## ANSWERS.

W. McD. (*a*) The term Scythia, as used in ancient times, denoted a vast and undefined territory lying on the north and east of the Black Sea, the Caspian Sea, and the Sea of Aral. The word as now used does not denote so much a tract of country as a catalogue of tribes and nations.

ALPHA. (*a*) You can either send direct to publishers or order through any local bookseller. We do not know the price.
(*b*) Perhaps some science teacher will kindly answer your question.

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2,73440
2|36720
2|18360
2| 9180
2| 4590
3| 2295
3|  765
3|  255
5|   85
     17
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Answer to Question (*c*) by "Ignoramus" in last issue of the JOURNAL, by Charles Richmond, aged 9, of Parry Sound school. The headmaster informs us that the question was given to a class of twenty in Junior 3rd Class, all of whom solved it without assistance.

$$73440=2\times2\times2\times2\times2\times3\times3\times3\times5\times17$$
$$=3\times5\times2\times2\times2\times2\times3\times3\times2\times17$$
$$=15\times16\times17\times18$$

Solutions to Problems in No. 23, by T. C. Doidge: —

(*a*) Prime factors of 1800=2,2,2,3,3,5,5.
Since we have the 3rd power of 2 as a divisor, 1, 2, 4, 8 are divisors of 1800.
Also 1, 3, 9. The product of each factor of 1, 2, 4, 8 and of 1, 3, 9 gives numbers that are divisors of 1800, thus:
1, 2, 4, 8
1, 3, 9,
1, 2, 4, 8, 3, 6, 12, 24, 9, 18, 36, 72. As there is the second power of five, 5 and 25 are divisors; also the product of these divisors with each of the divisors just found, thus:
1, 2, 4, 8, 3, 6, 12, 24, 9, 18, 36, 72
1, 5, 25
1, 2, 4, 8, 3, 6, 12, 24, 9, 18, 36, 72, 5, 10, 20, 40, 15, 30, 60, 120, 45, 90, 180, 360, 25, 50, 100, 200, 75, 150, 300, 600, 225, 450, 900, 1800 = 36 divisors.
$\frac{4\times3\times3}{2^3\times3^2\times5^2}$=36 divisors. (By increasing each index 1 and multiplying.)

(*b*)
$$\frac{12}{7\times13}+\frac{6}{7\times11}+\frac{9}{11\times13}=\frac{132+78+63}{7\times13\times11}=\frac{273}{7\times13\times11}=\frac{3}{11}=.272727+$$

The decimal to be added must consist of three figures, and when added must make the result greater than 1.

$1-.272=.728$ or $\frac{728}{1000}$ *Answer.*

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 27272 +
 .728
1.00072 . .
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(*c*) $\frac{1}{5}=.2$

$\frac{1}{5^3}=\frac{1}{25}$ of $.2=.008$.

$\frac{1}{3}$ of $\frac{1}{5^3}=\frac{1}{3}$ of $.008=.002666666\ldots$

$\frac{1}{5^5}=\frac{1}{25}$ of $.008=.00032$

$\frac{1}{5}$ of $\frac{1}{5^5}=\frac{1}{5}$ of $.00032=.000064$

$\frac{1}{5^7}=\frac{1}{25}$ of $.00032=.0000128$

$\frac{1}{7}$ of $\frac{1}{5^7}$ of $.0000128=.00000182857\ldots$

{ Value of expression inside of brackets $=.2-.026+.000064-.0000182857\ldots\} = (.1973955714)\times16-\frac{4}{239}=3.158329142\ldots-0167364\ldots=3.141592+$. *Answer.*

(*d*) 125
150
225

500 bbls. @ $7 = $3,500, less 4%, or $140 = $3,360 to be divided.

Every bbl. of *A's* is worth $1\frac{1}{10}$ of *B's* ∴
" " *C's* " $\frac{58}{55}$ of $\frac{11}{10}$ of *B's*, or $\frac{29}{25}$ of *B's*.
*A's* 125 bbls. is worth as much as $137\frac{1}{2}$ bbls. of *B's*.
*C's* 225 " " " 261 " "
The money is divided into the ratio of $137\frac{1}{2}$, 150, and 261.

*A* receives $ 842.30 }
*B* " 918.87 } *Answer.*
*C* " 1,598.83 }

(*c*) The prime factors of 73440 are 2, 2, 2, 2, 2, 3, 3, 3, 5, 17. First by inspection.
5 is one of the consecutive numbers, or 10, 15, 20, 25, 30, 35, &c.
17 " " " 34, 68, 85, 102, &c.
5 and 17, or any multiple of 17, can not be two of the consecutive numbers.
10 and 17, or any multiple of 17, can not be two of the numbers.
15 and 17 may be two of the numbers; also 17 and 20, and it can be easily seen that no other multiples of 5 and 17 can be two of the numbers. Therefore the numbers are between 17 and 20 inclusive. As 19 is not one of the factors, the only numbers remaining, viz.: 15, 16, 17, 18, which are made up of the prime factors, are the four consecutive.
Second method.—Find all the divisors and arrange according to order of magnitude, thus: 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 17, 18, 20, 24, 30, 36, 40, &c. It will be seen that there are only four consecutive numbers, viz.: 15, 16, 17, 18, that are divisors of 73440, and are consequently the four consecutive factors.

T. C. DOIDGE.

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The following are my solutions to questions in your issue of November 15th, 1886:

I fancy "Quaker's" (*b*) is misprinted. If you allow *A* to have $1.25, and *C* $1.44. Then let per cent. that *B* has more than *A* be *x*.
Then let $125\times\frac{100+x}{100}\times\frac{100+x}{100}=144$. Let $\frac{100+x}{100}$ be *y*.

Then let $y^2=\frac{144}{125}$ or $y=\frac{12}{5\sqrt{5}}$.

Then let $\frac{100+x}{100}=\frac{12}{5\sqrt{5}}$ ∴ $x=7{\cdot}3345$. $1.25 and 7·3345 per cent. of itself = $1.34+ = *B's* share.
∴ Sum divided = ($1.25 + $1.34 + $1.44) = $4.03 +.

(*c*). At last payment, if he had spent $\frac{1}{3}$ of the money he had, he would have had ($\$33\frac{1}{18}$ − 50c.) = $\$32\frac{5}{9}$ left.
∴ $\$32\frac{5}{9}=\frac{2}{3}$ of money then.
$\$48\frac{5}{6}$ = money then.
Similarly in second payment:
$\$48\frac{5}{6}$ − 50c. = $\$48\frac{1}{3}=\frac{2}{3}$ of money then.
$\$72\frac{1}{2}$ = money then.
Also in first payment:
$\$72\frac{1}{2}$ − 50c. = $72 = $\frac{2}{3}$ of money then.
∴ $108 = money at first.

I think "Subscriber's" 1. is misprinted also. If you divide the fraction $\frac{17}{18}$ into two such parts that 4 times one of them added to $5\frac{1}{3}$ times the other may make $4\frac{409}{684}$; then 4 times 1st part + $5\frac{1}{3}$ times 2nd part = 4 times 1st part + 4 times 2nd part + $1\frac{1}{3}$ times 2nd part = 4 times both parts + $1\frac{1}{3}$ times 2nd part, $\frac{17}{18}\times4=\frac{34}{9}$ = 4 times both parts. ∴ $4\frac{409}{684}-\frac{34}{9}=\frac{561}{684}=1\frac{1}{3}$ times 2nd part.
∴ $\frac{3}{4}\times\frac{561}{684}=\frac{187}{342}$ = 2nd part, and $\frac{17}{18}-\frac{187}{342}=\frac{136}{342}$ = 1st part.

Ans. to No. 2 of Subscribers:—
$\frac{50}{81}(A+B)=C+D$, $\frac{56}{75}(A+C)=B+D$, $\frac{65}{66}(B+C)=A+D$. From these we get

| | | | |
|---|---|---|---|
| | 50 *A* + 50 *B* | = | 81 *C* + 81 *D* |
| | 56 *A* + 56 *C* | = | 75 *B* + 75 *D* |
| | 65 *B* + 65 *C* | = 66 *A* | + 66 *D* |
| Sum= | 106 *A* + 115 *B* + 121 *C* | = 66 *A* + 75 *B* + 81 *C* + 221 *D* | |
| | 40 (*A* + *B* + *C*) | = 222 *D* | |
| | *D* | = $\frac{20}{111}(A+B+C)$. | |