

Watch. Practice. Understand. | Lesson 252

All the Essential Functions and Graphs Student Must Know Before Taking Calculus

Watch the matching video: <https://www.youtube.com/watch?v=i7rHY7hSmOw>

Practice focus: Functions, composition and piecewise rules

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

01 For $f(x) = x^2 - 3x$, find $f(-2)$.

02 If $f(x) = 2x + 1$ and $g(x) = x^2$, find $f(g(3))$ and $g(f(3))$.

03 For $f(x) = x + 2$ when $x < 1$, and $f(x) = x^2$ when $x \geq 1$, find $f(0)$, $f(1)$, $f(2)$.

04 Find the domain of $f(x) = \sqrt{(x - 2)/(x - 5)}$.

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Practice focus: Graph transformations

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

05 Describe $y = -2(x - 3)^2 + 1$ relative to $y = x^2$.

06 Find the endpoint and domain of $y = \sqrt{x + 4} - 2$.

07 For $y = |x - 2| + 3$, find the minimum and x-intercepts.

08 A point (2, 5) lies on $y = f(x)$. Where does it move on $y = 3f(x - 1) - 4$?

Worked answers | Lesson 252

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Practice focus: Functions, composition and piecewise rules

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01 For $f(x) = x^2 - 3x$, find $f(-2)$.

$$f(-2) = 4 + 6 = 10.$$

02 If $f(x) = 2x + 1$ and $g(x) = x^2$, find $f(g(3))$ and $g(f(3))$.

$$g(3) = 9, \text{ so } f(9) = 19. \quad f(3) = 7, \text{ so } g(7) = 49.$$

03 For $f(x) = x + 2$ when $x < 1$, and $f(x) = x^2$ when $x \geq 1$, find $f(0)$, $f(1)$, $f(2)$.

Use the first rule at 0 and the second at 1 and 2: 2, 1, 4.

04 Find the domain of $f(x) = \sqrt{(x - 2)/(x - 5)}$.

Require $x \geq 2$ for the radical and $x \neq 5$ for the denominator. Domain: $[2, 5)$ union $(5, \text{infinity})$.

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Practice focus: Graph transformations

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05 Describe $y = -2(x - 3)^2 + 1$ relative to $y = x^2$.

Shift right 3, stretch vertically by 2, reflect across the x-axis, and shift up 1.

06 Find the endpoint and domain of $y = \sqrt{x + 4} - 2$.

Endpoint $(-4, -2)$; require $x + 4 \geq 0$, so domain $[-4, \text{infinity})$.

07 For $y = |x - 2| + 3$, find the minimum and x-intercepts.

Minimum 3 at $x = 2$. There are no x-intercepts because $y \geq 3$.

08 A point $(2, 5)$ lies on $y = f(x)$. Where does it move on $y = 3f(x - 1) - 4$?

The x-coordinate increases by 1 and y becomes $3(5) - 4$. New point: $(3, 11)$.