

Algebra 2 · Interpreting and Comparing Functions · Worksheet Answer Key

Common Core F-IF.B.4, F-IF.B.5, F-IF.B.6, F-IF.C.8a, F-IF.C.9 · mathovore.fr

This algebra 2 function worksheet answer key solves all 22 problems of the interpreting and comparing functions worksheet step by step.

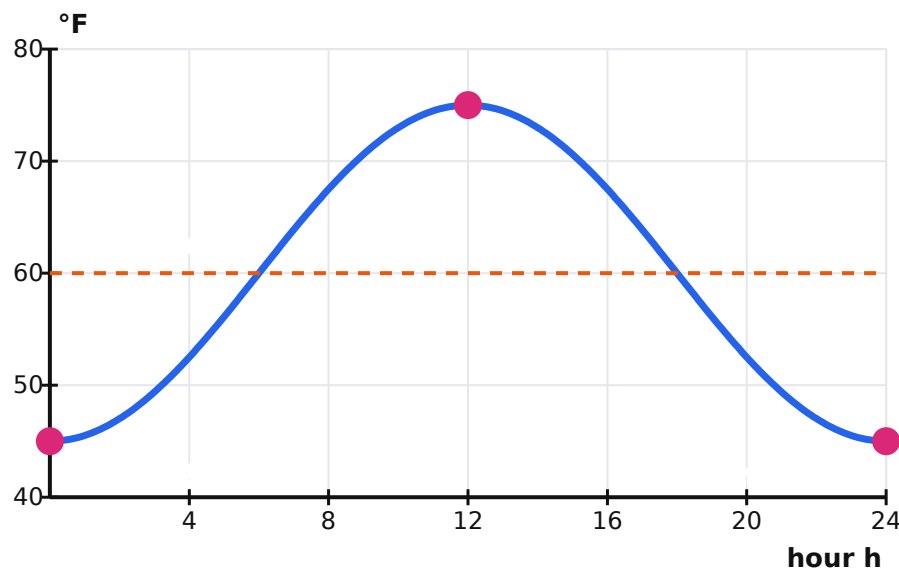
This answer key gives full worked solutions for all 22 problems on interpreting and comparing functions. Check the units and the interval in every rate of change, and confirm each domain against the situation before comparing your final answers.

Algebra 2 Common Core: F-IF.B.4 · F-IF.B.5 · F-IF.B.6 · F-IF.C.8a · F-IF.C.9

Algebra 2 Function Worksheet Answer Key: problems 1-5

Problem 1: Key features from a graph

- a. The maximum is **75°F** at $h=12$ (noon), since $60+15=75$.
- b. The minimum is **45°F** at $h=0$ **and** $h=24$ (midnight), since $60-15=45$.
- c. One full cycle takes **24 hours**. The midline is **60°F**, halfway between 45 and 75.
- d. Increasing on $0 < h < 12$ and decreasing on $12 < h < 24$.
- e. $T(6)=60$ and $T(12)=75$, so $\frac{75-60}{12-6}=2.5$: **2.5°F per hour**.



Maximum, minimum and midline marked.

Problem 2: Domain from context

- The length is $40-w$, and both the width and the length must be positive, so w is greater than 0 and less than 40.
- The domain is $0 < w < 40$ feet.
- The zeros are $w=0$ and $w=40$, so the axis of symmetry is halfway at $w=20$. Then $A(20)=20(20)=400$. The greatest area is **400 square feet** with a width of **20 ft** (a square).

Problem 3: Discrete domain

- Tickets are whole numbers from 0 to 150, so the domain is $n=0,1,2$ **and so on, up to 150**.
- $C(40)=8.5(40)=340$ and $C(150)=8.5(150)=1275$. The revenue is **\$340** and **\$1,275**.
- The graph is a **set of separate points** on the line $y=8.5x$, because you cannot sell part of a ticket.

Problem 4: Rational model in context

- $C(8)=62.50$, $C(20)=25$, $C(50)=10$ dollars.
- It is **decreasing**: more members means a smaller share for each.
- The horizontal asymptote is $C=0$. The share gets closer to \$0 as the group grows but never reaches it.
- The number of members is a positive whole number, so the domain is $x=1,2,3$ **and so on**; the vertical asymptote at $x=0$ is not part of the situation.

Problem 5: Exponential key features

- $V(0)=1200$: the laptop cost **\$1,200** new.
- Decreasing**, because the base 0.8 is between 0 and 1 (a 20% loss each year).
- The asymptote is $V=0$: the value approaches \$0 but never becomes negative.
- $V(3)=1200(0.512)=614.4$, so **\$614.40**.
- $V(3)=614.40$ is still above 500, and $V(4)=1200(0.4096)=491.52$ is below. The answer is **year 4**.

Algebra 2 Function Worksheet Answer Key: problems 6-10

Problem 6: Logarithmic model

- $-\log_{10}10^{-7}=7$, $-\log_{10}10^{-3}=3$ and $-\log_{10}10^{-4}=4$. The pH values are **7, 3 and 4**.
- A concentration must be positive, so the domain is $c>0$ (the vertical asymptote is $c=0$).
- The function is **decreasing**. Multiplying c by 10 adds 1 to $\log c$, so the pH **drops by 1**.

Problem 7: Average rate of change from equations

- $f(4)=4$ and $f(1)=-2$, so $\frac{4-(-2)}{4-1}=\frac{6}{3}=2$. The rate is **2**.
- $g(3)=27$ and $g(-1)=-1$, so $\frac{27-(-1)}{3-(-1)}=\frac{28}{4}=7$. The rate is **7**.

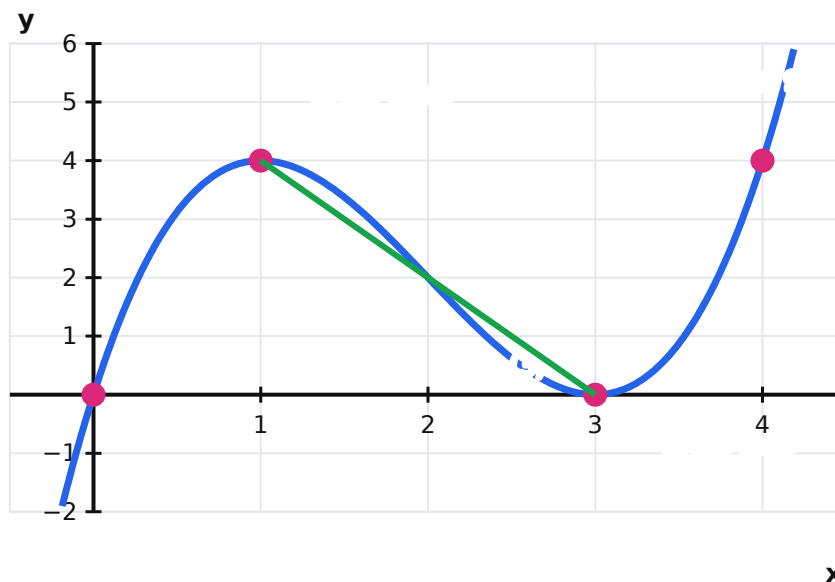
c. $h(4)=16$ and $h(1)=2$, so $\frac{16-2}{4-1}=\frac{14}{3}$. The rate is $\frac{14}{3}\approx 4.67$.

Problem 8: Average rate of change from a table

- $\frac{1.2-0.3}{6-2}=\frac{0.9}{4}=0.225$ miles per minute.
- $\frac{0.7-0}{4-0}=0.175$ mi/min on $[0,4]$ and $\frac{1.9-0.7}{8-4}=0.3$ mi/min on $[4,8]$.
- The averages rise from 0.175 to 0.3 miles per minute, so Sofia **speeds up** as the run goes on.

Problem 9: Rate of change and features from a graph

- $\frac{4-0}{1-0}=4$, $\frac{0-4}{3-1}=-2$ and $\frac{4-0}{4-3}=4$.
- Since $g(x)=x(x-3)^2$, the zeros are **0 and 3** (the graph touches the axis at 3). It increases for $x<1$ and $x>3$, and decreases for $1<x<3$.
- The relative maximum is **4 at** $x=1$ and the relative minimum is **0 at** $x=3$.



Relative maximum (1, 4) and minimum (3, 0).

Problem 10: Compare average rates

- For f : $\frac{16-1}{4}=3.75$. For g : $\frac{16-0}{4}=4$. On $[0,4]$, g **changes faster**.
- For f : $\frac{64-16}{2}=24$. For g : $\frac{24-16}{2}=4$. On $[4,6]$, f **changes much faster**.
- The linear rate stays at 4, but the exponential rate keeps growing and eventually passes it.

Algebra 2 Function Worksheet Answer Key: problems 11-15

Problem 11: Zeros from factored form

- $f(x)=(x-2)(x-5)$, so the zeros are $x=2$ **and** $x=5$.
- The axis is halfway between the zeros: $x=\frac{2+5}{2}=3.5$.
- $f(3.5)=(1.5)(-1.5)=-2.25$. The minimum value is -2.25 .

Problem 12: Maximum from factored form

- a. $g(x) = -2(x^2 - 4x - 5) = -2(x-5)(x+1)$, so the zeros are $x=5$ **and** $x=-1$.
- b. The axis is $x = \frac{5+(-1)}{2} = 2$, and $g(2) = -8 + 16 + 10 = 18$. The maximum value is **18**.
- c. $g(0) = 10$, so the y-intercept is **10**.

Problem 13: Complete the square

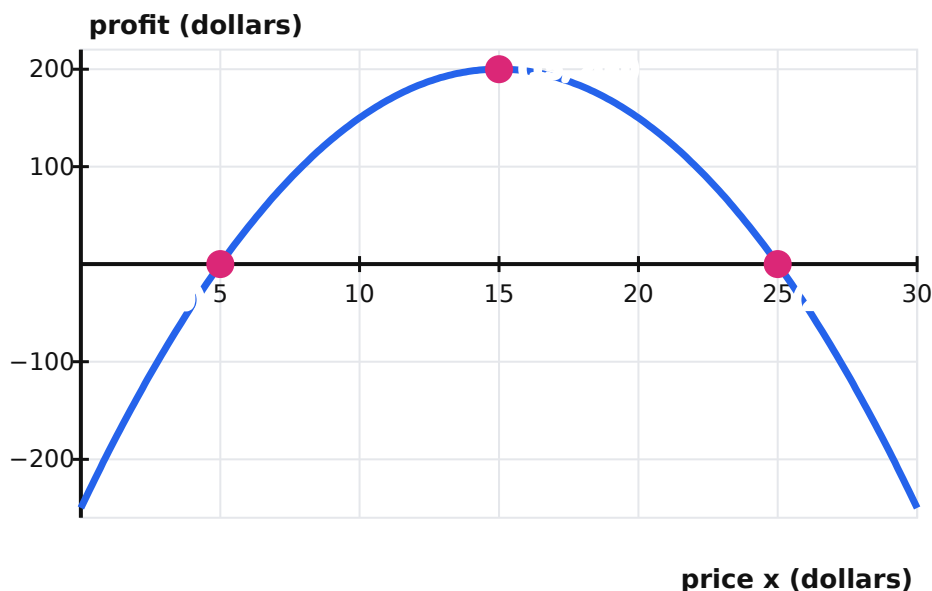
- a. $x^2 + 6x + 9 - 9 + 5$ gives $f(x) = (x+3)^2 - 4$. The vertex is $(-3, -4)$. Setting $(x+3)^2 = 4$ gives $x+3 = \pm 2$, so the zeros are -5 **and** -1 .
- b. $x^2 - 10x + 25 - 25 + 19$ gives $h(x) = (x-5)^2 - 6$. The vertex is $(5, -6)$. Setting $(x-5)^2 = 6$ gives zeros $x = 5 \pm \sqrt{6}$.

Problem 14: Complete the square with a leading coefficient

- a. $2(x^2 - 6x) + 7 = 2(x-3)^2 - 18 + 7$, so $f(x) = 2(x-3)^2 - 11$. The parabola opens up, so $(3, -11)$ is a **minimum**. From $(x-3)^2 = \frac{11}{2}$, the zeros are $x = 3 \pm \frac{\sqrt{22}}{2}$.
- b. $-3(x^2 - 2x) + 9 = -3(x-1)^2 + 3 + 9$, so $g(x) = -3(x-1)^2 + 12$. It opens down, so $(1, 12)$ is a **maximum**. From $(x-1)^2 = 4$, the zeros are $x=3$ **and** $x=-1$.

Problem 15: Profit from a quadratic model

- a. $P(x) = -2(x^2 - 30x + 125) = -2(x-5)(x-25)$, so the break-even prices are **\$5 and \$25**.
- b. $-2(x^2 - 30x + 225) + 450 - 250$ gives $P(x) = -2(x-15)^2 + 200$.
- c. The maximum occurs at $x=15$: a price of **\$15** gives a profit of **\$200**.
- d. $P(0) = -250$: giving tickets away would lose \$250 (the fixed costs).



Zeros at $x = 5$ and $x = 25$; maximum at $(15, 200)$.

Algebra 2 Function Worksheet Answer Key: problems 16-20

Problem 16: Compare two quadratics

- $f(x) = x^2 - 6x + 9 - 9 + 5 = (x-3)^2 - 4$, so the vertex is $(3, -4)$.
- The minimum of f is -4 and the minimum of g is 2 (vertex $(1, 2)$). The function f has the lesser minimum.
- The function f has zeros $x=1$ and $x=5$ because $(x-3)^2 = 4$. The graph of g opens up with minimum 2 , so it never reaches 0 : **only** f has real zeros.
- $f(0) = 5$ and $g(0) = 3$ (from the graph), so f has the greater y-intercept.

Problem 17: Compare a table and an equation

- Each value is twice the one before, so $A(x) = 3(2)^x$ and $A(4) = 48$.
- $B(4) = 5(4) + 4 = 24$, so A is greater (48 versus 24).
- For A : $\frac{24-3}{3} = 7$. For B : $\frac{B(3)-B(0)}{3} = \frac{19-4}{3} = 5$. The rate of A is greater.

Problem 18: Compare two projectiles

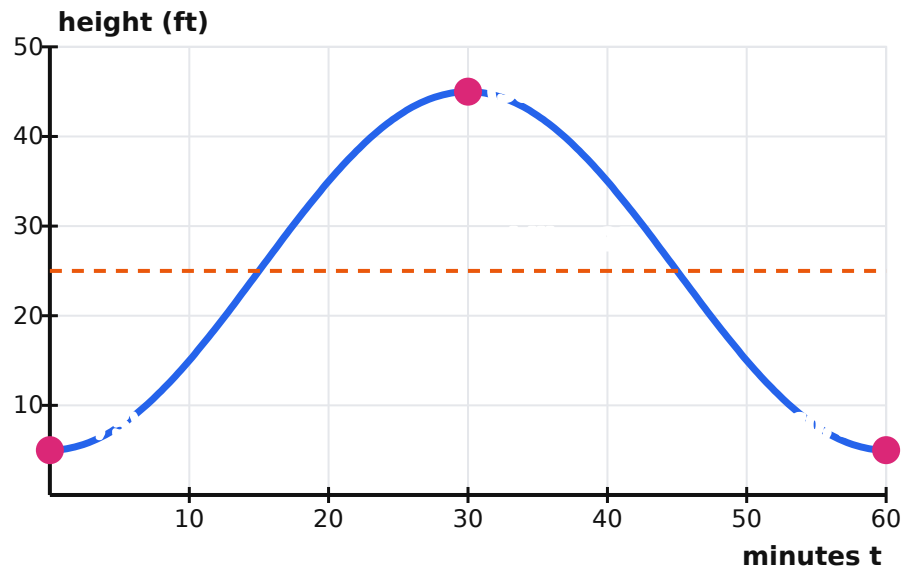
- $h_A(t) = -16(t^2 - 2t) + 6 = -16(t-1)^2 + 22$. The maximum is **22 feet** at $t = 1$ second.
- The table is symmetric about $t = 1.5$ with a top value of 40 , so Ball B reaches **40 feet**. **Ball B** goes higher.
- $h_A(0) = 6$ and Ball B starts at 4 , so **Ball A** starts higher.
- Ball A: $\frac{22-6}{1} = 16$ ft/s. Ball B: $\frac{36-4}{1} = 32$ ft/s. Ball B is rising **faster** at first.

Problem 19: Average cost model

- $A(10) = \frac{250}{10} = 25$, $A(40) = \frac{400}{40} = 10$ and $A(100) = \frac{700}{100} = 7$ dollars.
- $\frac{7-25}{100-10} = -0.2$: on average the cost per sticker **falls \$0.20 for each extra sticker** between 10 and 100.
- $A(n) = 5 + \frac{200}{n}$, so the horizontal asymptote is $A = 5$. The \$200 setup cost is spread over more stickers, so the average approaches the \$5 per-sticker cost.
- $5 + \frac{200}{n} = 6$ gives $n = 200$, so **200 stickers**.

Problem 20: Ferris wheel heights

- The lowest height is **5 ft** at $t = 0$ and $t = 60$; the highest is **45 ft** at $t = 30$.
- The period is **60 minutes**: that is the time for one full turn.
- $h(10) = 25 - 20\cos\frac{\pi}{3} = 15$ gives $\frac{15-5}{10} = 1$ ft/min on $[0, 10]$. $h(20) = 25 - 20\cos\frac{2\pi}{3} = 35$ gives $\frac{35-15}{10} = 2$ ft/min on $[10, 20]$. The seat rises **faster** on $[10, 20]$.

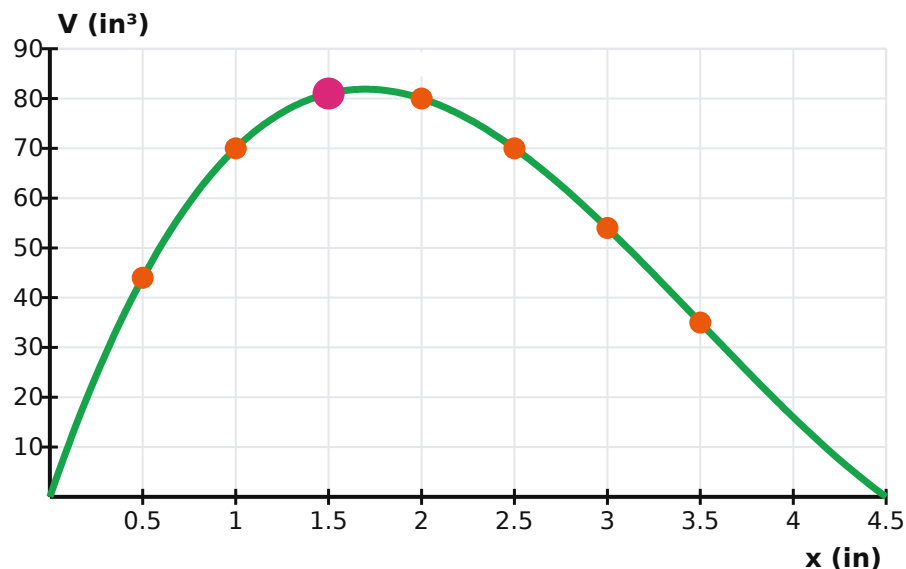


Lowest and highest points of the seat.

Algebra 2 Function Worksheet Answer Key: problems 21-22

Problem 21: Open box volume

- The side x must be positive, and $9-2x$ must be positive, so the domain is $0 < x < 4.5$.
- The greatest table value is **81 cubic inches at $x=1.5$** . (The true maximum is slightly above 81, near $x=1.7$.)
- $\frac{81-44}{1} = 37$ in³ per inch, positive: the volume **increases**. $\frac{54-81}{1.5} = -18$ in³ per inch, negative: the volume **decreases**.



The greatest table value is (1.5, 81).

Problem 22: Compare savings plans

- Plan A: $150+25(6)=300$ and $150+25(7)=325$ dollars. Plan B: $100(1.2)^6 \approx 298.60$ and

$$100(1.2)^7 \approx 358.32 \text{ dollars.}$$

- b. After week 6, A has \$300 and B has \$298.60. After week 7, B has \$358.32 against A's \$325. Plan B first leads in **week 7**.
- c. Plan A: $\frac{300-150}{6} = 25$ dollars per week. Plan B: $\frac{298.60-100}{6} \approx 33.10$ dollars per week. Over 6 weeks, B's **average rate is greater** even though A has slightly more money.

How to use this algebra 2 function worksheet answer key

Read this algebra 2 function worksheet answer key after trying each problem yourself, and redo any problem you missed.

