

$$\textcircled{1} \quad \frac{1}{4}(4-2x) - 4 = 20 + 11$$

$$\frac{1}{4}(4-2x) - 4 = 31$$

+4 +4

$$4 \cdot \frac{1}{4}(4-2x) = 35 + 4$$

$$4-2x = 39$$

-4 -4

$$-2x = 35$$

$$x = -17.5$$

$$\textcircled{2} \quad 6b + 51$$

$$\textcircled{3} \quad 8(4x-2) + 9$$
$$32x - 16 + 9$$

$$\textcircled{4} \quad A = \frac{1}{2}(b_1 + b_2)h$$

$$\frac{2}{1} \cdot \frac{A}{h} = \frac{1}{2}(b_1 + b_2) \cdot \frac{2}{1}$$

$$\frac{2A}{h} = b_1 + b_2$$

$$-b_1 \quad -b_1$$

$$b_2 = \frac{2A}{h} - b_1$$

$$\textcircled{5} \quad -2x - 7 \leq -3$$

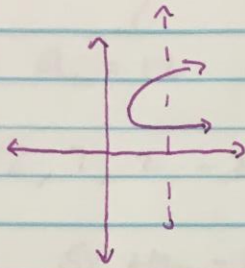
+7 +7

$$-2x \leq 4$$

$$\frac{-2x}{-2} \leq \frac{4}{-2}$$

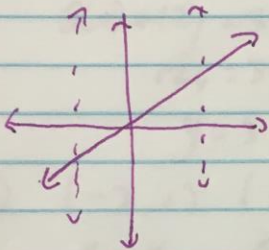
$$x \geq -2$$

(10)



not a function.

does not pass vertical line test



function, vertical line hits function through only one point.

(11)

Maximum - top of mountain.

$x = 1$, $y = 2$
 \uparrow , \uparrow
 time , max height

(12)

$5, 8, 11, 14, 17, 20, 23, 26$
 $\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow$
 $+3 +3 +3 +3 +3 +3 +3$
 or

$$a_n = a_1 + (n-1)d$$

$$a_8 = 5 + (8-1)(3) = 5 + 7(3) = 26$$

(13)

~~$-8, -15, -22, -29, -36, -43, \dots$~~
 Fix: write explicit rule for $2, 4, 6, 8, 10, \dots$

$$a_1 = 2, d = 2$$

$$a_n = a_1 + (n-1)d$$

$$a_n = 2 + (n-1)2$$

$$a_n = 2 + 2n - 2$$

$$a_n = 2n$$

$$\begin{array}{l}
 \textcircled{6} \quad 4x + 1 \geq -7 \quad \text{or} \quad x + 8 > 22 \\
 \quad \quad -1 \quad -1 \quad \quad \quad -8 \quad -8 \\
 \quad \quad \frac{4x \geq -8}{4 \quad 4} \quad \quad \quad x > 4 \\
 \quad \quad x \geq -2
 \end{array}$$

$$\textcircled{7} \quad f(x) = \frac{2}{3}x - 3 \quad \text{when } x = 42$$

$$f(42) = \frac{2}{3} \left(\frac{42}{1} \right) - 3$$

$$f(42) = 2(14) - 3$$

$$f(42) = 28 - 3 = 25$$

$\textcircled{8}$ discrete functions - (dots) - unconnected points

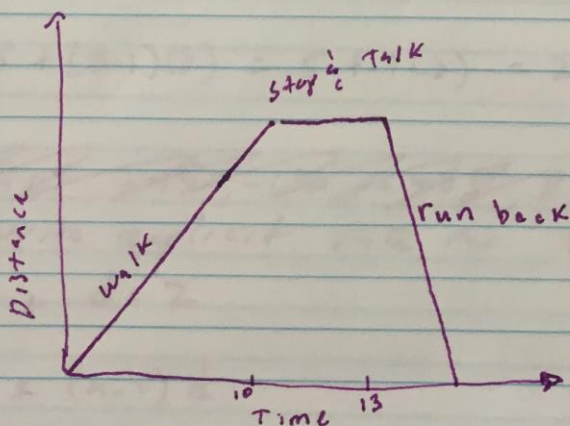
"Can't take half an umbrella"

Continuous functions - (connected) - unbroken line or curve

"Time, temperature"

discrete - can't score half of .2 points, etc.

$\textcircled{9}$



Starting Point
 Common difference

(14) $a_1 = 12$ $a_n = a_{n-1} - 5$

12, 7, 2, -3, -8

(15) $5x + 12y = 36$ plug zero for x

$5(0) + 12y = 36$

$12y = 36$

$y = 3$ $(0, 3)$

(16) $(-7, 1)$ $(-3, 19)$
 x_1 y_1 x_2 y_2

Slope = $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{19 - 1}{-3 - (-7)} = \frac{18}{-3 + 7}$
 $= \frac{18}{4} = \frac{9}{2}$

(17) linear function

$y = mx + b$

$y = 3x + 5$

$y = 5$

~~$x = 3$~~

$y = x^2$

not linear

not a function

(18) $(3, 4)$ $(-1, 6)$ $= \frac{6 - 4}{-1 - 3} = \frac{2}{-4} = -\frac{1}{2}$
 x_1 y_1 x_2 y_2

$y = mx + b$

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

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

$4 = -\frac{3}{2} + b$

$b = \frac{11}{2}$

$y = -\frac{1}{2}x + \frac{11}{2}$

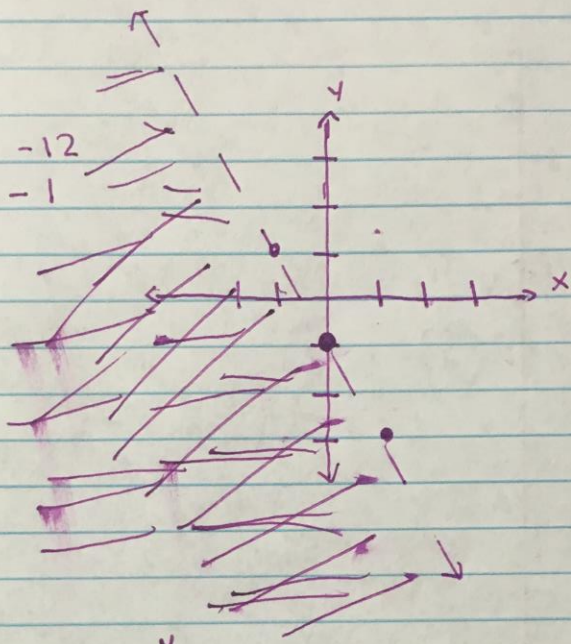
$(\frac{3}{1}) 4 + \frac{3}{2} = b$

$\frac{8}{2} + \frac{3}{2} = b$

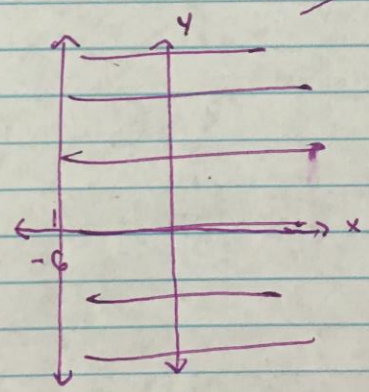
19) $10m + 15r = 500$

20) $24x + 12y < -12$
 $12y < -24x - 12$
 $y < -2x - 1$

dashed below



21) $3x \geq -18$
 $x \geq -6$
 right
 solid



22)
$$F(x) = \begin{cases} x + y = -1 \\ x - y = -7 \end{cases}$$

elimination method

$2x = -8$

$x = -4$

Substitute $x = -4$ into any equation

$x + y = -1$
 $-4 + y = -1$
 $y = 3$

$(-4, 3)$

23

$x =$ ^{boys} ~~parrots~~
 $y =$ ~~magpies~~ girls

$x + y = 10$ ← total guest
 $1.75x + 2.25y = 20.50$ ← total cost

↑ get rid of decimals. x by 100

$100(1.75x + 2.25y = 20.50)$

$175x + 225y = 2050$

So now system = $\begin{matrix} -175(x + y = 10) & \Rightarrow & -175x - 175y = -1750 \\ 175x + 225y = 2050 & & 175x + 225y = 2050 \end{matrix}$
 $50y = 300$
 $y = 6$

$y = 6$ girls
 $x = 4$ boys

24

$|x| + h$
↑ up/down
shift

$|x + h|$
↑ left/right/shift

$|x + 3|$ left 3

$|x| + 3$ up

$|x - 3|$ right 3

$f(x) = |x| - 3$ down

25

Translate left 6 units

$f(x) = |x + 6|$

26

$(-6, 0)$

↑ no vertical shift

$$(27) \quad 3|x+6|=3$$

$$|x+6|=1$$

$$x+6=1 \quad \text{or} \quad x+6=-1$$

$$x=-5$$

$$x=-7$$

$$(28) \quad |x-6|-3 \leq 9$$

$$+3 \quad +3$$

$$|x-6| \leq 12 \quad \text{and}$$

$$x-6 \leq 12$$

$$x \leq 18$$

$$x-6 \geq -12$$

$$x \geq -6$$

$$-6 \leq x \leq 18$$

$$(29) \quad \left|\frac{x}{3}\right| + 2 \leq 4$$

$$-2 \quad -2$$

$$\left|\frac{x}{3}\right| \leq 2 \quad \text{and}$$

$$\frac{x}{3} \leq 2$$

$$x \leq 6$$

$$\frac{x}{3} \geq -2$$

$$x \geq -6$$

$$-6 \leq x \leq 6$$

$$(30) \quad 2|x+6| + 3 \geq 29$$

$$-3 \quad -3$$

$$\frac{2|x+6|}{2} \geq \frac{26}{2}$$

$$|x+6| \geq 13 \quad \text{or}$$

$$x+6 \geq 13$$

$$x \geq 7$$

$$x+6 \leq -13$$

$$x \leq -19$$

$$x \leq -19 \quad \text{or} \quad x \geq 7$$

→ flip

$$\begin{aligned} (31) \quad & \left(\frac{1}{16}\right)^{-\frac{5}{2}} \\ &= 16^{5/2} \quad \text{rewrite} \\ &= (\sqrt[2]{16})^5 \\ &= 4^5 \\ &= 256 \end{aligned}$$

$$(32) \quad 9^{3/2} = (\sqrt[2]{9})^3 = 3^3 = 27$$

$$(33) \quad 3, 9, 27, \dots$$

$\begin{array}{cc} \vee & \vee \\ \times 3 & \times 3 \end{array}$

$$r=3 \quad 3, 9, 27, \underline{81}, \underline{243}, \underline{729}$$

$$(34) \quad \text{Fix: } -5, -15, -45, -135$$

$$r=3 \quad \text{explicit: } a_1 = -5, r=3$$

$$a_n = a_1 \cdot r^{n-1}$$

$$a_n = -5 \cdot 3^{n-1}$$

$$(35) \quad \text{degree: } 10x^2y^2 + 5x^3 + 2$$

at exponents \downarrow \downarrow
 $2+2=4$ 3

degree = 4

$$(37) \quad 9y^2 + 3y \quad \text{GCF}$$

$$3y(3y+1)$$

no 34

$$(38) (x-3)(x^2-2x+3)$$

	x^2	$-2x$	3
x	x^3	$-2x^2$	$3x$
-3	$-3x^2$	$6x$	-9

$$x^3 - 5x^2 + 9x - 9$$

(39)

A rectangle with height $x+2$ and width x^2-2 .

$$(x^2-2)(x+2) = x^3 + 2x^2 - 2x - 4$$

(40)

plug $x=3$

$$\begin{aligned} &(x^2-2)(x+2) \\ &= (3^2-2)(3+2) \\ &= (9-2)(5) \\ &= 7(5) = 35 \end{aligned}$$

(41)

$$\begin{aligned} (4x+2)(x-3) &= 4x^2 - 12x + 2x - 6 \\ &= 4x^2 - 10x - 6 \end{aligned}$$

(42)

$$\begin{aligned} (3x-2)^2 &= (3x-2)(3x-2) \\ &= 9x^2 - 6x - 6x + 4 \\ &= 9x^2 - 12x + 4 \end{aligned}$$

(43)

$$y = x^2 + 2 \Rightarrow y = x^2 - 3$$

shift down 5

(44)

$$f(x) = x^2 \Rightarrow g(x) = -x^2 + 3$$

↑ reflection across x axis
↑ shift up 3
4x15

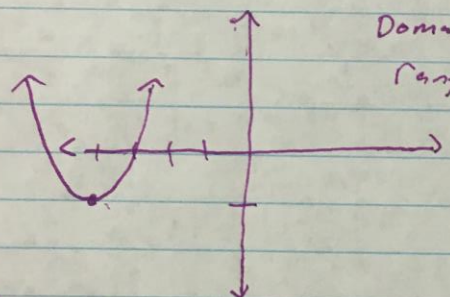
45) x-intercepts
 $(x+3)(x-7) = 0$

$x+3=0$ $x-7=0$
 $-3-3$ $+7+7$
 $x=-3$ $x=7$

46) $y = 2x^2 - 4x + 3$ axis of symmetry
 a b c $x = -\frac{b}{2a}$

$x = -\frac{-4}{2(2)}$
 $x = \frac{4}{4} = 1$

47) $y = (x+4)^2 - 1$



Domain: $-\infty < x < +\infty$
Range: $-1 \leq y < +\infty$

48) $x^2 + 3x - 18$
 $(x+6)(x-3)$

49) $5x^2 - 12x + 4$ multiply + add to
 $(5x-2)(x-2)$

50) $x^2 = 15 - 2x$ all on same side

$x^2 + 2x - 15 = 0$

$(x+5)(x-3) = 0$

$x = -5$ $x = 3$

$$\begin{aligned}
 (51) \quad & 4x^2 - 9 = 0 \\
 & (2x+3)(2x-3) = 0 \\
 & 2x+3=0 \quad 2x-3=0 \\
 & 2x=-3 \quad 2x=3 \\
 & x=-3/2 \quad x=3/2
 \end{aligned}$$

$$\begin{aligned}
 (52) \quad & 3x^2 + 8x - 2 = 0 \\
 & x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 & x = \frac{-8 \pm \sqrt{64 - 4(3)(-2)}}{2(3)} \\
 & x = \frac{-8 \pm \sqrt{64 + 24}}{6} \\
 & x = \frac{-8 \pm \sqrt{88}}{6} \\
 & x = \frac{-8 \pm 2\sqrt{22}}{6} \\
 & x = \frac{-4 \pm \sqrt{22}}{3}
 \end{aligned}$$

$$\begin{aligned}
 (53) \quad & x^2 + 10x + 25 \\
 & \quad \downarrow 1/2 \\
 & (x+5)^2
 \end{aligned}$$