Number Theory #5)

counter example 453 digits add to 12, not divisible by 2.

I6) $-(-2)-(-5)+6 = 13$

I7) (a) $(-2)^4 = 16$ (b) $-2^4 = -16$ (c) $(-2)^{-4} = \frac{1}{16}$ (d) $(-2)^0 = 1$ (e) $-2^0 = -1$

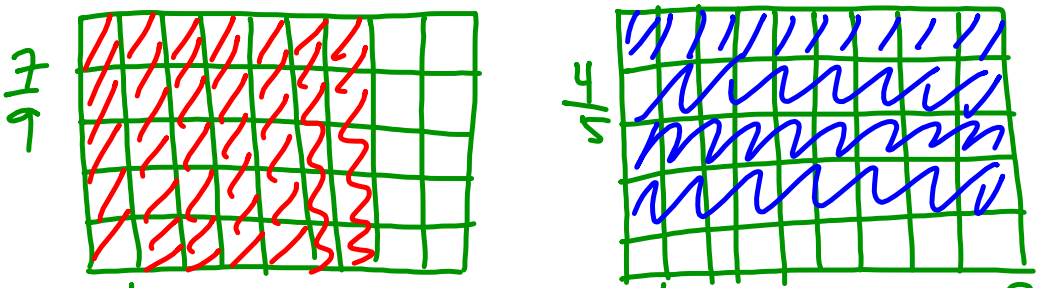
T4) yes, exponents distribute mult/div.

$(3 \cdot 4)^2 = 3^2 \cdot 4^2$ $\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2}$

T11) $1:7 = 3.2:22.4$ ✓ yes

$\frac{22.4}{3.2} = \frac{224}{32} = \frac{7}{1}$

F1) $\frac{7}{9}$, $\frac{4}{5}$ which is bigger? Draw picture.



leftover pieces: 10 leftover pieces: 9

(same size pieces)

$\Rightarrow \frac{4}{5} > \frac{7}{9}$

F6) $\frac{5}{8} \div \frac{1}{3} = 1\frac{7}{8}$

I want to run $\frac{5}{8}$ mi and take water breaks every $\frac{1}{3}$ mile. How many water breaks do I take?

I have $\frac{5}{8}$ yd of fabric. My pattern needs $\frac{1}{3}$ yd of fabric. How many of these patterns can I make?

My gas tank has $\frac{5}{8}$ gallon of gas. Every mile, I use $\frac{1}{3}$ gallon of gas. How many miles can I go?

F7) (a) $\dfrac{2}{\frac{1}{3}+\frac{1}{5}} - 4 \div \frac{32}{3}$

$= \dfrac{2}{\frac{8}{15}} - 4 \div \frac{32}{3} = \cancel{2}^{1}\left(\frac{15}{\cancel{8}_{4}}\right) - \cancel{4}^{1} \cdot \frac{3}{\cancel{32}_{8}}$

$= \frac{15}{4} - \frac{3}{8} = \frac{30}{8} - \frac{3}{8} = \boxed{\frac{27}{8}}$

F12)

$\frac{2}{3}x = 42$ $\quad x =$ orig. cost

$x = \cancel{42}^{21}\left(\frac{3}{\cancel{2}}\right) = \boxed{63}$

F13) $\frac{1}{5}$ of pop. loves ice cream $\Rightarrow$ $\frac{4}{5}$ of pop. doesn't like ice cream

$\dfrac{3}{\cancel{16}_{4}}\left(\dfrac{\cancel{4}^{1}}{5}\right) = \boxed{\frac{3}{20}}$ of pop.

F14) need $3\frac{2}{5}$ cups, have $1\frac{1}{2}$ cups

$$\frac{1\frac{1}{2}}{3\frac{2}{5}} = \frac{\frac{3}{2}}{\frac{17}{5}} = \frac{3}{2}\cdot\frac{5}{17} = \frac{15}{34} \text{ of recipe}$$

F15) $\frac{1}{6}+\frac{3}{8}+\frac{1}{4} = \frac{4}{24}+\frac{9}{24}+\frac{6}{24} = \frac{19}{24}$

$\frac{5}{24}$ of budget is left

X = amt of budget

$\frac{5}{24}X = 250$

$X = \frac{50}{250}\left(\frac{24}{\cancel{5}_1}\right)$

$X = \$1200$

T12) $\frac{2}{7}\div\frac{3}{4} \overset{?}{=} \frac{7}{2}\cdot\frac{3}{4} = \frac{21}{8}$

$\frac{2}{7}\div\frac{3}{4} \overset{?}{=} \frac{2}{7}\cdot\frac{4}{3} = \frac{8}{21}$

$\frac{2}{7}\div\frac{3}{4} = \frac{2}{7}\cdot\frac{4}{3}$

N4) $2^3\cdot 3\cdot 7\cdot 11^2$

total # factors $= (4)(2)(2)(3) = 48$

7.1B 11b) 224 and $\frac{7006}{10000} = 224\frac{7006}{10,000}$

$= 224.7006$

7.1B 15) 0.0625 and 0.125 (2 terminating decimals)

$\frac{0.0625+0.125}{2}$

keep finding midpts. there are only many.

ex is this terminating or repeating decimal?

1) $\frac{21}{15} = \frac{7}{5}$ T

2) $\frac{1}{2^2\cdot 5^2\cdot 3}$ R

3) $\frac{1}{2^{10}\cdot 5}$ T

4) $\frac{3}{14\cdot 5}$ R

7.1B 3a) $\frac{2027}{1000} = 2.027$

10) $\frac{2}{3}$ of yearly supply
$\frac{5}{7}$ of what's left
$\frac{3}{4}$ of " "
? leftover

used	leftover
$\frac{2}{3}$	$\frac{1}{3}$
$\frac{5}{7}\left(\frac{1}{3}\right)=\frac{5}{21}$	$\frac{1}{3}-\frac{5}{21}=\frac{2}{21}$
$\frac{3}{4}\left(\frac{2}{21}\right)=\frac{1}{14}$	$\frac{2}{21}-\frac{1}{14}=\frac{1}{42}$
$\frac{1}{42}$	

x= yearly supply

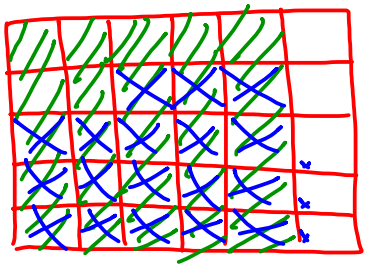
$$\frac{2}{3}x+\frac{5}{7}\left(\frac{1}{3}x\right)+\frac{3}{4}\left(\frac{1}{3}x-\frac{5}{7}\left(\frac{1}{3}x\right)\right)+a(x)=x$$

$$\frac{2}{3}+\frac{5}{7}\left(\frac{1}{3}\right)+\frac{3}{4}\left(\frac{1}{3}-\frac{5}{7}\left(\frac{1}{3}\right)\right)+a=1$$

7.1B #16) $0.00334_7 = \frac{334_7}{100{,}000_7}$

N2) Any whole # (2 or bigger) has unique prime factorizatn by Fundamental Thm of Arithmetic.

F2) $\frac{5}{6} - \frac{3}{5} = \frac{7}{30}$



I1) $-|-4| - 6^2 + (-1)^{41}(56) \div 7 \cdot 3 + (-3)^4$

$= -4 - 36 - 56 \div 7 \cdot 3 + 81$

$= -4 - 36 - 8 \cdot 3 + 81$

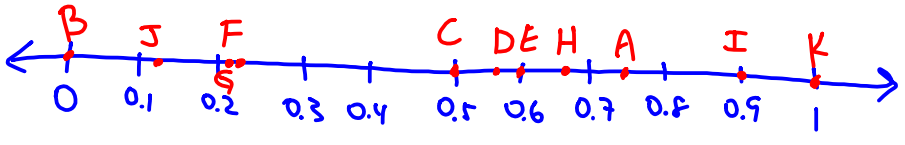
$= -4 - 36 - 24 + 81$

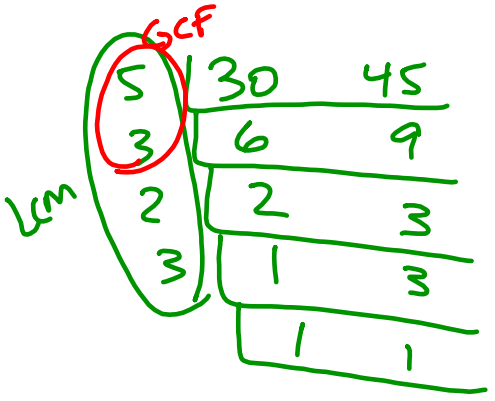
$= 81 - 64 = 17$

F8) $A = \frac{3}{4}$, $B = \frac{0}{8}$, $C = 0.5$, $D = 0.5\overline{5}$,

$E = 0.6$, $F = \frac{2}{9}$, $G = 0.22$, $H = \frac{2}{3}$, $I = 0.9$,

$K = 0.\overline{9}$ $J = \frac{1}{8}$



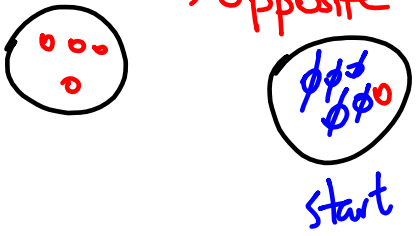


$-(-4)-5=-1$

①

②

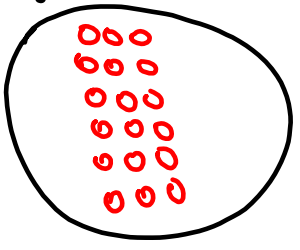
start → opposite



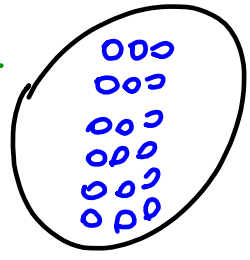
answer: -1

$-6 \cdot -3 = -(6 \cdot -3) = 18$

6 groups of -3

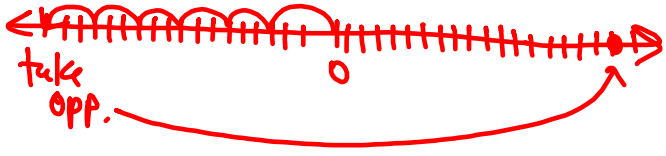


take opposite →

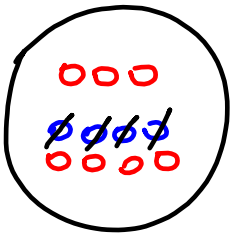


$-6 \cdot -3$

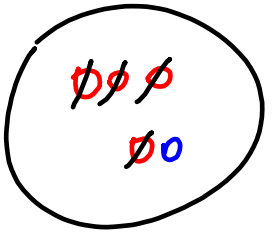
$= -(6 \cdot -3)$



$-3-4=-7$



$-3-(-4)=1$



$(5\div\frac{2}{3}=7\frac{1}{2})$

Create story problem for $5\div\frac{2}{3}\overset{(a)}{=}7$.

I have 5 yds of fabric. Each dress needs $\frac{2}{3}$ yd of fabric. How many dresses can I make?

(b) $5\div\frac{2}{3}=7\frac{1}{2}$

- I'm running 5 miles. I'll take a water break every $\frac{2}{3}$ of a mile. How many water breaks? (gives 7 as answer).
- I'm running 5 miles. The neighborhood is $\frac{2}{3}$ of a mile. How many times do I have to lap the neighborhood? (gives $7\frac{1}{2}$ as answer)

Story problem for $5\frac{3}{5}\div1\frac{1}{2}=4$.

I want $5\frac{3}{5}$ ~~hot dogs~~ gallons of gas. Each ~~pkg~~ container of ~~hot dogs~~ gas contains $1\frac{1}{2}$ ~~of them~~ gallons.

How many ~~pkgs must I buy~~ trips to gas station must I make?

$\left(\frac{28}{5}\div\frac{3}{2}=\frac{28}{5}\cdot\frac{2}{3}=\frac{56}{15}\text{ or }3\frac{11}{15}\right)$

Dress sold $\frac{1}{3}$ off. Sale price = \$42; original price = ?

$\frac{2}{3}x = 42$

Purchased radio for \$84 which is $\frac{1}{5}$ off original price. orig. price = ?

$\frac{4}{5}x = 84$

$\frac{689}{1000} = 0.689$

$\frac{3}{25}\left(\frac{4}{4}\right) = \frac{12}{100} = 0.12$

$25 = 5^2$ need $10, 10^2, 10^3, 10^4,$ or ....

$5^2 \cdot 2^2 = 10^2 = 100$

$\frac{133}{5^3 \cdot 2^2}\left(\frac{2}{2}\right)$

$= \frac{266}{5^3 \cdot 2^3} = \frac{266}{10^3} = \frac{266}{1000} = 0.266$

$\frac{1}{5^4 \cdot 2^7}\left(\frac{5^3}{5^3}\right) = \frac{125}{10^7} = 0.0000125$

$\frac{11}{6} = 1.8\overline{3}$

$$
\begin{array}{r}
1.8333\ldots \\
6\overline{)\,11.0000} \\
-\,6 \\
\hline
50 \\
-\,48 \\
\hline
20 \\
-\,18 \\
\hline
20 \\
-\,18 \\
\hline
20 \\
-\,18
\end{array}
$$

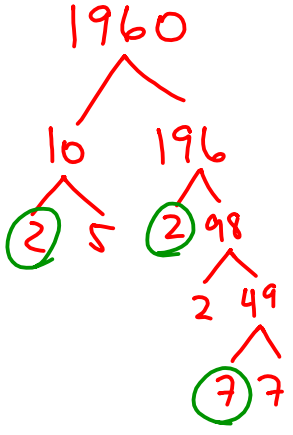
(a) $19 \nmid (3800+37)$

$19 \mid 3800$ but $19 \nmid 37$

(b) $19 \mid (3800+19)$

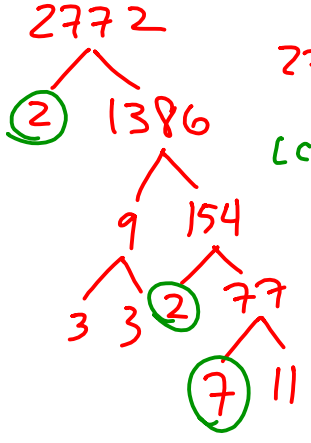
$= 19 \mid 19(200+1)$ ✓

$5 \mid 25$ ✓ $\quad 5 \nmid 26$ ✓



$1960 = 2^3 \cdot 5 \cdot 7^2$

GCF $= 2^2 \cdot 7$



$2772 = 2^2 \cdot 3^2 \cdot 7 \cdot 11$

LCM $= 2^3 \cdot 3^2 \cdot 5 \cdot 7^2 \cdot 11$

GCF(1960, 2772)

$= GCF(1960, 812) = GCF(812, 336)$

$= GCF(336, 140)$

$= GCF(140, 56)$

$= GCF(56, 28)$

$= GCF(28, 28)$

$= 28$

$$\begin{array}{r} 1960 \\ -1624 \\ \hline 336 \end{array}$$

$$\begin{array}{r} 812 \\ -672 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 336 \\ -280 \\ \hline 56 \end{array}$$

$$\begin{array}{r} 140 \\ -112 \\ \hline 28 \end{array}$$