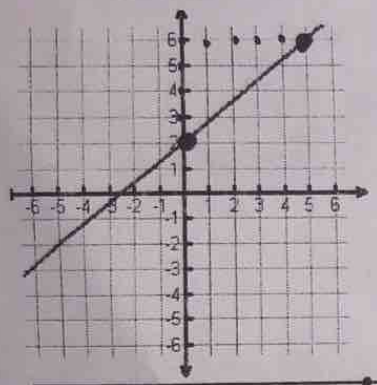
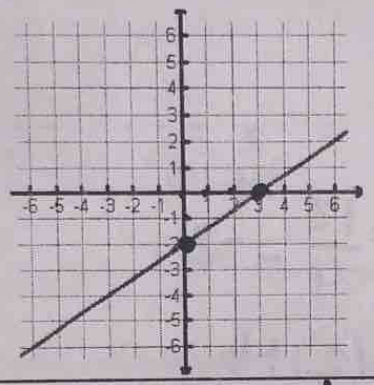
Writing an equation of a line given a graph.

A. Use any 2 "good" points on the graph to find the slope, m.
B. Find the y-intercept on the graph, b.
C. Substitute slope for m and y-intercept for b into the equation y = mx + b.

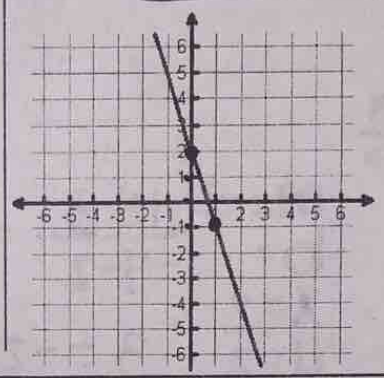
5. $m = \frac{4}{5}$, $b = 2$ → $y = \frac{4}{5}x + 2$



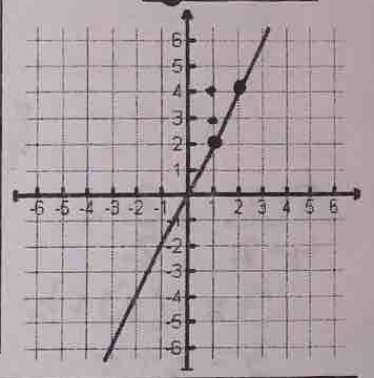
6. $m = \frac{2}{3}$, $b = -2$ → $y = \frac{2}{3}x - 2$



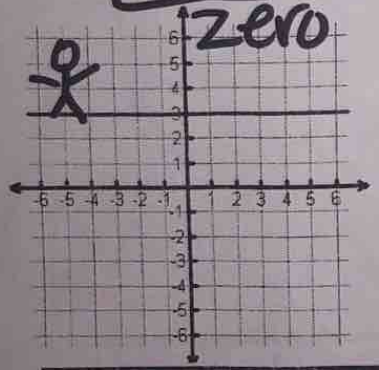
7. $m = -3$, $b = 2$ → $y = -3x + 2$



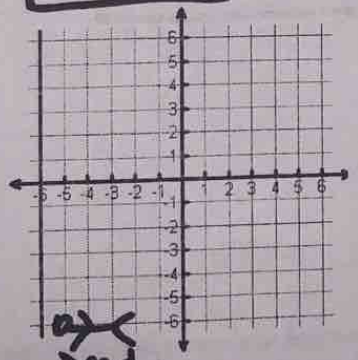
8. $m = 2/1$, $b = 0$ → $y = 2x$



9. ~~undefined~~ → $y = 3$ zero

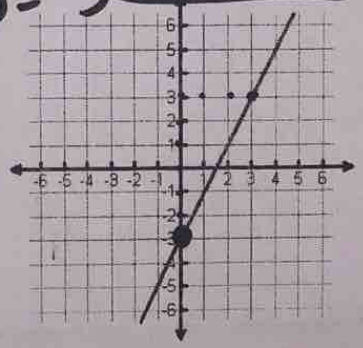


10. ~~zero slope~~ → $x = -6$

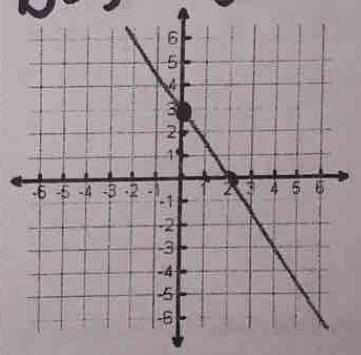


Dead

11. $m = 2$, $b = -3$ → $y = 2x - 3$



12. $m = -3/2$, $b = 3$ → $y = -\frac{3}{2}x + 3$



Writing an equation of a line given m and a point.

A. Substitute slope for m and the point (x, y) into y=mx+b and solve for b.
B. Substitute m and b back into the equation.

13. m = 2 and Point: (2, 3)

m=2 b=-1 x=2 y=3

$y=mx+b$
$3=2(2)+b$
$3=4+b$
$-4\ \ -4$
$b=-1$

$y=2x-1$

14. m = 1/2 and Point: (4, -3)

m=½ b= x=4 y=-3

$-3=\frac{1}{2}(4)+b$
$-3=2+b$
$-5=b$

$y=\frac{1}{2}x-5$

15. m = -2 and Point: (-5, 3)

m=-2 b= x=-5 y=3

$3=-2(-5)+b$
$3=10+b$
$-7=b$

$y=-2x-7$

16. m = 4 and Point (1, 4)

m=4 b= x=1 y=4

$4=4(1)+b$
$4=4+b$
$b=0$

$y=4x$

17. m = ½ and Point: (-1, -2)

18. m = 2 and Point (0, 3)

19. m =3 and Point: (3, 0)

20. m = undefined and Point (3, 6)

Writing an equation of a line given TWO points.

A. Use the slope formula to find m.
B. Pick one point, substitute slope form, the point (x, y) and then solve for b.
C. Substitute m and b back into the equation.

21. (2, 3) and (4, 5) 2 3 4 5

m=1 b= x=2 y=3

$\frac{5-3}{4-2}=\frac{2}{2}=1$
$3=1(2)+b$
$3=2+b$
$-2\ \ -2$
$b=1$

$y=x+1$

22. (2, 3) and (-4, 15) 2 3 -4 15

m=-2 b= x=2 y=3

$\frac{15-3}{-4-2}=\frac{12}{-6}=-2$
$3=-2(2)+b$
$3=-4+b$
$b=7$

$y=-2x+7$

23. (2, 2) and (0, 4)

24. (2, 3) and (1, 4)

25. (4, 5) and (5, 2)

- **Graphs:**
  - Lines _____ intersect and are in the _____ plane.
- **Equations:**
  - SAME slopes
  - _____ y - intercepts

Are these lines parallel?

1. $y = -2x + 1$ and $y = -2x - 4$ parallel

2. $y = 3x - 4$ and $-3x + y = 1$ Paral

$+3x \quad +3x$

$y = 3x + 1$

Writing an Equation of a Line PARALLEL to another and given a point.

A. Given equation should be solved for y ($y = mx + b$).
B. Write down the slope of that line.
C. Substitute m and (x, y) in $y = mx + b$. Solve for b.
D. Write the equation using the slope and y-intercept.

3. Write a line parallel to the line $2x + y = 3$ and passes through the point (-2, 5).

$2x + y = 3$

$-2x \quad -2x$

$y = -2x + 3$

$m = -2$

$b = 1$

$x = -2$

$y = 5$

$5 = -2(-2) + b$

$5 = 4 + b$

$-4 \quad -4$

$b = 1$

$y = -2x + 1$

4. Write a line parallel to the line $y = 3x - 5$ and passes through the point (-5, -2).

$m = 3$

$b =$

$x = -5$

$y = -2$

$-2 = 3(-5) + b$

$-2 = -15 + b$

$+15 \quad +15$

$13 = b$

$y = 3x + 13$

5. Write a line parallel to the line $y = -4x + 1$ and passes through the point (2, -1).

$m = -4$

$b =$

$x = 2$

$y = -1$

$-1 = 2(-4) + b$

$-1 = -8 + b$

$+8 \quad +8$

$b = 7$

$y = -4x + 7$

6. Write a line parallel to the line $y = -x - 7$ and passes through the point (-4, -4).

$m = -1$

$b =$

$x = -4$

$y = -4$

$-4 = -1(-4) + b$

$-4 = 4 + b$

$-4 \quad -4$

$b = -8$

$y = -x - 8$

Perpendicular Lines

- Graphs:
  - Lines intersect at a _____ angle.
- Equations:
  - _____ slopes
  - OPPOSITE RECIPROCAL
  - *change sign AND flip ~~y-intercepts~~

Writing an Equation of a Line PERPENDICULAR to another and given a point.

A. Given equation should be solved for y. (y = mx + b).
B. Write down the perpendicular slope of that line.
C. Substitute the new slope and (x, y) in y = mx + b. Solve for b.
D. Write the equation using m and b.

7. Write a line perpendicular to the line $y = \frac{1}{2}x - 2$ and passes through the point (1, 0).

$m = -2$
$b =$
$x = 1$
$y = 0$

$0 = -2(1) + b$
$0 = -2 + b$
$2 = b$

$y = -2x + 2$

8. Write a line perpendicular to the line $y = -3x + 2$ and passes through the point (6, 5).

$m = \frac{1}{3}$
$b =$
$x = 6$
$y = 5$

$5 = \frac{1}{3}(6) + b$
$5 = 2 + b$
$3 = b$

$y = \frac{1}{3}x + 3$

* 9. Write a line perpendicular to the line $2x + 3y = 9$ and passes through the point (6, -1).

$m = \frac{3}{2}$
$b =$
$x = 6$
$y = -1$

$-1 = \frac{3}{2}(6) + b$
$-1 = 9 + b$
$-9 \quad -9$
$b = -10$

$y = \frac{3}{2}x - 10$

$2x + 3y = 9$
$-2x \quad -2x$
$\frac{3y}{3} = \frac{-2x}{3} + \frac{9}{3}$
$y = \frac{-2}{3}x + 3$

10. Write a line perpendicular to the line $y = 2x - 1$ and passes through the point (2, 4).

$m = -\frac{1}{2}$
$b =$
$x = 2$
$y = 4$

$4 = \frac{-1}{2}(2) + b$
$4 = -1 + b$
$5 = b$

$y = \frac{-1}{2}x + 5$