TEACHERS' DESK.

J. C. GLASHAN, ESQ., EDITOR.

Contributors to the 'Desk' will oblige by observing the following rules :

1. To send questions for insertion on separate sheets from those containing answers to questions already proposed.
2. To write on one side of the paper.
3. To write their names on every sheet.

CORRECT ANSWERS RECEIVED.

G. S. AMSDEN, pupil of Florence School ; 76.
W. C. BRADSHAW, Everett ; 76, (79.)
CON. O'GORMAN, White Lake ; 75, (78).
R. SHEPHERD, Wyoming ; 75, 76.
HENRY GRAY, Sombra ; 76, 77, (78, 79.)
JAS. E. FRITH, Vandecar ; 75, 76, 77.

ANSWERS TO CORRESPONDETS.

Con. O'Gorman. None ; any other would be merely a variation of yours, or differ from it in some unimportant particular ; e.g., for the latter part might be substituted ' a man's wages equals $\frac{(2)-2(1)}{9}$ =$1.60.

ANSWERS TO QUERIES.

(71). Area of end of boiler equals .785398 × 50² =1963.495 square inches.

Area of steam-section=.254551 × 50²=636.377
" flue-ends=.785398 × (3¼)² × 64=530.929
∴ " water section= 796.189

(15 ft. equals 180 inches ; 1 gallon contains 277.274 cnbic inches).

∴ gallons of water= $\frac{796.189 \times 180}{277.274}$ =517 gallons nearly.

(72.) ($3\frac{1}{3}$ min.=$\frac{1}{6}$ of 20 m.=$\frac{7}{12}$ of $5\frac{5}{7}$ minutes)

10 taps empty a cisternful and 20 minute's influx in 20 minutes ;

∴ 10 taps empty $\frac{1}{6}$ of a cisternful and $3\frac{1}{3}$ minutes influx in $3\frac{1}{3}$ minutes.

Again, 15 taps empty a cisternful and $5\frac{5}{7}$ influx in 5 5-7th minutes.

∴ 15 taps empty 7-12ths of a cisternfull and $3\frac{1}{3}$ minutes influx in $3\frac{1}{3}$ minutes;

∴ (15 − 10 =) 5 taps empty $(\frac{7}{12}-\frac{1}{6}=)\frac{5}{12}$ of a cisternful in $3\frac{1}{3}$ minutes ;

∴ 12 taps empty a whole cisternful in $3\frac{1}{3}$ min. ; and 2 taps empty $\frac{1}{6}$ of a cisternful in $3\frac{1}{3}$ minutes ;

∴ (10 − 2=)8 taps carry off the influx

∴ (12 + 8=)20 taps empty a cisternful and carry off the influx in $3\frac{1}{3}$ minutes.

The solution by symbolic arithmetic is extremely easy. Let x equal No. of taps needed to empty a cisternful in 20 minutes, then the No. required equals $(10-x)+6x$;

But $20x$ equals 5 5-7ths$(x+5)$ ∴ No. required equals 20.

(73.) Let ab and ac represent any two numbers a, b, and c being prime to each other ; their G.C.M. is a, and their L.C.M. is abc ; hence we have this canon :—

Divide the L. C. M. by the G. C. M., separate the quotient into any two factors prime to each other; the products of the G. C. M. and each factor will give a pair of Nos. fulfilling the proposed conditions. *Unity is to be taken as a prime factor.*

56385 ÷ 179 = 1 × 5 × 7 × 9.

Pairs of solutions are

179 and 56385,
895 " 11277,
1253 " 8055,
161 " 16265,

(74.) Let the weight of the beam per unit of length be w and the pressure at M be p.

Take moments about N

$\frac{1}{2}w(a+c)^2 - pc - \frac{1}{2}wb^2 = 0$ - - - - - (i)

The M-moments about any point at distance x from M are $\frac{1}{2}w(a+x)^2 - px$

At B and C these moments vanish, otherwise the joints wonld bend, hence MB and MC are the values of x in

$\frac{1}{2}w(a+x)^2 - px = 0$ - - - - - (ii)

Elimination of p between (i) and (ii) leaves a quadratic in x.

Example. Let the total length be 6 ft. and the distance of the supports from the ends be 9 inches and 1 foot 10½ inches, respectively ; thus a equals 9, b equals 22½, c equals 40½ ∴ p equals $24w$ and x equals 3 or 27, which added to a equal 9 gives B at 1ft. and C at 2 ft. from A.

(Compare the example under 58.)

(75). Let W equal the weight of the body, w that of the cane and d equal the distance of the centre of gravity of the cane from D.