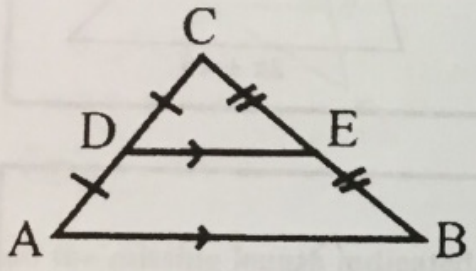
Unit 5

Lesson 4

Triangle Midsegment Theorem

- The **mid-segment** of a triangle is the segment joining the **midpoints** of 2 sides of the triangle.
- The mid-segment is **parallel** to the third side and it is **half the length** of the third side.



DE is the mid-segment of ΔABC

D is the midpoint of AC and E is the midpoint of BC

DE is parallel to AB and DE = ½ AB or AB = 2DE

Examples:

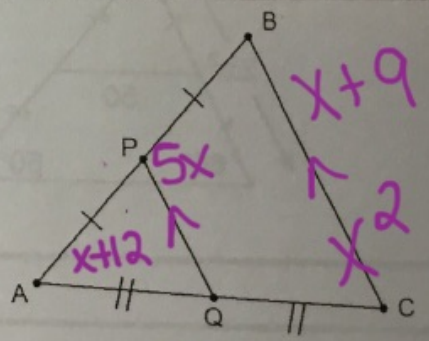
1. If $PQ = 8, BC =$ 16 (x2).
2. If $BC = 8, PQ =$ 4 (x ½).
3. If $AP = 12, PB =$ 12 and $AB =$ 24.
4. If $BC = x + 9$ and $PQ = 5x$, then $x =$ 1, $PQ =$ 5, and $BC =$ 10.
5. If $PQ = x + 12$ and $BC = x^2$, then $x =$ 6, −4, $PQ =$ 18, 8, and $BC =$ 36, 16.

$2(5x) = x + 9$

$10x = x + 9$

$-x \quad -x$

$9x = 9 \quad x = 1$



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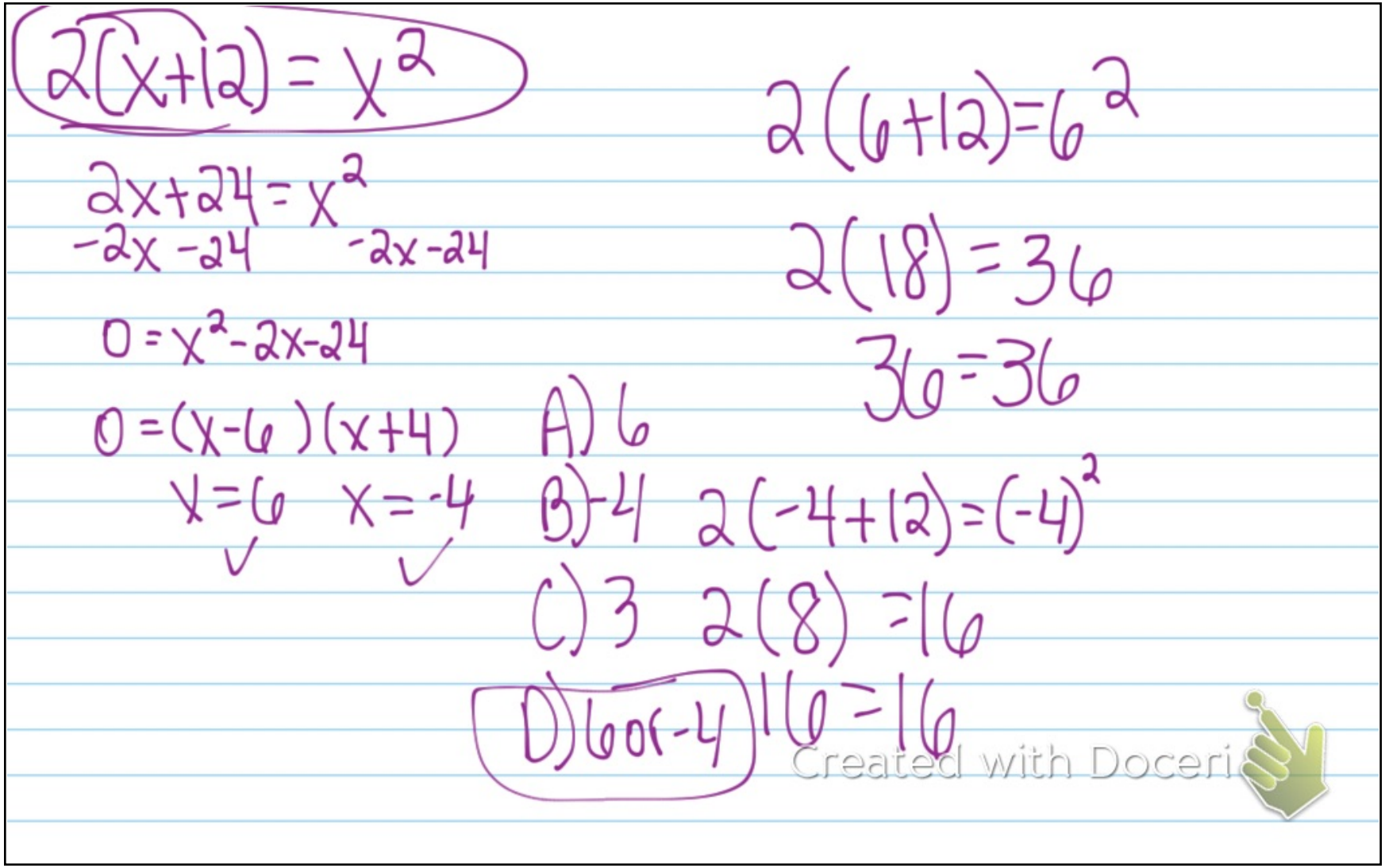
2(x+12) = x²
2x+24 = x²
-2x -24 -2x -24
0 = x² - 2x - 24
0 = (x-6)(x+4)
x = 6 x = -4
A) 6
B) -4
C) 3
D) 6 or -4
2(6+12) = 6²
2(18) = 36
36 = 36
2(-4+12) = (-4)²
2(8) = 16
16 = 16
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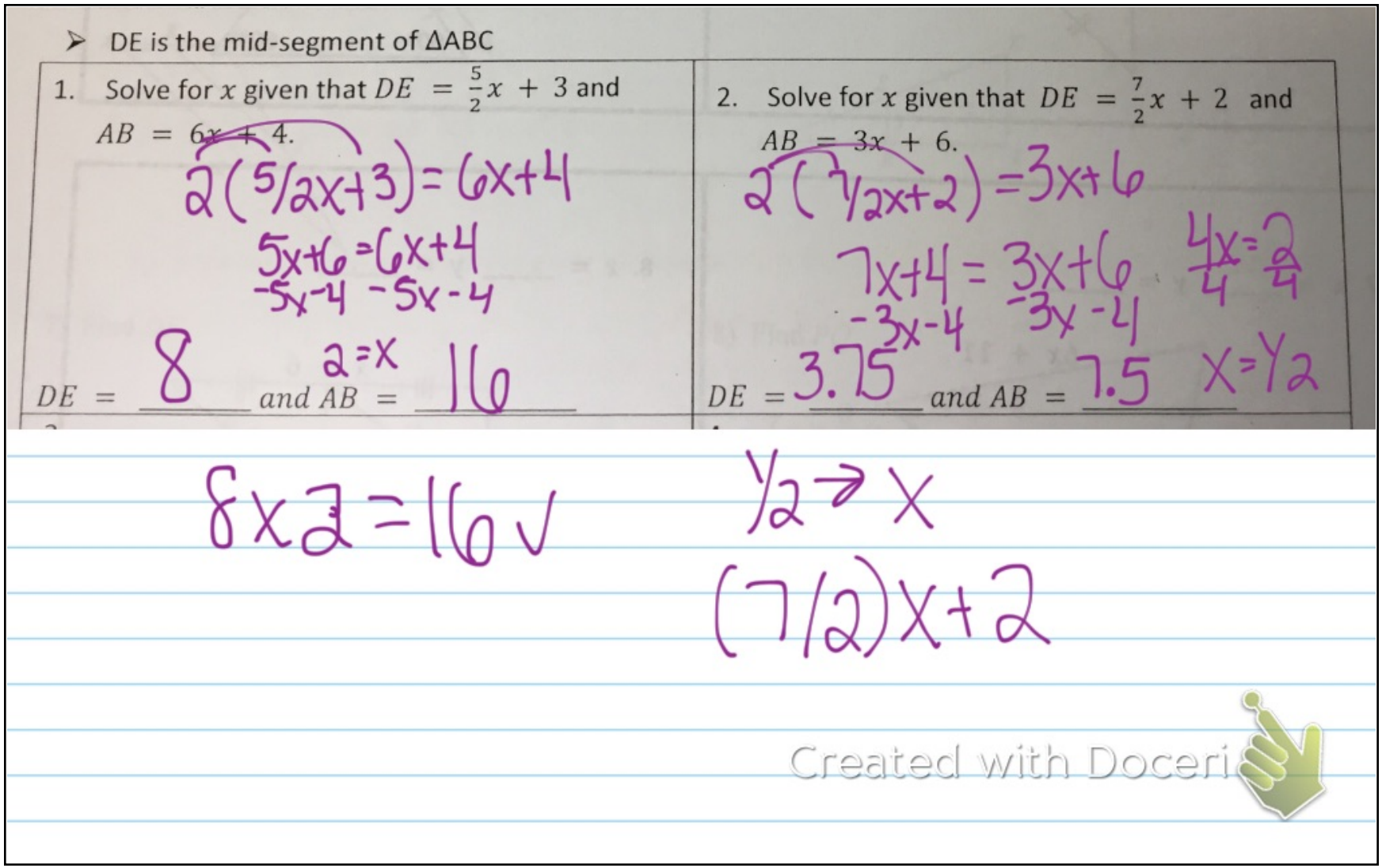

➢ DE is the mid-segment of ΔABC

1. Solve for x given that $DE = \frac{5}{2}x + 3$ and $AB = 6x + 4$.

$2(5/2x+3) = 6x+4$

$5x+6 = 6x+4$

$-5x-4 \quad -5x-4$

$2 = x$

$DE =$ 8 and $AB =$ 16

$8 \times 2 = 16$ ✓

2. Solve for x given that $DE = \frac{7}{2}x + 2$ and $AB = 3x + 6$.

$2(7/2x+2) = 3x+6$

$7x+4 = 3x+6$

$-3x-4 \quad -3x-4$

$\frac{4x}{4} = \frac{2}{4}$

$x = 1/2$

$DE =$ 3.75 and $AB =$ 7.5

$1/2 \rightarrow x$

$(7/2)x+2$

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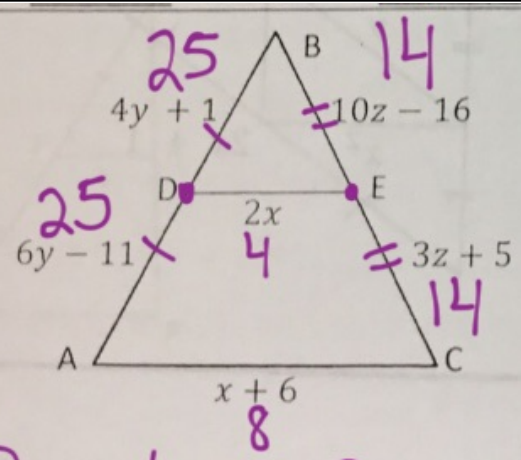
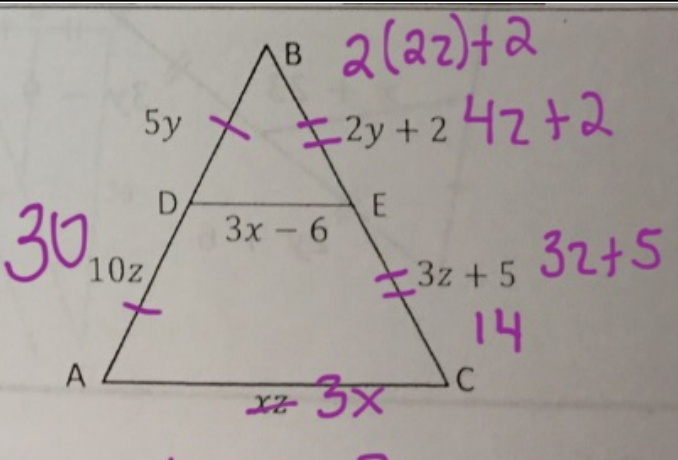
3.



25 14 25 4 14 8

$x =$ 2 $y =$ 6 $z =$ 3

4.



2(2z)+2 4z+2 30 3z+5 14 xz 3x

$x =$ 4 $y =$ 6 $z =$ 3

$x+6=2(2x)$
$x+6=4x$
$-x \quad -x$
$6=3x$
$2=x$

$4y+11=6y-11$
$-4y+11 \quad -4y+11$
$12=2y$
$y=6$

$10z-16=3z+5$
$-3z+16 \quad -3z+16$
$7z=21$
$z=3$

1) $\frac{5y}{5}=\frac{10z}{5}$
$y=2z$

2) $4z+2=3z+5$
$-3z-2 \quad -3z-2$
$z=3$

3) $6x-12=3x+12$
$-3x+12 \quad -3x$
$3x=12 \quad x=4$

4) $y=6$

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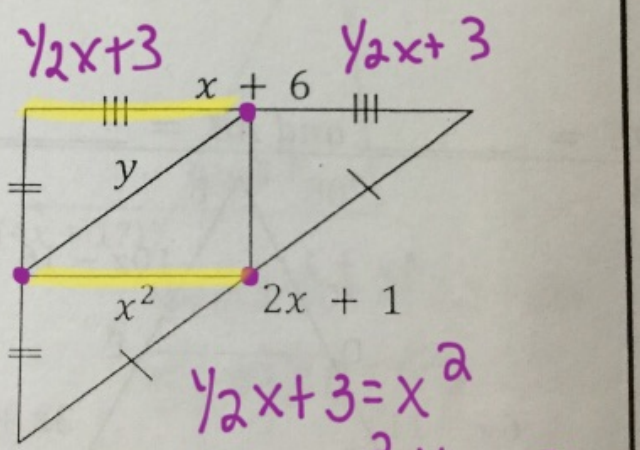
8. $x =$ 2 $y =$ 2.5



½x+3 ½x+3

½x+3=x²

0=x²-½x-3

2y=5

y=2.5

(x-2)(x+1.5) $\frac{½ \pm \sqrt{(-½)^2-4(1)(-3)}}{2}$

$\frac{½ \pm \sqrt{12.25}}{2}$ $\frac{½ \pm 3.5}{2}$ x=2 ~~x=-1.5~~

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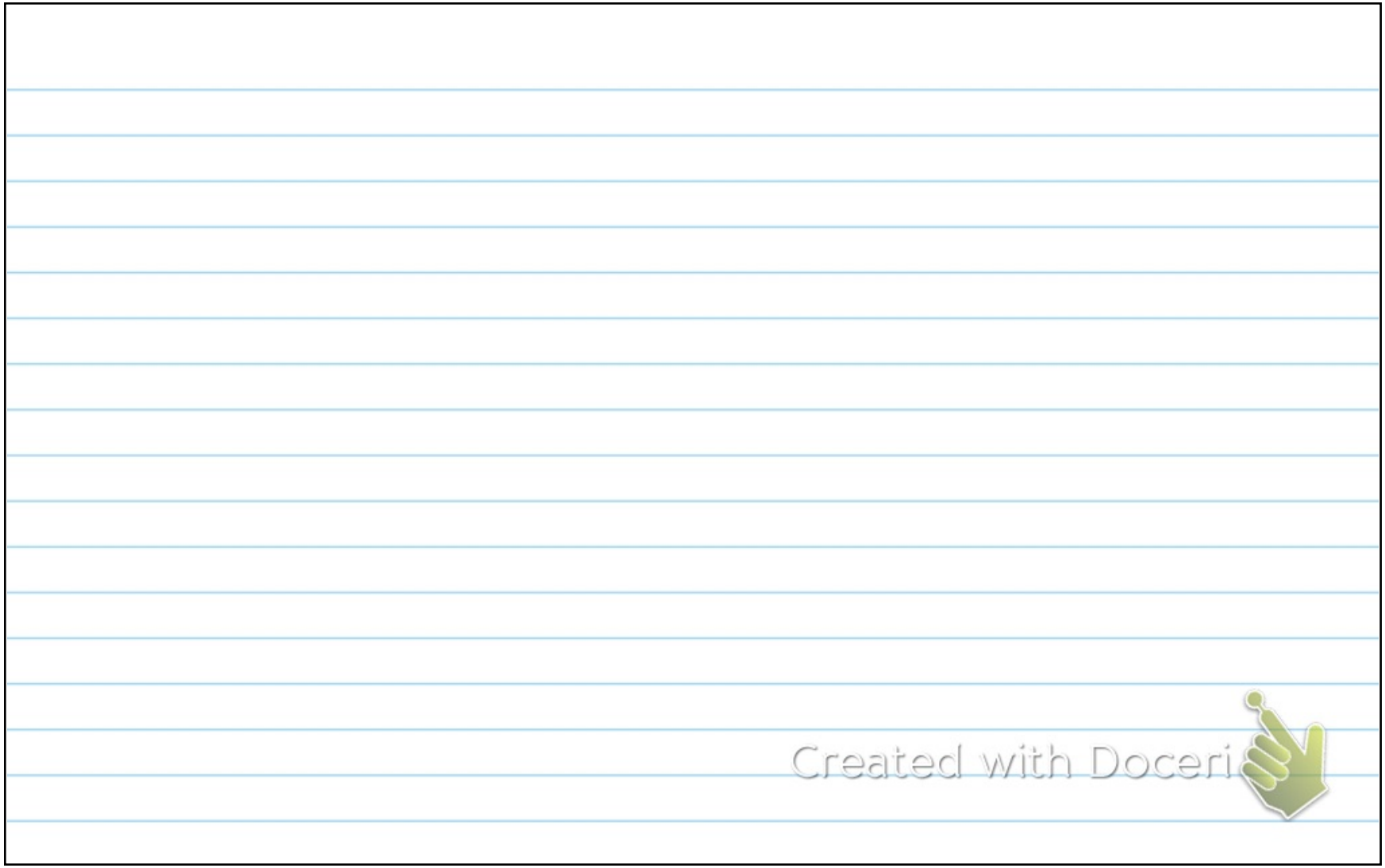
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