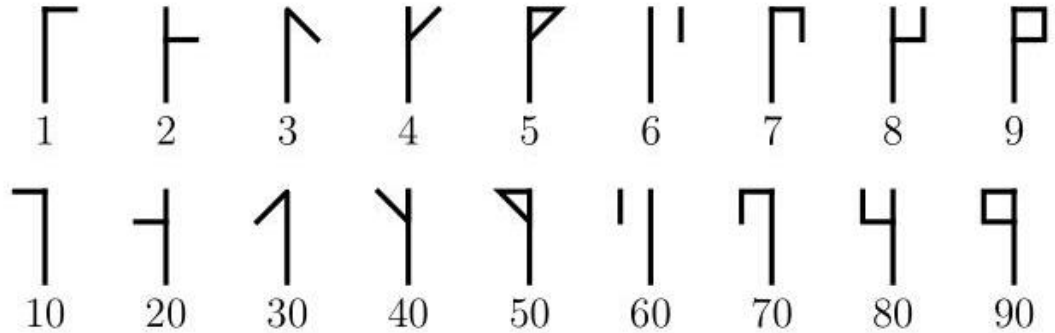
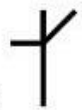
BERKELEY MATH CIRCLE

Math Kangaroo
&
The Art
Of
Problem Solving

Instructor: Patricio Angulo via Oye Productions

Cistercian numerals were used in the early thirteenth century. Any integer from 1 to 99 can be represented by a single glyph formed by combining two of the glyphs shown below.



The glyph for 24 looks like  , the glyph for 81 looks like  , and the glyph for 93 looks like  .
What does the glyph for 45 look like?

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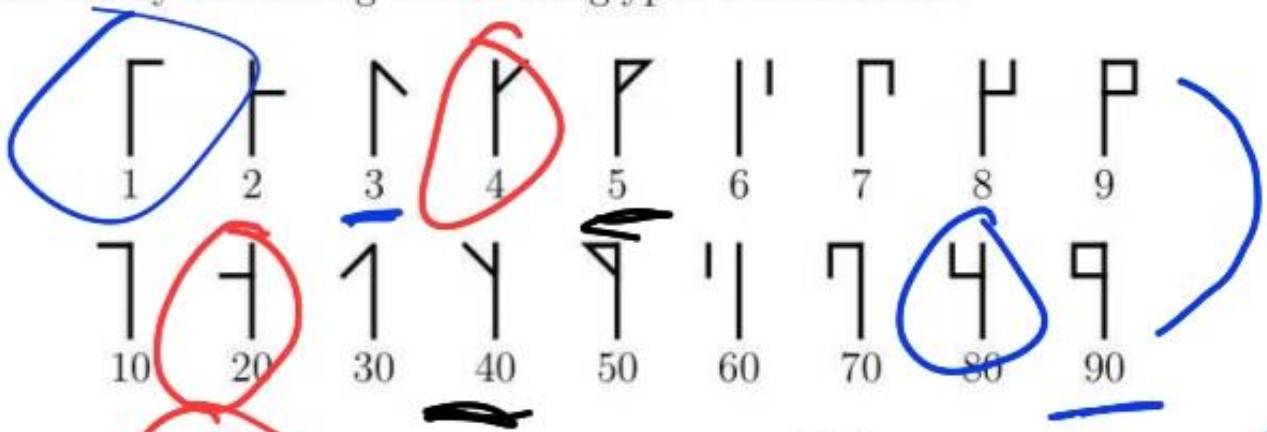
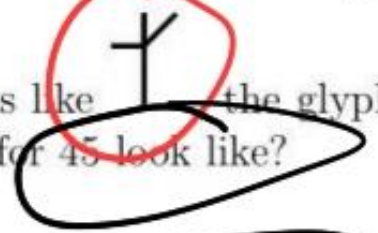


The glyph for 24 looks like  the glyph for 81 looks like  , and the glyph for 93 looks like  .
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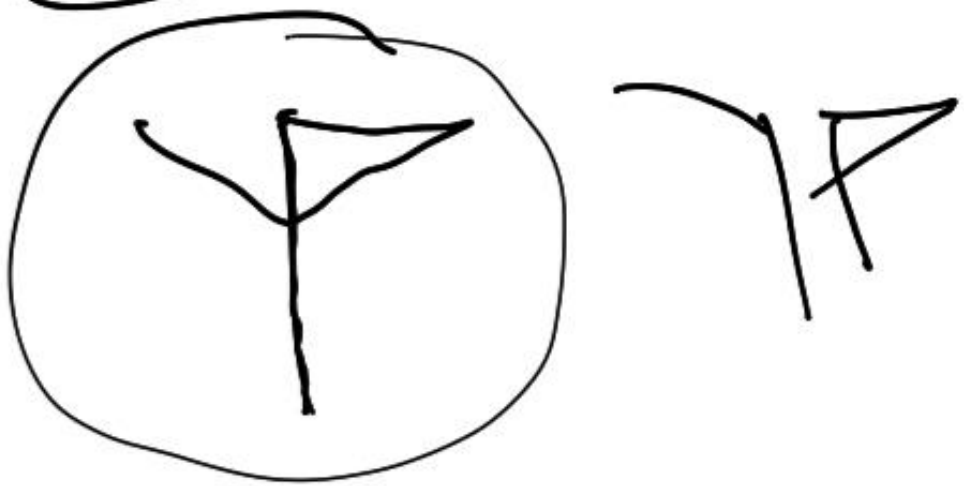
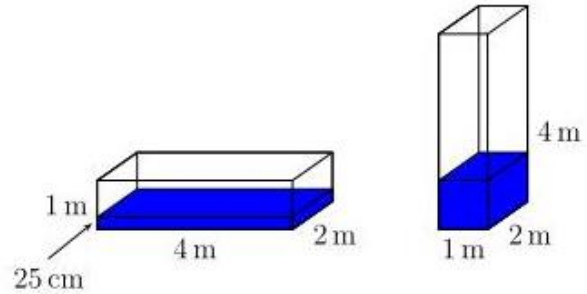


A water tank with a rectangular base has the dimensions 1 m×2 m×4 m. It contains water to a depth of 25 cm, as shown in the first picture. The tank is turned so that a 1 m × 2 m face becomes the base, as shown in the second picture. What is the depth of the water now?



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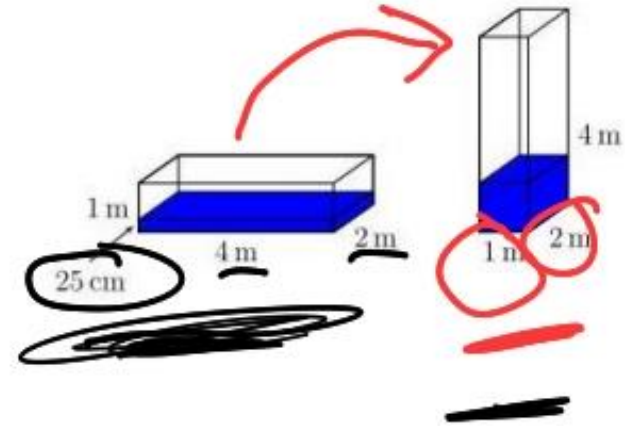

$25\,\text{cm} \Rightarrow 0.25\,\text{m}$

$$\text{Volume}_{H_2O} = 2 \times 4 \times 0.25\,\text{m}$$

$$= 2\,\text{m}^3$$

$$\text{Volume}_{H_2O} = 2\,\text{m}^3 = 1 \times 2 \times d$$

$$d = 1\,\text{m}$$

Some glasses are stacked on top of each other. A stack of 8 glasses is 42 cm high and a stack of 2 glasses is 18 cm high. How high is a stack of 6 glasses?

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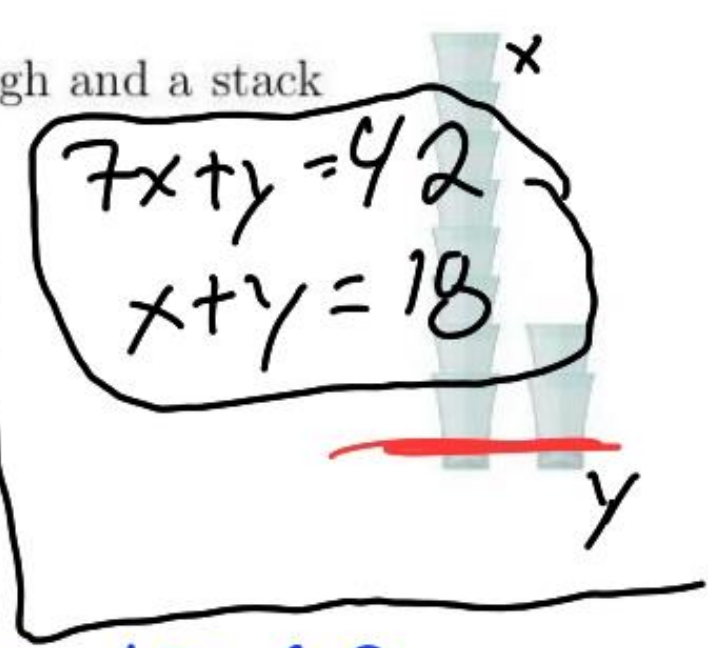
$2 : 18$ $\times 9$ $\neq$ $8 : 42$ $\times 5.25$



$42 - 18 = 24 \div 6 = 4$ cm per top cup

Take 2 glasses @ 18cm

18cm $- (2 \times 4) = 10$cm $\rightarrow$ extra bottom height

For 6 $\Rightarrow 10 + 6 \cdot 4$

$= 34$cm

The license plate of Kangy's car fell off. He put it back upside down but luckily this didn't make any difference. Which of the following could be Kangy's license plate?

(A) **04 NSN 40**

(B) **60 HOH 09**

(C) **80 BNB 08**

(D) **03 HNH 30**

(E) **08 XBX 80**

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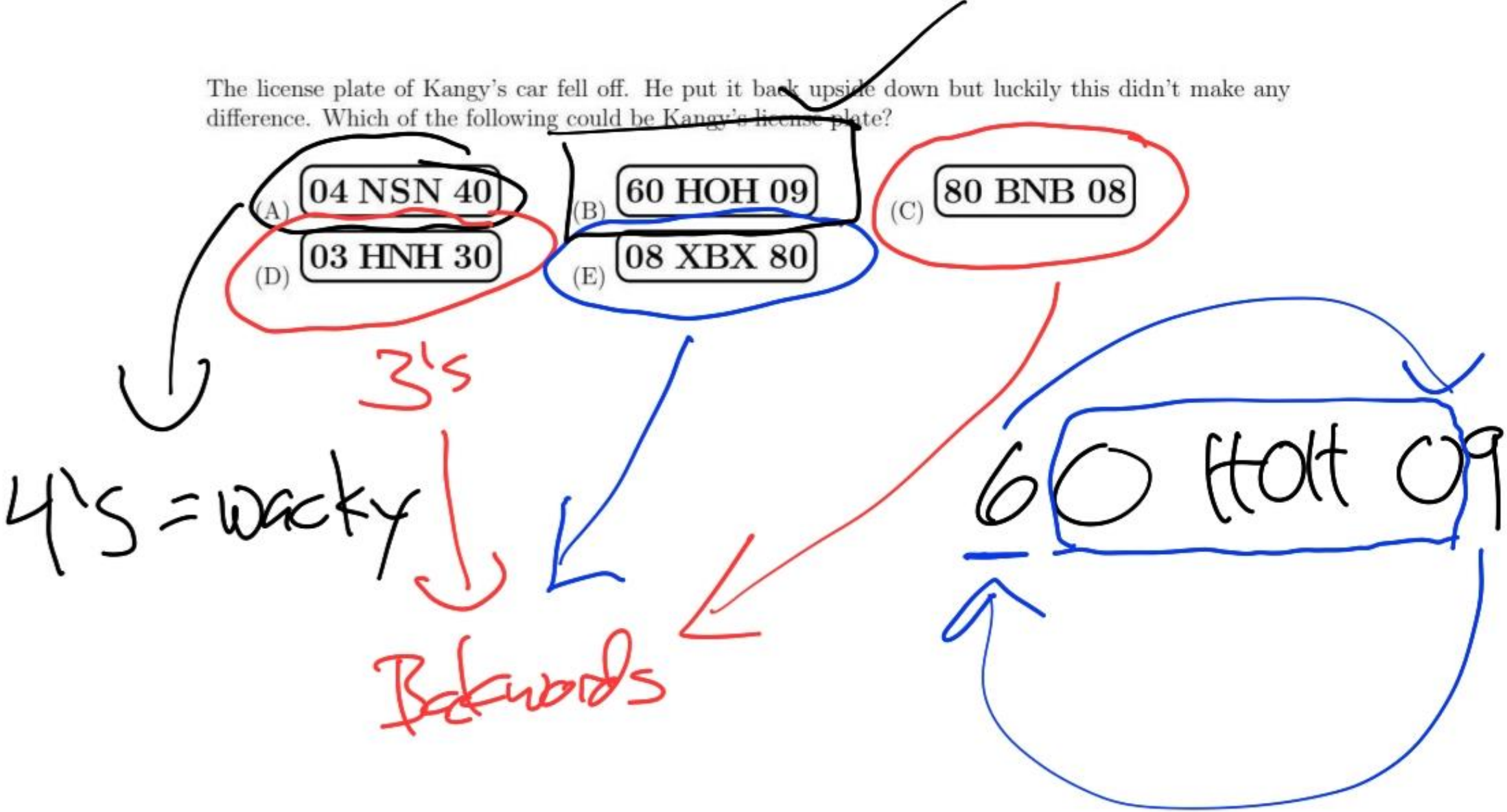

In my office, there are two clocks. One clock gains one minute every hour and the other loses two minutes every hour. Yesterday I set them both to the correct time but when I looked at them today, I saw that the time shown on one was 11:00 a.m. and shown on the other was 12:00 noon. What time was it when I set the two clocks?

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