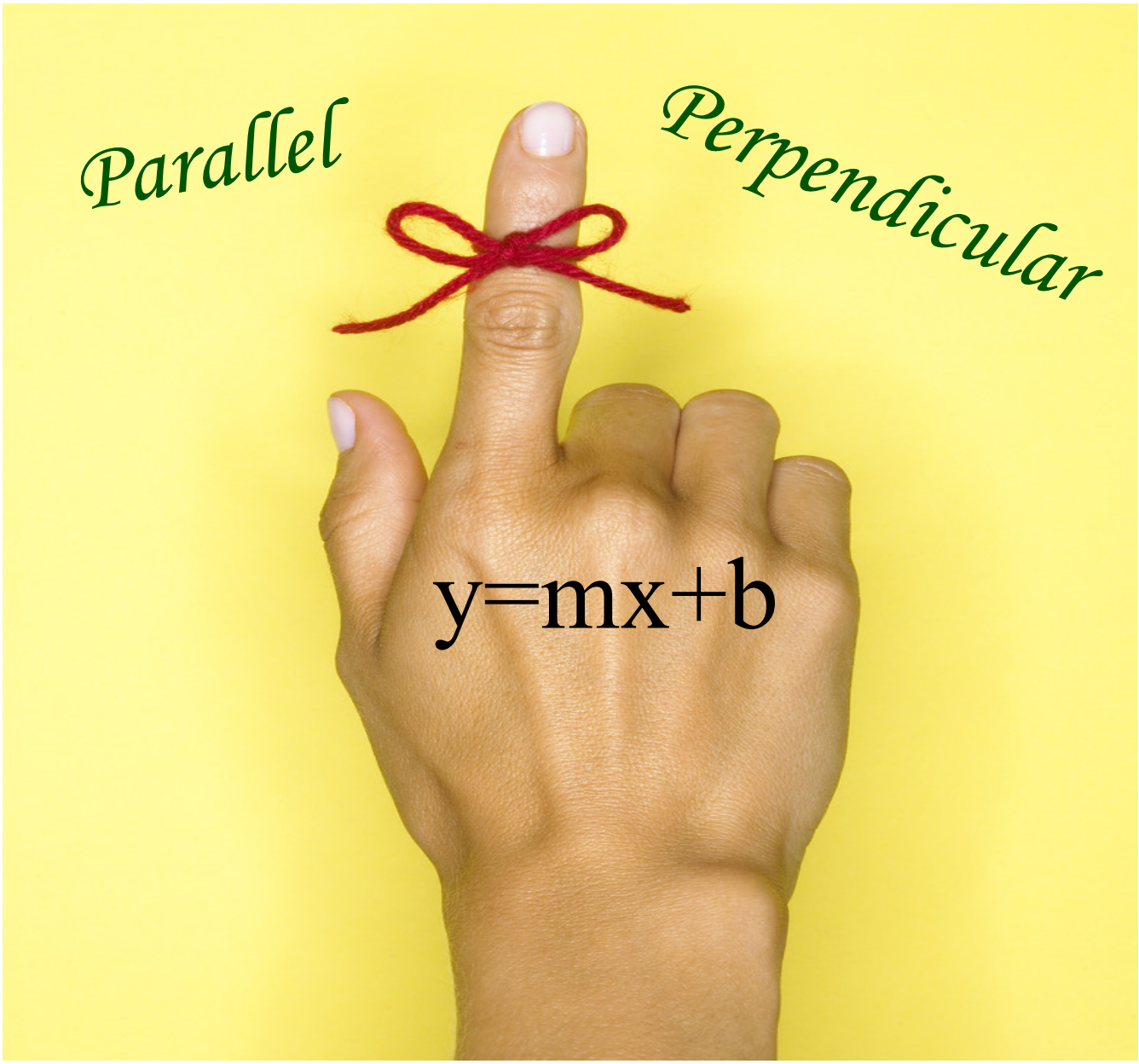

Parallel
Perpendicular
y=mx+b


Reminder !!!
Whenever you see the words Parallel & Perpendicular think
Slope


y-intercept
x=0
Reminder!
x-intercept
y=0

To Find the equation of any line:

① Find slope (m)

② Find point (x_1, y_1)

③ Find equation using $y - y_1 = m(x - x_1)$

Find the equation of a line parallel to 3y=4x-1 and passing through the point (4,2).

Step #1

Parallel - (Same Slope)

$\frac{3y}{3} = \frac{4x}{3} - \frac{1}{3}$

$y = \frac{4}{3}x - \frac{1}{3}$

$m = \frac{4}{3}$

$m_{\parallel} = \frac{4}{3}$

Step #2

Point

(4,2)

$x_1 = 4$

$y_1 = 2$

Step #3

$y - y_1 = m(x - x_1)$

$y - 2 = \frac{4}{3}(x - 4)$

$3y - 6 = 4x - 16$

$0 = 4x - 3y - 10$

$0 = 4x - 3y - 10$

Determine the equation of a line perpendicular to $4x+5y=7$ and having the same x-intercept as $10x+7y=-20$.

Step #1 Opposite Reciprocal Slope

$4x+5y=7$

$\frac{5y}{5}=\frac{-4x}{5}+\frac{7}{5}$

$y=\frac{-4}{5}x+\frac{7}{5}$

$m=-\frac{4}{5}$

$m_\perp=\frac{5}{4}$

Step #2 Point x-int (y = 0)

$10x+7y=-20$

$10x+7(0)=-20$

$10x+0=-20$

$\frac{10x}{10}=\frac{-20}{10}$

$x=-2$

Point $(-2,0)$

$x_1=-2$

$y_1=0$

Step #3

$y-y_1=m(x-x_1)$

$y-0=\frac{5}{4}(x-(-2))$

$y=\frac{5}{4}(x+2)$

Slope point form

$y=\frac{5x}{4}+\frac{10}{4}$

$y=\frac{5}{4}x+\frac{5}{2}$

Slope intercept form

$4y=5x+10$

$0=5x-4y+10$

general form

Determine the equation of a horizontal line passing through the same point on the y-axis as $3y = 6x - 9$

y-intercept

Step #1

Slope of a horizontal line

$m = 0$

Step #2

Point y-int $(x=0)$

$3y = 6x - 9$

$3y = 6(0) - 9$

$3y = 0 - 9$

$\frac{3y}{3} = \frac{-9}{3}$

$y = -3$

Point $(0, -3)$

$x_1 = 0$

$y_1 = -3$

Step #3

$y - y_1 = m(x - x_1)$

$y - (-3) = 0(x - 0)$

$y + 3 = 0$

Homework:

① Given:

point: $(-2, 7)$

(i) Find slope

$\frac{4y}{4} = \frac{16x}{4} - \frac{3}{4}$

$y = 4x - \frac{3}{4}$

$y = mx + b$

$m = 4$

$m_{\perp} = -4$

(ii) Point:

$(-2, 7)$

$x_1 = -2$

$y_1 = 7$

(iii) $y - y_1 = m(x - x_1)$

$y - 7 = 4(x - -2)$

$y - 7 = 4(x + 2)$

$y - 7 = 4x + 8$

$y = 4x + 8 + 7$

$\boxed{y = 4x + 15}$ slope intercept form

$\boxed{0 = 4x - y + 15}$ general form

② Given:

(4,3)

(i) Find slope

$-y = -5x + 8$

$\frac{-y}{-1} = \frac{-5x}{-1} + \frac{8}{-1}$

$y = 5x - 8$

$m = \frac{5}{1}$

$m_1 = -\frac{1}{5}$

(ii) Point:

(4,3)

$x_1 = 4$

$y_1 = 3$

(iii) $y - y_1 = m(x - x_1)$

$y - 3 = -\frac{1}{5}(x - 4)$

cd: 5

$5y - 15 = -1x + 4$

$x + 5y - 19 = 0$ general form

③ Given:

x-int of 3 → (3,0) $x_1 = 3$ $y_1 = 0$

y-int of -4 → (0,-4) or $x_1 = 0$ $y_1 = -4$

(i) Find m:

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{-4-0}{0-3}$

$m = \frac{-4}{-3}$

$m = \frac{4}{3}$

(ii) Point:

(3,0)

$x_1 = 3$

$y_1 = 0$

(iii) $y - y_1 = m(x - x_1)$

$y - -4 = \frac{4}{3}(x - 0)$

$y + 4 = \frac{4}{3}(x)$

$y + 4 = \frac{4x}{3}$

$y = \frac{4}{3}x - 4$

④ Given:

$(6,2)$ $x_1 = 6$ $y_1 = 2$

$(1,-5)$ $x_2 = 1$ $y_2 = -5$

(i) Find slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-5-2}{1-6}$$

$$m = \frac{-7}{-5} = \frac{7}{5}$$

(ii) Point.

$(6,2)$

$x_1 = 6$

$y_1 = 2$

(iii) $y - y_1 = m(x - x_1)$

$y - 2 = \frac{7}{5}(x-6)$

$y - 2 = \frac{7x}{5} - \frac{42}{5}$ (·5)

$5y - 10 = 7x - 42$

$0 = 7x - 42 - 5y + 10$

general form $\boxed{0 = 7x - 5y - 32}$

$5y = 7x - 32$

Slope-int form $\boxed{y = \frac{7}{5}x - \frac{32}{5}}$

⑤ Given:

Point: $(4,-3)$ $x_1 = 4$ $y_1 = -3$

(i) Find Slope

$2(y-1) = 10x-4$

$2y-2 = 10x-4$

$2y = 10x-4+2$

$\frac{2y}{2} = \frac{10x}{2} - \frac{2}{2}$

$y = 5x-1$

$m = 5$

$m_{\perp} = 5$

(ii) Point:

$(4,-3)$

$x_1 = 4$

$y_1 = -3$

(iii) $y-y_1 = m(x-x_1)$

$y-(-3) = 5(x-4)$

$y+3 = 5x-20$ -3

$y = 5x-23$

⑥ Given

$(-2,6)$ $x_1 = -2$ $y_1 = 6$

(i) Slope:

horizontal line: $m = \frac{0}{1}$

$m = 0$

(ii) Point.

$(-2,6)$

$x_1 = -2$

$y_1 = 6$

(iii) $y - y_1 = m(x - x_1)$

$y - 6 = 0(x + 2)$

$y - 6 = 0(x+2)$

$\boxed{y - 6 = 0}$

① Given:

$(8,-1)$ $x_1 = 8$ $y_1 = -1$

(i) Slope:

Vertical line: $m = \frac{1}{0}$

(ii) Point

$(8,-1)$

$x_1 = 8$

$y_1 = -1$

(iii) $y - y_1 = m(x - x_1)$

$y - (-1) = \frac{1}{0}(x - 8)$

$\frac{y+1}{1} = \frac{x-8}{0}$

$0(y+1) = 1(x-8)$

$\boxed{0 = x - 8}$

Equations of Lines - Review

① $x+2y-6=0$

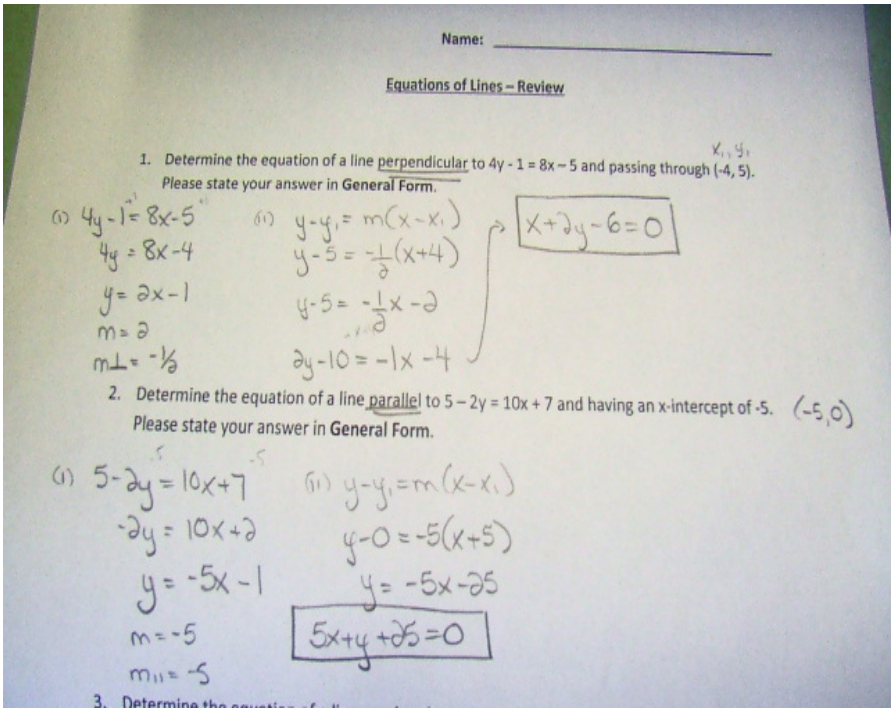
② $5x+y+25=0$

③ $y+1=\frac{-4}{7}(x-2)$

④ $y-3=0$

⑤ $y=6x+8$

⑥ $2x-3y+6=0$



Name: _____

Equations of Lines – Review

1. Determine the equation of a line perpendicular to $4y - 1 = 8x - 5$ and passing through $(-4, 5)$. x_1, y_1
   Please state your answer in General Form.

(i) $4y - 1 = 8x - 5$
$4y = 8x - 4$
$y = 2x - 1$
$m = 2$
$m_\perp = -\frac{1}{2}$

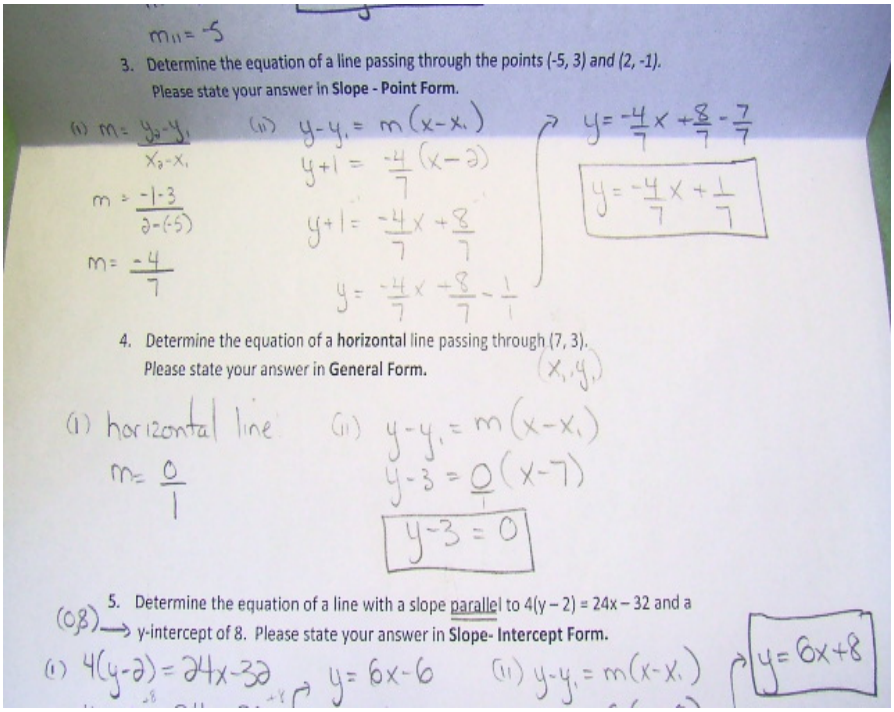
(ii) $y - y_1 = m(x - x_1)$
$y - 5 = -\frac{1}{2}(x + 4)$
$y - 5 = -\frac{1}{2}x - 2$
$2y - 10 = -1x - 4$
$x + 2y - 6 = 0$

2. Determine the equation of a line parallel to $5 - 2y = 10x + 7$ and having an x-intercept of -5. $(-5, 0)$
   Please state your answer in General Form.

(i) $5 - 2y = 10x + 7$
$-2y = 10x + 2$
$y = -5x - 1$
$m = -5$
$m_{||} = -5$

(ii) $y - y_1 = m(x - x_1)$
$y - 0 = -5(x + 5)$
$y = -5x - 25$
$5x + y + 25 = 0$

3. Determine the equation of



$m_{11} = -5$

3. Determine the equation of a line passing through the points (-5, 3) and (2, -1).
Please state your answer in **Slope - Point Form.**

(i) $m = \frac{y_2 - y_1}{x_2 - x_1}$ (ii) $y - y_1 = m(x - x_1)$ $\rightarrow$ $y = \frac{-4}{7}x + \frac{8}{7} - \frac{7}{7}$

$m = \frac{-1-3}{2-(-5)}$ $y+1 = \frac{-4}{7}(x-2)$ $y = \frac{-4}{7}x + \frac{1}{7}$

$m = \frac{-4}{7}$ $y+1 = \frac{-4}{7}x + \frac{8}{7}$

$y = \frac{-4}{7}x + \frac{8}{7} - \frac{1}{1}$

4. Determine the equation of a **horizontal** line passing through (7, 3).
Please state your answer in **General Form.** (x_1, y_1)

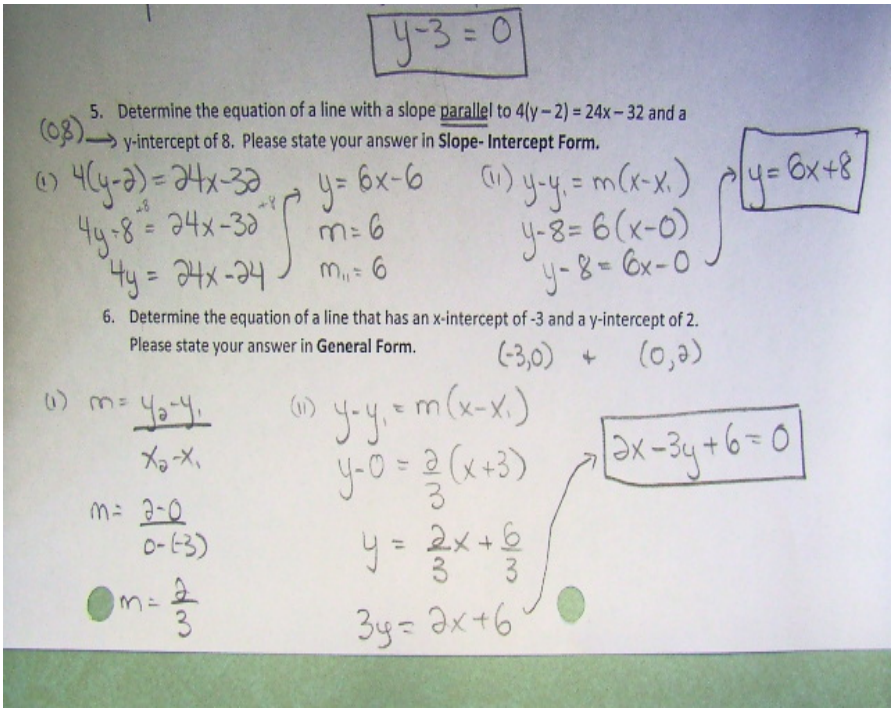
(i) horizontal line (ii) $y - y_1 = m(x - x_1)$

$m = \frac{0}{1}$ $y - 3 = \frac{0}{1}(x - 7)$

$y - 3 = 0$

(08) 5. Determine the equation of a line with a slope parallel to $4(y - 2) = 24x - 32$ and a y-intercept of 8. Please state your answer in **Slope- Intercept Form.**

(i) $4(y-2) = 24x - 32$ $\rightarrow$ $y = 6x - 6$ (ii) $y - y_1 = m(x - x_1)$ $\rightarrow$ $y = 6x + 8$


y-3=0
5. Determine the equation of a line with a slope parallel to 4(y-2) = 24x-32 and a y-intercept of 8. Please state your answer in Slope- Intercept Form.
(08)
(i) 4(y-2) = 24x-32
4y-8 = 24x-32
4y = 24x-24
y = 6x-6
m = 6
m∥ = 6
(ii) y-y1 = m(x-x1)
y-8 = 6(x-0)
y-8 = 6x-0
y = 6x+8
6. Determine the equation of a line that has an x-intercept of -3 and a y-intercept of 2.
Please state your answer in General Form.
(-3,0) (0,2)
(i) m = (y2-y1)/(x2-x1)
m = (2-0)/(0-(-3))
m = 2/3
(ii) y-y1 = m(x-x1)
y-0 = 2/3(x+3)
y = 2/3x + 6/3
3y = 2x+6
2x-3y+6=0