

January 30, 2017

1. Put your bags up front, we will be moving around.

2. Find your calculator number and get in your group.

The image shows several calculator numbers arranged in a grid, each enclosed in a colored circle. The numbers are as follows:

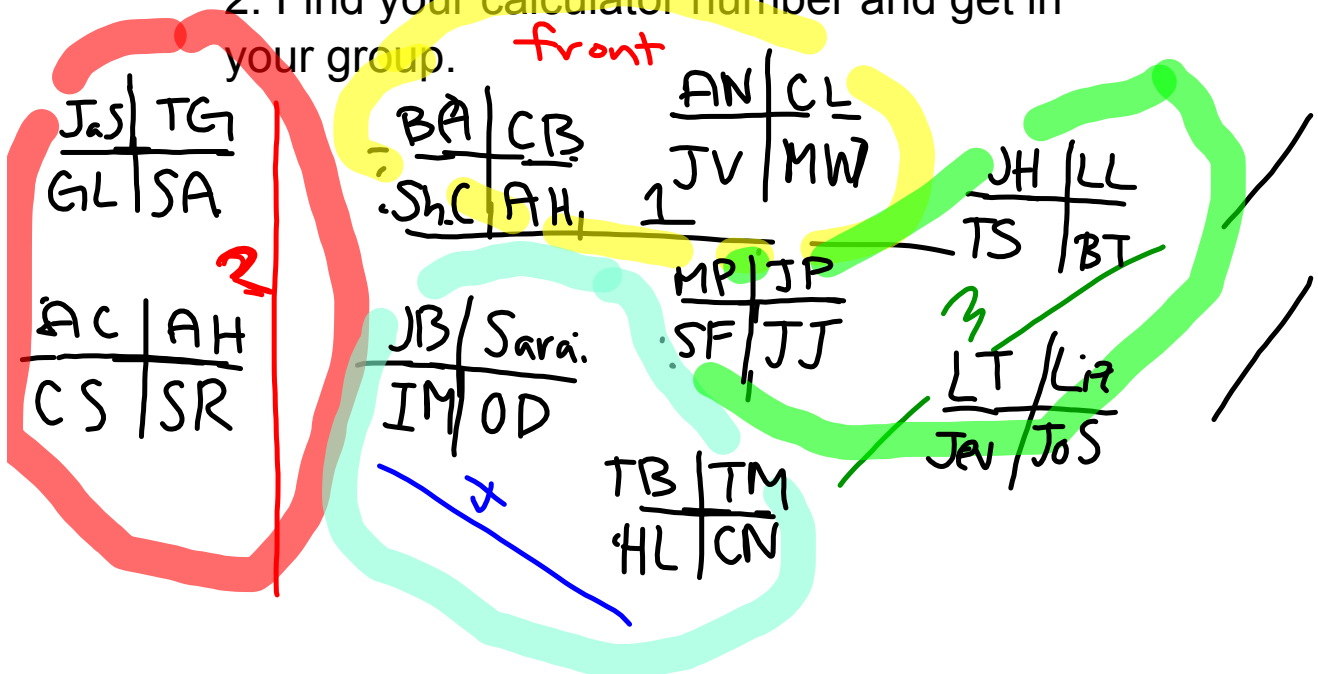
- Red circle:** $\frac{1}{18} \div \frac{5}{51}$ and $\frac{20}{7} \div \frac{26}{2}$. A red '2' is written above the second fraction.
- Yellow circle:** $\frac{30}{22} \div \frac{11}{24}$ and $\frac{17}{19} \div \frac{13}{27}$. The word "front" is written in red above the second fraction.
- Green circle:** $\frac{15}{16} \div \frac{14}{1}$ and $\frac{10}{23} \div \frac{9}{6}$. A green '3' is written below the second fraction.
- Blue circle:** $\frac{3}{12} \div \frac{31}{8}$ and $\frac{21}{29} \div \frac{25}{1}$. A blue 'x' is written below the first fraction.

There are also some additional lines and marks on the right side of the page, including a large green checkmark and some diagonal lines.

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2. Find your calculator number and get in your group.



3 31
12 8

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1. Put your bags up front, we will be moving around.

2. Find your calculator number and get in your group. *front*

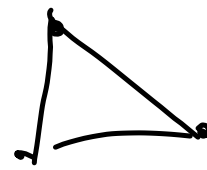
The diagram shows a classroom layout with several groups of desks circled in different colors. Each group contains a 2x2 grid of letter pairs:

- Red group (circled in red):**
 - BO | JO
 - MP | FG
 - AC | RJ
 - MM | SH
- Yellow group (circled in yellow):**
 - AM | ML
 - GE | JC
 - CC | VD
 - LCS | NN
- Green group (circled in green):**
 - LW | BT
 - RQ | ER
 - JM | AR
 - IW | KH
 - EO | AH
 - SC | SM
- Blue group (circled in blue):**
 - VA | LC
 - GH | KM
 - TA | AB
 - CB | AG

A red question mark is placed next to the red group, and a blue 'x' is placed next to the blue group.

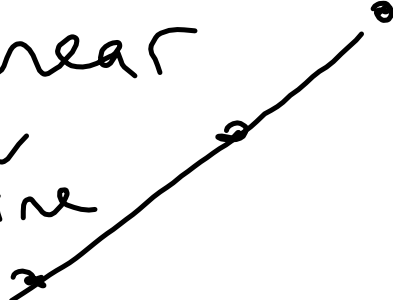
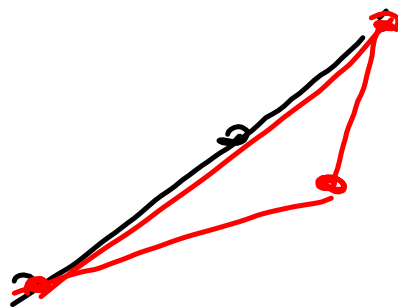
3 31
12 8

$(0, -1)$
 $(1, -2)$
 $(2, -4)$



$A_{\Delta} = \frac{1}{2}bh \rightarrow = \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 & x_1 & y_1 \\ x_2 & y_2 & 1 & x_2 & y_2 \\ x_3 & y_3 & 1 & x_3 & y_3 \end{vmatrix}$

collinear
 ↓ ↓
 same line

(2) $(-1, 7), (3, -9), (-3, 15)$

$$\frac{1}{2} \begin{vmatrix} -1 & 7 & 1 \\ 3 & -9 & 1 \\ -3 & 15 & 1 \end{vmatrix} = \frac{1}{2} \left(\begin{matrix} 9 + 2 + 45 \\ & & \end{matrix} \right) - \left(\begin{matrix} 2 + 15 + 27 \\ & & \end{matrix} \right)$$

$$\frac{1}{2} \left((9+2+45) - (2+15+27) \right)$$

Area = 6
 not collinear

$$\frac{1}{2} (12) = 6$$

$$22. (9, -10)$$

$$(4, -1)$$

$$(1, 5)$$

$$A = -\frac{3}{2}$$

$$\begin{array}{c|ccc|ccc} 9 & -10 & 1 & 9 & -10 & \\ 4 & -1 & 1 & 4 & -1 & \\ 1 & 5 & 1 & 1 & 5 & \end{array}$$

$$(-9 + -10 + 20) - (-1 + 45 - 40)$$

$$1 - 4 = -3$$

-

Area of a triangle

$$A_{\Delta} = \frac{1}{2}bh \rightarrow \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

$$\begin{aligned} &(-1, 7) \\ &(3, -9) \\ &(-3, 15) \end{aligned}$$

$$\frac{1}{2} \cdot 0$$

$$0$$

collinear

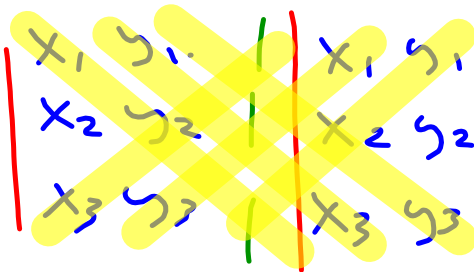
↓ ↓
same line

$$\begin{aligned} \text{Area}_{\Delta} &= \frac{1}{2} \begin{vmatrix} x_1 & y_1 & | \\ x_2 & y_2 & | \\ x_3 & y_3 & | \end{vmatrix} \\ \textcircled{21} \quad \begin{matrix} (-1, 7) \\ (3, -9) \\ (-3, 15) \end{matrix} &= \frac{1}{2} \begin{vmatrix} -1 & 7 & | \\ 3 & -9 & | \\ -3 & 15 & | \end{vmatrix} \end{aligned}$$

Area of a triangle

$$A_{\Delta} = \frac{1}{2}bh$$

$$= \frac{1}{2}$$



area is

ALWAYS
Positive!

#21-26

If area is 0,
then collinear.



$$\textcircled{21} \quad A_{\Delta} = \frac{1}{2} \begin{vmatrix} -1 & 7 & 1 & -1 & 7 \\ 3 & -9 & 1 & 3 & -9 \\ -3 & 15 & 1 & -3 & 15 \end{vmatrix}$$

$$\frac{1}{2} \left((9 - 21 + 45) - (27 - 15 + 21) \right)$$

$$33 - (33)$$

$$= \frac{1}{2}(0)$$

$$= 0 \text{ , collinear}$$

① Set up matrix.

② Put 1's in 3rd column.

③ Take determinant

④ Make it positive and half it.

⑤ Smile.

$$\textcircled{2} A_D = \frac{1}{2} \begin{vmatrix} -1 & 7 & 1 & -1 & 7 \\ 3 & -9 & 1 & 3 & -9 \\ -3 & 15 & 1 & -3 & 15 \end{vmatrix}$$

$$= \frac{1}{2} \left((9 - 21 + 15) - (27 - 15 + 21) \right)$$

$$= \frac{1}{2} (0)$$

$$= 0, \text{ collinear}$$

① Set up matrix.

② Put 1's in 3rd column.

③ Take determinant

④ Make it positive and half it.

⑤ Smile.

$$\textcircled{2} \quad A = \frac{1}{2} \begin{vmatrix} -1 & 7 & 1 & -1 & 7 \\ 3 & -9 & 1 & 3 & -9 \\ -3 & 15 & 1 & -3 & 15 \end{vmatrix}$$

$$= \frac{1}{2} \left((9 - 21 + 45) - (27 - 15 + 21) \right)$$

$$= \frac{1}{2} (33 - 33)$$

$$= \frac{1}{2} (0)$$

$$= 0, \text{ collinear}$$

① Set up matrix.

② Put 1's in 3rd column.

③ Take determinant

④ Make it positive and half it.

⑤ Smile.

$$\textcircled{2} A_{\Delta} = \frac{1}{2} \begin{vmatrix} -1 & 7 & 1 & -1 & 7 \\ 3 & -9 & 1 & 3 & -9 \\ -3 & 15 & 1 & -3 & 15 \end{vmatrix}$$

$$\frac{1}{2} \left((9 - 21 + 45) - (27 - 15 + 21) \right)$$

$$= \frac{1}{2} (33 - 33)$$

$$= \frac{1}{2} (0)$$

$$= 0, \text{ collinear}$$

① Set up matrix.

② Put 1's in 3rd column.

③ Take determinant

④ Make it positive and half it.

⑤ Smile.

$$\textcircled{21} \quad A_{\Delta} = \frac{1}{2} \begin{vmatrix} -1 & 7 & 1 \\ 3 & -9 & 1 \\ -3 & 15 & 1 \end{vmatrix} \begin{vmatrix} -1 & 7 \\ 3 & -9 \\ 3 & -15 \end{vmatrix}$$

$$(9 - 21 + 45) - (27 - 15 + 21)$$

$$33 - 33$$

0, collinear

- ① Set up matrix.
- ② Put 1's in 3rd column.
- ③ Take determinant
- ④ Make it positive and half it.
- ⑤ Smile.

②

$$A_{\Delta} = \frac{1}{2} \begin{array}{c|cc|cc} + & -1 & 7 & 1 & -1 & 7 \\ 2 & 3 & -9 & 1 & 3 & -9 \\ - & -3 & 15 & 1 & -3 & 15 \end{array}$$

$$(9 - 21 + 9) - (27 - 15 + 27)$$

$$33 - 33$$

$$\frac{1}{2}(0) = 0, \text{ collinear}$$

① Set up matrix.

② Put 1's in 3rd column.

③ Take determinant

④ Make it positive and half it.

⑤ Smile.

$$\textcircled{21} \begin{pmatrix} -1, 7 \\ 3, -9 \\ -3, 15 \end{pmatrix}$$

$$\begin{vmatrix} -1 & 7 & 1 & -1 & 7 \\ 3 & -9 & 1 & 3 & -5 \\ -3 & 15 & 1 & -3 & 15 \end{vmatrix}$$

$$(9 + -21 + 45) - (27 + -15 + 21)$$

$$33 - 33 = 0$$

- ① Set up matrix.
- ② Put 1's in 3rd column.
- ③ Take determinant
- ④ Make it positive and half it.
- ⑤ Smile.

②④

$$A_2 = -\frac{1}{2}$$

$$\begin{array}{ccc|ccc} \frac{1}{2} & 1 & 1 & \frac{1}{2} & 1 & 1 \\ 2 & -\frac{5}{2} & 1 & 2 & -\frac{5}{2} & 1 \\ \frac{3}{2} & 1 & 1 & \frac{3}{2} & 1 & 1 \end{array}$$

$$\left(\frac{-5}{4} + \frac{3}{2} + 2\right) - \left(\frac{-15}{4} + \frac{1}{2} + 2\right)$$

$$\frac{4}{4} - \left(\frac{-5}{4}\right)$$

$$\frac{14}{4} = \frac{7}{2}$$

$$\frac{1}{2} \cdot \frac{7}{2} = \frac{7}{4}$$

① Set up matrix.

② Put 1's in 3rd column.

③ Take determinant

④ Make it positive and half it.

⑤ Smile.

$$\textcircled{1} \quad 2 \begin{bmatrix} 3 & 2 \\ 5 & 6 \end{bmatrix} \begin{bmatrix} -1 & 7 & 6 \\ 2 & 0 & 3 \end{bmatrix} - \begin{bmatrix} 1 & 0 & 0 \\ -1 & -2 & 5 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 4 \\ 10 & 12 \end{bmatrix} \begin{bmatrix} -1 & 7 & 6 \\ 2 & 0 & 3 \end{bmatrix}$$

$$\begin{array}{l} 6(-1) + 4(2) \quad 6(7) + 4(3) \\ -6 + 8 \quad 42 + 12 \\ 2 \quad 70 \\ 10(-1) + 12(2) \quad 10(6) + 12(3) \\ -10 + 24 \quad 60 + 36 \\ 14 \quad 96 \end{array} - \begin{bmatrix} 1 & 0 & 0 \\ -1 & -2 & 5 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 42 & 48 \\ 15 & 72 & 91 \end{bmatrix}$$