

servative M.P., Oldham, 1900-1906. Liberal M.P. Manchester, 1906-1908. Liberal M. P., Dundee since 1908. Held office successively as Under Secretary of State for Colonies, President Board of Trade, Home Secretary. 1911-1915, First Lord of Admiralty. In Coalition Cabinet, 1915, Chancellor of Duchy of Lancaster. Writer. Chief Works. "The River War," "London to Ladysmith via Pretoria," etc.

Rt. Hon. Reginald McKenna, born London, 1863. Educated King's College, London, Trinity Hall, Cambridge. Liberal M.P., North Monmouthshire since 1895. Barrister. President Board of Education, 1907-8. First Lord of Admiralty 1908-11. Home Secretary 1911-1915. Chancellor of Exchequer in Coalition Cabinet 1915.

G. H. C. asks for answers to the following problems:

1. A glass globe was weighed full of air. Afterwards the air was exhausted from it and it was found to weigh less. The same experiment was tried with a collapsible rubber bag, and no difference in weight was found, whether the bag did or did not contain air. Why was this?

2. When a ball is rolling rapidly on the ice the force of friction naturally tends to stop it. If the ball weighs 100 grams and the force of friction acting on it is 1,500 dynes, how much more slowly will it move at the end of half a minute than at the beginning? State the units in which answer is given.

1. When the glass globe filled with air is weighed we weigh globe and air. When the air is exhausted a vacuum is created and we weigh glass only; hence the difference.

When the collapsible rubber bag is weighed filled with air we also weigh the bag and the air contained in it. When the air is exhausted we do not create a vacuum and therefore we have the same height of air above the scale as before and exactly the same air pressure upon the scale as when the bag was full of air, therefore no difference in weight.

2. A dyne is a force which working upon 1 gram for 1 sec. causes a change of velocity of 1 cm. per sec. Therefore,:

If 1 dyne of force causes in 1 sec on 1 gram a change of velocity of 1 cm. per sec., 1500 dynes on 100 grams for 30 sec. will cause a change of

$$\frac{1500 \times 30}{100} = 450 \text{ cm.}$$

per sec. Hence the ball at the end of the 30th sec. is moving 450 cm. per sec., more slowly than at first.

Or by formula: —

$$M. V. = F.T.$$

$$100 \times V = 1500 \times 30$$

$$\therefore V = \frac{1500 \times 30}{100}$$

$$= 450 \text{ cm. per sec.}$$

$$M. = 100 \text{ gr.}$$

$$F. = 1500 \text{ dynes.}$$

$$T = 30 \text{ sec.}$$

or a negative acceleration of 450 cm. per sec.

R. MACD.

Problems sent in were illegible in places. If legible copies are sent at once, answers will be given in September.

NURSE'S SONG.

When the voices of children are heard on the green
And laughing is heard on the hill,
My heart is at rest within my breast,
And everything else is still.
"Then come home, my children, the sun is gone down,
And the dews of night arise;
Come, come, leave off play, and let us away,
Till the morning appears in the skies."

"No, no, let us play, for it is not yet day,
And we cannot go to sleep;
Besides, in the sky the little birds fly,
And the hills are all covered with sleep."
"Well, well, go and play till the light fades away,
And then go home to bed."
The little ones leaped, and shouted, and laughed,
And all the hills echoed.—William Blake.

THE TREE.

The Tree's early leaf-buds were bursting with bloom:
"Shall I take them away?" said the Frost, sweeping down.
"No; leave them alone
Till the blossoms have grown,"
Said the Tree, as he trembled from rootlet to crown.

The Tree bore his blossoms and all the birds sung;
"Shall I take them away?" said the Wind, as he swung.
"No; leave them alone
Till the berries have grown."
Said the Tree, while his leaflets quivering hung.

The Tree bore his fruit in the midsummer glow:
Said the Girl, "May I gather thy berries now?"
"Yes, all thou canst see,
Take them; all are for thee,"
Said the Tree, while he bent his branches down.

—Bjornson.