formula $V = \pi r^2 h$. If the volume (V) equals 142 and the radius (r) equals 5.2, use logarithms to find h to the *nearest tenth*. [Use $\pi = 3.14$.] [8]

b The graph of $y = \log_2 x$ lies in quadrants

- (1) I and II, only (3) III and IV, only
(2) II and III, only (4) I and IV, only [2]

35 *a* Two consecutive sides of a parallelogram are 8 centimeters and 10 centimeters long, respectively. If the length of the longer diagonal of the parallelogram is 14 centimeters, find the measure of the largest angle of the parallelogram to the *nearest degree*. [7]

b Using your answer to part *a*, find the area of the parallelogram to the *nearest square centimeter*. [3]

36 *a* On the same set of axes, sketch the graphs of $y = 2 \sin x$ and $y = \cos \frac{1}{2}x$ as x varies from 0 to 2π radians. [8]

b State the number of values of x in the interval $0 \leq x \leq 2\pi$ that satisfy the equation $2 \sin x = \cos \frac{1}{2}x$. [2]

*37 *a* On a graph, indicate the solution set of $\{(x,y) | xy \geq 12 \text{ and } x - 2y < 2\}$. [8]

b From your graph in part *a*, give the coordinates of a point which does *not* satisfy either inequality. [2]

* This question is based on an optional topic in the syllabus.

(B) Values of Trigonometric Functions

(B) Values of Trigonometric Functions

Angle	Sin	Cos	Tan	Cot	
0° 00'	.0000	1.0000	.0000	—	90° 00'
10	.0029	1.0000	.0029	343.77	50
20	.0058	1.0000	.0058	171.89	40
30	.0087	1.0000	.0087	114.59	30
40	.0116	.9999	.0116	85.940	20
50	.0145	.9999	.0145	68.750	10
1° 00'	.0175	.9998	.0175	57.290	89° 00'
10	.0204	.9998	.0204	49.104	50
20	.0233	.9997	.0233	42.964	40
30	.0262	.9997	.0262	38.188	30
40	.0291	.9996	.0291	34.368	20
50	.0320	.9995	.0320	31.242	10
2° 00'	.0349	.9994	.0349	28.636	88° 00'
10	.0378	.9993	.0378	26.432	50
20	.0407	.9992	.0407	24.542	40
30	.0436	.9990	.0437	22.904	30
40	.0465	.9989	.0466	21.470	20
50	.0494	.9988	.0495	20.206	10
3° 00'	.0523	.9986	.0524	19.081	87° 00'
10	.0552	.9985	.0553	18.075	50
20	.0581	.9983	.0582	17.169	40
30	.0610	.9981	.0612	16.350	30
40	.0640	.9980	.0641	15.605	20
50	.0669	.9978	.0670	14.924	10
4° 00'	.0698	.9976	.0699	14.301	86° 00'
10	.0727	.9974	.0729	13.727	50
20	.0756	.9971	.0758	13.197	40
30	.0785	.9969	.0787	12.706	30
40	.0814	.9967	.0816	12.251	20
50	.0843	.9964	.0846	11.826	10
5° 00'	.0872	.9962	.0875	11.430	85° 00'
10	.0901	.9959	.0904	11.059	50
20	.0929	.9957	.0934	10.712	40
30	.0958	.9954	.0963	10.385	30
40	.0987	.9951	.0992	10.078	20
50	.1016	.9948	.1022	9.7882	10
6° 00'	.1045	.9945	.1051	9.5144	84° 00'
10	.1074	.9942	.1080	9.2553	50
20	.1103	.9939	.1110	9.0098	40
30	.1132	.9936	.1139	8.7769	30
40	.1161	.9932	.1169	8.5555	20
50	.1190	.9929	.1198	8.3450	10
7° 00'	.1219	.9925	.1228	8.1443	83° 00'
10	.1248	.9922	.1257	7.9530	50
20	.1276	.9918	.1287	7.7704	40
30	.1305	.9914	.1317	7.5958	30
40	.1334	.9911	.1346	7.4287	20
50	.1363	.9907	.1376	7.2687	10
8° 00'	.1392	.9903	.1405	7.1154	82° 00'
10	.1421	.9899	.1435	6.9682	50
20	.1449	.9894	.1465	6.8269	40
30	.1478	.9890	.1495	6.6912	30
40	.1507	.9886	.1524	6.5606	20
50	.1536	.9881	.1554	6.4348	10
9° 00'	.1564	.9877	.1584	6.3138	81° 00'
	Cos	Sin	Cot	Tan	Angle

(B) Values of Trigonometric Functions

Angle	Sin	Cos	Tan	Cot	
9° 00'	.1564	.9877	.1584	6.3138	81° 00'
10	.1593	.9872	.1614	6.1970	50
20	.1622	.9868	.1644	6.0844	40
30	.1650	.9863	.1673	5.9758	30
40	.1679	.9858	.1703	5.8708	20
50	.1708	.9853	.1733	5.7694	10
10° 00'	.1736	.9848	.1763	5.6713	80° 00'
10	.1765	.9843	.1793	5.5764	50
20	.1794	.9838	.1823	5.4845	40
30	.1822	.9833	.1853	5.3955	30
40	.1851	.9827	.1883	5.3093	20
50	.1880	.9822	.1914	5.2257	10
11° 00'	.1908	.9816	.1944	5.1446	79° 00'
10	.1937	.9811	.1974	5.0658	50
20	.1965	.9805	.2004	4.9894	40
30	.1994	.9799	.2035	4.9152	30
40	.2022	.9793	.2065	4.8430	20
50	.2051	.9787	.2095	4.7729	10
12° 00'	.2079	.9781	.2126	4.7046	78° 00'
10	.2108	.9775	.2156	4.6382	50
20	.2136	.9769	.2186	4.5736	40
30	.2164	.9763	.2217	4.5107	30
40	.2193	.9757	.2247	4.4494	20
50	.2221	.9750	.2278	4.3897	10
13° 00'	.2250	.9744	.2309	4.3315	77° 00'
10	.2278	.9737	.2339	4.2747	50
20	.2306	.9730	.2370	4.2193	40
30	.2334	.9724	.2401	4.1653	30
40	.2363	.9717	.2432	4.1126	20
50	.2391	.9710	.2462	4.0611	10
14° 00'	.2419	.9703	.2493	4.0108	76° 00'
10	.2447	.9696	.2524	3.9617	50
20	.2476	.9689	.2555	3.9136	40
30	.2504	.9681	.2586	3.8667	30
40	.2532	.9674	.2617	3.8208	20
50	.2560	.9667	.2648	3.7760	10
15° 00'	.2588	.9659	.2679	3.7321	75° 00'
10	.2616	.9652	.2711	3.6891	50
20	.2644	.9644	.2742	3.6470	40
30	.2672	.9636	.2773	3.6059	30
40	.2700	.9628	.2805	3.5656	20
50	.2728	.9621	.2836	3.5261	10
16° 00'	.2756	.9613	.2867	3.4874	74° 00'
10	.2784	.9605	.2899	3.4495	50
20	.2812	.9596	.2931	3.4124	40
30	.2840	.9588	.2962	3.3759	30
40	.2868	.9580	.2994	3.3402	20
50	.2896	.9572	.3026	3.3052	10
17° 00'	.2924	.9563	.3057	3.2709	73° 00'
10	.2952	.9555	.3089	3.2371	50
20	.2979	.9546	.3121	3.2041	40
30	.3007	.9537	.3153	3.1716	30
40	.3035	.9528	.3185	3.1397	20
50	.3062	.9520	.3217	3.1084	10
18° 00'	.3090	.9511	.3249	3.0777	72° 00'
	Cos	Sin	Cot	Tan	Angle

(B) Values of Trigonometric Functions

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Angle	Sin	Cos	Tan	Cot	
18° 00'	.3090	.9511	.3249	3.0777	72° 00'
10	.3118	.9502	.3281	3.0475	50
20	.3145	.9492	.3314	3.0178	40
30	.3173	.9483	.3346	2.9887	30
40	.3201	.9474	.3378	2.9600	20
50	.3228	.9465	.3411	2.9319	10
19° 00'	.3256	.9455	.3443	2.9042	71° 00'
10	.3283	.9446	.3476	2.8770	50
20	.3311	.9436	.3508	2.8502	40
30	.3338	.9426	.3541	2.8239	30
40	.3365	.9417	.3574	2.7980	20
50	.3393	.9407	.3607	2.7725	10
20° 00'	.3420	.9397	.3640	2.7475	70° 00'
10	.3448	.9387	.3673	2.7228	50
20	.3475	.9377	.3706	2.6985	40
30	.3502	.9367	.3739	2.6746	30
40	.3529	.9356	.3772	2.6511	20
50	.3557	.9346	.3805	2.6279	10
21° 00'	.3584	.9336	.3839	2.6051	69° 00'
10	.3611	.9325	.3872	2.5826	50
20	.3638	.9315	.3906	2.5605	40
30	.3665	.9304	.3939	2.5386	30
40	.3692	.9293	.3973	2.5172	20
50	.3719	.9283	.4006	2.4960	10
22° 00'	.3746	.9272	.4040	2.4751	68° 00'
10	.3773	.9261	.4074	2.4545	50
20	.3800	.9250	.4108	2.4342	40
30	.3827	.9239	.4142	2.4142	30
40	.3854	.9228	.4176	2.3945	20
50	.3881	.9216	.4210	2.3750	10
23° 00'	.3907	.9205	.4245	2.3559	67° 00'
10	.3934	.9194	.4279	2.3369	50
20	.3961	.9182	.4314	2.3183	40
30	.3987	.9171	.4348	2.2998	30
40	.4014	.9159	.4383	2.2817	20
50	.4041	.9147	.4417	2.2637	10
24° 00'	.4067	.9135	.4452	2.2460	66° 00'
10	.4094	.9124	.4487	2.2286	50
20	.4120	.9112	.4522	2.2113	40
30	.4147	.9100	.4557	2.1943	30
40	.4173	.9088	.4592	2.1775	20
50	.4200	.9075	.4628	2.1609	10
25° 00'	.4226	.9063	.4663	2.1445	65° 00'
10	.4253	.9051	.4699	2.1283	50
20	.4279	.9038	.4734	2.1123	40
30	.4305	.9026	.4770	2.0965	30
40	.4331	.9013	.4806	2.0809	20
50	.4358	.9001	.4841	2.0655	10
26° 00'	.4384	.8988	.4877	2.0503	64° 00'
10	.4410	.8975	.4913	2.0353	50
20	.4436	.8962	.4950	2.0204	40
30	.4462	.8949	.4986	2.0057	30
40	.4488	.8936	.5022	1.9912	20
50	.4514	.8923	.5059	1.9768	10
27° 00'	.4540	.8910	.5095	1.9626	63° 00'
	Cos	Sin	Cot	Tan	Angle

(B) Values of Trigonometric Functions

Angle	Sin	Cos	Tan	Cot	
27° 00'	.4540	.8910	.5095	1.9626	63° 00'
10	.4566	.8897	.5132	1.9486	50
20	.4592	.8884	.5169	1.9347	40
30	.4617	.8870	.5206	1.9210	30
40	.4643	.8857	.5243	1.9074	20
50	.4669	.8843	.5280	1.8940	10
28° 00'	.4695	.8829	.5317	1.8807	62° 00'
10	.4720	.8816	.5354	1.8676	50
20	.4746	.8802	.5392	1.8546	40
30	.4772	.8788	.5430	1.8418	30
40	.4797	.8774	.5467	1.8291	20
50	.4823	.8760	.5505	1.8165	10
29° 00'	.4848	.8746	.5543	1.8040	61° 00'
10	.4874	.8732	.5581	1.7917	50
20	.4899	.8718	.5619	1.7796	40
30	.4924	.8704	.5658	1.7675	30
40	.4950	.8689	.5696	1.7556	20
50	.4975	.8675	.5735	1.7437	10
30° 00'	.5000	.8660	.5774	1.7321	60° 00'
10	.5025	.8646	.5812	1.7205	50
20	.5050	.8631	.5851	1.7090	40
30	.5075	.8616	.5890	1.6977	30
40	.5100	.8601	.5930	1.6864	20
50	.5125	.8587	.5969	1.6753	10
31° 00'	.5150	.8572	.6009	1.6643	59° 00'
10	.5175	.8557	.6048	1.6534	50
20	.5200	.8542	.6088	1.6426	40
30	.5225	.8526	.6128	1.6319	30
40	.5250	.8511	.6168	1.6212	20
50	.5275	.8496	.6208	1.6107	10
32° 00'	.5299	.8480	.6249	1.6003	58° 00'
10	.5324	.8465	.6289	1.5900	50
20	.5348	.8450	.6330	1.5798	40
30	.5373	.8434	.6371	1.5697	30
40	.5398	.8418	.6412	1.5597	20
50	.5422	.8403	.6453	1.5497	10
33° 00'	.5446	.8387	.6494	1.5399	57° 00'
10	.5471	.8371	.6536	1.5301	50
20	.5495	.8355	.6577	1.5204	40
30	.5519	.8339	.6619	1.5108	30
40	.5544	.8323	.6661	1.5013	20
50	.5568	.8307	.6703	1.4919	10
34° 00'	.5592	.8290	.6745	1.4826	56° 00'
10	.5616	.8274	.6787	1.4733	50
20	.5640	.8258	.6830	1.4641	40
30	.5664	.8241	.6873	1.4550	30
40	.5688	.8225	.6916	1.4460	20
50	.5712	.8208	.6959	1.4370	10
35° 00'	.5736	.8192	.7002	1.4281	55° 00'
10	.5760	.8175	.7046	1.4193	50
20	.5783	.8158	.7089	1.4106	40
30	.5807	.8141	.7133	1.4019	30
40	.5831	.8124	.7177	1.3934	20
50	.5854	.8107	.7221	1.3848	10
36° 00'	.5878	.8090	.7265	1.3764	54° 00'
	Cos	Sin	Cot	Tan	Angle

(B) Values of Trigonometric Functions

(C) Logarithms of Trigonometric Functions

(B) Values of Trigonometric Functions

Angle	Sin	Cos	Tan	Cot	
36° 00'	.5878	.8090	.7265	1.3764	54° 00'
10	.5901	.8073	.7310	1.3680	50
20	.5925	.8056	.7355	1.3597	40
30	.5948	.8039	.7400	1.3514	30
40	.5972	.8021	.7445	1.3432	20
50	.5995	.8004	.7490	1.3351	10
37° 00'	.6018	.7986	.7536	1.3270	53° 00'
10	.6041	.7969	.7581	1.3190	50
20	.6065	.7951	.7627	1.3111	40
30	.6088	.7934	.7673	1.3032	30
40	.6111	.7916	.7720	1.2954	20
50	.6134	.7898	.7766	1.2876	10
38° 00'	.6157	.7880	.7813	1.2799	52° 00'
10	.6180	.7862	.7860	1.2723	50
20	.6202	.7844	.7907	1.2647	40
30	.6225	.7826	.7954	1.2572	30
40	.6248	.7808	.8002	1.2497	20
50	.6271	.7790	.8050	1.2423	10
39° 00'	.6293	.7771	.8098	1.2349	51° 00'
10	.6316	.7753	.8146	1.2276	50
20	.6338	.7735	.8195	1.2203	40
30	.6361	.7716	.8243	1.2131	30
40	.6383	.7698	.8292	1.2059	20
50	.6406	.7679	.8342	1.1988	10
40° 00'	.6428	.7660	.8391	1.1918	50° 00'
10	.6450	.7642	.8441	1.1847	50
20	.6472	.7623	.8491	1.1778	40
30	.6494	.7604	.8541	1.1708	30
40	.6517	.7585	.8591	1.1640	20
50	.6539	.7566	.8642	1.1571	10
41° 00'	.6561	.7547	.8693	1.1504	49° 00'
10	.6583	.7528	.8744	1.1436	50
20	.6604	.7509	.8796	1.1369	40
30	.6626	.7490	.8847	1.1303	30
40	.6648	.7470	.8899	1.1237	20
50	.6670	.7451	.8952	1.1171	10
42° 00'	.6691	.7431	.9004	1.1106	48° 00'
10	.6713	.7412	.9057	1.1041	50
20	.6734	.7392	.9110	1.0977	40
30	.6756	.7373	.9163	1.0913	30
40	.6777	.7353	.9217	1.0850	20
50	.6799	.7333	.9271	1.0786	10
43° 00'	.6820	.7314	.9325	1.0724	47° 00'
10	.6841	.7294	.9380	1.0661	50
20	.6862	.7274	.9435	1.0599	40
30	.6884	.7254	.9490	1.0538	30
40	.6905	.7234	.9545	1.0477	20
50	.6926	.7214	.9601	1.0416	10
44° 00'	.6947	.7193	.9657	1.0355	46° 00'
10	.6967	.7173	.9713	1.0295	50
20	.6988	.7153	.9770	1.0235	40
30	.7009	.7133	.9827	1.0176	30
40	.7030	.7112	.9884	1.0117	20
50	.7050	.7092	.9942	1.0058	10
45° 00'	.7071	.7071	1.0000	1.0000	45° 00'
	Cos	Sin	Cot	Tan	Angle

(C) Logarithms of Trigonometric Functions*

Angle	L Sin	L Cos	L Tan	L Cot	
0° 00'	—	10.0000	—	—	90° 00'
10	7.4637	10.0000	7.4637	12.5363	50
20	7.7648	10.0000	7.7648	12.2352	40
30	7.9408	10.0000	7.9408	12.0591	30
40	8.0658	10.0000	8.0658	11.9342	20
50	8.1627	10.0000	8.1627	11.8373	10
1° 00'	8.2419	9.9999	8.2419	11.7581	89° 00'
10	8.3088	9.9999	8.3089	11.6911	50
20	8.3668	9.9999	8.3669	11.6331	40
30	8.4179	9.9999	8.4181	11.5819	30
40	8.4637	9.9998	8.4638	11.5362	20
50	8.5050	9.9998	8.5053	11.4947	10
2° 00'	8.5428	9.9997	8.5431	11.4569	88° 00'
10	8.5776	9.9997	8.5779	11.4221	50
20	8.6097	9.9996	8.6101	11.3899	40
30	8.6397	9.9996	8.6401	11.3599	30
40	8.6677	9.9995	8.6682	11.3318	20
50	8.6940	9.9995	8.6945	11.3055	10
3° 00'	8.7188	9.9994	8.7194	11.2806	87° 00'
10	8.7423	9.9993	8.7429	11.2571	50
20	8.7645	9.9993	8.7652	11.2348	40
30	8.7857	9.9992	8.7865	11.2135	30
40	8.8059	9.9991	8.8067	11.1933	20
50	8.8251	9.9990	8.8261	11.1739	10
4° 00'	8.8436	9.9989	8.8446	11.1554	86° 00'
10	8.8613	9.9989	8.8624	11.1376	50
20	8.8783	9.9988	8.8795	11.1205	40
30	8.8946	9.9987	8.8960	11.1040	30
40	8.9104	9.9986	8.9118	11.0882	20
50	8.9256	9.9985	8.9272	11.0728	10
5° 00'	8.9403	9.9983	8.9420	11.0580	85° 00'
10	8.9545	9.9982	8.9563	11.0437	50
20	8.9682	9.9981	8.9701	11.0299	40
30	8.9816	9.9980	8.9836	11.0164	30
40	8.9945	9.9979	8.9966	11.0034	20
50	9.0070	9.9977	9.0093	10.9907	10
6° 00'	9.0192	9.9976	9.0216	10.9784	84° 00'
10	9.0311	9.9975	9.0336	10.9664	50
20	9.0426	9.9973	9.0453	10.9547	40
30	9.0539	9.9972	9.0567	10.9433	30
40	9.0648	9.9971	9.0678	10.9322	20
50	9.0755	9.9969	9.0786	10.9214	10
7° 00'	9.0859	9.9968	9.0891	10.9109	83° 00'
10	9.0961	9.9966	9.0995	10.9005	50
20	9.1060	9.9964	9.1096	10.8904	40
30	9.1157	9.9963	9.1194	10.8806	30
40	9.1252	9.9961	9.1291	10.8709	20
50	9.1345	9.9959	9.1385	10.8615	10
8° 00'	9.1436	9.9958	9.1478	10.8522	82° 00'
10	9.1525	9.9956	9.1569	10.8431	50
20	9.1612	9.9954	9.1658	10.8342	40
30	9.1697	9.9952	9.1745	10.8255	30
40	9.1781	9.9950	9.1831	10.8169	20
50	9.1863	9.9948	9.1915	10.8085	10
9° 00'	9.1943	9.9946	9.1997	10.8003	81° 00'
	L Cos	L Sin	L Cot	L Tan	Angle

* These tables give the logarithms increased by 10. Hence in each case 10 should be subtracted.

© Logarithms of Trigonometric Functions

© Logarithms of Trigonometric Functions*

Angle	L Sin	L Cos	L Tan	L Cot	
9° 00'	9.1943	9.9946	9.1997	10.8003	81° 00'
10	9.2022	9.9944	9.2078	10.7922	50
20	9.2100	9.9942	9.2158	10.7842	40
30	9.2176	9.9940	9.2236	10.7764	30
40	9.2251	9.9938	9.2313	10.7687	20
50	9.2324	9.9936	9.2389	10.7611	10
10° 00'	9.2397	9.9934	9.2463	10.7537	80° 00'
10	9.2468	9.9931	9.2536	10.7464	50
20	9.2538	9.9929	9.2609	10.7391	40
30	9.2606	9.9927	9.2680	10.7320	30
40	9.2674	9.9924	9.2750	10.7250	20
50	9.2740	9.9922	9.2819	10.7181	10
11° 00'	9.2806	9.9919	9.2887	10.7113	79° 00'
10	9.2870	9.9917	9.2953	10.7047	50
20	9.2934	9.9914	9.3020	10.6980	40
30	9.2997	9.9912	9.3085	10.6915	30
40	9.3058	9.9909	9.3149	10.6851	20
50	9.3119	9.9907	9.3212	10.6788	10
12° 00'	9.3179	9.9904	9.3275	10.6725	78° 00'
10	9.3238	9.9901	9.3336	10.6664	50
20	9.3296	9.9899	9.3397	10.6603	40
30	9.3353	9.9896	9.3458	10.6542	30
40	9.3410	9.9893	9.3517	10.6483	20
50	9.3466	9.9890	9.3576	10.6424	10
13° 00'	9.3521	9.9887	9.3634	10.6366	77° 00'
10	9.3575	9.9884	9.3691	10.6309	50
20	9.3629	9.9881	9.3748	10.6252	40
30	9.3682	9.9878	9.3804	10.6196	30
40	9.3734	9.9875	9.3859	10.6141	20
50	9.3786	9.9872	9.3914	10.6086	10
14° 00'	9.3837	9.9869	9.3968	10.6032	76° 00'
10	9.3887	9.9866	9.4021	10.5979	50
20	9.3937	9.9863	9.4074	10.5926	40
30	9.3986	9.9859	9.4127	10.5873	30
40	9.4035	9.9856	9.4178	10.5822	20
50	9.4083	9.9853	9.4230	10.5770	10
15° 00'	9.4130	9.9849	9.4281	10.5719	75° 00'
10	9.4177	9.9846	9.4331	10.5669	50
20	9.4223	9.9843	9.4381	10.5619	40
30	9.4269	9.9839	9.4430	10.5570	30
40	9.4314	9.9836	9.4479	10.5521	20
50	9.4359	9.9832	9.4527	10.5473	10
16° 00'	9.4403	9.9828	9.4575	10.5425	74° 00'
10	9.4447	9.9825	9.4622	10.5378	50
20	9.4491	9.9821	9.4669	10.5331	40
30	9.4533	9.9817	9.4716	10.5284	30
40	9.4576	9.9814	9.4762	10.5238	20
50	9.4618	9.9810	9.4808	10.5192	10
17° 00'	9.4659	9.9806	9.4853	10.5147	73° 00'
10	9.4700	9.9802	9.4898	10.5102	50
20	9.4741	9.9798	9.4943	10.5057	40
30	9.4781	9.9794	9.4987	10.5013	30
40	9.4821	9.9790	9.5031	10.4969	20
50	9.4861	9.9786	9.5075	10.4925	10
18° 00'	9.4900	9.9782	9.5118	10.4882	72° 00'
	L Cos	L Sin	L Cot	L Tan	Angle

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Angle	L Sin	L Cos	L Tan	L Cot	
18° 00'	9.4900	9.9782	9.5118	10.4882	72° 00'
10	9.4939	9.9778	9.5161	10.4839	50
20	9.4977	9.9774	9.5203	10.4797	40
30	9.5015	9.9770	9.5245	10.4755	30
40	9.5052	9.9765	9.5287	10.4713	20
50	9.5090	9.9761	9.5329	10.4671	10
19° 00'	9.5126	9.9757	9.5370	10.4630	71° 00'
10	9.5163	9.9752	9.5411	10.4589	50
20	9.5199	9.9748	9.5451	10.4549	40
30	9.5235	9.9743	9.5491	10.4509	30
40	9.5270	9.9739	9.5531	10.4469	20
50	9.5306	9.9734	9.5571	10.4429	10
20° 00'	9.5341	9.9730	9.5611	10.4389	70° 00'
10	9.5375	9.9725	9.5650	10.4350	50
20	9.5409	9.9721	9.5689	10.4311	40
30	9.5443	9.9716	9.5727	10.4273	30
40	9.5477	9.9711	9.5766	10.4234	20
50	9.5510	9.9706	9.5804	10.4196	10
21° 00'	9.5543	9.9702	9.5842	10.4158	69° 00'
10	9.5576	9.9697	9.5879	10.4121	50
20	9.5609	9.9692	9.5917	10.4083	40
30	9.5641	9.9687	9.5954	10.4046	30
40	9.5673	9.9682	9.5991	10.4009	20
50	9.5704	9.9677	9.6028	10.3972	10
22° 00'	9.5736	9.9672	9.6064	10.3936	68° 00'
10	9.5767	9.9667	9.6100	10.3900	50
20	9.5798	9.9661	9.6136	10.3864	40
30	9.5828	9.9656	9.6172	10.3828	30
40	9.5859	9.9651	9.6208	10.3792	20
50	9.5889	9.9646	9.6243	10.3757	10
23° 00'	9.5919	9.9640	9.6279	10.3721	67° 00'
10	9.5948	9.9635	9.6314	10.3686	50
20	9.5978	9.9629	9.6348	10.3652	40
30	9.6007	9.9624	9.6383	10.3617	30
40	9.6036	9.9618	9.6417	10.3583	20
50	9.6065	9.9613	9.6452	10.3548	10
24° 00'	9.6093	9.9607	9.6486	10.3514	66° 00'
10	9.6121	9.9602	9.6520	10.3480	50
20	9.6149	9.9596	9.6553	10.3447	40
30	9.6177	9.9590	9.6587	10.3413	30
40	9.6205	9.9584	9.6620	10.3380	20
50	9.6232	9.9579	9.6654	10.3346	10
25° 00'	9.6259	9.9573	9.6687	10.3313	65° 00'
10	9.6286	9.9567	9.6720	10.3280	50
20	9.6313	9.9561	9.6752	10.3248	40
30	9.6340	9.9555	9.6785	10.3215	30
40	9.6366	9.9549	9.6817	10.3183	20
50	9.6392	9.9543	9.6850	10.3150	10
26° 00'	9.6418	9.9537	9.6882	10.3118	64° 00'
10	9.6444	9.9530	9.6914	10.3086	50
20	9.6470	9.9524	9.6946	10.3054	40
30	9.6495	9.9518	9.6977	10.3023	30
40	9.6521	9.9512	9.7009	10.2991	20
50	9.6546	9.9505	9.7040	10.2960	10
27° 00'	9.6570	9.9499	9.7072	10.2928	63° 00'
	L Cos	L Sin	L Cot	L Tan	Angle

* These tables give the logarithms increased by 10. Hence in each case 10 should be subtracted.

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© Logarithms of Trigonometric Functions*

Angle	L Sin	L Cos	L Tan	L Cot	Angle
27° 00'	9.6570	9.9499	9.7072	10.2928	63° 00'
10	9.6595	9.9492	9.7103	10.2897	50
20	9.6620	9.9486	9.7134	10.2866	40
30	9.6644	9.9479	9.7165	10.2835	30
40	9.6668	9.9473	9.7196	10.2804	20
50	9.6692	9.9466	9.7226	10.2774	10
28° 00'	9.6716	9.9459	9.7257	10.2743	62° 00'
10	9.6740	9.9453	9.7287	10.2713	50
20	9.6763	9.9446	9.7317	10.2683	40
30	9.6787	9.9439	9.7348	10.2652	30
40	9.6810	9.9432	9.7378	10.2622	20
50	9.6833	9.9425	9.7408	10.2592	10
29° 00'	9.6856	9.9418	9.7438	10.2562	61° 00'
10	9.6878	9.9411	9.7467	10.2533	50
20	9.6901	9.9404	9.7497	10.2503	40
30	9.6923	9.9397	9.7526	10.2474	30
40	9.6946	9.9390	9.7556	10.2444	20
50	9.6968	9.9383	9.7585	10.2415	10
30° 00'	9.6990	9.9375	9.7614	10.2386	60° 00'
10	9.7012	9.9368	9.7644	10.2356	50
20	9.7033	9.9361	9.7673	10.2327	40
30	9.7055	9.9353	9.7701	10.2299	30
40	9.7076	9.9346	9.7730	10.2270	20
50	9.7097	9.9338	9.7759	10.2241	10
31° 00'	9.7118	9.9331	9.7788	10.2212	59° 00'
10	9.7139	9.9323	9.7816	10.2184	50
20	9.7160	9.9315	9.7845	10.2155	40
30	9.7181	9.9308	9.7873	10.2127	30
40	9.7201	9.9300	9.7902	10.2098	20
50	9.7222	9.9292	9.7930	10.2070	10
32° 00'	9.7242	9.9284	9.7958	10.2042	58° 00'
10	9.7262	9.9276	9.7986	10.2014	50
20	9.7282	9.9268	9.8014	10.1986	40
30	9.7302	9.9260	9.8042	10.1958	30
40	9.7322	9.9252	9.8070	10.1930	20
50	9.7342	9.9244	9.8097	10.1903	10
33° 00'	9.7361	9.9236	9.8125	10.1875	57° 00'
10	9.7380	9.9228	9.8153	10.1847	50
20	9.7400	9.9219	9.8180	10.1820	40
30	9.7419	9.9211	9.8208	10.1792	30
40	9.7438	9.9203	9.8235	10.1765	20
50	9.7457	9.9194	9.8263	10.1737	10
34° 00'	9.7476	9.9186	9.8290	10.1710	56° 00'
10	9.7494	9.9177	9.8317	10.1683	50
20	9.7513	9.9169	9.8344	10.1656	40
30	9.7531	9.9160	9.8371	10.1629	30
40	9.7550	9.9151	9.8398	10.1602	20
50	9.7568	9.9142	9.8425	10.1575	10
35° 00'	9.7586	9.9134	9.8452	10.1548	55° 00'
10	9.7604	9.9125	9.8479	10.1521	50
20	9.7622	9.9116	9.8506	10.1494	40
30	9.7640	9.9107	9.8533	10.1467	30
40	9.7657	9.9098	9.8559	10.1441	20
50	9.7675	9.9089	9.8586	10.1414	10
36° 00'	9.7692	9.9080	9.8613	10.1387	54° 00'
	L Cos	L Sin	L Cot	L Tan	Angle

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Angle	L Sin	L Cos	L Tan	L Cot	Angle
36° 00'	9.7692	9.9080	9.8613	10.1387	54° 00'
10	9.7710	9.9070	9.8639	10.1361	50
20	9.7727	9.9061	9.8666	10.1334	40
30	9.7744	9.9052	9.8692	10.1308	30
40	9.7761	9.9042	9.8718	10.1282	20
50	9.7778	9.9033	9.8745	10.1255	10
37° 00'	9.7795	9.9023	9.8771	10.1229	53° 00'
10	9.7811	9.9014	9.8797	10.1203	50
20	9.7828	9.9004	9.8824	10.1176	40
30	9.7844	9.8995	9.8850	10.1150	30
40	9.7861	9.8985	9.8876	10.1124	20
50	9.7877	9.8975	9.8902	10.1098	10
38° 00'	9.7893	9.8965	9.8928	10.1072	52° 00'
10	9.7910	9.8955	9.8954	10.1046	50
20	9.7926	9.8945	9.8980	10.1020	40
30	9.7941	9.8935	9.9006	10.0994	30
40	9.7957	9.8925	9.9032	10.0968	20
50	9.7973	9.8915	9.9058	10.0942	10
39° 00'	9.7989	9.8905	9.9084	10.0916	51° 00'
10	9.8004	9.8895	9.9110	10.0890	50
20	9.8020	9.8884	9.9135	10.0865	40
30	9.8035	9.8874	9.9161	10.0839	30
40	9.8050	9.8864	9.9187	10.0813	20
50	9.8066	9.8853	9.9212	10.0788	10
40° 00'	9.8081	9.8843	9.9238	10.0762	50° 00'
10	9.8096	9.8832	9.9264	10.0736	50
20	9.8111	9.8821	9.9289	10.0711	40
30	9.8125	9.8810	9.9315	10.0685	30
40	9.8140	9.8800	9.9341	10.0659	20
50	9.8155	9.8789	9.9366	10.0634	10
41° 00'	9.8169	9.8778	9.9392	10.0608	49° 00'
10	9.8184	9.8767	9.9417	10.0583	50
20	9.8198	9.8756	9.9443	10.0557	40
30	9.8213	9.8745	9.9468	10.0532	30
40	9.8227	9.8733	9.9494	10.0506	20
50	9.8241	9.8722	9.9519	10.0481	10
42° 00'	9.8255	9.8711	9.9544	10.0456	48° 00'
10	9.8269	9.8699	9.9570	10.0430	50
20	9.8283	9.8688	9.9595	10.0405	40
30	9.8297	9.8676	9.9621	10.0379	30
40	9.8311	9.8665	9.9646	10.0354	20
50	9.8324	9.8653	9.9671	10.0329	10
43° 00'	9.8338	9.8641	9.9697	10.0303	47° 00'
10	9.8351	9.8629	9.9722	10.0278	50
20	9.8365	9.8618	9.9747	10.0253	40
30	9.8378	9.8606	9.9772	10.0228	30
40	9.8391	9.8594	9.9798	10.0202	20
50	9.8405	9.8582	9.9823	10.0177	10
44° 00'	9.8418	9.8569	9.9848	10.0152	46° 00'
10	9.8431	9.8557	9.9874	10.0126	50
20	9.8444	9.8545	9.9899	10.0101	40
30	9.8457	9.8532	9.9924	10.0076	30
40	9.8469	9.8520	9.9949	10.0051	20
50	9.8482	9.8507	9.9975	10.0025	10
45° 00'	9.8495	9.8495	10.0000	10.0000	45° 00'
	L Cos	L Sin	L Cot	L Tan	Angle

* These tables give the logarithms increased by 10. Hence in each case 10 should be subtracted.

FOR TEACHERS ONLY

SCORING KEY

11

ELEVENTH YEAR MATHEMATICS

Wednesday, June 15, 1980 — 9:15 a.m. to 12:15 p.m., only

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use checkmarks to indicate pupil errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. In problems involving logarithms, answers should be left correct to four significant digits unless directions say otherwise. Units need not be given when the wording of the questions allows such omissions.

Part I

Allow 2 credits for each correct answer; allow no partial credit. For questions 1–20, allow credit if the pupil has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 4	(11) 3	(21) 9
(2) 4	(12) 2	(22) $(3t + 1)(2t - 3)$
(3) 1	(13) 1	(23) $-2 + 3i$
(4) 3	(14) 3	(24) 9
(5) 1	(15) 4	(25) $\frac{2\pi}{5}$
(6) 3	(16) 3	(26) $\frac{b}{a}$
(7) 2	(17) 1	(27) $\frac{7}{25}$
(8) 4	(18) 4	(28) 30 or $\frac{\pi}{6}$
(9) 2	(19) 2	(29) -1
(10) 2	(20) 3	(30) 0.5681

[OVER]

ELEVENTH YEAR MATHEMATICS — *concluded*

Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers in Mathematics*. Care should be exercised in making deductions as to whether the error is purely a mechanical one or due to a violation of some principle. A mechanical error generally should receive a deduction of 10 percent, while an error due to a violation of some cardinal principle should receive a deduction ranging from 30 percent to 50 percent, depending on the relative importance of the principle in the solution of the problem.

$$(31) \begin{array}{l} a \ 1.2, -0.5 \quad [8] \\ b \ \text{III and IV} \quad [2] \end{array}$$

$$(35) \begin{array}{l} a \ 102 \quad [7] \\ b \ 78 \quad [3] \end{array}$$

$$(33) \ 32 \quad [5.5]$$

$$(36) \ b \ 3 \quad [2]$$

$$(34) \begin{array}{l} a \ 1.7 \quad [8] \\ b \ 4 \quad [2] \end{array}$$