

Topic: Functions

02.01

$$\begin{aligned}
 & a^2 + 2ab \\
 & = (-5)^2 + (2x - 5x - 4) \\
 & = 25 + 40 \\
 & = 65
 \end{aligned}$$

02.02

$$\begin{aligned}
 & 20 - 4x^2y \\
 & = 20 - (4 \times (-1)^2 \times 3) \\
 & = 20 - (4 \times 1 \times 3) \\
 & = 20 - 12 = 8
 \end{aligned}$$

02.03

$$\begin{aligned}
 & f(x) = 4^x \\
 & f\left(\frac{3}{2}\right) = 4^{\frac{3}{2}} \\
 & = (\sqrt{4})^3 \\
 & = 2^3 = \underline{8}
 \end{aligned}$$

02.04

$$\begin{aligned}
 & f(x) = 3\sqrt{x} \\
 & f(12) = 3\sqrt{12} \\
 & = 3 \times 2\sqrt{3} \\
 & = \underline{6\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 & \sqrt{12} \\
 & = \sqrt{4} \sqrt{3} \\
 & = 2\sqrt{3}
 \end{aligned}$$

02.05

$$\begin{aligned}
 & f(x) = \frac{3}{\sqrt{x}} \\
 & f(2) = \frac{3}{\sqrt{2}} \\
 & = \frac{3}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \\
 & = \frac{3\sqrt{2}}{2}
 \end{aligned}$$

02.06

$$\begin{aligned}
 & f(x) = 4\sqrt{x} + \sqrt{2} \\
 & f(72) = 4\sqrt{72} + \sqrt{2} \\
 & = 4 \times 6\sqrt{2} + \sqrt{2} \\
 & = 24\sqrt{2} + \sqrt{2} \\
 & = 25\sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 & \sqrt{72} \\
 & = \sqrt{36} \sqrt{2} \\
 & = 6\sqrt{2}
 \end{aligned}$$

Topic: Functions

02.07

$$A = 2x^2 - y^2$$

$$A = 2(3)^2 - (-4)^2$$

$$= 2(9) - 16$$

$$= 18 - 16$$

$$A = 2$$

02.08

$$f(x) = 2x - 5x^2$$

$$f(-2) = 2(-2) - 5(-2)^2$$

$$= -4 - 5(4)$$

$$= -4 - 20$$

$$= -24$$

02.09

$$f(x) = 3^x$$

$$a) f(4) = 3^4 = 81$$

$$b) f(x) = 3^x \quad f(x) = \sqrt{27}$$

$$3^x = \sqrt{27}$$

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

$$\begin{aligned} 3^{\frac{2}{3}} &= \sqrt[3]{3^2} \\ &= \sqrt[3]{9} \\ &= \sqrt[3]{27} \end{aligned}$$

02.10

$$h(t) = 15t - 3t^2$$

$$h(-2) = 15(-2) - 3(-2)^2$$

$$= -30 - 3(4)$$

$$= -30 - 12$$

$$= -42$$

02.11

$$f(x) = \frac{3}{x^2}$$

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

$$= \frac{3}{\frac{1}{9}}$$

$$= 3 \div \frac{1}{9} = 3 \times \frac{9}{1} = 27$$

02.12

$$f(x) = 3x + 2$$

$$f(a) = 23 \quad f(a) = 3a + 2$$

$$3a + 2 = 23$$

$$3a = 21$$

$$a = 7$$

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02.13

$$\begin{aligned}
 f(x) &= 4 - x^2 \\
 f(-3) &= 4 - (-3)^2 \\
 &= 4 - 9 \\
 &= -5
 \end{aligned}$$

02.14

$$\begin{aligned}
 f(m) &= m^2 - 3m \\
 f(-5) &= (-5)^2 - 3(-5) \\
 &= 25 + 15 \\
 &= 40
 \end{aligned}$$

02.15

$$\begin{aligned}
 f(x) &= x^2 + 2x - 1 \\
 g(x) &= 5x + 3 \\
 f(x) &= g(x) \\
 x^2 + 2x - 1 &= 5x + 3 \\
 x^2 + 2x - 1 - 5x - 3 &= 0 \\
 x^2 - 3x - 4 &= 0 \\
 (x + 1)(x - 4) &= 0 \\
 x = -1 \quad x &= 4
 \end{aligned}$$

02.16

$$\begin{aligned}
 f(x) &= 7 - 4x \\
 f(-2) &= 7 - 4(-2) \\
 &= 7 + 8 \\
 &= 15
 \end{aligned}$$

02.17

$$\begin{aligned}
 f(x) &= x^2 + 5x \\
 f(-3) &= (-3)^2 + 5(-3) \\
 &= 9 - 15 \\
 &= -6
 \end{aligned}$$

02.18

$$\begin{aligned}
 f(x) &= x^2 + 3 \\
 \text{a) } f(-4) &= (-4)^2 + 3 \\
 &= 16 + 3 \\
 &= 19 \\
 \text{b) } f(t) &= 52 \quad f(t) = t^2 + 3 \\
 t^2 + 3 &= 52 \\
 t^2 &= 49 \\
 t &= +7 \text{ or } -7
 \end{aligned}$$

Topic: Functions

02.19

$$I = \frac{20}{2^c}$$

$$a) I = \frac{20}{2^3} = \frac{20}{8} = \frac{5}{2} = 2.5$$

$$b) I = \frac{20}{2^c}$$

\*change subject  
to  $2^c$

$$2^c \times I = 20$$

$$2^c = \frac{20}{I}$$

$$\Rightarrow 2^c = \frac{20}{10}$$

$$2^c = 2 \quad c = 1$$

$$c) \text{ max} = 20$$

when  $c = 0$

(since  $2^0 = 1$ )