

5. What part did the Scots and Irish play in the rebellion?
6. What were the following:—Petition of Right, Divine Right, ship-money?
7. Who were—Hampton, Land, Strafford, Bradshaw, Rupert, Essex, Monk, Ironsides?
8. Assign events to the following dates:—1625, 1628, 1642, 1649, 1653, 1660.

ARITHMETIC.

GRADES VI AND VIII.

1. Simplify:— $\left\{ \frac{1\frac{1}{4} - 1\frac{1}{2}}{1\frac{1}{4} \times 1\frac{1}{2}} \right\} \div \left\{ \frac{4\frac{1}{2} \times 3\frac{3}{4}}{6\frac{1}{2} - 1\frac{1}{2}} \right\}$
2. Find the value of:— $17.25 \times 5.4 - 174024 \div 97.4$
3. Of the four.—Sum invested, amount of simple interest, Rate per cent and time. Given any three; find the fourth.
4. How much money (sterling) must be invested in the $2\frac{1}{2}$ per cents at 105 to yield an income of \$2,267.86 $\frac{1}{2}$ after deducting an income tax of 7 pence in the pound.
5. Sold 25 cwt. hay for \$220 being $\frac{1}{2}$ more than cost. Find the gain per cwt.
6. Bought a horse for \$234; how much must I ask for him, that I may strike off 10% and still gain 25% on my outlay?
7. Trees are planted 9 feet apart around a rectangular field containing 8 acres, one of whose sides measures 320 yards. How many trees will be required?
8. A and B can mow 24 acres in five days. B and C can mow 9 acres in two days, and A and C 4 acres in one day. How many acres can each mow per day?

A PROOF.

The following proof of the formula $A = \pi r^2$, may be of some service to the readers of the SCHOOL JOURNAL:—

From centre "A" describe a number of closely fitting concentric rings (resembling somewhat the annual growth in a cross section of a log). It is clear that the area of a circle is made up of the areas of the edges of their rings.

Draw a diameter $b c$. (vertically).

Then suppose the outside ring or circumference to be cut at b and straightened out at right angles to $b c$, and similarly each of the remaining rings until the centre "A" is reached. It will be now seen that an isosceles triangle has been built up, having the circumference of the circle for base, and the radius of the circle for perpendicular height.

Hence Area of Circle = Area of an isosceles triangle whose base is the circumference of the circle, and perpendicular height the radius

$$\text{of the circle— or Area of Circle} = \frac{c \cdot (2 \cdot r)r}{2} = \frac{2 \cdot r^2}{2} = \pi r^2$$

Com.

Prize Competition.

ARITHMETICAL PROBLEMS.

FOR FOURTH CLASS—BY LEX.

1. Bought eggs at the rate of 5 for 2 cents. How many must be sold for 14 cents to gain 40%?
2. A tank is 8 ft. long, 5 ft. 4 in. wide, and 4 ft. 6 in. deep. Find the number of gallons it contains, having given that 1 cubic foot of water weighs 1,000 oz., and that a pint weighs $1\frac{1}{2}$ lbs. Ans. 1200 gallons.
3. Susan can knit a pair of mittens in $\frac{2}{3}$ of a day, and Sarah can knit a pair in $\frac{3}{4}$ of day. How many pairs can both knit in a day? Ans. 4 pairs.
4. In a square lot containing $1\frac{1}{2}$ acres, how far is the centre from each side. (Give answer in rods.) Ans. 8 rods.
5. Simplify $2\frac{1}{2} (\frac{2}{3} \div \frac{2}{3} \text{ of } \frac{2}{3}) + (\frac{2}{3} \div \frac{2}{3} + \frac{1}{4})$. Ans. $4\frac{3}{4}$.
6. A rectangular field containing 15 acres is 60 rods long. How many trees 20 feet apart will be required to plant it around. Ans. 165.
7. How long will it take a train 20 rods long, and going at the rate of 15 miles an hour, to cross a bridge 15 rods long? Ans. 26 $\frac{1}{2}$ seconds.

8. A boy spent \$3.20 more than $\frac{2}{3}$ of his money, and had \$4 left. How much had he at first? Ans. \$11.52

9. Bought a Jersey cow in England for £18 11s. 6d. Paid for passage to Canada £2 15s., where I sold her for \$140. Find my gain in Canadian currency? Ans. \$36.46 $\frac{1}{2}$.

10. A can do a piece of work in $\frac{1}{2}$ of a day, B can do it in $\frac{1}{3}$ of a day, and C can do it in $\frac{1}{4}$ of a day. How long will it take all working together to do it. Ans. $\frac{1}{4}$ of a day.

11. Sold two horses for \$150 each, on one I gained 20%, and on the other I lost 20%. (1) Find my gain or loss on both? (2) Find my gain or loss per cent on both? Ans. (1) \$12 $\frac{1}{2}$ lost, (2) 4% lost.

12. A dealer in Brampton expends \$200 in Scranton coal. He pays \$4.50 per long ton for the coal in Scranton. The freight from Scranton to Brampton is fifty cents a long ton. He sells it in Brampton at \$6.50 a short ton. Find his total gain? Ans. \$91.20.

13. If a merchant sells tea at 66c. a lb., and gains 20%, what % will he gain if he sells at 77c. a lb. Ans. 40%.

14. How many lbs. of tea at 70c. a lb. must I mix with 50 lbs. at \$1 a lb. in order to sell the mixture at 80c. a lb. without loss. Ans. 100 lbs.

15. Divide \$840 among A, B and C, so that B may have \$100 less than A, and \$40 more than C. Ans. A \$360, B \$260, C \$220.

16. The diameter of the driving wheel on an engine is 7 ft. How often will it revolve in going 2 miles? Ans. 480 times.

17. A and B can do a piece of work in 4 days; B and C in 6 days; A and C in 8 days. How long will it take A and B and C together to do it? Ans. 3 $\frac{2}{3}$ days.

18. Find the cost at 30 cents a sq. yard of plastering a room 30 ft. long, 20 ft. wide, and 16 ft. high. Wainscoting 4 ft. high. Ans. \$60.00.

19. Telegraph poles are placed 8 rods apart, and a train passes one every 4 $\frac{1}{2}$ seconds. How many miles an hour is the train going? Ans. 20 miles.

20. From 200 acres take 199 acres, 3 rods, 39 rods, 30 yds., 2 ft., 36 in. Ans. 0.

21. A farmer sold 100 geese and turkeys, receiving for the geese 75 cents each, and for the turkeys \$1.25 cents each, and for the whole \$104. Find the number of each? Ans. 58 turkeys; 42 geese.

22. A has a hog weighing 300 lbs., and B has another weighing 500 lbs., C buys both hogs weighed together for 5 cents a lb. The three men agree that A's hog is worth $\frac{1}{2}$ cent a lb. more than B's and shall be paid for accordingly. How much per lb. will each receive for his hog? Ans. A 5 $\frac{1}{4}$ cents, B 4 $\frac{1}{2}$ cents.

23. A can do a piece of work in 8 days, B in 6 days. They work together for 2 days when A quits. In what time will B finish it? Ans. 2 $\frac{1}{2}$ days.

24. A publisher printed an edition of 10,000 copies of a 12mo. book of 336 pp.; how much paper did he use, allowing 1 quire to each ream for waste? Ans. 307 $\frac{1}{2}$ reams.

25. Find the cost of a log 12 ft. long and measuring 28 inches in diameter at \$2.00 a standard? Ans. \$3.92.

A CHEAP AND RELIABLE PAINT FOR SCHOOL BLACK-BOARDS.

We receive so many inquiries concerning the paint used on the University black-boards, we have concluded to print the recipe in full, and keep copies on hand to supply to our friends.

To any subscriber of the EXPONENT we will send it free on receipt of stamp.

To any one who is not a subscriber we will send it, and the NORMAL EXPONENT, one year, for 50c.

RECIPE.

$\frac{1}{2}$ lb.	Lampblack	10 cts.
$\frac{1}{2}$ lbs.	Flours of Emery	25 cts.
$\frac{1}{4}$ pt.	Japan Dryer	5 cts.
$\frac{1}{4}$ pt.	Copal Varnish	10 cts.
$\frac{1}{2}$ pt.	Boiled Linseed Oil	5 cts.
2 $\frac{1}{2}$ qts.	Turpentine	20 cts.

1 gal. Blackboard Paint..... 75 cts.

This will cover 150 square feet with two coats.

These materials must be applied with a stiff brush, and stirred up from the bottom, at every brushful, to keep the grit thoroughly mixed with the liquid materials.—The Normal Exponent.