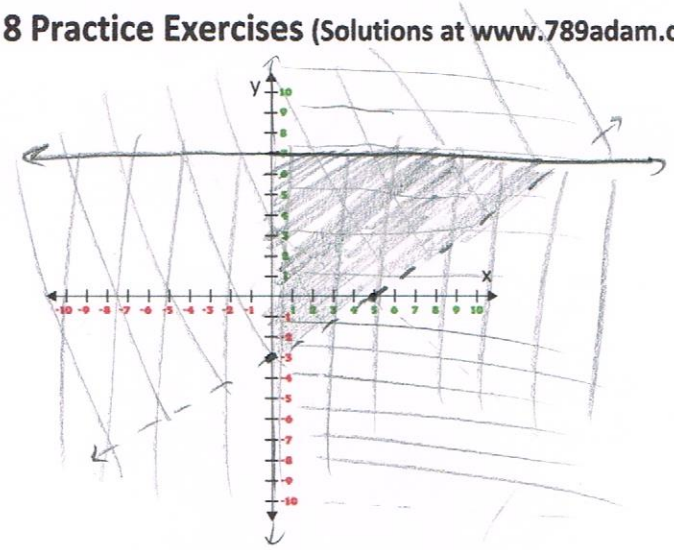
Chapter 8 Practice Exercises (Solutions at www.789adam.com)

Graph the system of inequalities

$x \geq 0$

$3x - 5y < 15$ x-int = 5, y-int = -3

$y \leq 7$



Convert 5 decades into minutes. Show your unit ratios.

$$5 \text{ decades} \times \frac{10 \text{ yr}}{1 \text{ dec}} \times \frac{365 \text{ day}}{1 \text{ yr}} \times \frac{24 \text{ hr}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hr}} =$$

26,280,000 minutes

The scale on a model indicates that 1 inch equals 40 feet. A building in the model is 13.5 inches tall. How tall is the building in real life?

$$\frac{1 \text{ inch}}{40 \text{ feet}} = \frac{13.5 \text{ inches}}{h \text{ feet}}$$

$h = 540$ feet

Your favorite clothing store, AquaPostal, is having a sale next weekend. All shoes will be 40% off. You've been saving for a new pair of shoes. They cost \$60, you have \$40 saved up. Is that enough to buy them during the sale?

Savings is 40% of price.

$s = 0.40 \cdot 60$

$s = \$24$

New price is price minus savings

$n = 60 - 24 = 36$

Yes

If you have to pay an additional 8% sales tax, do you have enough for the shoes at AquaPostal?

tax is 8% of new price

$t = 0.08 \cdot 36$

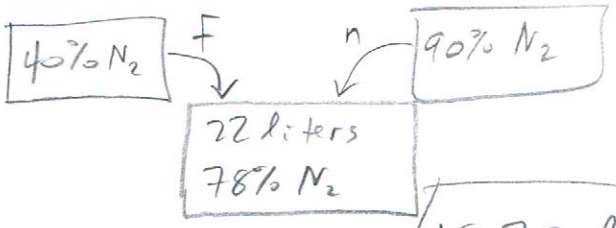
$t = \$2.88$

Still Yes

Final price is new price plus tax

$f = 36 + 2.88 = 38.88$

I have a canister that is labelled 40% nitrogen and another that is labelled 90% nitrogen. How many liters of each should I mix to make 22 liters that matches the nitrogen content of Earth's atmosphere (78% nitrogen)?



Total stuff $f + n = 22$

Special stuff $0.4f + 0.9n = 0.78(22)$

$0.4f + 0.9n = 17.16$ x10 $\rightarrow 4f + 9n = 171.6$

$f + n = 22$ x4 $\rightarrow -(4f + 4n = 88)$

$5n = 83.6$

$n = 16.72$

$f + 16.72 = 22$

$f = 5.28$

16.72 ℓ of 90% N_2

5.28 ℓ of 40% N_2

Solve the absolute value equations

$|2x - 1| = 11$

$2x - 1 = 11$ or $2x - 1 = -11$

$2x = 12$ $\quad 2x = -10$

$x = 6$ or $x = -5$

$\{6, -5\}$

$3|x + 2| + 2 = 23$

$3|x+2| = 21$

$|x+2| = 7$

$x + 2 = 7$ or $x + 2 = -7$

$x = 5$ or $x = -9$

$\{5, -9\}$

$12|5x - 17| + 9 = 5$

$12|5x-17| = -4$

$|5x-17| = -\frac{1}{3}$

$\emptyset$

$-2|2x + 3| + 1 = -5$

$-2|2x+3| = -6$

$|2x+3| = 3$

$2x + 3 = 3$ or $2x + 3 = -3$

$2x = 0$ $\quad 2x = -6$

$x = 0$ or $x = -3$

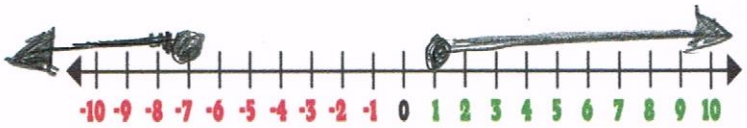
$\{0, -3\}$

Solve the absolute value inequalities. Draw a graph of the solution set.

$|x + 3| \geq 4$

$x + 3 \geq 4$ OR $x + 3 \leq -4$

$x \geq 1$ OR $x \leq -7$

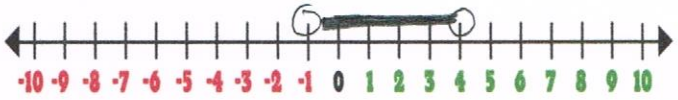


$|2x - 3| < 5$

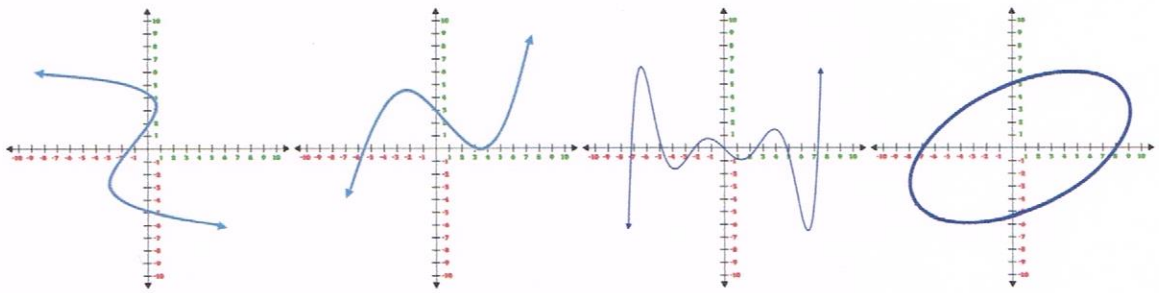
$2x - 3 < 5$ AND $2x - 3 > -5$

$2x < 8$ AND $2x > -2$

$x < 4$ AND $x > -1$



Identify each of the following graphs as functions or non-functions.



No Yes Yes No

Given the function $j(a) = 3a + |2a| - a^2 + 7$ find the following.

$j(4) = 3(4) + |2 \cdot 4| - 4^2 + 7$

$12 + 8 - 16 + 7$

11

$j(-2) = 3(-2) + |2 \cdot -2| - (-2)^2 + 7$

$-6 + 4 - 4 + 7$

1

$j(10) = 3(10) + |2 \cdot 10| - 10^2 + 7$

$30 + 20 - 100 + 7$

-43

$j(-3) =$

$3(-3) + |2 \cdot -3| - (-3)^2 + 7$

$-9 + 6 - 9 + 7$

-5

$j(0) =$

$3(0) + |2 \cdot 0| - 0^2 + 7$

$0 + 0 - 0 + 7$

7

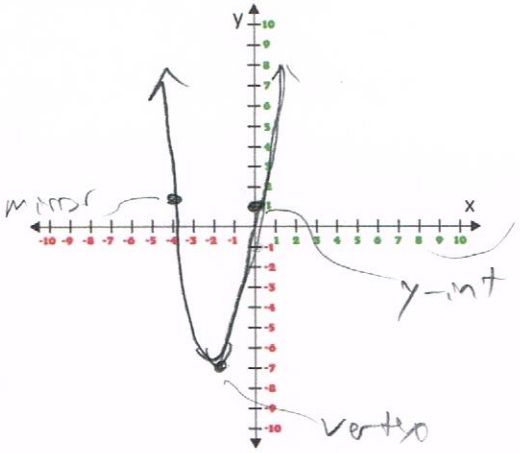
$j(-1) =$

$3(-1) + |2 \cdot -1| - (-1)^2 + 7$

$-3 + 2 - 1 + 7$

5

For the quadratic function, find the vertex; then graph the parabola: $y(x) = 2x^2 + 8x + 1$



$X_{vertex} = \frac{-b}{2a}$

$= \frac{-8}{2(2)} = -2$

$Y_{vertex} = 2(-2)^2 + 8(-2) + 1$

$= 8 - 16 + 1$

$= -7$

Vertex is $(-2, -7)$

y-intercept is $(0, 1)$

mirror point is $(-4, 1)$

A model rocket fires from the ground with an upward velocity of 100 feet per second. How high will it be at its highest point? When will it land on the ground? When will it be 100 feet above the ground?

$V_i = 100$ ft/sec

$h_i = 0$

$g = -32.2$ ft/sec^2

$h(t) = \frac{1}{2}(-32.2)t^2 + 100t + 0$

$h(t) = -16.1t^2 + 100t$

Highest point at vertex

$t = \frac{-b}{2a} = \frac{-100}{2(-16.1)} = 3.106$ sec

$h(3.106) = -16.1(3.106)^2 + 100(3.106)$

$h = 210.6$ ft ← Highest point

Ground when $h = 0$

$0 = -16.1t^2 + 100t$

$0 = t(-16.1t + 100)$

$t = 0$ or $-16.1t + 100 = 0$

$t = 6.211$ ← Hit ground

way up: 1.25 seconds

way down: 4.96 seconds

$100 = -16.1t^2 + 100t$

$16.1t^2 - 100t + 100 = 0$

$\frac{+100 \pm \sqrt{100^2 - 4(16.1)(100)}}{2(+16.1)}$

$\frac{100 \pm \sqrt{3560}}{32.2} = 1.25$ or 4.96