meteorology, and to terrestrial and astronomical physics, require observations of such a character that they cannot be advantageously carried on otherwise than under the direction of the Government. Institutions for the study of such phenomena should be maintained by the Government; and, in particular, an observatory should be found specially devoted to astronomical physics, and an organization should be established for the more complete observation of tidal phenomena, and for the reduction of the observations.

IV. We have stated in a previous report that the national collections of natural history are accessible to private investigators, and that it is desirable that they should be made still more useful for purposes of research than they are at present. We would now express the opinion that corresponding aid ought to be afforded to persons engaged in important physical and chemical investigations; and that whenever practicable such persons should be allowed access, under proper limitations, to such laboratories as may be established or aided by the State.

V. It has been the practice to restrict grants of money made to private investigators for purposes of research to the expenditure actually incurred by them. We think that such grants might be considerably increased. We are of opinion that the restriction to which we have referred, however desirable as a general rule, should not be maintained in all cases, but that under certain circumstances, and with proper safeguards, investigators should be remunerated for their time and labour.

VI. The grant of £1,000 administered by the Royal Society, has contributed greatly to the promotion of research, and the amount of this grant may with advantage be considerably increased.

In the case of researches which involve, and are of sufficient importance to deserve exceptional expenditure, direct grants in addition to the annual grant made to the Royal Society should be made in aid of the investigations.

VII. The proper allocation of funds for research; the establishment and extension of laboratories and observatories; and, generally, the advancement of science and the promotion of scientific instruction as an essential part of public education, would be most effectually dealt with by a Minister of Science and Education. And we consider the creation of such a Ministry to be of primary importance.

VIII. The various departments of the Government have from time to time referred scientific questions to the Council of the Royal Society for its advice; and we believe that the work of a Minister of Science, even if aided by a well organized scientific staff, and also the work of the other departments, would be materially assisted if they were able to obtain, in all cases of exceptional importance or difficulty, the advice of a Council representing the scientific knowledge of the nation.

IX. This Council should represent the chief scientific bodies in the United Kingdom. With this view its composition need not differ very greatly from that of the present Government Grant Committee of the Royal Society. It might consist of men of science selected by the Council of the Royal Society, together with representatives of other important scientific societies, and a certain number of persons nominated by the Government. We think that the functions at present exercised by the Government Grant Committee might be advantageously transferred to the proposed Council.

THE SIGNAL SERVICE.

A report of the meteorological and magnetic observations of the Dominion for the year ending the 31st December, 1874, has been issued as a supplement to the seventh annual report of the Department of Marine and Fisheries, though the means of taking observations are yet, in many respects, deficient, the reports furnished to the Department, have been found of great importance to the interests of navigation. The stations from which these reports are received at the central office are thirty-five in number. Storm warnings were issued in fifty-five different days during the past year, the total number of warnings being five hundred and forty-four. To Quebec and points westward two hundred and twenty-two warnings were issued in twenty-nine days. To points below Quebec and throughout the maritime Provinces the days of warning were thirty-four, and the number three hundred and twenty-two. The warnings distributed in the several months were in January, 8; in February, 42; March, 4; April, 51; May, 44; June, 64; July, 0; August, 16; September, 70; October, 99; November, 104; December, 42. The Superintendant of the Central Office, Mr. G. T. Kingston, M. A., points out the necessity of a more skilful and experienced corps of observers, especially at those stations from whence regular and trustworthy observations are looked for, and unless the reports are such as can be relied on, they are worthless for the purpose contemplated in obtaining them. It is suggested that a special staff of properly qualified observers should be organized in addition to the existing corps, and supplied with scientific instruments requisite for the most efficient duty. The maritime interests of the Dominion are now large, and rapidly growing, already standing fifth among the nations of the world; but the efficiency of the signal service has not been allowed to keep in time with their advancement. It is no small reproach to the Government that the only station possessing self-recording apparatus similar to that used in Edgland, and without which much of the time expended is thrown away, is that of St. John's College in Manitoba, and there only supplied by the private munificence of the Bishop of Rupert's Land. We believe the intelligence of the country will heartily second the Government in any reasonable expenditure for the better equipment of the Signal corps.

VIII. Mathematical Department.

SOLUTIONS OF QUESTIONS IN THE JOURNAL FOR JUNE, 1875.

1. Multiply by $\sqrt{11} + \sqrt{7} + \sqrt{5} + \sqrt{3}$; multiply the product by $6 + 2\sqrt{55} + 2\sqrt{21}$; again, multiply the last product by $172 - 24\sqrt{55}$, and the result is a rational quantity.

2. Answered as follows by the "Shepherd of Touraine:"

He sells the first portion at a profit of 25 per cent, and the last at 175 per cent, and gains 60 per cent on the whole. The first profit is less than the mean profit by 35 per cent, and the second is greater by 115 per cent.; he has, therefore, sold 115 parts of the first against 35 of the second, that is, the first portion sold was $\frac{115}{150}$ of the whole cost; and the last $\frac{135}{150}$; but the first portion was $\frac{3}{4}$ of the cask and two gallons more; and the difference between $\frac{115}{150}$ and $\frac{3}{4}$, is $\frac{1}{60}$: $\therefore$ 2 gls. $= \frac{1}{60}$ of the cask, and the whole cask contained 120 gallons.

The 35 per cent. mentioned in the question should have been 25.

3. The formula is $f = m(s - s')$; $\therefore 12(\cdot932 - \cdot8) \times 62\frac{1}{2} = 99$lbs.

4. Let l = length, and n = the No. of divisions; then $\frac{l}{n}\sqrt{n}$, $\frac{l}{n}\sqrt{2n}$, $\frac{l}{n}\sqrt{3n}$, &c, represent the distances of the points from the upper extremity of the divided length.

$$\frac{l}{n}(\sqrt{n} \qquad = 8\cdot1649.$$

$$\frac{l}{n}(\sqrt{2n} - \sqrt{n}) = 3\cdot3821.$$

$$\frac{l}{n}(\sqrt{3n} - \sqrt{2n}) = 2\cdot5950.$$

$$\frac{l}{n}(\sqrt{4n} - \sqrt{3n}) = 2\cdot1878.$$

$$\frac{l}{n}(\sqrt{5n} - \sqrt{4n}) = 1\cdot9274.$$

$$\frac{l}{n}(\sqrt{6n} - \sqrt{5n}) = 1\cdot7426.$$

5. The extreme segments are $7\frac{1}{5}$ and 3, and the middle segment $1\frac{4}{5}$: then, if the weight is to be applied at any other point than the middle, the strength will be, as the product of the two distances is to the square of half the length of the beam between the supports. Then we have,

As $6^2 : 9 \times 3 :: 500 : 375$ = wt. for the middle.

As $7\frac{1}{5} \times 4\frac{4}{5} : 9 \times 3 :: 500 : 390\frac{5}{8}$ = wt. for D.

6. $\frac{1}{3}\pi b^2 a$ = Solidity; and $\frac{1}{3}\pi b^2 as$ = weight.

Let x = part of axis immersed; then, $a : b :: x : \frac{bx}{a}$ = rad. of section immersed, and $\frac{\pi b^2 x^3}{3a^2}$ = buoyant force; hence, $\frac{\pi b^2 x^3}{3a^2} - \frac{\pi b^2 as}{3}$ $= \frac{\pi b^2}{3a^2}\left(x^3 - a^3 s\right)$ = force the work at the vertex. $\frac{\pi b^2 x^3}{3a^2} : \frac{\pi b^2 as}{3} :: \frac{3a}{4} : \frac{3a^4 s}{4x^3}$ distance from the vertex of the common centre of gravity of the cone, and the force or weight applied at the vertex; consequently $\frac{3x}{4} = \frac{3a^4 s}{4x^3}$; $\therefore x = \pm a s^{\frac{1}{4}}$; hence by substituting for x^3, $\frac{\pi b^2}{3a^2}(a^3 s^{\frac{3}{4}} - a^3 s) = \frac{\pi b^2 a}{3}(s^{\frac{3}{4}} - s)$. Now $s^{\frac{3}{4}} - s$ being a positive quantity when s is a proper fraction, and $\frac{\pi b^2 a}{3}(s^{\frac{3}{4}} - s)$ applied at the vertex is requisite to cause the cone to float with indifference.